2014 ACCP Virtual Poster Symposium

May 20–21

ORIGINAL RESEARCH

ADR/Drug Interactions

1. Stevens–Johnson syndrome associated with carbamazepine therapy in psychiatric patients in Indonesia. *Riza R. D. Sulistyo,*[1]; (1) Department of Pharmacy, Dr Radjiman Wediodiningrat Mental Hospital Lawang Malang Indonesia, Malang, Indonesia
OBJECTIVE: This study is aimed to investigate the incidence rate of Stevens–Johnson syndrome associated with carbamazepine therapy in psychiatric patients in Indonesia.
METHODS: 320 inpatients data that received carbamazepine therapy from 2011 to 2012 was obtained. Incidence of Stevens–Johnson syndrome was rated by obtaining information from patients medical records.
RESULTS: The result of this study shows that from 320 patients, age range from 23 to 70 years old (mean = 2.93 years old), male 167 patients (52.30%), female 153 patients (47.70%), four patients (1.25%), two male and two female has experienced Stevens–Johnson syndrome. The onset of carbamazepine-induced Stevens–Johnson's Syndrome is range from 1 to 5 days (mean = 4 days) since first therapy with carbamazepine.
CONCLUSION: Stevens–Johnson syndrome associated with carbamazepine therapy in psychiatric patients in Indonesia remain high. This need follow up for preventing this fatal side effect (genotyping test) when carbamazepine is still play as important medicine in psychiatric patients in.

2. Neurotoxicity associated with cefepime use secondary to colistin-associated nephrotoxicity: a case report. *Nicholas Lockhart, Pharm.D. Student*[1]; (1) University of Tennessee College of Pharmacy, University of Tennessee College of Pharmacy, Knoxville, TN
OBJECTIVES: To describe an adverse drug event associated with concomitant colistin and cefepime use in a patient with a multi-drug resistant (MDR) *Pseudomonas aeruginosa* pneumonia.
METHODS: A 62-year-old quadriplegic white male with multiple sclerosis (MS) was transferred from a long-term care facility to the emergency department due to hematemesis. He was initiated on empiric antimicrobial coverage for aspiration pneumonia. A left lower lung bronchoscopy identified multi-drug resistant *Pseudomonas aeruginosa*, and cefepime 10 g IV continuous infusion over 24 hours and colistin 450 mg IV loading dose followed by 150 mg IV every 8 hours maintenance dose were started for presumed pneumonia. Within 2 days of initiating cefepime and colistin, the patient became gradually less responsive and developed acute kidney injury (AKI) due to colistin-associated nephrotoxicity. The patient's mental status progressively worsened, likely due to cefepime drug accumulation caused from the decline in renal function, and eventually resulted in seizure activity. After hemodialysis and various attempts to control epileptiform activity, it was decided to withdraw care and the patient expired from respiratory failure.
RESULTS: Cefepime is widely reported to cause neurotoxicity and seizures in patients with renal insufficiencies, while colistin has reported nephrotoxic effects, which can cause AKI. A report of this specific interaction was not found in a medical literature search; however, the potential for this type of an adverse drug event is possible when considering the pharmacology of the medications and the doses administered. In this patient case, the likelihood of this adverse event is considered to be probable based on the Naranjo probability scale.
CONCLUSION: Health care professionals should be aware of the possible deleterious effects with concomitant colistin and cefepime use including the potential for encephalopathy secondary to renal failure. Caution should be advised when initiating aggressive dosing strategies with these agents.

3. Evaluation of peripheral neuropathy associated with fluoroquinolone use. *Jeanne Fields, Pharm.D.*[1], Stacy Gould, Pharm.D., BCPP, CGP[1]; (1) Louis A. Johnson VAMC, Clarksburg, WV
OBJECTIVES: (i) Identify factors associated with an increased risk of fluoroquinolone (FQ)-induced peripheral neuropathy (PN). (ii) Determine if patients with PN at our facility reported exacerbation of symptoms or developed symptoms of PN after administration of oral or intravenous FQ antibiotics. (iii) Evaluate data to determine if associations exist between FQ use and the development of PN.
METHODS: Retrospective review of 210 patients with a diagnosis of PN who were prescribed a FQ between 9/20/10 and 9/20/13.

- Factors evaluated that may increase risk of PN include:
  - Renal impairment.
  - Length of therapy.
  - Concomitant medications.

RESULTS:

- Renal impairment
  - 9 out of 39 (23%) patients with a CrCl < 50 ml/minutes did not receive a renally adjusted dose.
- Length of therapy
  - The majority of patients (64%) were prescribed a day supply of 6–10 days.
- Concomitant medications
  - Metronidazole was the most commonly prescribed concomitant medication also associated with PN.
- Patients with reported symptoms of PN within 4 months after initiation of FQ
  - Of the 201 patients who met inclusion criteria, 3.5% reported symptoms of PN within the specified time frame.
  - All 7 patients received renally adjusted doses.
  - Patients were prescribed a day supply of 5–14 days.
  - 1 of the 7 received a concomitant medication also associated with PN.

CONCLUSIONS: Consideration of the patient's renal function, length of therapy, and concomitant medications when prescribing FQs may help decrease the risk of FQ-induced PN. Although PN symptoms were reported after FQ use, it is unclear if the association is related to FQ use, an underlying disease state, or other confounding factor. Increased awareness and monitoring of FQ-induced PN may decrease adverse outcomes and improve patient safety.

Adult Medicine

4. Safety of dabigatran used concurrently with aspirin therapy in a veteran population with atrial fibrillation. *William Call, Pharm.D., BCPS*[1], Travis Linneman, Pharm.D., BCPS[2], Patrick Finnegan, Pharm.D., BCPS[1]; (1) Department of Pharmacy Practice, St. Louis College of Pharmacy, St. Louis, MO (2) John Cochran Division, VA St. Louis Health Care System, St. Louis, MO
OBJECTIVES: Safety data and guideline recommendations regarding use of dabigatran etexilate and antiplatelet therapy is lacking. This study evaluated the safety of dabigatran when used concurrently with aspirin compared with dabigatran monotherapy.
METHODS: This was a retrospective cohort of all VA Saint Louis Health Care System patients with prescription filled for dabigatran over a two year period. Patients with concurrent aspirin therapy were compared to patients without aspirin therapy for adverse events/effects. The primary outcome measure was a composite of major/life-threatening bleeding, myocardial infarction or ischemic cardiovascular events, or death.

RESULTS: The rate of primary outcome, per 6 months dabigatran exposure, in the dabigatran and aspirin group (n=38) compared with the dabigatran group (n=21) was 12.03% and 11.25%, respectively (p=0.516), with a cumulative hazard rate of 31.9% and 22.3%, respectively (HR with combination, 1.37; 95% CI, 0.37–5.06; p=0.417). The rates, per 6 months exposure, of major or life-threatening bleeding (7.5% vs 6.9%; p=0.551), ischemic cardiac events (4.01% vs 3.75%, p=0.714), and mortality (2.67% vs 0%, p=0.644), were not significantly different between groups. No significant difference was found between groups in the other secondary outcomes. Compared between aspirin 325 mg (n=5) and aspirin 81 mg (n=33), when used concurrently with dabigatran, the rates of mortality (40% vs 0%, p=0.014), adverse GI events/effects (60% vs 10%, p=0.021), and dabigatran discontinuation (60% vs 12%, p=0.035) were significantly higher per 6 months exposure with aspirin 325 mg.
CONCLUSION: No statistically significant differences were seen in rates of adverse events between dabigatran with aspirin and dabigatran alone. In a limited cohort, concurrent therapy with aspirin 325 mg yielded increased rates of adverse GI events/effects, dabigatran discontinuation, and death compared with aspirin 81 mg.

5E. Evaluation of the adherence to American health-systems pharmacists (ASHP) stress prophylaxis and society for healthcare epidemiology of America (SHEA) and infectious diseases society of America (IDSA) Clostridium difficile infection treatment guidelines.
Olaitan Aroworade, Pharm.D.[1], Zahra Khudeira, Pharm.D.[2]; (1) Pharmacy, Mount Sinai Health Systems, Chiacgo, IL (2) Sinai Health System, Chicago, IL
OBJECTIVES: Proton pump inhibitors (PPIs) are indicated for the treatment of gastrointestinal diseases and their use has increased dramatically in all areas of healthcare. Safety concerns have been raised about the potential long-term effects of these drugs such as fractures, interstitial nephritis, and pneumonia. Recently, the FDA released a drug safety communication suggesting a positive association between the use of PPIs and *C. difficile* infection (CDI). The purpose of this study was to determine the adherence to the ASHP stress prophylaxis and SHEA/ IDSA CDI treatment guidelines among patients being treated for CDI.
METHODS: This is a retrospective chart review that included all cases of CDI from October 2012 to August 2013. The cases were identified using the ICD9 diagnosis code for CDI (008.45). Exclusion criteria included: age < 18 years and an incomplete medical record to review. The following were evaluated: CDI severity and adherence to CDI treatment per SHEA/IDSA guidelines, CDI episodes categorized as first or recurring event of CDI, PPI use during hospitalization, adherence to ASHP stress prophylaxis guidelines, and PPI use history classified as no PPI use prior to hospitalization, PPI use prior to hospitalization and unknown PPI use prior to hospitalization use.
RESULTS: A total of 70 CDI cases were reviewed. Sixty-two percent of PPI use was determined to be appropriate. Forty-eight percent of CDI cases were treated according to the SHEA/IDSA guidelines. CDI severity (two categories, severe and not severe) was a significant predictor of adherence to the guideline. Those with a higher severity were 2.27 times likely to be treated according to the CDI guidelines.
CONCLUSION: Based on the results of this study, it reveals that there is opportunity to increase adherence to both guidelines. Future plans will include incorporating both guidelines into the clinical decision pathway in the electronic health record.
Presented at the 2013 ASHP Midyear Clinical Meeting.

Ambulatory Care

6E. Physician perspectives of interdisciplinary care in the management of patients with diabetes.
Nissa Mazzola, Pharm.D.[1], Daniel J. Coletti, Ph.D.[2], Joseph Conigliaro, M.D., MPH[3]; (1) Clinical Pharmacy Practice, St. John's University College of Pharmacy and Health Sciences, Queens, NY; (2) Division of Psychiatry Research, The Zucker Hillside Hospital, Glen Oaks, NY (3) Division of General Internal Medicine, North Shore LIJ Health System, Great Neck, NY
OBJECTIVES: The objective of this investigation was to compare physician attitudes toward diabetes management in a Patient Centered Medical Home and a second internal medicine practice without an interdisciplinary diabetes team. We also sought to test for attitudinal differences between board-certified internists and Internal Medicine residents.
METHODS: Physicians completed a 19-item anonymous survey to examine the perceived importance of different components of diabetes treatment and education and perceptions of the referral process for accessing members of the diabetes team.
RESULTS: Physicians from both sites endorsed positive attitudes to referring patients for additional education when initiating insulin therapy (M = 9.17 out of 10 and M = 9.64 out of 10, respectively). Respondents at both sites were significantly less confident, however, that they understood the roles and activities of the CDE (M = 5.8/10 and 5.36/10, respectively). Physicians in the PCMH site perceived fewer barriers to referring patients for diabetes education ($t = 4.83$, $df = 84$, $p<0.001$) and were more likely to feel that their patients were seen in a timely manner ($t = 3.88$, $df = 85$, $p<0.001$). Providers in the PCMH site were more inclined to endorse "facilitating behavior change" as a component of diabetes self management education than the comparison site ($t = 2.27$, $df = 84$, $p<0.05$). Analysis of attending-resident patterns of response suggested that residents were more likely to be concerned about patient adherence than attendings in making a recommendation for insulin therapy ($t = 2.01$, $df = 87$, $p<0.05$).
CONCLUSIONS: Results suggest that diabetes support professionals are seen as valuable team members, and physicians are interested in learning more about their roles and activities. The integration of non-physician team members into the PCMH is associated with more positive attitudes around access and efficiency. The finding that residents were more influenced by concerns about patient adherence than attendings suggests that experience and training may lead to more confidence supporting patients in the initiation of insulin.
Submitted for presentation at Society of General Internal Medicine Annual Meeting, San Diego, CA April 23–26, 2014.

7. Maintenance of goal hemoglobin A1c (HbA1c) and low density lipoprotein-cholesterol (LDL-C) in Veterans with diabetes after discharge from a pharmacist-managed ambulatory care clinic.
P. Benjamin Erwin, Pharm.D., BCACP[1], Matthew Pitlick, Pharm.D., BCPS[2], Golden Peters, Pharm.D., BCPS[1]; (1) Saint Louis College of Pharmacy, Saint Louis, MO; (2) Department of Pharmacy Practice, St. Louis College of Pharmacy, St. Louis, MO
OBJECTIVES: This study evaluated the ability of patients with diabetes to maintain goal HbA1c of < 7% or LDL-C of < 100 mg/dL after being discharged from a pharmacist-managed ambulatory care clinic. The goals of this study were to (i) document length of time to failure of maintaining HbA1c or LDL-C goal, and (ii) characterize risk factors that may be associated with a shorter time to failure.
METHODS: Medical records of veterans with diabetes who were discharged from the ambulatory care clinic between July 1, 2007 and June 30, 2009 after meeting goal HbA1c were reviewed. The time to HbA1c goal failure, LDL-C goal failure, medical history, laboratory data, medications, demographic information, and clinic appointment attendance, were documented.
RESULTS: 22 patients were discharged from clinic after meeting their HbA1c goal and subsequently failed to maintain their goal while 35 patients were discharged after meeting and failing to maintain their LDL-C goal. The mean time to failure for HbA1c and LDL-C was 20.4 months (SEM 3.23) and 25.8 months (SEM 2.45), respectively. Advanced age at clinic enrollment (HR 1.08, SEM 0.0314, p=0.015) and HbA1c level at clinic discharge (HR 2.61, SEM 0.4361, p=0.028) were risk factors significantly associated with time to failure of HbA1c goal, while no risk factors were associated with shorter time to failure of maintaining LDL-C goal.
CONCLUSIONS: Veteran patients with diabetes demonstrated durable maintenance of both their goal HbA1c and LDL-C after being discharged from a pharmacist-managed ambulatory care

clinic. Advanced age and elevated HbA1c at discharge may predispose patients shorter time to fail to maintain goal HbA1c, which might provide rationale to continuing clinic follow-up for these patients vs discharging patients from clinic. However, LDL-C goal maintenance appeared to be maintained well regardless of patient characteristics

Cardiovascular

8. Acute coronary syndromes with revascularization: relationship between $P2Y_{12}$-receptor inhibitors, major adverse cardiovascular events, and cigarette smoking status. *Firoozeh Salek, Pharm.D., Ph.D.*[1]; (1) Department of Pharmacy, Robert Wood Johnson University Hospital, Rahway, NJ

OBJECTIVES: Evidence from the landmark CURE study suggests that in ACS subjects, there is no difference in major adverse cardiovascular events (MACE), defined as cardiovascular death, nonfatal myocardial infarction, or nonfatal stroke; between the "never-smoker" subgroup treated with clopidogrel+aspirin compared to aspirin. This study assessed MACE in ACS never-smokers with revascularization treated with newer $P2Y_{12}$-receptor inhibitors (PIs).

METHODS: Comparative evaluation of MACE in ACS never-smokers with revascularization treated with oral PIs and followed ≥ 3 months; using a MEDLINE search, as well as an evaluation of online FDA Center for Drug Evaluation Reviews through December 2013 was conducted. A direct request for unpublished smoking status data from identified trials was planned, if never-smoker data were collected but unpublished.

RESULTS: Two published studies were identified (TRITON-TIMI 38 and PLATO) following an exhaustive search. Smoking status analyses from these trials were published; however, collected never-smoker subgroup data were not specifically reported. Since never-smoker subgroup data were unpublished, the manufacturers were contacted directly. While the manufacturer of prasugrel provided unpublished subgroup data from TRITON-TIMI 38 upon request and upon follow-up, the manufacturer of ticagrelor did not provide requested data from PLATO. In TRITON-TIMI 38 (N=13,608), reported rate of MACE based on tobacco use was:

Never Smokers	n=4, 656	10.7% vs 11.7%	HR 0.91 (95% CI 0.77, 1.08)
Prior Smokers	n=3, 757	9.6% vs 12.4%	HR 0.76 (95% CI 0.62, 0.92)
Current Smokers	n=5, 195	8.2% vs 10.6%	HR 0.76 (95% CI 0.64, 0.91)

for prasugrel+aspirin vs clopidogrel+aspirin, respectively.

CONCLUSION: In TRITON-TIMI 38, never-smokers treated with prasugrel+aspirin had no significant reduction in MACE compared to clopidogrel+aspirin; while prior-smokers and current-smokers treated with prasugrel+aspirin had significantly fewer MACE compared to clopidogrel+aspirin. These MACE data suggest prasugrel+aspirin is more effective than clopidogrel+aspirin only in positive smoking history patients; but there is no difference in rate of MACE between ACS never-smoker patients treated with different PIs.

9. Hypertension guidelines: the more the better? *Dorothee C. Dartsch, Ph.D.*[1]; (1) CaP Campus Pharmazie GmbH, Hamburg, Germany

OBJECTIVES: Treatment of the 1.5 billion people with hypertension (HTN) worldwide should be based on current guidelines. However, diverging recommendations of different national societies may confuse health care teams and impair optimal outcomes. The purpose of this contribution was to analyse consistency between the most recently published HTN guidelines.

METHODS: The HTN guidelines compared were those of (i) the European Societies of HTN and Cardiology, resp., (ii) the Eighth Joint National Committee (US), (iii) the American and International, resp., Societies of HTN, (iv) Hypertension Canada, and v) NICE (UK), each in the most recent version (Jan 2014).

RESULTS: The guidelines vary in the BP targets in people between age 60 and 80, the recommendation of starting treatment with combinations rather than single agents and the choice of antihypertensives. Increasing the BP thresholds and targets reduces the intensity of treatment which is desirable in polypharmacy patients (pts) because it may reduce adverse events. On the other hand it may increase CV risk and mortality. With adherence to antihypertensives being a great concern, opting for combination therapies from the start seems reasonable as it may increase adherence by achieving BP reductions faster. On the other hand, where a monotherapy would be sufficient, pts will be over-treated. In the absence of co-morbidities, all guidelines recommend initiation with ACEI or ARB, thiazide or CCB (some state preferences for different age groups and ethnicity) and escalate therapy with binary and ternary combinations thereof. Only Hypertension Canada still recommends BB for pure HTN.

CONCLUSION: To avoid confusion, misunderstanding and medication errors, health care teams should agree on and refer to one specific HTN guideline, especially for elderly patients where discrepancies are most pronounced, until additional studies and more consistent guidelines are available.

10. Comparing medication persistence, healthcare resource utilization and costs among newly diagnosed, newly treated patients using dabigatran vs warfarin. *Serban R. Iorga, Ph.D.*[1], Tim Bancroft, Ph.D.[1], Jonathan Lim, M.Sc., M.Eng.[2], Cheng Wang, M.D., Ph.D.[2], Stephen D. Sander, Pharm.D.[2], Jason P. Swindle, Ph.D., M.P.H.[1]; (1) Health Economics and Outcomes Research, OptumInsight, Eden Prairie, MN; (2) Health Economics & Outcomes Research, Boehringer Ingelheim Pharmaceuticals, Inc., Ridgefield, CT

OBJECTIVES: Dabigatran, a direct thrombin inhibitor approved in the US in 2010, is indicated to reduce stroke and systemic embolism risk in patients with non-valvular atrial fibrillation (NVAF). This study compared medication persistence, healthcare utilization and costs among newly-diagnosed, newly-treated (NDNT) NVAF patients using dabigatran vs warfarin.

METHODS: The Optum Research Database was used to select NVAF patients aged ≥ 18 years, who initiated pharmacotherapy with dabigatran or warfarin between 10/01/2010–10/31/2011, and were continuously enrolled for 12 months before the index date (defined as the first pharmacy claim date for dabigatran or warfarin). Newly-diagnosed (i.e. first AF diagnosis occurring within 30 days prior to the index date), newly-treated (i.e. no pre-index oral anticoagulant pharmacy claim) NVAF patients were followed up to 12 months, or until health plan disenrollment or death. Dabigatran and warfarin patients were matched using propensity scores. Post-index medication persistence, healthcare utilization, and costs were compared using match-adjusted Wilcoxon signed-rank, and Wald tests. Product-limit persistence probabilities were compared using the log-rank test. All-cause hospitalization incidence rates were computed per-100-person-years.

RESULTS: Among NDNT NVAF patients using dabigatran, 869 were matched to patients using warfarin (mean age 68 years, 40% female). Compared to warfarin, median medication persistence was higher with dabigatran (204 vs 161 days; $p<0.001$). The incidence rate of all-cause hospitalizations was lower with dabigatran (40.26 [95% CI: 35.60–45.53]) vs warfarin (54.58 [95% CI: 48.93–60.88]), and mean per-patient-per-month (PPPM) office and outpatient visits were fewer with dabigatran (1.64 vs 2.24; $p<0.001$, and 0.86 vs 1.13; $p<0.001$, respectively). Although mean PPPM pharmacy costs were higher with dabigatran than with warfarin ($480 vs $311; $p<0.001$), there were no statistical differences in all-cause healthcare costs (mean PPPM: $2,503 vs $2,493; $p=0.974$).

CONCLUSION: Dabigatran pharmacotherapy was associated with higher medication persistence, lower healthcare utilization, and similar total healthcare costs, as compared to warfarin.

11. Anticoagulation with rivaroxaban in post cardioversion patients (The ARC Study). *Pete Antonopoulos, Pharm.D.*[1], Dan Ng, Pharm.D.[1], Asimul Ansari, M.D.[1], Najamul Ansari, M.D.[1]; (1) Department of Pharmacy and Department of Cardiology, Stroger Jr Hospital of Cook County, Chicago, IL
OBJECTIVES: Rivaroxaban is a Xa inhibitor that has been proven non-inferior to warfarin for the prevention of stroke in non-valvular atrial fibrillation in the ROCKET-AF trial; however, the use of rivaroxaban for the prevention of stroke in the immediate post-cardioversion period has not been studied. Patients undergoing cardioversion have an embolic risk of 1–5% and therefore require anticoagulation for 1 month. Anticoagulation with enoxaparin during this time requires expensive injections and bridging with warfarin that requires intense follow-up, lab monitoring, and time.
METHODS: This is a prospective, unblinded, interventional, with historical control pilot study of 30 non-valvular atrial fibrillation patients cardioverted between October 2012 and December 2013. Patients received anticoagulation before cardioversion with rivaroxaban 20 mg tab daily at dinner and for 30 days after cardioversion. All patients were followed up by weekly telephone calls using a standardized patient questionnaire to assess rivaroxaban efficacy of thrombosis prevention and the incidence of both major and minor bleeding.
RESULTS: There were no thrombo-embolic events reported (p=NS). Major bleeding (GI bleed secondary to aspirin and OTC NSAID use) occurred in 3.33% (1/30) of patients and there were zero minor bleeds reported. Total bleeding was 3.33% (1/30) for rivaroxaban similar to warfarin historical control bleeding of 3.1%.
CONCLUSION: Anticoagulation with rivaroxaban post cardioversion is non-inferior, simpler, and more cost-effective compared to enoxaparin bridging to warfarin therapy. The safety of rivaroxaban was similar to published rates of ADE but statistical power was not met. Reinforcement of aspirin discontinuation when not clearly indicated and NSAID avoidance is key to minimizing bleeding.

Community Pharmacy Practice

12. Pharmacists views and practices in regard to sales of antibiotics without a prescription in Madinah, Saudi Arabia. *Anas Bahnassi, Ph.D. RPh*[1]; (1) Clinical and Hospital Pharmacy, Taibah University, Madinah, Saudi Arabia
OBJECTIVES: The aim of this study was to investigate pharmacists views and practices in Madinah, Saudi Arabia through conducting direct interviews including direct questions and hypothetical scenarios.
METHODS: A purposeful sample of 150 community pharmacists of different ethnic and educational backgrounds were approached to participate in the study. Semi-structured interviews including general questions and five hypothetical scenarios were used for the investigation. Complete transcripts of the interviews were prepared. All transcripts were coded and categorized into main themes using a computer software.
RESULTS: 54 pharmacists agreed to participate (response rate: 36%). Sale of antibiotics without prescription is commonly practiced in Saudi Arabia. Lack of legislation enforcement has exacerbated this practice. Economic hardship, patient's age, emotional factors, and pharmacists' self confidence in diagnosing and prescribing medications in general and antibiotics in particular were the themes included in the interviews and influenced pharmacists' decision to sell antibiotics without a prescription. Many pharmacists did not see the practice as a problem and felt capable of continuing to dispense antibiotics without a prescription. Pharmacists who saw the practice as a problem sees legislation enforcement to be the solution of the problem.
CONCLUSION: Pharmacists' views and practices are alarming. The results of this study show that this practice will continue to spread unless strict enforcement is put in place. Lack of clear understanding of the limitations of pharmacist's scope of practice. Results of these study can be extrapolated to other countries in the region and other countries of the similar social and professional development status.

13. Diabetes mellitus care in Qatar: a survey of pharmacists' activities, attitudes and perceived barriers. *Maguy S. El Hajj, Pharm.D., BCPS*[1], Safae Abu Yousef, BScPharm (Pharm.D. candidate)[2], Meena Basri, BScPharm[3]; (1) Clinical Pharmacy and Practice Section, Qatar University College of Pharmacy, Doha, Qatar (2) Qatar University College of Pharmacy, Doha, Qatar (3) Heart Hospital, Doha, Qatar
OBJECTIVES: Diabetes mellitus is recognized as a global major public health issue. It increases the risk of cardiovascular diseases and is associated with many microvascular complications. With good management many of these complications can be prevented or delayed. In Qatar, diabetes affects approximately 17% of adult Qatari population and it accounts for 18% of health care expenditures. The emerging diabetes epidemic represents an opportunity for Qatar pharmacists to demonstrate their impact on patient care. The study objectives were to describe the practices and attitudes of Qatar pharmacists toward diabetes, and to assess their perceived barriers for diabetes care provision.
METHODS: Study objectives were addressed in a cross sectional survey of community and ambulatory pharmacists in Qatar. A phone call explaining the study was made to all pharmacists. Consenting pharmacists anonymously completed the survey either online or as paper. Data were analyzed using Statistical Package of Social Sciences (SPSS®) Version 20.
RESULTS: Over a 7-month period, we collected 126 surveys (24% response rate). More than 70% of respondents said that they always or often discuss the importance of self testing of blood glucose with diabetic patients. Over 60% of respondents stated that they always or often counsel about the side effects of oral anti-diabetic drugs. However, only around 50% indicated that they always or often provide education on the importance of regular screening for nephropathy and retinopathy. Using diabetes attitude scale-3, most respondents had positive attitudes toward need for special training, psychosocial impact of diabetes, and patient autonomy. Top two perceived barriers for providing diabetes services were lack of time (53%) and shortage of personnel (42%)
CONCLUSION: Overall, Qatar pharmacists have positive attitudes toward diabetes. Interventions should be implemented to overcome their perceived barriers and to improve their diabetes services.

14. Anchoring techniques in hypnotherapy as a tool for enhancing patient adherence to treatment plan. Hamzah Mohammad, Pharm.D.[1]; (1) School of Pharmacy, The University of Jordan, Amman, Jordan
OBJECTIVES: Addressing medication adherence as an issue of multiple responsibilities between patients and their clinicians, particularly, their pharmacists and hypothesized a psychological etiologies for non adherence problems, can be a frame of new reservoir of very effective tools, that originated in clinical psychology and applied in clinical pharmacy to influence patients behavior towards pharmacotherapy. The purpose of this study is to evaluate the efficacy of hypno-anchoring techniques in treating non adherence problems in chronically ill patients with long run pharmacotheraputic plans.
METHODS: In this study a sample of (n=50) patients of age 18–71 years with chronic conditions, and receiving their refill prescriptions for 3 months from ALAnbar™ community pharmacy and pharmaceutical care clinic was enrolled in Hypno-Counseling Program. After assessment of adherence status of each patient by using Multifactorial Adherence Score Test (MAST)©, the patient received a three hypno-counseling sessions, one each month at refill time and at the end of 3 months the patients reassessed by (MAST)©. The counseling sessions administered by hypnotherapy-trained Pharm.D., The (MAST)© provide clinical, psychological, physical and biochemical adherence assessment approaches and comprehend them as numerical scaled percentage value.

RESULTS: After statistical manipulation of the collected data the results revealed that there is a significant difference between the mean of initial results (iAvg = 58%) and the mean of final results (fAvg = 76%), p-value was <0.05 (p-value<0.05) so there is a statistical and clinical difference in favor of alternative hypothesis (58% vs 76%, p-value<0.05).
CONCLUSION: The results lead us to conclude that the hypnotherapy can be an effective tool in enhancing patients' compliance and increasing their awareness towards healthy lifestyle modifications if used in proper clinical scenarios and adjusted according to an effective assessment tool.

15. Evaluation of community pharmacists' perceived confidence identifying drug/herbal interactions and adverse drug events with oral antineoplastic agents. *Lindsey Dayer, Pharm.D.*[1], Schwanda Flowers, Pharm.D.[1], Eddie Dunn, Pharm.D.[1]; (1) College of Pharmacy, University of Arkansas for Medical Sciences, Little Rock, AR
OBJECTIVES: Assess community pharmacists' perceived confidence identifying drug and/or herbal interactions (DHI) with oral antineoplastic agents (OAA) and assess their confidence identifying adverse drug events (ADE) caused by OAA.
METHODS: A survey was developed to assess community pharmacists' knowledge of 11 OAAs. This survey evaluated pharmacists' confidence when identifying potential DHI and ADE. A list of Arkansas community pharmacies (n=712) was obtained from the Arkansas State Board of Pharmacy and randomized. The pharmacist on duty was contacted for a phone survey; 246 pharmacists completed the survey.
RESULTS: Overall confidence in identifying DHI and ADE varied with each OAA. Pharmacists reported which OAA they had dispensed in the last 6 months; there was a trend towards more confidence in those agents dispensed within the last 6 months. However, up to one-third of said they were not confident counseling even in agents dispensed by a majority (>75%) within the last 6 months. Seventy-seven percent reported their main barrier to counseling as a lack of training or knowledge. The majority (79%) were not confident in their ability to handle an influx of newly marketed OAA. This study was approved by the UAMS IRB.
CONCLUSION: There are > 40 OAA for > 50 different cancer types. Approximately 25–35% of therapies in development are OAA. Many have significant interactions with other drugs that may cause severe ADEs. This study identified an overall lack of pharmacist confidence in identifying DHI and ADE. One of the main barriers identified is the lack of knowledge. Although not all are dispensed regularly in pharmacies, pharmacists are often on the front line for interacting with patients receiving OAAs and should have baseline knowledge of these medications. This data provides preliminary information needed to create new/additional educational programs in the curriculum and continuing education programs to improve confidence among community pharmacists.

16. Evaluation of comprehensive medication reviews performed by students in the 3rd professional year. *Katherine Hale, Pharm.D., BCPS*[1]; (1) Department of Pharmacy Practice, University of Montana Skaggs School of Pharmacy, Missoula, MT
OBJECTIVES: Evaluate the number and type of drug-related problems (DRPs) identified and subsequent recommendations made by third-year students completing a medication therapy management activity during a required pharmacy practice course. Determine if fall risk and immunization assessments were performed.
METHODS: Students completing Pharmacy 505 at the University of Montana are required to complete one comprehensive medication review outside of class during the 16-week course. Care plans submitted November 2013 were reviewed. The course coordinator coded and examined care plans for the presence of pre-determined categories of DRPs and recommendations, and to determine if fall risk and immunizations were assessed, documented, and addressed. Patient demographics including age, gender, number of chronic disease states, number of prescription and over-the-counter medications, and visit length were gathered.
RESULTS: Sixty-two care plans were submitted. The average patient was 65 years, had 6 chronic disease states, and took 6 prescription medications and 4 over-the-counter medications. Visit length averaged 68 minutes. Students identified 247 DRPs and made 476 recommendations. An average of four DRPs were identified and eight recommendations made per patient. The most commonly reported DRPs included: uncontrolled health condition (26.7%); drug-drug interactions (25.1%); untreated medical condition (6.5%); poor understanding of medication use (6.1%); and poor adherence (5.7%). The most common recommendations were: medication counseling (41%); no change, monitor therapy (40%); lifestyle modifications (30.4%); add new medication (24.2%); and discontinue medication (15%). Allergies and immunization history were documented and fall risk addressed in 74%, 40%, and 11% of cases respectively.
CONCLUSION: By reviewing the ability of students to identify actual DRPs and make relevant recommendations to resolve them, information about the preparation of pharmacy students for their final professional year can be gathered. Although the findings may be specific to UM, the methods can be generalized to other pharmacy programs.

Critical Care

17. Pharmacokinetics of extended-infusion piperacillin-tazobactam in critically ill patients undergoing continuous renal replacement therapy. *Elisabeth Hébert, B.Pharm*[1], Annie Beauchamp, B.Pharm[1], Viviane Lavigne, Pharm D.[1], Danya Munoz, Pharm D.[1], Don K. Awissi, B. Pharm, M.Sc, BCSP[2], Michel Savoie, B. Pharm, M.Sc[2], Geneviève Lebrun, B. Pharm, M.Sc[2], Mylène Fagnan, B. Pharm, M.Sc[2], Robert Robitaille, Ph.D[3], Julie Amyot, Ph.D[3], Nicolas Tétreault, Ph.D[3], Christian Lavallée, M.D.[4], France Varin, B. Pharm, Ph.D[1], Vincent Pichette, M.D., FRCP[5], Martine Leblanc, M.D., FRCP[6]; (1) Faculty of Pharmacy, Université de Montréal, Montréal, QC (2) Pharmacy Department, Hôpital Maisonneuve-Rosemont, Montréal, QC (3) Biochemistry Department, Hôpital Maisonneuve-Rosemont, Montréal, QC (4) Department of Infectious diseases and Medical Microbiology, Hôpital Maisonneuve-Rosemont, Montréal, QC (5) Nephrology Department, Hôpital Maisonneuve-Rosemont, Montréal, QC (6) Nephrology Department, Intensive Care Unit, Hôpital Maisonneuve-Rosemont, Montréal, QC
OBJECTIVES: The aim of this study was to evaluate the pharmacokinetic and pharmacodynamic profile of piperacillin-tazobactam administered as a 4 hour-infusion in critically ill patients undergoing continuous renal replacement therapy. The primary outcome was to determine the proportion of patients achieving an unbound piperacillin plasma concentration above a concentration of 64 mg/L for at least 50% of the time interval.
METHODS: Prospective observational pharmacokinetic study in the setting of an intensive care unit of a canadian university-affiliated hospital. Twenty critically ill patients undergoing continuous venovenous hemodiafiltration and receiving a 4 h-infusion of piperacillin-tazobactam 4/0.5 g every 8 hours, for a documented or suspected infection, were included in this study. Blood samples were obtained every hour over an 8 hour dosing interval. Pre-filter blood, post-filter blood, effluent, urine, and antibiotic samples were also collected.
RESULTS: Eighteen patients out of twenty achieved the primary outcome. Regarding piperacillin pharmacokinetic parameters, the median (interquartile range) minimum unbound plasma concentration was 65.15 mg/L (51.30–89.30), maximum unbound plasma concentration was 141.3 mg/L (116.75–173.90), the sieving coefficient was 0.809 (0.738–0.938), the total clearance was 65.82 mL/min (53.79–102.87) and renal clearance was 0.16 mL/min (0.05–3.04). According to statistical analysis, variables that influenced the piperacillin area under curve were patient's body weight on sampling day (regression estimate = −399.47; p=0.034; adjusted r^2 = 0.219) and post-dilution rate (regression estimate = −17.67;

p=0.019; adjusted $r^2 = 0.230$). When combined, these two variables were no longer statistically significant.
CONCLUSION: In this study, the administration of a 4 hour-infusion of piperacillin-tazobactam seemed to enhance the probability of achieving a favorable pharmacokinetic profile in patients undergoing continuous renal replacement therapy. Therapeutic drug monitoring would allow for individualized adjustments according to patient characteristics.

18E. ICU delirium treatment: Continuation of antipsychotic therapy from ICU to discharge. *Rachel Flurie, Pharm.D.*[1], Jeffrey Gonzales, Pharm.D., BCPS, FCCM[1], Asha Tata, Pharm.D., BCPS[2], Leah Millstein, M.D.[3], Mangla Gulati, M.D., FACP, FSHM[3]; (1) University of Maryland School of Pharmacy, Baltimore, MD; (2) University of Maryland Medical Center, Baltimore, MD; (3) University of Maryland School of Medicine, Baltimore, MD
OBJECTIVES: To evaluate the frequency of patients initiated on antipsychotics for delirium in the ICU who are transferred to a medical floor still on antipsychotics.
METHODS: A retrospective chart review of patients admitted to the medical intensive care unit (MICU) at the University of Maryland Medical Center (UMMC) between June 1, 2011 and May 31, 2012. Inclusion criteria: age ≥ 18 years, a positive diagnosis of ICU delirium using the Confusion Assessment Method-ICU (CAM-ICU) and new antipsychotic therapy initiated in the MICU at least 24 hours before ICU transfer. Exclusion criteria: patients on an antipsychotic prior to ICU admission or transferred out of the ICU to a non-medical floor. Data collection: demographics, comorbidities, delirium risk factors, and CAM-ICU score. Patients were analyzed as two groups: Group 1 – ICU to Floor; Group 2 – Floor to Discharge, with respect to antipsychotic therapy.
RESULTS: Forty-five patients met inclusion criteria, with a mean age of 58 ± 15 years, 56% male, 49% Caucasian. Average ICU length of stay was 12.4 ± 10.6 days. Regarding risk factors: 82% had concomitant benzodiazepines, 87% had concomitant opioids, 91% had a bladder catheter, 82% had physical restraints, 78% were mechanically ventilated, and 41% were immobile. In Group 1, antipsychotics were continued in 11 (24%) patients. Of those patients, 5 (45%) were discharged from the hospital on an antipsychotic. The decision to continue antipsychotic therapy on the floor was inappropriate 9% of the time based on a patient's CAM-ICU score within 24 hours of transfer.
CONCLUSION: Nearly 25% of patients started on antipsychotics for ICU delirium are continued on therapy upon ICU transfer. The decision to continue therapy is made on ICU assessments, as there is no objective assessment for delirium on the medicine floors at UMMC. This may lead to inappropriate continuation of antipsychotic therapy during transitions of care.Published in Published in Crit Care Med 2013;41(12):A918.

19E. The IMPACT of a pharmacist assessing delirium in the mechanically ventilated, critically ILL patient. *Nicole Vivacqua, Pharm.D.*[1], Jill Cwik, Pharm.D.[2], Amish Doshi, Pharm.D.[2], Ina Zamfirova, B.A.[3], Arvey Stone, M.D.[4]; (1) Department of Pharmacy, Advocate Lutheran General Hospital, Park Ridge, IL; (2) Pharmacy, Advocate Lutheran General Hospital, Park Ridge, IL; (3) Russell Institute for Research & Innovation, Center for Advanced Care, Advocate Lutheran General Hospital, Park Ridge, IL; (4) Advocate Lutheran General Hospital, Advocate Lutheran General Hospital, Park Ridge, IL
OBJECTIVES: Delayed prevention, recognition, and treatment of delirium is associated with immediate and long term negative outcomes in the critically ill patient including increased duration of mechanical ventilation, mortality, length of ICU stay, cost of care, and long term cognitive impairment.
METHODS: A 2:1 comparative analysis of retrospective, non CAM-ICU group (n=60) and prospective, CAM-ICU group (n=30) was performed on all subjects requiring > 48 hours of mechanical ventilation (MV) receiving continuous infusions of analgesia and sedation. Retrospective subjects were identified as positive for delirium based on terminology documented in patient progress notes because the CAM-ICU tool was not utilized. Prospective subjects were assessed daily using the CAM-ICU by the pharmacist during sedation vacation. Prevention and treatment strategies were implemented during interdisciplinary rounds.
RESULTS: Mortality and delirium were higher in the non CAM-ICU group (26% vs 20% & 40% vs 23.3%). Positive delirium had no effect on ICU LOS for either group (all p>0.05), however it had a significant impact on duration of ventilation for both retrospective and prospective groups (p=0.005 and p=0.012). Patients with delirium had a longer duration of MV for both the non CAM-ICU and CAM-ICU groups (5.96 vs 3.83 days and 8.57 vs 3.87 days). When the CAM-ICU group received an antipsychotic, or had an increase in mobility, there was a decrease in delirium (p=0.007 and p=0.021). The incorporation of a new sedation plan and the utilization of dexmedetomidine also significantly decreased delirium for the CAM-ICU group (p<0.001). When comparing subjects with delirium in the CAM-ICU group to delirium subjects in the non CAM-ICU group, there was no statistically significant difference in mortality, LOS, and duration of mechanical ventilation (all p>0.05).
CONCLUSION: Pharmacist implementation did not decrease the duration of mechanical ventilation. Delirium was not associated with an increase in mortality or LOS.
Presented at Society of Critical Care Congress Meeting, San Francisco, California 2014.

20. Incidence of methicillin-resistant *Staphylococcus aureus* (MRSA) pneumonia infection in patients with nares-positive cultures compared to nares-negative cultures for MRSA in a medical intensive care unit. *Nicole Anne Gerardo, Pharm.D. Candidate 2015*[1], Basirat Sanuth, Pharm.D.[2], Zahra Khudeira, Pharm.D., M.A.[3]; (1) University of Illinois at Chicago, College of Pharmacy, Chicago, IL; (2) Medical Intensive Care Unit, Mount Sinai Hospital, Sinai Health System, Chicago, IL, Chicago, IL; (3) Sinai Health System, Chicago, IL
OBJECTIVES: The primary outcome was the incidence of MRSA pneumonia (PNA) in patients with nares-positive compared to those negative for MRSA. The secondary outcomes were the incidence of cultures of other body sites positive for MRSA and non-MRSA organisms, and the most common risk factors for MRSA PNA in MRSA nares-positive compared to nares-negative patients.
METHODS: Data was retrospectively collected in patients who were screened for MRSA in the nares on medical intensive care unit (MICU) admission.
RESULTS: Eighty-six patients were enrolled in the study with 43 patients in each group. The data collected was from January 1 to June 30, 2013. The average ages of patients in both groups were 61 years old. Fifteen (34.8%) of the MRSA nares-positive patients had PNA and 11 (73.3%) were due to MRSA. Eight (18.6%) of the MRSA nares-negative patients had PNA and 1 (12.5%) was due to MRSA. Other body sites positive for MRSA was noted in 6/43 (14%) and none (0%) of patients in the MRSA nares-positive compared to negative patients. Other body sites positive for non-MRSA organisms were seen in 36/43 (83.7%) and 21/43 (48.8%) in the MRSA nares-positive compared to negative patients. The most common risk factors for MRSA PNA development in both groups were immunocompromised states (29.5%), structural lung disease and/or smoking history (25.5%), previous hospitalization (21.5%), and previous stay at long-term acute care facilities, nursing homes, receipt of hemodialysis and/or wound care (19%).
CONCLUSION: The incidence of PNA infection especially secondary to MRSA is higher in patients with MRSA nares-positive compared to negative on ICU admission in this study. Also, the incidence of other body sites (excluding nares) being positive for MRSA as well as non- MRSA organisms is higher in MRSA nares-positive patients. The most common risk factor for MRSA PNA development in both groups of patients is immunocompromised states.

21. Management of severe alcohol withdrawal in the medical intensive care unit utilizing dexmedetomidine as an adjunctive treatment. *Jill Cwik, Pharm.D.*[1], Amish Doshi, Pharm.D.[1]; (1) Pharmacy, Advocate Lutheran General Hospital, Park Ridge, IL
OBJECTIVES: Severe alcohol withdrawal is frequently encountered in the intensive care unit (ICU) and there are currently no practice guidelines to guide treatment. Benzodiazepines are the mainstay of therapy; however several case reports demonstrate dexmedetomidine can be used as an adjunctive agent for treatment of alcohol withdrawal. The purpose of our study was to determine if the use of dexmedetomidine as an adjunct to benzodiazepines decreased the amount of benzodiazepines, decreased the ICU length of stay (LOS) and duration of mechanical ventilation compared to those that receive benzodiazepines alone.
METHODS: A 2:1 comparative retrospective review was performed evaluating subjects that received continuous infusion benzodiazepines and those that received dexmedetomidine in addition to benzodiazepines. The total benzodiazepine dose 24 hours before dexmedetomidine initiation and 2, 12 and 24 hours following was assessed. Additionally, ICU LOS, duration of mechanical ventilation, Clinical Institute Withdrawal Assessment for Alcohol-Revised (CIWA-Ar) scale, and heart rate and blood pressure were collected.
RESULTS: Thirty-seven subjects, 92% male, received both dexmedetomidine and benzodiazepines. The mean CIWA-Ar score prior to dexmedetomidine was 10.54 and 24 hours post dexmedetomidine initiation and reduced to 7.4 $\pm$ 5. The average ICU LOS was 10.7 days and 62.2% of subjects were mechanically ventilated for 7.18 $\pm$ 4.3 days. There was a statistically significant increase in ICU LOS in those that were mechanically ventilated and received dexmedetomidine (p=0.017). There significant reduction in the benzodiazepine requirement at 2, 12 and 24 hours (p=0.001). There was a reduction in mean CIWA-Ar scores at 2, 12 and 24 hours (9.71, 8.41, 8.53, respectively); however the reduction was not statistically significant after 24 hours of treatment (p=0.817).
CONCLUSIONS: Dexmedetomidine significantly reduced the total benzodiazepine use at baseline, 2, 12, and 24 hours after the start of the infusion. Dexmedetomidine did not decrease duration of mechanical ventilation or reduce ICU LOS.

Drug Information

22. Correlation of journal impact factor vs randomized controlled trial quality. *Pearl Pfiester, M.S, Pharm.D. Student*[1], Robert Beckett, Pharm.D.[1], Dustin Linn, Pharm.D.[1]; (1) Manchester University College of Pharmacy, Fort Wayne, IN
OBJECTIVES: Journal impact factor (JIF) may provide insight into journal popularity; however, it does not directly account for quality of articles published in that journal. The objective of this study is to determine whether JIF correlates with reporting and methodologic quality of randomized controlled trials (RCTs).
METHODS: This cross-sectional study included Phase III, 2-group RCTs of single medication interventions for humans published in March 2009 or 2010; articles were identified through a PubMed search. Each article was scored using the 2010 Consolidated Standards for Reporting Clinical Trials (CONSORT) Statement for reporting quality and the Cho-Bero Instrument for Assessing Quality of Drug Studies for methodologic quality by one of two primary reviewers and an independent secondary reviewer. Two- and 5-year 2011 JIF was recorded using Thomson Reuters Web of Knowledge; reviewers were blinded to JIF at the time of article scoring.
RESULTS: Seventy-four articles met inclusion criteria. Articles were published in 48 journals; the most common was *Journal of Clinical Oncology* (n=18; 24%). The most common medication interventions were antineoplastic agents (n=31; 41%), miscellaneous therapeutic agents (n=11; 15%), and central nervous system agents (n=9; 12%). Median JIF was 5.5 (IQR 3.7–18.4) for 2-year and 5.2 (IQR 3.5–16.8) for 5-year. Normalized quality score medians were 0.59 (IQR 0.48–0.67) using CONSORT and 0.70 (IQR 0.58–0.79) using Cho-Bero. Two-year JIF positively correlated with both CONSORT score ($p<0.001$; $r = 0.44$) and Cho-Bero score ($p<0.001$; $r = 0.40$). Similarly, 5-year JIF correlated with both CONSORT score ($p<0.001$; $r = 0.43$) and Cho-Bero score ($p<0.001$; $r = 0.41$).
CONCLUSION: This study suggests a moderate correlation between JIF vs reporting and methodologic quality measured by CONSORT and Cho-Bero, respectively, in RCTs. Over-reliance on JIF as a measure of quality should be cautioned due to low overall quality scores. This study underscores need for clinicians to continue to critically evaluate RCTs for specific patients.

23E. Impact of lorcaserin on glycemic control in overweight and obese patients with type 2 diabetes: analysis of week 52 responders and nonresponders. Xavier Pi-Sunyer, M.D., M.P.H.[1], *William Soliman, Ph.D.*[2], William Shanahan, M.D.[3], Randi Fain, M.D.[2], Joanne Quan, M.D.[3], Yuhan Li, M.S.[2], W. T. Garvey, M.D.[4]; (1) Columbia University College of Physicians and Surgeons; (2) Eisai Inc.; (3) Arena Pharmaceuticals; (4) University of Alabama at Birmingham
OBJECTIVES: Lorcaserin, a selective 5-HT_{2C} agonist, is approved in the US for chronic weight management as an adjunct to a reduced-calorie diet and increased physical activity. This post hoc analysis of a previously published phase 3 trial (BLOOM-DM, NCT00603291) evaluates the effects of lorcaserin 10 mg twice daily (lor) on glycemic parameters in overweight and obese patients (pts) (BMI 27–45 kg/m^2) with type 2 diabetes mellitus (T2DM; HbA1c 7–10%) who achieved $\geq$ 5% weight loss at week (wk) 52 (week 52 responders).
METHODS: 509 pts in BLOOM-DM were equally randomized to placebo (pbo) or lor with diet and exercise counseling. This analysis assessed fasting plasma glucose (FPG), HbA1c, and use of antihyperglycemic medications at wk 52 (MITT/LOCF), stratified by wk 52 weight response.
RESULTS: FPG and HbA1c levels were similar for pbo and lor groups at baseline. Among wk 52 responders (16.1% of pbo, 37.5% of lor group, $p<0.0001$), the mean percent (SE) weight loss at wk 52 was -8.5% (0.5) and -10.4% (0.5), respectively, which corresponded to mean (SE) reductions in FPG and HbA1c of 26.0 (6.6) mg/dL and 1.0% (0.1) for pbo and 38.1 (4.3) mg/dL and 1.3% (0.1) for lor ($p<0.05$ vs pbo for both). Among wk 52 responders, more pts in the lor group used fewer or the same number of anti-hyperglycemic medications at wk 52 compared with baseline vs the pbo group. Glycemic changes were relatively modest for wk 52 nonresponders, although improvements were greater with lor than pbo.
CONCLUSION: This exploratory analysis suggests that $\geq$ 5% weight loss at wk 52 in pts with T2DM is associated with substantial improvements in glycemic parameters and the use of fewer concomitant antidiabetic medications, and twice as many lor as pbo pts achieved this level of weight loss.
Presented at Obesity Week, Atlanta, GA, November 11–16, 2013.

Education/Training

24. Good literacy to enhance response in diabetics (GLITTER-DM). *Yen Dang, Pharm.D.*[1], Nima Patel-Shori, Pharm.D., BCACP[2], Michael Barros, Pharm.D., BCPS, BCACP[3], Daohai Yu, Ph.D.[4]; (1) Pharmacy Practice, University of Maryland Eastern Shore, Salisbury, MD; (2) Temple University School of Pharmacy, Philadelphia, PA; (3) Pharmacy Practice, Temple University School of Pharmacy, Philadelphia, PA; (4) Clinical Sciences, Temple University School of Medicine, Philadelphia, PA
OBJECTIVES: Patients with diabetes who have limited health literacy have poor disease knowledge, lower self-confidence in diabetes management, and difficulty understanding and adhering to medication instruction. The purpose of this study is to determine the effectiveness of individualized communication strategies and action plans to improve hemoglobin A1c (HbA1c) control in patients with low health literacy.

METHODS: A prospective, open-labeled, pilot study was conducted on 23 patients with type 1 and type 2 diabetes mellitus to assess the effectiveness of targeted communication strategies on self-management in patients who have low health literacy. Patients were eligible to participate if they were at least 18 years of age with a diagnosis of type 1 or 2 diabetes and possessed low health literacy, defined as a Rapid Estimate of Adult Literacy in Medicine- Revised (REALM-R) score of 6 or less. In addition, patients also needed to have a HbA1c > 7% upon study entry. Patients were randomized to receive the teach back method, personalized actions, and follow-up phone calls to assess comprehension or were assigned to usual care. The primary endpoint was the change in HbA1c value at 3 months.
RESULTS: At study termination, the patients receiving literacy-appropriate interventions had greater HbA1c reduction (−1.9% vs −0.6%, p=0.02) and less hyperglycemic events per week (0.1 vs 0.6, p=0.04) than the patients assigned to usual care. There were no differences in the number of hypoglycemic events, testing frequency, medication-adherence rates, or hospitalizations and emergency room visits related to diabetes.
CONCLUSION: Literacy-appropriate methods such as the teach back method, personalized action plans, and telephone follow-ups may improve glycemic control in low health literacy patients with diabetes.

25. Students' perceptions of clinical simulation cases in an oncology pharmacotherapy course. *Jacqueline Olin, M.S., Pharm.D., BCPS, CDE*[1], Sabrina W. Cole, Pharm.D., BCPS[1]; (1) Wingate University School of Pharmacy, Wingate, NC
OBJECTIVES: Oncology pharmacotherapy can be challenging for students since many lack previous experience with chemotherapy preparation or provision. A variety of instructional techniques based on active learning strategies may facilitate comprehension. This study evaluated students' perceptions of whether the use of decision-making simulation activities contributed to an improved classroom learning experience.
METHODS: Patient case simulations (including breast cancer and colon cancer cases) were prepared in advance using the DecisionSim® platform technology. Third-year student pharmacists in the oncology pharmacotherapy course solved the cases in teams of three during class time on two campuses. Participants completed an IRB-approved voluntary survey with some demographic information and rated their agreement with statements about the utility and benefit of the cases using a 4-point scale (4-completely agree to 1-completely disagree).
RESULTS: The survey response rate was 99% (n=77 main campus respondents and n=14 satellite campus respondents). Students' average age was 26 with 57% having obtained a previous associates' degree or further education. Overall the majority of students completely agreed or agreed that simulation cases helped identify learning needs (89%), promoted understanding of key concepts (93.4%), and should be continued in this course and other courses (90%). In contrast to student responses on the main campus, fewer students on the satellite campus agreed or strongly agreed that the technology should be continued in this course and other courses (93.8% vs 69.2%, respectively).
CONCLUSION: The use of simulation cases is an effective teaching method in an oncology pharmacotherapy course, which may have contributed to higher-order learning. Students felt the use of simulation cases promoted understanding of key concepts related to oncology pharmacy. Continued emphasis on the use of simulation software in a distance learning environment is warranted.

26. Retention of advanced cardiac life support knowledge and skills following high-fidelity mannequin simulation training. *Angela Bingham, Pharm.D., BCPS, BCNSP*[1], Sanchita Sen, Pharm.D., BCPS[1], Laura Finn, RPh[1], Michael Cawley, Pharm.D., RRT, CPFT, FCCM[1]; (1) University of the Sciences, Philadelphia College of Pharmacy, Philadelphia, PA
OBJECTIVES: To assess pharmacy students' ability to retain advanced cardiac life support (ACLS) knowledge and skills within 120 days of previous high-fidelity mannequin simulation training.
METHODS: Pharmacy students were randomly assigned to rapid response teams of 5–6 students. Students selected interventions independent of facilitator input. ACLS skills and mannequin survival were compared for teams where some members had previous simulation training 120 days earlier and teams without previous exposure. A predetermined rubric was used to record and assess students' performance in the mannequin-based simulations. To successfully resuscitate the simulated patient, teams were required to correctly identify the cardiac arrhythmia and implement all correct ACLS skills.
RESULTS: Teams with student members with previous ACLS simulation training (n=10) demonstrated numerical superiority to teams without previous exposure (n=12): administered the correct antiarrhythmic drug and dose (100% vs 69%), calculated correct vasopressor infusion rate (78% vs 42%), and spent significantly less time successfully calculating vasopressor infusion rate (83 sec vs 113 sec; p=0.006; CI 9.38–47.95). Mannequin survival was 37% higher for teams with members who had previous ACLS simulation training (70% vs 33%).
CONCLUSION: Simulation with high-fidelity mannequins appears to be an effective educational tool to promote pharmacy students' retention of ACLS knowledge and skills for at least 120 days.

Emergency Medicine

27E. Prevalence of patients who present to the emergency department with an acute pulmonary embolism that qualify for outpatient treatment. *Kristan Vollman, Pharm.D.*[1], Nicole M. Acquisto, Pharm.D.[1]; (1) University of Rochester Medical Center, Rochester, NY
OBJECTIVES: Outpatient treatment of patients with low-risk pulmonary embolism (PE) has the potential to reduce healthcare-associated costs and increase patient satisfaction while maintaining a similar efficacy and safety profile compared to inpatient treatment. The purpose of this study was to determine the prevalence of patients with acute PE diagnosed in the emergency department (ED) at our institution which qualify for outpatient treatment.
METHODS: This is a retrospective review of adult patients that presented to the ED between July 2012 and June 2013 that were diagnosed with an acute PE. Patients were captured from ICD9 codes. Data collection included age, sex, history of or active cancer, heart failure, chronic lung disease, bleeding risk or active bleeding, heart rate, systolic blood pressure, temperature, incidence of altered mental status or chest pain, and oxygen saturation. Additionally, patient disposition, anticoagulation type and dose, length of stay (LOS) and barriers to follow-up were collected. These data points were used to calculate a pulmonary embolism severity index (PESI) score for each patient. Patients were categorized as appropriate for outpatient treatment if their PESI score was < 86 and they did not have a documented social circumstance that would predispose them to treatment failure. Descriptive statistics were used to present the data.
RESULTS: A total of 107/207 patient charts have been reviewed to date. There were 64 patients that met inclusion criteria. A PESI score < 86 was found in 25/64 patients, with 8/25 qualifying for outpatient treatment. All were treated in the inpatient setting. The median LOS in all patients (n=64) was 3 days (range 2–7). The median LOS for patients who qualified for outpatient treatment (n=8) was 2 days (range 1–4). Only one patient received outpatient treatment (PESI score = 99).
CONCLUSION: On-going.
Presented at 2013 ASHP Midyear Clinical Meeting University HealthSystem Consortium Annual Conference 2013.

Endocrinology

28. Evaluating the association between vitamin B12 deficiency and peripheral neuropathy in patients with diabetes. *Brenda Zagar, Pharm.D.*[1], Daniel Longyhore, Pharm.D., BCACP[2]; (1) Department of Pharmacy, St. Luke's University Health Network, Bethlehem, PA; (2) Department of Pharmacy Practice, Wilkes University, Wilkes-Barre, PA

OBJECTIVES: Vitamin B-12 deficiency has been demonstrated as prevalent among patients with diabetes. The objective of this study is to ascertain if there is an association between vitamin B-12 deficiency and peripheral neuropathy in patients with diabetes.

METHODS: We identified 7,032 patients (age > 18 years) from January 2009 to July 2013 with a serum vitamin B-12 concentration and a diagnosis of diabetes (DO) or diabetes and peripheral neuropathy (DPN). After identification, we evaluated each patient for vitamin B-12 concentration, methylmalonic acid concentration (when available), and presence of medications that may induce vitamin B-12 deficiency. The data was compared between groups for differences in vitamin B-12 concentration and incidence of deficiency. In addition, we performed subpopulation analyses based on concurrent medication use.

RESULTS: Of the 7032 patients (5814 in DO and 1,218 DPN), 479 patients had a documented vitamin B-12 concentration ≤ 250 pg/mL (390 in DO and 89 in DPN). Neither the mean vitamin B-12 concentration nor incidence of vitamin B-12 deficiency was significantly different between the DO and DPN groups (729 pg/mL vs734 pg/mL, p=0.89) (390 (6.7%) vs 89 (7.3%), p=0.45). In a subgroup analysis, those patients who used metformin were found to have an increased incidence of vitamin B-12 deficiency (100 (11.3%) vs 379 (6.2%), p<0.0001), but not an increased incidence of neuropathy (74 (10.8%) vs 26 (13.3%), p=0.33). The data did not find a difference in incidence of vitamin B-12 deficiency or neuropathy in the proton pump inhibitor or histamine-2 antagonist groups.

CONCLUSION: Vitamin B-12 levels were not found to be a predictor of neuropathy in patients with diabetes. Metformin was associated with decreased vitamin B-12 concentrations, but this did not translate into a higher incidence of neuropathy.

29. Aspirin for primary prevention of cardiovascular disease in patients with diabetes: a meta-analysis. *Lianne A. Kokoska, Pharm.D.*[1], Sheila Wilhelm, Pharm.D., BCPS[2], Candice L. Garwood, Pharm.D., FCCP, BCPS[2], Helen Berlie, Pharm.D., CDE[2]; (1) Department of Pharmacy Services, Harper University Hospital, Detroit Medical Center, Detroit, MI; (2) Department of Pharmacy Practice, Eugene Applebaum College of Pharmacy and Health Sciences, Wayne State University, Detroit, MI

OBJECTIVES: Use of aspirin for primary prevention of cardiovascular disease (CVD) is controversial, especially in patients with diabetes. Several meta-analyses in diabetic patients evaluating aspirin for prevention of major cardiovascular events (fatal and non-fatal myocardial infarction or stroke) report no benefit with increased bleeding. However, these meta-analyses do not include atherosclerotic endpoints (angina, transient ischemic attack, peripheral artery disease, revascularization). The objective of this meta-analysis was to evaluate aspirin's safety and efficacy for primary prevention of CVD including atherosclerotic events.

METHODS: Two investigators independently searched PubMed, Scopus and Cochrane databases through December 2013 using keywords cardiovascular disease, aspirin, diabetes mellitus. Full-text, English articles evaluating the efficacy of aspirin for primary prevention of CVD in humans with diabetes were included if they reported event rates. Bibliographies of recent review articles and meta-analyses were hand searched. CVD and bleeding endpoints were extracted and analyzed using RevMan 5.2.7.

RESULTS: Six studies (n=10,117) met criteria. 5064 patients received aspirin and 5053 patients received placebo. Aspirin doses ranged from 100 mg every other day to 650 mg daily. Follow-up ranged from 3.6 to 10.1 years. A random effects model was used due to heterogeneity. There was no difference in all-cause (OR 0.98, 95% CI 0.81–1.20) or cardiovascular mortality (OR 0.94, 95% CI 0.61–1.46). However, patients in the aspirin group were less likely to experience any atherosclerotic event (OR 0.86, 95% CI 0.78–0.96). There were no differences in rates of bleeding (OR 2.53, 95% CI 0.77–8.34), GI bleeding (OR 2.14, 95% CI 0.63–7.33) and hemorrhagic stroke (OR 0.90, 0.34–2.33) between groups.

CONCLUSION: In patients with diabetes, aspirin did not reduce the risk of all-cause or cardiovascular death, but was associated with lower rates of atherosclerotic events. There were no differences in bleeding, GI bleeding and hemorrhagic stroke rates between groups.

Gastroenterology

30. Lower sustained virologic response rates in a hepatology clinic vs phase III clinical trials for the NS3/4A inhibitors boceprevir and telaprevir. *Lisa Smith, B.S. Pharm., Pharm.D.*[1], Jana Lee Sigmon, Pharm.D. Candidate[2], Fred Fowler, M.D., M.B.A.[3]; (1) School of Pharmacy, Wingate University, Wingate, NC; (2) Wingate University, Wingate, NC; (3) Carolina Digestive Health, Concord, NC

OBJECTIVES: In Phase III trials, boceprevir or telaprevir, in combination with pegylated interferon and ribavirin resulted in greater sustained virologic response (SVR) than pegylated interferon and ribavirin for genotype 1 chronic hepatitis C. The purpose of this study was to compare SVR in Phase III trials to clinical practice in order to determine if the efficacy in randomized placebo controlled trials for triple therapy is greater than that seen in the clinical setting.

METHODS: Data from a retrospective cohort of 81 consecutive patients treated for genotype 1a or Ib chronic HCV in a private hepatology clinic from May 2011 to April 2013 were compared to Phase III trials. Patients received peginterferon alfa-2a 180 g or weight based peginterferon alfa-2b, ribavirin 13 mg per kilogram and either telaprevir 875 mg or boceprevir 800 mg. Logistic regression determined factors associated with SVR in the private hepatology clinic.

RESULTS: SVR was significantly lower in the cohort (38%) vs Phase III trials (57 to 73%). Side effects resulting in early discontinuation of therapy was higher in the clinical setting (27%) vs Phase III trials (2–15%). Of those who completed treatment, Caucasian race (OR 6.8 (1.533–26.55 95% CI)) and stage 3–4 liver disease (OR 0.263 [0.074–0.929 95% CI]) predicted SVR.

CONCLUSION: Patients receiving triple therapy for HCV in the private hepatology clinic had lower SVR rates and higher side effect induced discontinuation rates than patients in phase III trials. Programs to improve side effect management in clinical practice should be investigated.

Geriatrics

31. The impact of psychotropic use monitoring (PUM) on inappropriate prescribing of antipsychotics in a nursing home. *Yufei Chen, B.Sc. (Pharm)(Hons) Candidate*[1], Ee Heok Kua, M.B.B.S., M.D., FRCPsych, PBM[2], Sui Yung Chan, Ph.D., M.B.A., B.Sc. (Pharm)(Hons)[1], Joyce Lee, Pharm.D., BCPS, BCACP[1], Kai Zhen Yap, Ph.D., B.Sc., (Pharm)(Hons)[1]; (1) Department of Pharmacy, Faculty of Science, National University of Singapore, Singapore; (2) National University Health System, Singapore

OBJECTIVES: The Psychotropic Use Monitoring (PUM) is a pharmacist-led intervention whereby the pharmacist trained nurses to use a specially designed form to provide observation-based monitoring and objective feedback of residents' behavior and outcomes of antipsychotic use to physicians during patient consultation. This study evaluated the impact of the PUM intervention on inappropriate antipsychotic prescribing decisions (APDs), defined as APDs without documented clinical rationale, for managing behavior and psychological symptoms of dementia.

METHODS: The PUM intervention was implemented at the dementia ward of a Nursing Home (NH) in Singapore. Residents' characteristics and details of the physician-documented APDs over 48 weeks before the training began ('pre-PUM') and

24 weeks after the pharmacist-trained nurses implemented PUM ('post-PUM') were collected retrospectively from the medication/medical records of the residents present. Using APDs as the independent unit of analysis, the proportions of APDs without physician-documented reasons during 'pre-PUM' and 'post-PUM' were compared using the two-sample z-test of proportion.
RESULTS: The age (82.0 ± 9.1 vs 78.8 ± 10.5 years), gender (54.1% vs 56.4% male), race (80.3% vs 74.5% Chinese), and proportion of residents using antipsychotics (56.0% vs 55%) of the 61 and 55 residents present during pre-PUM and post-PUM respectively were not statistically different. While the total numbers of APDs increased from 40 to 55 after implementing PUM, the proportion of APDs without physician-documented reasons decreased significantly from 27.5% (n=11) to 10.9% (n=6; p=0.04).
CONCLUSION: The PUM intervention appeared to be effective in reducing inappropriate APDs, by supporting physicians in making APDs more accountable. PUM may be especially useful in settings with manpower constraints as the monitoring was observation-based, with no requirements for extensive interviews or physical assessments of residents. Therefore, there is potential to implement and further evaluate the effectiveness of PUM in reducing inappropriate APDs and the associated adverse resident outcomes using a cluster-randomized controlled trial in more NHs.

32. Medication non-adherence and associated factors in community-dwelling older persons attending senior activity centres. *Joshua Liang, B.Sc. (Pharm)(Hons) Candidate*[1], Christine Teng, M.Sc. (Clinical Pharmacy)[1], Kai Zhen Yap, PhD, BSc, (Pharm)(Hons)[1]; (1) Department of Pharmacy, Faculty of Science, National University of Singapore, Singapore City, Singapore
OBJECTIVES: This cross-sectional study aims to (i) determine the prevalence of non-adherence to chronic medications among community-dwelling older persons who take part in activities at 2 volunteer-run senior activity centres (SAC) in Singapore and (ii) identify associated factors.
METHODS: Structured interviewer-administered surveys were conducted between December 4 and December 27, 2013. Participants included those above the age of 55 who were on chronic medications. Self-reported medication adherence was measured using the 8-Item Morisky Medication Adherence Scale (MMAS). Information pertaining to participants' demographics, psychological well-being, medical conditions, number of medicines, and health literacy was also collected for evaluation using chi-square and Mann–Whitney *U*-tests to identify association with non-adherence.[1] Statistically significant factors were subsequently analysed using multivariate logistic regression.
RESULTS: 64% of the 81 participants were found be non-adherent to their chronic medications. The top three items of the MMAS that participants indicated non-adherence in were: finding medication-taking troublesome (25.9%), stopping medications due to perceived control of one's medical conditions (23.5%), and occasional forgetfulness (24.7%). Race and health literacy were found to be associated with non-adherence. Specifically, Chinese participants (adjusted OR = 3.09; CI 1.10, 8.66) and participants with inadequate health literacy (adjusted OR = 3.40; CI 1.26, 9.14) were more likely to be non-adherent.
CONCLUSION: Prevalence of non-adherence to chronic medication is high among community-dwelling older persons attending SACs. There is a need to address unintentional non-adherent behaviour due to forgetfulness and intentional non-adherent behaviour arising from issues of convenience and perceptions of needfulness in adhering to daily medication regimens. In addition, developing programs to improve health literacy among them may have a positive impact on adherence rates, with potential added benefit of imparting a life skill that enables them to make better health-related decisions for themselves.
REFERENCE: 1. Vik SA, Maxwell CJ, Hogan DB. Measurement, correlates, and health outcomes of medication adherence among seniors. Ann Pharmacotherapy 2004;38:303–312.

33. "PLEAD" for laxatives - development and implementation of the pharmacist-led education on appropriate drug-use program in nursing homes. *Kai Zhen Yap, Ph.D., B.Sc., (Pharm)(Hons)*[1], Sui Yung Chan, Ph.D., M.B.A., B.Sc. (Pharm)(Hons)[1], Joyce Lee, Pharm.D., BCPS, BCACP[1]; (1) Department of Pharmacy, Faculty of Science, National University of Singapore, Singapore City, Singapore
OBJECTIVES: This study evaluated the outcomes of the program, Pharmacist-Led Education on Appropriate Drug-use (PLEAD) for laxatives, which was newly-developed to engage the nursing staff (NS) of nursing homes (NHs) in behavioral changes towards improving the laxative use appropriateness and clinical outcomes of residents.
METHODS: The content of PLEAD (summarized using the mnemonic iPURGE) was first derived from published references, medication use evaluations, and interviews with NH residents and NS. A PLEAD workshop, which included a 10-minute ice-breaking session, 5-minute quiz on constipation and laxative use, 1-hour presentation of the program content, and 45-minutes discussion session, was then conducted for the NS in one NH. While the NS's responses were reported, the differences in laxative prescribing/use and residents' outcomes over 1-month periods before and after PLEAD were also obtained retrospectively from residents' medication/medical records and compared with a control NH using General Linear Model, with adjustment for resident characteristics such as age, gender and race.
RESULTS: During the workshop, the audience indicated commitment to pro-actively (i) alert the physicians on inappropriate prescribing of laxatives and (ii) monitor residents' laxative use outcomes. The mean difference in the number of laxative prescriptions altered was significantly higher in the intervention NH (0.4 vs 0.01 prescriptions per residents, adjusted p-value <0.001). Although the changes in amounts of laxatives used did not differ between the two NHs, significant improvements in the mean residents' average and maximum number of days per week with bowel opening (0.1 vs −0.42 and 0.16 vs −0.5 respectively; p-value <0.05) was observed in the intervention NH.
CONCLUSION: PLEAD for laxatives elicited behavioral changes among the NS, and possibly resulted in the improvement of laxative use appropriateness and bowel outcomes. Thus, pharmacists could use the PLEAD framework to develop programs for advocating appropriate and effective use of other over-the-counter medications, such as analgesics, in the NHs.

Herbal/Complementary Medicine

34. An assessment of vitamin D supplementation and its effectiveness in patients with cystic fibrosis. *Adrian Turner, BSPS*[1], Kim Adcock, Pharm.D.[1]; (1) University of Mississippi School of Pharmacy
OBJECTIVES: Supplementation of fat soluble vitamins like vitamin D are recommended by the Cystic Fibrosis Foundation (CFF) guidelines. Recent studies have reported subtherapeutic levels of vitamin D in patients with cystic fibrosis (CF) despite supplementation. This suggests that increasing supplemental vitamin D could improve vitamin D absorption in CF patients. The purpose of this study is to determine if the amount of supplemental vitamin D administered is sufficient to negate the patients' vitamin D deficiency due to malabsorption of fat soluble vitamins.
METHODS: The institutional review board approved this retrospective chart review of CF patients at the University of Mississippi Medical Center during fall of 2012 through summer of 2013. Primary measures were vitamin D concentrations and supplementation regimen. Secondary measures included alkaline phosphatase, gamma glutamyl transferase, hospitalizations, bone mineral density tests (if available), and concomitant medications. Inclusion criteria were vitamin D concentrations obtained in the previous three years. Exclusion criteria was vitamin D supplementation initiated < 1 month prior to review. Analysis of data was performed using descriptive (means and percentages) and comparative statistics (Pearson's Correlation).

RESULTS: The charts of 180 CF patients were reviewed. Sixty-eight patients did not meet inclusion criteria. One hundred-twelve patients were included for analysis. The mean 25-hydroxyvitamin D level was determined to be 28.47 ng/mL. Thus, patients did not achieve normal recommended vitamin D levels. There was almost no correlation between supplementation and concentration (Pearson's r equals 0.0728 for patients achieving > 30 ng/mL vitamin D3 concentrations; Pearson's r equals −0.2232 for patients achieving < 30 ng/mL vitamin D3 concentrations).
CONCLUSION: Vitamin D levels are, on average, subtherapeutic for CF patients. Additionally, there is little to no correlation between vitamin D supplementation and vitamin D concentration. These would suggest that individualizing vitamin D supplementation may be beneficial in the CF population.

35. Inhibitory effects of cinnamon on overweight and hyperglycemia in genetic metabolic syndrome model animal. *Hong Luo, M.D./Ph.D.*[1], St Liu, N/A[2], Yi Ryuu, M.S.[3]; (1) CAMS/PUMC, China, Global Science Institute/Global Culture Education Center, GSCP, Japan; (2) Faculty of Pharmaceutical Sciences, Okayama University, Japan; (3) GSCP, Japan. USTB, China
OBJECTIVES: The objective of this study was to determine whether cinnamon improves body weight and blood glucose levels in metabolic syndrome. Cinnamon is a traditional Chinese herb with Winbu Zaoshieffect. The Otsuka Long-Evans Tokushima Fatty (OLETF) rat, a genetic metabolic syndrome animal model, exhibits an innate polyphagia, progressive overweight, hyperlipidemia and hyperglycemia. The effect of cinnamon on overweight and hyperglycemia in OLETF was studied.
METHODS: The animals were divided into three groups: (i) cinnamon group in OLETF, cinnamon powder was mixture in diet (62.5 g/kg) for 10 days. (ii) OLETF control and (iii) the counterpart Long-Evans Tokushima Otsuka (LETO) rats as normal control.
RESULTS: With cinnamon treatment for 10 days, serum glucose was 105.6 ± 24.6 mg/dL in the cinnamon OLETF group that was near half of the serum glucose in OLETF control (207.5 ± 19.8 mg/dL, $p<0.05$) and no significant difference with normal control (106.0 ± 3.1 mg/dL, $p>0.05$). The body weight of OLETF was decreased about 100 grams by cinnamon (545.0 ± 35.4 g, vs OLETF 652.0 ± 17.0 g, $p<0.05$), that was similar with the body weight of LETO normal control (562.8 ± 15 g, $p>0.05$).
CONCLUSION: Cinnamon inhibited the hyperglycemia and body weight in genetic multifactor syndrome model rat, which could be a useful method to treat obesity and diabetes especially in multifactor syndrome to reduce the risk of developing long term complications.

Infectious Diseases

36. The impact of clinical pharmacist and ID intervention in rationalisation of antimicrobial use. *Niaz Al-Somai, M.Sc., PhD*[1], Osama Al-Quteimat, M.Sc.[2], Mohammed Al-Muhur, M.Sc.[3], Nashaat Hamza, M.D.[4]; (1) Department of Pharmaceutical Care, King Abdullah Medical City- Saudi Arabia, Makkah, Saudi Arabia; (2) Pharmaceutical Care Department, King Abdullah Medical City, Makkah, Saudi Arabia; (3) Faculty of pharmacy, Umm Al-Quraa University, Makka, Saudi Arabia; (4) Infectious Disease, King Abdullah Medical City, Makkah, Saudi Arabia
OBJECTIVES: There is little research on the impact of implementing and monitoring antimicrobial policy within the stewardship program in Saudi hospitals. The purpose of this study is to measure the impact of the consultant clinical pharmacist (CP) and infectious disease consultant (ID) interventions on the use of three antimicrobials (Caspofungin, imipenem, meropenem) in hospitalized patients in King Abdullah Medical City hospital.
METHODS: The study was carried out in King Abdullah Medical City, Mekkah, Saudi Arabia. The hospital is a tertiary center that provides CCU, CSICU, Cardiac, Hematology, ICU, Medical, Neuroscience, Oncology, and specialized surgical services. The use of three antimicrobials (Caspofungin, Imipenem, Meropenem) was reviewed by the clinical Pharmacist for four periods, pre and post implementation of the policy. Relevant data were collected in four periods. In the first period, pre policy implementing, the data were collected retrospectively to be used as baseline status reference, and in the three remaining periods that followed, data were collected prospectively, and compared to base line data, in order to evaluate role of clinical pharmacist and ID interventions in optimizing antimicrobials therapy.
RESULTS: Caspofungin duration of therapy was not affected significantly by the intervention. Statistically significant reduction in antimicrobial therapy duration was observed in imipenem (37%) and meropenem (37%) from baseline, which indicate better control on antimicrobials use in which in turn will minimize organisem antimicrobials resistance.
CONCLUSION: The impact of the clinical pharmacist and ID interventions, in reducing antimicrobial therapy duration using imipenem and meropenem, is clear from the result presented above. However, lack of restriction and follow up in the antimicrobial policy in case of negative culture makes antimicrobial use uncontrollable in these cases. Establishing good and accepted policy may help reduce consumption and total cost of therapy.

37E. Antibiotic utilisation and socioeconomic deprivation: associations and opportunities. *Jordan Covvey, Pharm.D., BCPS*[1], Blair Johnston, Ph.D.[1], Victoria Elliott, B.Sc. (Hons), M.Sc.[2], William Malcolm, B.Sc. (Hons) Pharm, M.Sc. (Clin Pharm), MPH, MRPharmS[3], Alexander Mullen, B.Sc. (Hons) Pharm, Ph.D., MRPharmS[1]; (1) Strathclyde Institute of Pharmacy and Biomedical Sciences, University of Strathclyde, Glasgow, United Kingdom; (2) Scottish Antimicrobial Prescribing Group (SAPG), Information Services Division Scotland, Edinburgh, UK; (3) HAI and Infection Control Group, Health Protection Scotland, Glasgow, UK
OBJECTIVES: To evaluate the association between socioeconomic deprivation and antibiotic utilisation in Scotland.
METHODS: Data for antibiotic prescriptions dispensed in community pharmacies were obtained for all of National Health Service Scotland from 2010 to 2012. Dispensing events were linked to patient demographics, including age, sex, and locational deprivation as determined by the Scottish Index of Multiple Deprivation (SIMD) quintile score for the patient's neighbourhood area. A multivariate Poisson regression model was used to formally test the associations between antibiotic utilisation (items per 1000 persons per day) and patient demographics. Relative changes in utilisation by therapeutic class (according to *British National Formulary* sub-section) across deprivations levels were also quantified.
RESULTS: Approximately 12 million prescription items during 2010–2012 were assessed, corresponding to a crude population mean of 2.2 items/1000/day. The most deprived women had a prescription rate almost three times that of the least deprived men (1.21 vs 3.09 items/1000/day, $p<0.001$ for comparison); the prescription rate also steadily increased with age, from 1.6 items/1000/day for 0–9 year olds to 5.03 items/1000/day for 90+ year olds. When adjusted for age/sex, patients in the least deprived quintile received antibiotics at a rate 29.0% lower than those in the most deprived quintile (incident rate ratio: 0.71, 95% confidence interval: 0.68–0.75). Among antibiotic classes, the differential in prescription rates across levels of deprivation ranged from 3.3% for tetracyclines to 12.0% for metronidazole.
CONCLUSION: Bridging the gaps within inequality is an important goal for the public health agenda. The correlation between socioeconomic deprivation and chronic disease has been established, but the relationship with acute illness, such as infection, has been less clear. Deprivation was found to correlate with increased rates of antibiotic utilisation in Scotland, which may have significant implications for targeting future antimicrobial stewardship and public health campaigns.
Published in J Antimicrob Chemother 2013 Oct 31. [Epub ahead of print]. http://dx.doi.org/10.1093/jac/dkt439

38. The use of corticosteroids in community acquired pneumonia: a retrospective study in a sample of lebanese adult patients. *Rola Al-Wazzan, Pharm. D.*[1], Souraya Domiati, Pharm.D., MS[2], Wael El-Jaroushe, M.D.[3], Abdalla El-Lakany, Ph.D.[4]; (1) Beirut Arab University, Beirut, Lebanon (2) Faculty of Pharmacy, Department of Pharmacology and Therapeutics, Beirut Arab University, Beirut, Lebanon (3) Pulmonary and critical care department, Makassed General Hospital, Beirut, Lebanon (4) Faculty of Pharmacy, Pharmacy Practice Department, Beirut Arab University, Beirut, Lebanon

OBJECTIVES: The debate about the efficacy of corticosteroids in the treatment of Community-Acquired Pneumonia (CAP) is still a long-standing dilemma. Accordingly, this study was conducted to evaluate the effect of corticosteroids as an adjunctive therapy on the treatment of CAP in a group of Lebanese adults. The effect of corticosteroids' administration was appraised using the following indicators: mortality, recurrence, ICU admission and the length of stay in hospital (LOS).

METHODS: A retrospective analysis was performed by reviewing all patients files admitted to a Lebanese Hospital between 2012 and 2013. All patients who were on steroids prior to admission or had an indication for steroid use were excluded, except for patients having asthma or COPD. Results were analyzed using Megastat for excel.

RESULTS: Patients were mainly with low and moderate mortality risk according to both CURB-65 and the pneumonia severity index (PSI). Patients were categorized into three groups; group 1: CAP patients who were given steroids yet they have no indication, neither COPD nor asthma, for its use (31%), group 2: CAP patients who were given steroids and they have an indication for its use (29.8%), and group 3: CAP patients who had no indication for steroid use and weren't given steroids (39.2%). Mortality was significantly higher in group 1 when compared to both groups 2 and 3 with p-values <0.02. Recurrence was significantly higher in group 2 when compared to group 1 with a p-value=0.02. As for ICU admission, it was significantly higher in group 1 than in group 3 with a p-value=0.01. Similarly, LOS was significantly longer in group 1 than group 3 with a p-value=0.0028.

CONCLUSION: The study results showed that corticosteroids, when given without having an indication for their use, increase mortality, recurrence, ICU admission, and LOS.

39. Resistance of *Escherichia coli* urinary isolates in emergency department (ED)-treated patients from a community hospital. *Virginia Fleming, Pharm.D., BCPS*[1], Robin Southwood, Pharm.D., BCPS, CDE[1]; (1) Department of Clinical and Administrative Pharmacy, University of Georgia College of Pharmacy, Athens, GA

OBJECTIVES: Antibiograms report institution specific resistance data for use when making empiric antibiotic decisions, but may not represent the true resistance rates in subpopulations within the hospital since they are cumulative. Guidelines for treatment of uncomplicated UTIs provide Escherichia coli (E.coli) resistance thresholds for two commonly prescribed agents, sulfamethoxazole-trimethoprin (SMX-TMP) and the fluoroquinolones. Rates from our hospital antibiogram exceed these thresholds. The objective was to determine if E.coli resistance rates in patients seen and discharged from the emergency department (ED) differed from those reported on the cumulative antibiogram. Patients were also characterized as community-acquired or health-care associated UTI (CA-UTI or HA-UTI) to evaluate if difference in resistance were seen.

METHODS: Patients with a positive urine culture treated for UTI and discharged from the ED of a community hospital were reviewed. Patients who required admission, were pregnant, < 18 years, or who returned within 7 days with the same pathogen on culture were excluded. Resistance rates of E.coli were determined and compared to the hospital antibiogram. CA-UTI and HA-UTI groups were also compared to each other and to the hospital antibiogram.

RESULTS: Of the 308 screened, 217 patients were included. One-hundred seventy patients were CA-UTI and 47 were HA-UTI. E.coli resistance to levofloxacin was 13.5% in the total population, 9.2% in CA-UTI, and 38.5% in HA-UTI compared to 26% on the antibiogram. E.coli resistance to SMX/TMP was 26.9% overall, 25.2% in CA-UTI and 34.6% in HA-UTI compared to 27% on the antibiogram.

CONCLUSIONS: E.coli resistance to levofloxacin was lower in the ED subgroup than on the hospital antibiogram, while SMX/TMP rates were not significantly changed. CA-UTI patients showed less resistance to both agents compared to HA-UTI patients. E.coli resistance to levofloxacin was especially improved in CA-UTI ED patients, where it remained below the 10% threshold set by IDSA guidelines.

Medication Safety

40. A cross sectional observational study of prescription pattern of gastro-protective drugs with non-steroidal ANTI-inflammatory drugs in Nilgiris, India. *Roopa Basutkar, M.Pharmacy*[1]; (1) Department of Pharmacy Practice, JSS College of Pharmacy, Ooty, India

OBJECTIVES: To investigate the prevalence of concomitant use of GPDs in patients treated with NSAIDs and GPDs in recommended dose and frequency as prophylaxis. And also to know the association between risk factors and prescription of GPDs in patients treated with NSAIDs.

METHODS: Study was a prospective, observational, cross-sectional survey. Data from patients with prescription of NSAIDs at the out-patient departments of secondary care Hospital, Nilgiris, India were collected in a specially designed proforma for a period of 45 days. Analysis using χ^2 tests for discrete variables. Factors that might be associated with prescription of GPD with NSIADs were assessed in multiple logistic regression models

RESULTS: Three hundred and three patients were included in this study, and the rate of GPD prescription was 89.1%.Most of the patients received H2-receptor antagonist, and, to a lesser degree, antacid and proton pump inhibitor. Patients with history of GI ulcer/bleeding were much more likely to be co-prescribed GPD than those who had no history of GI disorders .Compared with patients who were managed in general outpatient clinic, those managed in Secondary care hospital in Nilgrisis, India were more likely to receive GPD.

CONCLUSION: The prescription rate of GPD with NSAIDs is high. Patients were prescribed with H2RA with dose of 150 mg twice daily, which are not effective in reducing the risk of NSAIDs induced gastric ulcer. Only the frequency of NSAIDs prescription was considered significant determinant for the co prescription with GPAs in patients who are < 65 years and ≥ 65 years old.

41. Has the quality of reporting improved for published case reports of adverse drug events? *Evan A. Williams, Pharm.D. Candidate*[1], Sandra L. Kane-Gill, Pharm.D., M.Sc., FCCM, FCCP[1]; (1) University of Pittsburgh School of Pharmacy, Pittsburgh, PA

OBJECTIVES: A previous study reported a highly variable quality of adverse drug event (ADE) related case reports published between the mid-1970's to mid-1990's. We evaluated if the quality of ADE case reporting improved between 2000 and 2013. Our study objectives were to evaluate case report completeness (patient demographics, drug information, ADE details) for recently published cases and to assess the influence of journal specialty on reporting.

METHODS: Journal selection was based on the highest impact factor and journals having a clinical focus that publish case reports. A MEDLINE search was completed to identify ADE-related case reports from journals representing critical care medicine (n=4), general medicine (n=6), nursing (n=2), and pharmacy specialties (n=6). Case report selection was the 5–8 most recent publications per journal. Each article was assessed by two reviewers independently, using a standardized form of case report details (23 variables) used in the previous study. Data were compared between reviewers and a third independent reviewer reconciled differences.

RESULTS: 108 case reports were evaluated in 18 journals representing critical care medicine (n=30), general medicine (n=36), nursing (n=10), and pharmacy specialties (n=32). Comparing our results to the previous study, improvement occurred in 18 of 23 variables contributing to reporting completeness ($p<0.05$). Most improvement was observed for reporting of patient characteristics, whereas drug characteristics demonstrated mixed results. Reporting completeness decline occurred for ADE mechanism and route of administration for recently published cases. Journal specialty comparison indicated pharmacy journals were most improved. Use of an ADE objective causality tool increased significantly (0.7% previous publication vs 23% current evaluation, $p<0.001$), mostly in pharmacy journals.
CONCLUSION: Significant progress was made in recent ADE case report completeness, therefore suggesting improved quality; however continued improvement is needed to provide readers consistent and necessary details. Standardized guidelines for publishing ADE case reports should be developed and implemented across all specialties.

42. Safety monitoring of ophthalmic biologics: analysis of pre and post-marketing safety data. *Ana Penedones, M.Sc.*[1], Francisco Batel-Marques, Pharm.D., Ph.D.[2]; (1) Pharmacovigilance Unit of the Centre Region of Portugal, AIBILI, Association for Innovation and Biomedical Research on Light and Image, Coimbra, Portugal; (2) School of Pharmacy, University of Coimbra, Coimbra, Portugal
OBJECTIVES: This study characterize the safety of ophthalmic biologics studying their associated iatrogenic actions in both pre and post-marketing settings.
METHODS: Three ophthalmic biologics were identified: pegaptanib, ranibizumab and aflibercept. A literature search was performed in Medline and Cochrane Library up to May, 2013 to identify pre-marketing phase III randomized controlled trials, all post-marketing clinical trials and published case reports involving adverse reactions to study pre and post-marketing settings. Additionally, all European spontaneous reports of adverse drug reactions available up to May, 2013 were analysed. Ocular adverse events (AEs) and those related with injection procedure, systemic AEs and those related with systemic inhibition of vascular endothelial growth factor (VEGF) were documented. Data were analysed using descriptive statistics.
RESULTS: Ocular AEs were more frequent than systemic AEs, being the most numerous 'eye pain' and 'ocular haemorrhage'. 'Vitreous floaters' and 'increased intraocular pressure' were statistically more significant compared to control group. Some AEs such as "endophthalmitis" were related to injection procedure. None of the systemic AEs, including those related with systemic inhibition of VEGF, were significant. The post-marketing safety study confirmed the incidence of ocular EAs previously identified. New safety concerns were identified such as 'retinal pigmented epithelium tears', 'hypersensitivity reactions' and 'intraocular inflammation'. Numbers of 'deaths' and 'strokes' were the most reported systemic AEs during clinical practice.
CONCLUSION: These results suggest that additional investigation is still needed in order to confirm and to identify the risks of these drugs' treatment including the incidence of some AEs such as systemic events to characterize ophthalmic biologics safety practice.

43. Evaluation of drugs removed from the United States market from 2000 to 2013. *Gamal Hussein, Pharm.D.*[1], Meghan Weller, Pharm.D. Candidate[1,2], Kendall Redmond, Pharm.D. Candidate[1,2], Brittany Kirby, Pharm.D. Candidate[1,2], Kristen Grigsby, Pharm.D. Candidate[1,2], Ramie Fathy, B.A. Student[2]; (1) Department of Pharmacy Practice, South College School of Pharmacy, Knoxville, TN (2) Department of Molecular Biology, Princeton University, Princeton, NJ
OBJECTIVES: This study was conducted to collect and analyze data on prescription drugs removed from the United States market from 2000 to 2013.
METHODS: Information was initially obtained from the FDA website and then augmented with data from primary literature. Medline was the primary bibliographic database utilized with withdrawn drug names as keywords. Inquiry was also done on drugs that were later reinstated and drugs that only had a single dosage form removed from the market.
RESULTS: A total of 26 drugs were withdrawn from the market during the time period researched. Three drugs were withdrawn then reinstated and five drugs had a certain dosage form withdrawn. The top three drug classes removed were: biological response modifiers (19.2%), gastrointestinal agents (15.3%), and psychotropic agents (15.3%). The top three reasons drugs were withdrawn from the market were cardiotoxicity, hepatotoxicity, and stroke. Of the agents withdrawn the average time on the market was 9.0 years $\pm$ 6.2. The median and mode were 8.5 and 4.0 years respectively. These were calculated removing the outliers which are propoxyphene (52.0 years) and pemoline (30.3 years).
CONCLUSION: It appears that the top classes of drugs withdrawn from the market and the reasons for removal have changed in the past 13 years as compared to earlier findings by others. Reported prolonged periods of drugs in the market before removal may necessitate a strict monitoring of both efficacy and toxicity once drugs are approved.

44. Retrospective review of bleeding incidence associated with concomitant use of warfarin and selective serotonin reuptake inhibitors (SSRIs) in a veteran population. *Thanh-Nga Nguyen, Pharm.D.*[1], Jennifer Bird, Pharm.D., BCPS, CACP[1], Rona Furrh, Pharm.D., BCPS[1], Chanda Jones, Pharm.D., BCPS[1], Chris Gentry, Pharm.D., BCPS[1]; (1) Oklahoma City Veterans Affairs Medical Center
OBJECTIVES: Both SSRIs and warfarin have independently been associated with bleeding but have distinct pharmacodynamic effects on different aspects of clotting physiology. Their concomitant use may increase the risk for bleeding beyond that of either agent alone. Research assessing adverse events associated with the concomitant use of warfarin and SSRIs is limited. We aimed to define the bleeding incidence associated with the concomitant use of warfarin and SSRIs in our veteran population.
METHODS: This retrospective cohort study evaluated and stratified bleeding events that occurred in veterans taking warfarin in the presence of an SSRI vs those taking warfarin alone between 10/1/2009 and 9/30/2011. Events were further stratified as major or minor, and bleed risk was assessed using the Outpatient Bleeding Risk Index (OBRI) prediction score.
RESULTS: We identified 3153 veterans who were prescribed warfarin, of which 527 were also prescribed an SSRI. Baseline characteristics were similar between groups with the exception of concomitant use of salicylic acid derivatives (5 in warfarin-SSRI vs 2 in warfarin, $p=0.013$). A total of 215 bleeding events were reported. They were more likely to occur in veterans who were taking warfarin along with an SSRI than in veterans who were taking warfarin alone (10.4% vs 6.09%, $p=0.0006$). No statistically significant difference between study groups was noted in major bleeding rate or OBRI scores.
CONCLUSION: Concomitant use of warfarin and SSRIs was associated with an increased risk of bleeding events compared to warfarin use alone. The discrepancy in the use of salicylic acid derivatives between studied groups may be due to its infrequent use in the veteran population. While further research is needed to confirm our findings, providers are encouraged to closely monitor for bleeding in veterans taking warfarin and an SSRI concomitantly.

Oncology

45E. A retrospective review of pamidronate dosing for the inpatient management of hypercalcemia at the Ottawa hospital. *Nazanin Malekmohammadi, Pharm.D*[1]; (1) Pharmacy department, Fraser health-surrey memorial hospital, Surrey, BC, Canada
OBJECTIVES: The primary objective of this study is to identify the proportion of patients who did not receive a pamidronate dose in accordance with existing TOH recommendations for

hypercalcemia. Other objectives will compare efficacy and safety outcomes between patients who received pamidronate doses in accordance to recommendations and those who did not.
METHODS: Retrospective, observational study involving the review of electronic patient records.
RESULTS: Out of the total prescribed pamidronated doses, 69% (69 out 101) were not in accordance with TOH recommendations. Of these non-recommended doses, 97% (67 of 69) were higher doses than recommended. There was no significant difference in the rates of resolution of hypercalcemia between those who received a recommended dose of pamidronate vs those who did not. (60% vs 74%, respectively; p=0.318). There was no significant difference in rates of hypocalcemia between the 2 groups (17% vs 27%, respectively; p=0.309). Patients receiving pamidronate at the General Campus and who were treated on the oncology service were significantly more likely to receive a non-recommended dose of pamidronate (OR 4.33 p=0.011 and OR 5.31, respectively; p=0.035).
CONCLUSION: The majority of pamidronate doses administered for hypercalcemia were not inaccordance with existing TOH recommendations. Receiving a non-recommended pamidronate dose did not seem to compromise therapeutic efficacy or patient safety.
Presented at the CSHP Annual General Meeting on November 22-23, 2013 in Vancouver, B.C, Canada. Additionally presented at the 9th annual Ottawa hospital patient safety conference in Ottawa Canada, on Oct 29th, 2013.

46. Barriers to medication adherence among patients receiving oral antineoplastic agents. Lindsey Dayer, Pharm.D[1], *Nalin Payakachat, Ph.D.*[1]; (1) College of Pharmacy, University of Arkansas for Medical Sciences, Little Rock, AR
OBJECTIVES: More than 40 oral antineoplastic agents (OAA) are available for > 50 different types of cancer. Poor adherence to OAA has been associated with treatment resistance and inferior disease-free survival. The objectives of this pilot study were to explore factors affecting patient adherence to OAA and observe whether follow-up contact by a pharmacist was associated with increased adherence.
METHODS: This study was a prospective cohort study design conducted in a single public university hospital ambulatory oncology clinic. Eligible patients who received an OAA for > 30 days and/or had completed at least one cycle of an OAA regimen consented to participate to take a self-administered survey which included the ASK-20 (measuring barriers to medication adherence, higher scores represent more barriers) and the European Organization for Research and Treatment of Cancer Quality of Life Questionnaire-C30 (EORTC QLQ-CC30, measuring quality of life (QOL), higher scores represents better QOL). Follow-up contact via mail at 1 and 3 months was sought. Descriptive and regression analyses were employed. The study was approved by the Institutional Review Board.
RESULTS: A total of 29 patients with an average age of 57 (SD = 13) years old participated in this study. The majority were female (79%) and Caucasian (66%). A number of patient's medications (mean = 6.6, SD = 4.2) were positively correlated with the ASK-20 score (mean = 34.8, SD = 8.9) (p=0.01) and was negatively associated with total QOL scores (mean = 72.9, SD = 15.9) (p=0.01). The majority of patients agreed that follow-up with a pharmacist increased their adherence to OAA regimens.
CONCLUSION: An increase in number of medications is associated with increased barriers to medication adherence. Patients' QOL is also negatively related to the increased barriers to medication adherence. Medication consolidation and pharmacist follow-up counseling in ambulatory oncology clinic settings may improve patient adherence to OAA. Future research on this topic in a bigger sample is warranted.

47E. Evaluation of colony stimulating factor use in inpatient and outpatient settings: a retrospective review for appropriateness. *Laurel Aaberg, Pharm.D*[1], Lyndall Calhoun, RPh[1], Ryan Freund, Pharm.D Candidate[1]; (1) Pharmacy, CoxHealth, Springfield, MO
BACKGROUND: Colony stimulating factors (CSFs) represent an integral part of oncology treatment, allowing for fewer chemotherapeutic dose reductions and prevention of cycle breaks. Indications for CSFs continue to evolve to allow more flexibility in provider prescribing. Additional guidance comes from the American Society of Clinical Oncology (ASCO) with updated clinical practice guidelines for the optimal use and manufacturer define parameters for CSF use.
OBJECTIVES: The primary objective of this study is to determine if providers are correctly prescribing CSF's utilizing current guidelines. Secondary objectives include assessing patient characteristics in regards to risk of febrile neutropenia and cost analysis of current prescribing habits.
METHODS: This was a retrospective, cohort medication-use evaluation (MUE) conducted at CoxHealth from August 19th to September 19th, 2013. Inclusion criteria include formulary CSF dispensed by CoxHealth.
RESULTS: In total, 45 patients were included in this study and represented 60 prescriptions throughout the study period. Pegfilgrastim was dispensed 77% of the time (46/60) at CoxHealth. A CSF was dispensed as secondary prophylaxis 57% of the time (34/60). In reviewing chemotherapy regimen risk, 40% of patients were receiving chemotherapy that was considered high risk for febrile neutropenia, followed by 52% and 8% receiving intermediate chemotherapy and low risk chemotherapy respectively. All patients who received chemotherapy for an intermediate risk or low risk chemotherapy had a clinical risk factor that would predispose them to febrile neutropenia.
CONCLUSION: From the data collected it was determined that providers are using CSF appropriately in their patients. All patients with an intermediate or low risk chemotherapy had clinical risk factors that predisposed them to febrile neutropenia. Due to the appropriate use of both products, strategies to provide cost savings is unlikely at this time. Additionally, outpatient oncology staff are correctly dispensing CSF to patients and are adhering to current guidelines.
Presented at the American Society of Health System Pharmacist Midyear Conference, Orlando, FL, December 8–12, 2013.

Pediatrics

48. Unlisenced and off-label prescriptions in pediatrics (combining FDA and Europeen authorizations). *Lydia Rabbaa Khabbaz, Pharm.D, Ph.D*[1], Sandra Berdkan, Pharmacy Resident[2], Aline Hajj, Pharm.D, Ph.D[1], Latife Karam, Pharm.D.[2]; (1) Faculty of Pharmacy, Saint-Joseph University, Beirut (2) Hotel Dieu Hospital, Beirut
OBJECTIVES: Prescribing off-label or unlicensed drugs to children has been described in several studies from North and South America, Australia and Europe. The proportion of hospitalized or outpatient children with at least one off-label prescription drug ranged from 18% to 90% in most studies, and between 0% and 48% for unlicensed drugs. In Lebanon, prescribers follow the FDA recommendations and/or the European guidelines.
METHODS: Our study is a retrospective study conducted in the pediatric department of a Lebanese university hospital, HOTEL DIEU DE FRANCE, to determine the frequency of pediatric prescriptions that are not in accordance with the laws of licensing agencies (FDA and EMA). This study involved 283 children from prematurity to adolescence, divided over chronic diseases, acute diseases and intensive care.
RESULTS: Medications prescribed belonged to 38 therapeutic classes. The number of drugs prescribed for each child ranged between 1–19 drugs (average 3.6). Route of administration mainly concerned the IV route followed by oral, inhalation, rectal, topical routes, intramuscular and subcutaneous injections. Our results indicate that 53.3% of pediatric prescription drugs are either not in line with European legislation or with the FDA laws. 46.8% of prescribed medicines are within the two laws at the same time. Only 14.9% of children received prescriptions that are fully compliant with both laws simultaneously. When the number of drugs is larger, the risk of non-compliance increases.
The therapeutic classes most frequently prescribed without license and/or off label are: antibiotics (28.2% of prescriptions are non-

compliant) > antihypertensive (7.5%) > analgesics = antacids (7.3%)> .anticancer drugs (6.5%) > antiemetic (5.6%) > diuretics (5.5%).
CONCLUSION: Non-compliance seems to be predominant in premature infants and those between 1 and 12 months, in chronic diseases and intensive care unit and among children admitted for cardiovascular reasons and lung diseases.

Pharmacoeconomics/Outcomes

49. Clinical and humanistic outcomes of an in-home clinical pharmacist intervention program. *Natalia Shcherbakova, Ph.D.*[1], Gary Tereso, Pharm.D., BCPS[2], Karen Coderre, Pharm.D., MS, BCPP[2]; (1) Pharmaceutical & Administrative Sciences, Western New England University, Springfield, MA; (2) Health New England, Springfield, MA
OBJECTIVES: To evaluate effectiveness of a 30-day in-home clinical pharmacist program on 30-day all-cause readmission rates, ER visits and outpatient visits as well as assess patient satisfaction with the program.
METHODS: This was a retrospective cohort study of Medicare Advantage members of a regional health plan in 2012. The program consisted of an in-home pharmacist visit to complete medication reconciliation and resolve medication issues with subsequent follow-up telephone calls within 30-day post-visit. In order to be included in the cohort patients had to be continuously enrolled in the health plan 180-day prior to the index date and received the service within 30-day post-index. The index date was defined as a discharge from an acute in-patient facility. Patients who declined to participate or were unable to be contacted served as a control group. A total of 245 patients were included in the cohort: 156 intervention and 89 controls.
RESULTS: There was no difference between the intervention and control groups on key demographic and clinical characteristics: age, gender, pre-index CCI, 180-day pre-index mean medical and pharmacy costs, 180-day pre-index inpatient hospitalizations and pre-index inpatient length of stay ($p>0.05$). The program participants received 301 clinical pharmacist interventions with the most frequent being: medication education (17.6%), coaching for intentional non-adherence (13.6%), medication reconciliation (12.0%) and identification of medication omission (10.0%). There was no difference in 30-day readmission rates, percent of patients with ≥ 1 ER visits, ≥ 1 physician office visit between intervention and control groups ($p>0.05$). Seventy-eight program participants responded to a satisfaction survey with 97% agreeing the pharmacist was helpful and answered all questions, 80% agreeing they modified their routine after the program and 76% agreeing they feel better about talking to their physician and asking questions.
CONCLUSION: Further research is warranted using different study design and larger sample to better understand the impact of the intervention on clinical outcomes.

50. Budget impact of the WHO essential medicines list in a resource-limited Indian charity hospital. *Dixon Thomas, Ph.D.*[1], Rajarajeshwari Byram, Pharm.D[2], Gerardo Alvarez-Uria, M.D., Ph.D.[3]; (1) Pharmacy Practice, RIPER/RDT, Ananatpur, India; (2) RIPER/RDT, India; (3) Infectious Diseases, RDT Hosptial
OBJECTIVES: The World Health Organization (WHO) has been publishing the essential medicines list (EML) since 1977. The EML includes the most efficacious, safe and cost-effective drugs for the most relevant public health conditions worldwide. Cost-effectiveness analysis is performed within each WHO therapeutic groups, but very little is known about budget impact of drugs or therapeutic groups contribute most to the spending of hospitals adopting the WHO EML concept.
METHODS: In this budget utilization study, we describe the annual consumption of medicines in a district hospital in India that limited the list of available drugs according to the WHO EML concept. We had collected information from the hospital database of all medicines issued in the hospital pharmacy from January 11th 2011 to January 10th 2012.
RESULTS: Only 21 drugs comprised 50% of the hospital spending. Anti-infective medicines accounted for 41% of drug spending, especially antiretrovirals to treat HIV infection. Among other therapeutic groups, insulins were the most costly drugs. We identified some medicines used in perinatal care, including anti-D immunoglobulin and lung surfactant, which were used rarely but bore a relative high cost burden.
CONCLUSION: The results of this study indicate that, in Indian charity hospitals adopting the WHO EML, antiretrovirals and antibiotics are the top therapeutic groups for major impact on the drug budget.

Pharmacogenomics/Pharmacogenetics

51E. CYP1A2 genotype and phenotype analysis in a cohort of pharmacy students as a model for teaching pharmacogenomics. *Raquel Ortiz, B.S., Pharm.D. Candidate*[1], Shanna Harris, Pharm.D.[2], Jamie Fairclough, M.P.H., Ph.D., MSPharm[3], Wilton Tran, Pharm.D. Candidate[2], Jim Mitroka, Ph.D.[2]; (1) Lloyd L. Gregory School of Pharmacy, Palm Beach Atlantic University, West Palm Beach, FL; (2) Palm Beach Atlantic University, LLoyd L. Gregory School of Pharmacy, West Palm Beach, FL; (3) Lloyd L. Gregory School of Pharmacy, Palm Beach Atlantic University, West Palm Beach
OBJECTIVES: This study was intended to be an exploratory and instructional project to evaluate the relationship between an individual's genotype and phenotype for the CYP1A2 enzyme, since previous studies have suggested that individuals with the CYP1A2 *1A/*1A genotype may be faster metabolizers of CYP1A2 substrates (such as caffeine) than individuals carrying the *1F allele. It was also used to encourage participation in a P2 pharmacogenomics course.
METHODS: Saliva samples were collected from 15 student volunteers and one professor, immediately following a "caffeine-free" period of 48 hours. Participants were administered 200 mg of caffeine (over-the-counter product) and saliva samples were collected 6 hours after dosing. DNA was extracted from the saliva samples and analyzed by real-time polymerase chain reaction for the presence of the CYP1A2*1A and *1F alleles (genotype). Pre- and post-dose saliva samples were prepared using solid phase extraction and analyzed via high-performance liquid chromatography for caffeine and its metabolite paraxanthine to determine the rate of caffeine metabolism (phenotype).
RESULTS: 9 of the participants were found to have the CYP1A2*1A/*1A genotype and 7 were carriers of the *1F allele. Mean (SD) values for the $t_{1/2}$ of caffeine were 15.1 (14.5) for the *1A homozygous and 9.0 (1.5) for *1F carriers. An independent samples *T*-test demonstrated that there were no statistically significant differences between the two groups [$p=0.980$]. The composite results and implications were presented to the class and the individual results were reported to each volunteer.
CONCLUSION: We conclude that there is no correlation between an individual's genotype and their phenotype in regards to caffeine metabolism in our cohort of volunteers. This could be due to our small sample size or the fact that there were no smokers in our study, since cigarette smoke is a powerful inducer of CYP1A2. The present study was also considered a useful teaching tool, offering students the opportunity to experience pharmacogenomic testing.
Presented at the American Society of Health-System Pharmacists Midyear Clinical Meeting, Orlando, FL, December 10, 2013.

Pharmacokinetics/Pharmacodynamics/Drug

52. Development of an adaptive design for a respiratory virus antiviral clinical trial. *Elizabeth Lakota, Pharm.D./M.S. Candidate*[1], Patrick Smith, Pharm.D.[2], Alan Forrest, Pharm.D.[1]; (1) School of Pharmacy and Pharmaceutical Sciences, University at Buffalo, Buffalo, NY; (2) D3 Medicine, Parsippany, NJ

OBJECTIVES: An investigational antiviral agent is to be studied in adults inoculated with an undisclosed respiratory virus. The objectives of this adaptive clinical trial design are to show proof of concept (efficacy) and efficiently develop an accurate and precise pharmacokinetic/pharmacodynamic model, in adults, which can be translated to children and infants.
METHODS: In the adaptive design, subjects will be studied in 3 equal cohorts with adaptive allocations to dose occurring after cohorts 1 and 2. There are 4 treatment options available: placebo, low dose, medium dose, and high dose (regimens 1, 2, and 3). Regimen 2 is the projected therapeutic dose derived from human pharmacokinetic and animal pharmacokinetic/pharmacodynamic studies. The maximum number of subjects to be enrolled is 66. The primary pharmacodynamic endpoint is reduction in viral area under the curve (AUC) in serum. A Monte Carlo simulation (MCS) of the proposed trial design was performed (50 trials, each with 60 subjects). Population pharmacokinetics were available and the pharmacodynamic model was derived from the class literature.
RESULTS: For good power of proof of concept, we determined that ~1/3 of subjects should receive placebo, with 4, 4, and 8 placebo cases allocated in cohorts 1, 2, and 3. In cohort 1, 8 and 8 subjects received regimens 2 and 3. In cohorts 2 and 3, assignment of the remainder, to regimens 1, 2 or 3, was allocated dynamically. In the 50 trial MCS, power to detect proof of concept was 100% and there was good precision on fitted population pharmacodynamic parameters (se %, for EC50 and Emax, was 34% and 23%).
CONCLUSION: The proposed adaptive design provides both, excellent power for proof of concept and rich pharmacokinetic/pharmacodynamic data, using a fairly small number of subjects. With this data, a precise pharmacokinetic/pharmacodynamic model can be developed and then translated to children and infants.

53. Effectiveness of vancomycin dosing by pharmacists in a community hospital. *Kevin Forbush, Pharm.D., BCPS*[1]; (1) Pharmacy Department, Central Maine Medical Center, Lewiston, ME
OBJECTIVES: Previous literature evaluated vancomycin dosing using nomograms, however, exclusion criteria in these trials limits their external validity. This retrospective, observational study measured the effectiveness of a pharmacist directed dosing service for vancomycin without exclusion criteria. The primary endpoint was the frequency of attaining an initial trough level in the range of 10–20 μg/mL. Secondary endpoints were achieving an indication-based goal trough range, measurement of nephrotoxicity incidence, and identification of factors associated with therapeutic troughs.
METHODS: Medical records of patients treated with vancomycin who had at least one trough level measured between October 1 and November 30, 2013 were reviewed. Dosing was based on population pharmacokinetic calculations and clinical judgment of pharmacists with no < 5 years of experience. Patient demographics, serum creatinine, and dosing data were collected.
RESULTS: 93 patients had an initial trough. Initial trough levels of 10–20 μg/mL were achieved in 66.7% of cases. Achievement of an indication based goal trough range occurred in 32.3% of patients. 48.4% and 19.4% of patients had levels below and above the goal trough, respectively. The nephrotoxicity rate was 6.5%. Factors associated with level over 20 μg/mL included obesity, omission of a loading dose, and increased dosing frequency. Administering a loading dose was the only factor associated with an initial trough level in effective range.
CONCLUSION: Vancomycin dosing based on population pharmacokinetics by pharmacists with substantial clinical experience led to initial trough levels between 10 and 20 μg/mL in the majority of cases. Further understanding of factors leading to trough levels out of range may produce better achievement of goal range based on indication. Loading doses increased the likelihood of therapeutic trough levels in the population studied.

54E. Trimethoprim/Sulfamethoxazole pharmacokinetics in hemodialysis patients. *Shaffeeulah Bacchus, Pharm.D.*[1]; (1) Pharmacy Department, Yankee Alliance Inc, Andover, MA
OBJECTIVES: To determine trimethoprim/sulfamethoxazole pharmacokinetics in HD patients in thrice weekly HD sessions utilizing contemporary technology and dialyzers.
METHODS: Twelve anuric patients (3M; 9F) received an infusion of 5 mg/kg (pre-HD weight) trimethoprim/sulfamethoxazole, based upon trimethoprim component, given intravenously over 60 minutes post HD. Blood samples were collected at 0, 30 and 60 minutes post trimethoprim/sulfamethoxazole infusion. Two days later patients received a standard HD session (180 minutes, Optiflux® F200NR, BFR = 350–450 mL/minutes, DFR = 800 mL/minutes) and blood samples were taken immediately pre HD, intra HD (30, 60, 120, 180 minutes) and post HD (15 and 30 minutes) to characterize trimethoprim/sulfamethoxazole, HD clearance and rebound. Sample assays and monoexponential PK were conducted independently at AMSCOP, Long Island University, utilizing HPLC and WinNonLin version 5.2, respectively. trimethoprim/sulfamethoxazole clearance (CL) values were normalized to 1.73 m^2 body surface area.
RESULTS: Patients were 49.6 ± 12.9 yrs old and received 388.8 ± 44.4 mg trimethoprim and 1943.8 ± 222.1 mg sulfamethoxazole respectively. Trimethoprim concentrations (μg/mL) post infusion, Pre HD, End HD, and 30 minutes post HD were 3.7 ± 1.0, 1.13 ± 0.51, 0.71 ± 0.34 and 0.9 ± 0.41 μg/mL respectively. Sulfamethoxazole concentrations (μg/mL) post infusion, Pre HD, End HD, and 30 minutes post HD were 98.64 ± 23.0 μg/mL, 8.70 ± 2.42 μg/mL, 2.75 ± 1.24 μg/mL and 3.33 ± 1.5 μg/mL respectively.
CONCLUSION: We conclude that trimethoprim/sulfamethoxazole 5 mg/kg IV post HD would not provide adequate coverage in HD patients. Additional dosing to achieve MIC coverage of ≤ 2/38 (trimethoprim/sulfamethoxazole) in μg/mL may be needed.
Presented at American Society of Nephrology, San Diego CA, October 27 to November 01, 2009.

55. Rapid attainment of AUC24/MIC > 400 in patients receiving vancomycin for MRSA infections. *Larry Bauer, Pharm.D.*[1]; (1) UW Department of Pharmacy, University of Washington, Seattle, WA
OBJECTIVES: Compare the AUC_{24}/MIC ratio for initial vancomycin doses selected by treating clinicians using estimated population parameters and actual computed parameters to those attained after individualized adjusted doses were prescribed.
METHODS: 32 patients were included using the following criterion: treating clinicians self-identified vancomycin treatment goal of AUC_{24}/MIC>400, culture-documented MRSA infection, MIC measured using the Etest method, vancomycin and serum creatinine concentrations during therapy. Estimated population AUC_{24} was determined using the following equation: $AUC_{24} = D/\{[(CrCl_{est} \cdot 0.79) + 15.4] \cdot 0.06\}$, where D is vancomycin dose in mg for a 24 hour period and $CrCl_{est}$ is estimated creatinine clearance in mL/minutes [Cockcroft-Gault for nonobese patients (within 30% IBW) and Salazar-Corcoran for obese patients (> 30% over IBW)]. Estimated population MIC for MRSA was the average institutional value for this organism during the past 6 months. Actual and adjusted AUC_{24} values were computed using a Bayesian computer program and a measured trough vancomycin concentration 2–5 doses after initial dosing or a dosing adjustment began. Initial vancomycin doses were determined by the treating clinicians, and adjusted vancomycin doses were prescribed to attain treatment goals.
RESULTS: While treating clinicians expected all doses initially prescribed to patients to attain the AUC_{24}/MIC treatment goal, only 53% of the vancomycin dosage regimens were expected to achieve goal using population estimates for AUC_{24} and MIC. For initial dosing of vancomycin, only 38% of patients actually achieved the goal of AUC_{24}/MIC>400. Subsequently, the adjusted dosage achieved the treatment goal in all cases (100%; $p<0.05$).
CONCLUSIONS: Vancomycin doses can be rapidly individualized to attain a widely-used pharmacokinetic/pharmacodynamic

goal. Clinician-prescribed initial doses or doses computed using population estimates will not achieve this goal for all patients.

56. An analysis of vancomycin dosing methods in a community hospital cohort. *Bradley W. Shinn, Pharm.D.*[1]; (1) The University of Findlay College of Pharmacy, Findlay, OH
OBJECTIVES: Vancomycin (VANC) is commonly used to treat a variety of Gram-positive infections. MICs to VANC have been increasing, which has decreased the effectiveness of VANC for the treatment of many serious infections. A variety of VANC dosing strategies are utilized, including pharmacokinetic (PK) equations, algorithms, nomograms, and computer programs. The objectives of this study are as follows: (i) to determine the effectiveness of the Global RPh computer program based on the initial serum concentration, and (ii) to compare the total daily VANC dose determined by this method to a calculated empiric total daily dose utilizing three other published dosing methodologies.
METHODS: This study included a total of 60 randomly-selected hospitalized patients who were intiated on VANC therapy. Patients were originally dosed using the Global RPh dosing program. Then, using demographic data at the time of hospital admission, an alternative dosing regimen was retrospectively determined using three other published VANC dosing methods, including a nomogram published by the Detroit Medical Center (DMC), which has been validated in the clinical setting.
RESULTS: A total of 30 patients (50%) had a usable VANC serum concentration reported. Four patients (13.3%) achieved a serum concentration within the targeted range. Eleven patients (36.7%) achieved a serum concentration in the range of 13–22 μg/mL. The total daily dose based on Global RPh was then compared to calculated total daily doses using alternative dosing methodologies.
CONCLUSION: Two alternative methodologies resulted in total daily doses comparable to the Global RPh method. Use of the DMC nomogram would have resulted in higher initial doses and, based on published data, would have resulted in a much higher number of patients achieving a therapeutic VANC concentration. Use of the Global RPh computer program may not result in an adequate number of patients achieving therapeutic VANC concentrations in clinical practice.

Pulmonary

57. A comparison of adherence and persistence with inhaled therapies between patients with asthma and chronic obstructive pulmonary disease in the United Kingdom. *Jordan Covvey, Pharm.D., BCPS*[1], Alexander Mullen, B.Sc. (Hons) Pharm, Ph.D., MRPharmS[1], Blair Johnston, Ph.D.[1], Fraser Wood, MBChB, MRCP[2], Anne Boyter, Ph.D., MRPharmS[1]; (1) Strathclyde Institute of Pharmacy and Biomedical Sciences, University of Strathclyde, Glasgow, UK; (2) Forth Valley Royal Hospital, Larbert, UK
OBJECTIVES: To describe and compare adherence and persistence with inhaled therapies in patients with asthma or COPD in the United Kingdom (UK).
METHODS: A retrospective prescribing database cohort was obtained from 44 general practitioner surgeries in National Health Service (NHS) Forth Valley Scotland. All patients with physician-diagnosed asthma or COPD who received inhaled therapy between January 2008 and December 2009 were included. Four classes of inhaled therapy were assessed: inhaled corticosteroids, long-acting beta-agonists, combination therapy inhalers and long-acting muscarinic antagonists. Adherence was calculated using the medication possession ratio (MPR) and persistence was determined using Kaplan-Meier survival analysis for the time to discontinuation (TTD) over one year. Two step-wise logistic regressions were performed to assess the contribution of diagnosis to adherence and persistence.
RESULTS: 12,923 patients were included in the analysis: 10,177 patients with asthma and 2746 patients with COPD. 24.8% of medication episodes for asthma and 45.0% of medication episodes for COPD were classified as having an adequate medication supply (MPR of 80–120%). The overall median TTD was 90 days (IQR: 50–184 days) for patients with asthma and 115 days (58–258 days, comparison $p<0.001$) for patients with COPD. Patients with COPD were found to be more likely to achieve an MPR of at least 80% (OR: 1.32, 95% CI: 1.20–1.46), but had a similar likelihood of persistence at one year to patients with asthma.
CONCLUSION: Patients with respiratory disease are particularly at risk for non-adherence due to polypharmacy and complex inhaled therapy regimens and inhaler devices. Medication adherence and persistence with the treatment for respiratory disease in the UK was found to be low. There is suggestion that patients with COPD may display more adherent behaviours than patients with asthma.

Transplant/Immunology

58. Effects of pioglitazone on blood glucose and inflammatory markers of diabetic kidney transplant patients: a randomized controlled clinical trial. *Ali Kharazmkia, Ph.D. of Clinical Pharmacy*[1]; (1) Department of Clinical pharmacy, School of Pharmacy, Lorestan University of Medical Sciences, Lorestan University of Medical Sciences, Khorramabad, Iran
OBJECTIVES: The aim of this study was to assess the effects of Pioglitazone on blood glucose control and inflammatory biomarkers in diabetic patients receiving insulin after kidney transplantation.
METHODS: In a triple-blind randomized placebo-controlled trial, 62 kidney transplanted diabetic patients (40 men and 24 women) were followed for 4 months after randomly assigned to placebo group and Pioglitazone group (30 mg/day). All of the patients continued their insulin therapy irrespective of the group that they were assigned to evaluate the effects of addition of pioglitazone on blood glucose and inflammation biomarkers such as C-reactive protein (CRP), high sensitivity CRP (hs-CRP), Erythrocyte sedimentation rate(ESR) and serum Interleukin-18 levels.
RESULTS: At baseline, there were no statistically significant differences in glycemic control levels lipid profile, allograft function and inflammatory markers between two groups. After 4 months of intervention, along with significant improvement in HbA1c in Pioglitazone group, daily insulin NPH requirements also decreased significantly. Although changes in Fasting blood glucose(FBS) have not demonstrated statistically significant differences among the groups but changes of Hemoglobin A1c(HbA1c) during 4-month follow up in Pioglitazone group show improvement in glucose control whereas HbA1c in placebo group increased by 0.3% ($p=0.0001$). There were statistically significant improvement in serum Triglycerides, total cholesterol, LDL and HDL in Pioglitazone group. Moreover, at the end of study the ESR, CRP and hs-CRP were significantly lower in Pioglitazone group ($p=0.03$, 0.0001 and 0.01). Regarding the serum level of IL–18, the changes were not statistically different at baseline and also at the end of study between two groups but it has a decreasing trend of serum level in Pioglitazone group ($p=0.002$).
CONCLUSION: Administration of Pioglitazone in addition to insulin in diabetic kidney transplant patients not only improved glycemic control (evidenced by HbA1c) and reduced daily insulin requirement but also significantly decreased inflammatory markers that may have a positive impact on overall cardiovascular events and mortalities beyond glycemic control.

Clinical Pharmacy Forum
ADR/Drug Interactions

59. Adverse Drug Reactions in Primary Care-Wazarat center. *Mohannad AlSallal, Pharm.D.*[1], Ayla Tourkmani, B.Sc. Pharm, Pharm.D., BCPS[1]; (1) Family and Community Medicine, Prince Sultan Military Medical City, Riyadh, Saudi Arabia
OBJECTIVES: We aimed to determine the number and to describe the characteristics, outcomes, causality, severity, seriousness and preventability of ADRs in primary care setting.

METHODS: Adverse Drug Reactions (ADRs) reported by the a primary care department at prince sultan military city in Saudi Arabia. All primary care ADRs reported from 2011 till 2012 were retrospectively reviewed. We use Naranjo causality assessment scale, ASHP severity assessment and Schumock and Thornton preventability scale. ADR defined by WHO as Any response to a drug that is noxious and unintended and that occurs at normal doses used in humans for prophylaxis, diagnosis, therapy of disease, or for the modification of physiologic function, excludes therapeutic failures, overdose, drug abuse, noncompliance, and medication errors.
RESULTS: Our finding results showed that 26 adverse drug reactions (ADRs) reported, with no fatal or permanent harm reports, female patients are affected by 22 repots (85%). The median age were 48 years range from 3 months to 76 years. 53% of ADR due to antidiabetic agents (insulin and oral hypoglycemic agents) and antihypertensive agents (ACEI, ARBs, BB and diuretics).
CONCLUSION: Based on the results that 53% of ADRs due to antidiabetic and antihypertensive agents, we recommend the following: 1. Need proper patient counseling regarding ADR of these medications and record of ADR by clinician is essential to detect, prevent and manage the ADR accordingly. 2. Involve patients with chronic diseases to follow up and monitor undesirable side effect and distribute patients education materials about these medication by using lexi-comp (Arabic language) as a tool of education. 3. Encourage using the above scales (ASHP, Naranjo, Shumock-Thornton) to detect severity, causality and preventability of ADRs.

Adult Medicine

60. Evaluation of appropriate use, safety, and cost-saving opportunities with epoetin alfa in dialysis patients treated for anemia of chronic kidney disease. *Kenneth Boley, Pharm.D.*[1], Pamela Evans, Pharm.D.[1]; (1) St. Dominic - Jackson Memorial Hospital, Jackson, MS
OBJECTIVES: A medication use evaluation of epoetin alfa was conducted to identify opportunities for improving patient care and safety. The secondary purpose was to recognize opportunities for cost containment.
METHODS: A retrospective chart review was conducted for thirty-five inpatients with the diagnosis of chronic kidney disease from July 1st through October 31st of 2013 at St. Dominic – Jackson Memorial Hospital. Data collected included epoetin alfa dose, schedule of administration, route of administration, contraindications, hemoglobin level, ferritin level, transferrin saturation, and status of current iron therapy regimen.
RESULTS: Hemoglobin level was < 11 g/dL in 100% of patients receiving epoetin alfa. However, epoetin alfa was administered to 28.5% of patients defined as having uncontrolled hypertension. Ferritin and TSAT were ordered for 25.7% and 17.1% of patients, respectively. A smaller percentage, 11.4%, had iron therapy initiated or continued during hospitalization. Epoetin alfa was administered intravenously in 71% of patients reviewed. Changing to the subcutaneous route and reducing the dose by 30% could produce a cost-savings of $2491 over 4 months. Doses exceeded 100 Units/kg in 57% of patients. If these patients received an adjusted dose of 100 Units/kg, the potential cost savings would be $2883 over the 4 month review period.
CONCLUSION: Although appropriately prescribed with regard to hemoglobin levels, a significant percentage of patients received epoetin alfa with uncontrolled hypertension. Considering the prominence of iron deficiency in anemia of chronic kidney disease, opportunities for improving patient care include routinely assessing iron status and continuing or initiating iron replacement therapy. Finally, adjusting epoetin dose and requiring the subcutaneous route of administration could result in significant cost-savings.

Ambulatory Care

61. Effects of a pharmacist-managed telephone-based lipid clinic in a Veteran population. *Courtney Pawula, Pharm.D.*[1], Shannon Mentzel, Pharm.D.[1]; (1) Phoenix VA Health Care System, Phoenix, AZ
OBJECTIVES: The purpose of this study is to compare differences in mean low-density lipoprotein (LDL) between Veterans enrolled in a pharmacist-managed telephone lipid clinic and Veterans who received usual care.
METHODS: In March 2009, Phoenix VA Health Care System clinical pharmacists began to manage Veterans with diabetes and a LDL > 100 mg/dL using a telephone visit model. Included in this retrospective, chart review study were Veterans with a diagnosis of diabetes enrolled in a selected primary care (PC) clinic with LDL values > 100 mg/dL prior to 3/1/2010. This study reviews the outcomes of the clinical pharmacist interventions in these Veterans compared to usual care of Veterans with diabetes and a LDL > 100 mg/dL. Study group assignment to the intervention group was for Veterans that had any clinical pharmacy intervention between March 2010 and October 2011. Secondary objectives included the percent of Veterans who reached LDL goal, number of interventions, adherence, and change in LDL from baseline.
RESULTS: 132 Veterans were screened for inclusion. Of the 63 included, 37 were in the clinical pharmacist group (CP) and 26 were in the usual care group (UC). Baseline characteristics were similar between groups. Baseline LDL was 134.3 for the clinical pharmacist group and 120.3 for the usual care group (p=0.0533). The final LDL was 115.9 and 120.9 for the clinical pharmacist and usual care groups, respectively (p=0.4581). There was a significant decrease in LDL in the pharmacist group from baseline (p=0.004).
CONCLUSIONS: This study showed that clinical pharmacists can have a role in improving Veterans' lipid management in a PC clinic as compared to usual care. Future directions of this study include expansion of this service to more Veterans and PC clinics, determining the long-term outcomes, and statin dose relationship related to outcomes.

62. Medication reconciliation during transition of care: from hospital discharge to first refill. *Lauren Miller, Pharm.D.*[1], Brian L. Erstad, Pharm.D., FASHP, FCCM, FCCP, BCPS[1], Kurt Weibel, Pharm.D., M.S.[2]; (1) The University of Arizona College of Pharmacy, Tucson, AZ; (2) The University of Arizona Medical Center - University Campus, Tucson, AZ
OBJECTIVES: The purpose of this project was to evaluate the impact of a transition-of-care pharmacist on medication errors and hospital readmission rates.
METHODS: One pharmacist coordinated patient discharges on two inpatient units with historically high readmission rates from August 2012 through July 2013. The pharmacist attended interdisciplinary discharge coordination meetings, ensured appropriate discharge orders, facilitated the filling of medications including coordinating prior authorizations and making sure patients could afford medications, and educated patients on discharge medications and disease states.
RESULTS: A total of 1058 discharges were coordinated by the pharmacist. The pharmacist was involved in the education of 1011 patients and performed 452 interventions. The pharmacist intercepted 450 medication errors, 439 of which were prescribing errors. There was no difference in readmission rates per month between the two inpatient units (p=0.1656). There were more readmissions per month (median 27.5 vs 25, p=0.0369) and discharges per month (median 156.5 vs 148, p=0.0073) in the previous control year vs the year during pharmacist involvement. The pharmacist assisted in coordinating insurance benefits for 25% of the patients being discharged. Interventions made by the pharmacist to improve discharge management included: change an improper medication dose or quantity (11.3%), change an inappropriate prescription for a medication (5.1%), start an omitted medication (23.5%), prevent a drug interaction (3.3%), avoid duplication of therapy (15.7%), prevent multiple discharge problems (16.4%), correct insurance issues related to medication coverage(12.2%), and resolve other problems (12.6%). The most common medication classes involved were: antimicrobials (9.1%), anticoagulants (8%) diabetic medications (3.8%), other drug class (24%), and multiple drug classes (35%).

CONCLUSION: A transition-of-care pharmacist is in a unique position to educate patients on hospital discharge, to intercept a substantial number of medication errors, and to resolve insurance issues that may lead to adherence problems. These improvements in care may result in reduced hospital readmission rates.

63. Medication reconciliation in a clinic setting: a student pharmacist/physician partnership. Alyssa Howard, Pharm.D. 2014 Candidate[1], *Jane Mort, Pharm.D.*[1]; (1) College of Pharmacy, South Dakota State University, Brookings, SD
OBJECTIVES: Implement a pharmacy student led medication reconciliation process in a clinic setting, evaluate the impact, and ascertain practitioner/patient acceptance.
METHODS: A pharmacy student performed medication reconciliation based on risk stratification (i.e., age/prescription characteristics) utilizing patient self-reported medication use, clinic records, and community pharmacy files. Patients also received standard care including a medication history taken by a nurse. The pharmacy student worked with two prescribers to intervene on discrepancies. Patients and providers were surveyed regarding their experience and value of pharmacy services.
RESULTS: Among 78 patients, 167 discrepancies were identified. Of those discrepancies, 121 (72.5%; 2.3/patient) were for prescription medications. The most common prescription discrepancy involved extra medication on either the clinic or pharmacy record (52.1%). Of the 167 discrepancies found by the student, only 64 were identified by the nurse (38.3%). A total of 195 interventions resulted from the discrepancies, most involving medication being discontinued on the clinic profile (33.9%). Survey data (59 patient surveys; 75.6% response) showed most patients had no preference to which professional (nurse/pharmacy) performed the medication reconciliation (59.3%); however nearly all patients found benefit in having pharmacy personnel conduct the process (91.5%). Qualitative practitioner surveys (2 prescribers) regarding utility of the medication reconciliation program showed positive feedback—more thorough medication reconciliation, improved time management for other providers, and enhanced identification of medication discrepancies. Both prescribers indicated a desire to include pharmacy services in future practice activities.
CONCLUSION: Medication discrepancies were frequent within the studied patient population and led to numerous interventions. Additionally, a majority of the identified discrepancies would not have been recognized by the current standard of care in the clinic. Patient and practitioner feedback supports pharmacy based medication reconciliation in the clinic.

64. Use of problem-based learning techniques in ambulatory care advanced pharmacy practice experiences. *Michael Conley, Pharm.D.*[1], Christine Chim, Pharm.D.[2], Carla Bouwmeester, Pharm.D.[1], Debra Reid, Pharm.D.[1], Kathy Bungay, Pharm.D.[1]; (1) School of Pharmacy, Northeastern University, Boston, MA; (2) College of Pharmacy & Health Sciences, St. John's University, Queens, NY
OBJECTIVES: Our focus as practitioners has increasingly been on chronic disease management in the ambulatory setting. Educational strategies for pharmacists must parallel these trends by providing setting-appropriate learning experiences. Problem-based learning (PBL) is one technique that can be used to teach problem solving in complex chronic disease situations. Published studies describe PBL use in hospital advanced practice pharmacy experience (APPE) settings but no comparable literature exists for the ambulatory care setting.
APPEs in primary care orient students not only to the care of patients with chronic diseases but also to the environmental and psychosocial factors that influence how patients and caregivers manage their disease(s).
METHODS: To accomplish the goals of empowering students to learn both thinking strategies and domain knowledge, we aimed to incorporate PBL into ambulatory care APPEs. We created a standardized system to promote comparable learning experiences across different ambulatory care practice sites.
To use PBL, we first developed and tested four setting-appropriate cases to address issues commonly encountered in ambulatory care settings. One case is used per 6-week APPE. To support faculty, we developed facilitator guides that help students discover new learning questions weekly. We now have two years of experience integrating PBL cases into APPEs.
RESULTS: Feedback received from students indicates that the process stimulated more critical thinking, helped students expand their knowledge about topics not always seen in practice and added to their APPE learning experience. Qualitative findings indicate that the PBL experience allows students to think more openly and critically about their approach to patients. Formal quantitative formative and summative assessments are being developed and tested.
CONCLUSION: Students discovered the complexities of the interplay of psychosocial aspects of patient care, medication therapy management, and healthcare delivery. Additionally, early results from interdisciplinary PBL sessions (pharmacists and physician assistant students) indicate additional benefits of discovery about providers' roles.

65. Pharmacist-provided comprehensive diabetes education in a rural setting results in a significant reduction in patient A1c levels. *Barbara Smith, BS Pharmacy*[1], Dean Reardon, Ph.D.[2]; (1) Department of Pharmacy Practice, University of Charleston School of Pharmacy, Charleston, WV; (2) Department of Pharmaceutical and Administrative Sciences, University of Charleston School of Pharmacy, Charleston, WV
OBJECTIVES: A study was undertaken to assess the value of pharmacist-provided comprehensive diabetes self-management education for patients with diabetes in a rural setting with uncontrolled A1c levels.
METHODS: Ninety-one patients were enrolled in a diabetes self-management training program for a total of 10 hours. The program follows the National Standards for Diabetes Self-Management Education and is accredited by the American Association of Diabetes Educations (AADE).
RESULTS: Of the ninety-one patients enrolled, seventy-five completed the education program. Diabetes patient data including A1c, weight, lipid profile, and blood pressure values was obtained from patient medical records both before and after completion of the education program. Average A1c values dropped from 8.3% to 7.2% and 8.7% to 7.2% in males and females respectively for those patients completing the education program. These results represent a 13.4% and 16.7% total reduction in normalized A1c levels in male and female patients respectively. Data from patients who did not attend or complete the education program either had an increase in A1c from 7.2% to 7.3% (males) or a marginal reduction in A1c values from 8.4% to 8.1% (females). Reduction in A1c values for patients completing the education program did not correlate with any significant reduction in the other metrics (weight, lipid profile, blood pressure) measured in the study.
CONCLUSION: However, these results indicate inclusion of a comprehensive diabetes education program in addition to concurrent medical treatment provides positive health benefits to diabetes patients in a rural setting by leading to significant reduction in A1c levels.

66. Development of a diabetes educational resource for the South Asian population. *Shameem Aadam, M.Pharm., R.Ph.*[1], Kuntal Patel, Pharm.D. Candidate 2014[2]; (1) Clinical Administrative Sciences, Roosevelt University College of Pharmacy, Schaumburg, IL; (2) Roosevelt University College of Pharmacy, Schaumburg, IL
OBJECTIVES: South Asian immigrants in the United States are seven times more likely to develop type II diabetes compared to the Caucasian population. Despite the wide prevalence of the disease within the South Asian population, there are limited resources available tailored to patients of the South Asian decent. This creates a barrier in providing education to South Asian patients with diabetes. The purpose of this project was to develop an educational tool to be used in the South Asian group

educational diabetes class that would provide the basic education and teaching regarding diabetes but adapted to the South Asian Population.
METHODS: A group South Asian diabetes educational class was developed at Advocate Medical Group in Park Ridge, IL in 2009. To provide standardized teaching to the patients in the South Asian group class, an educational tool was developed in June 2013. This resource includes basic information regarding diabetes, heart health, pharmacologic therapy, long-term complications of diabetes and most importantly nutritional information tailored to the South Asian population. The resource also highlights the relationship between prevalence of Diabetes and heart disease within the South Asian population. This educational resource is provided to patients at the beginning of the first educational class and used throughout all three educational classes as a teaching aide.
CONCLUSION: Since its implementation the resource has received positive feedback from patients. Patients have particularly appreciated the nutritional content being adapted to the South Asian Diet. It has helped them to better understand the relationship between carbohydrates and diabetes and implement the techniques of carbohydrate counting to a traditional South Asian diet. Going forward, we hope to have this resource validated so that it can be used by other health care professional as a resource for their patients with diabetes that are of South Asian decent.

Cardiovascular

67. Drug therapy problems and contributing factors among patients with cardiovascular diseases in Felege Hiwot Referral and Jimma University Specialized Hospital, Ethiopia. *Gobezie Temesgen, B.Pharm., M.Sc. in Clinical Pharmacy*[1]; (1) Department of Pharmacy, Ambo University, Ambo, Ethiopia
OBJECTIVES: The objective of the research is to characterize the prevalence of drug therapy problems and contributing factors among hospitalized patients with cardiovascular diseases in Felege Hiwot Referral and Jimma University Specialized hospital
METHODS: Hospital based general cohort study design was used. All admitted patients with cardiovascular disease/s, in Felege Hiwot Referral and Jimma University specialized hospital were included. Most of the data were collected from patient card. Pharmacists in collaboration with a nurse were involved in collecting the data. The data were analyzed using SPSS version 20.0 Descriptive, logistic and linear regressions were used. p-value of <0.05 was considered statistically significant to study association between risk factors and drug therapy problems
RESULTS: The most common cardiovascular disease encountered were hypertensive heart disease (27, 27.83%), rheumatic heart disease (24, 24.74%) and,functional heart failure and cor pulmonalae (24, 24.74%). A total of 164 number of DTPs were identified with the mean number of DTP was 1.69+0.993. Most of the patients had drug therapy problem. Presence of heart failure (AOR: 8.001) had significant association
CONCLUSION: Drug therapy problem is highest. Number of co morbidity had significant association with number of DTPs. As the number of co morbidity increases by one unit, there is 28.2% increase in number of DTP.

Clinical Administration

68E. Evaluation of clinical pharmacist interventions in a university hospital located in a rural area in Lebanon. *Hiba Najem, Pharm.D.*[1]; (1) Pharmacy Department, Centre Hospitalier du Nord, Beirut, Lebanon
OBJECTIVES: Clinical pharmacist role has grown considerably in the last period of time due to its prominence in coordinating with healthcare professionals to achieve optimal health outcomes. Few studies have been published regarding the clinical pharmacist interventions in Lebanese hospitals, and none concerning remote hospitals has been done.
The objectives of this study are to evaluate the impact of clinical pharmacist as a member of the healthcare team and as a drug information source, and to evaluate the clinical pharmacist interventions acceptance rate at the Centre Hospitalier du Nord (CHN) University Hospital located in a rural region of Lebanon.
METHODS: A 12-month prospective analysis was conducted in the Internal Medicine department of CHN where a clinical pharmacist was attending daily rounds for 3–4 hours and spending the rest of the working hours checking prescriptions and answering drug information questions. All performed interventions were documented on a 'Pharmacist Intervention Form'. After data entry, the statistics were analyzed by the clinical pharmacist, reported and discussed every 2 months at the Pharmacy and Therapeutics committee.
RESULTS: 1631 interventions were performed by the clinical pharmacist; 91% were accepted and 9% were rejected. The frequency of performed interventions was as follows: order clarification (26%), alternate route (20%), therapeutic consultation (14%), drug information (11%), dose adjustment in renal impairment (8%), followed by the other seven categories.These results expose both a high acceptance rate and versatility in intervention types not shown in previously published studies concerning the same topic.
CONCLUSION: This study shows the impact of including a clinical pharmacist in the healthcare team for all the added value that he/ she offers in the different areas of interventions while achieving a high approval rate. The significance of the results is more pronounced because they occurred in a remote hospital where the clinical pharmacist has scarce human, financial and logistic resources.
Presented at the European Association of Hospital Pharmacists Congress ("The innovative hospital pharmacist – imagination, skills and organisation"), Barcelona, Spain March 26-28, 2014.

69. Development and application of a clinical pharmacy specialist (CPS) productivity database in a Veterans Affairs ambulatory care setting. *Kimberly Schnacky, Pharm.D.*[1], Alyssia Jaume, Pharm.D.[1], Laura VanScoik, Pharm.D.[2]; (1) Orlando VA Medical Center, Orlando, FL; (2) James A. Haley Veterans' Hospital, Tampa, FL
OBJECTIVES: The development of a productivity database to capture and evaluate workload for CPS in an ambulatory care setting is described. The objective is to establish benchmarks for clinical pharmacy workload/productivity, identify pharmacists requiring clinic restructuring, and capture objective data for performance evaluation.
METHODS: A database was developed to capture all elements of CPS workload. Outpatient staff pharmacist workload was excluded. With the assistance of automated reports, data was collected and entered into the database monthly. All clinical pharmacy staff completed an online survey tool to weight each workload component by its perceived time requirement and complexity. Results of the survey allowed assignment of relative value units (RVU) for each workload component. All workload values were adjusted for pharmacist leave, overtime, and full or part time status to allow comparison between clinicians. CPS were identified by a four digit number to maintain confidentiality. A discussion of resource investment for database development/maintenance will be included.
RESULTS: A total of 47 CPS were evaluated in the database. The weighted total data was used to objectively compare the pharmacists with similar job descriptions. Productivity summaries were completed at midyear, end of year, and annualized. Raw data was also available for pharmacy administration review. Graphical analysis of productivity data was utilized for CPS self-improvement plans and refined resource allocation.
CONCLUSION: This productivity tool is a unique approach to measurement of actual daily CPS workload in comparison to traditional intervention based analysis. Assignment of RVU to a variety of clinical patient care activities in areas including, but not limited to primary care, psychiatry, cardiology, transplant, anemia, and oncology are described. Future application of the database will be the creation of a clinical pharmacist dashboard

for weekly self-assessments. Lessons learned and future enhancements will be presented.

70. Assessing the impact of a clinical pharmacy technician admission medication reconciliation program at the Cincinnati VA Medical Center. *Alyssa Wilson, Pharm.D.*[1]; (1) Pharmacy, Cincinnati VA Medical Center, Cincinnati, OH

OBJECTIVES: In March of 2013, the Cincinnati VA Medical Center launched a new admission medication reconciliation program driven by Clinical Pharmacy Technicians in order to ensure timely medication reconciliation for all Veterans upon admission, namely within 24 hours. The Clinical Pharmacy Technicians are responsible for the documentation of an accurate medication list for each patient, which is then reviewed and cosigned by a Clinical Pharmacy Specialist. Any clinical discrepancies are addressed with the patient's other healthcare providers, contributing and enhancing the multidisciplinary approach to patient care. Within a month of implementing the program, the facility had greater than a 90% completion rate within 24 hours, which is consistent with The Joint Commission patient safety goal.

In addition to achieving the above mentioned Joint Commission goal, the Clinical Pharmacy Technicians have been successful in identifying numerous clinically significant discrepancies during the admission process. Thus, an impact study was designed to assess the overall safety and efficacy of the clinical pharmacy technician driven admission medication reconciliation process.

METHODS: A retrospective review of 94 patients randomly selected from a 6 month period had their admission medication reconciliation documentation and History and Physical reviewed and assessed using a standardized tool to evaluate the safety and efficacy of the admission medication reconciliation process. The following parameters were reviewed and recorded: total number of medications the patient was on prior to admission; total number of non-VA prescription medications; total number of herbal/OTC medications; number of medication omissions identified; number of medication dose changes identified; number of medications inappropriately restarted; and high risk medications (warfarin, amiodarone, insulin, scheduled pain medications, levothyroxine).

RESULTS: Data collection is currently underway and will be completed by 2/1/14.

CONCLUSION: Pending.

71. Justification of cognitive pharmacy activities through cost savings/avoidance and productivity reporting. *Lynette Jackson, Pharm.D.*[1], Samia Fawzi, R.Ph., Pharm.D.[1], Mitch Sobel, R.Ph.[2], Radhika Pisupati, Pharm.D.[2]; (1) Department of Parmacy, St. Joseph's Wayne Hospital, Wayne, NJ; (2) Department of Parmacy, St. Joseph's Healthcare System, Paterson, NJ

OBJECTIVES: Traditionally pharmacy productivity is defined by the amount of product dispensed. However as more pharmaceutical care and clinical services are being provided it is of utmost importance to incorporate these cognitive activities into productivity.

METHODS: Developing scorecards was one of the first steps implemented to provide justification of cognitive pharmacy services. Scorecards highlighted several interventions and their associated cost savings/avoidance, e.g renal dose adjustments, pharmacokinetic monitoring, IV-to-PO conversions, and antibiotic de-escalations. Over a 5 month period there were 3882 interventions that resulted in change with an associated cost savings/avoidance of $133,090. Though interventions efficiently decreased costs and improved patient care it caused billable units to trend down significantly and lowered pharmacy revenue/productivity. Administration then had to be convinced that these cognitive interventions were clinical consult services that should have a productive value of their own. The pharmacy director continually held meetings with the VP, CFO, and CEO to express that pharmacy services should not be based solely on product dispensed but also cognitive services. It took a great deal of effort to incorporate this concept into productivity metrics.

RESULTS: A "fee for services provided" billing model similar to other service departments was adopted and cognitive interventions are now counted as a billable consult service. All reportable interventions and clinical services were assigned a billable unit value from 1 (e.g. drug information) to10 (e.g. medication utilization review). Each unit value correlates to 15 minutes of consultative time. This was based on an average time spent per cognitive function and will vary throughout institutions. Every billable unit value is then multiplied by the number of interventions in that category and is reported to finance in conjunction with product dispensed for productivity metrics.

CONCLUSION: This has led to validation and increases in FTE's.

Critical Care

72. Development and implementation of a multidisciplinary sepsis management program. *Efrain Marrero, Pharm.D., BCPS*[1], Christina Burger, Pharm.D., BCPS[1]; (1) Saint Francis Hospital, Memphis, TN

OBJECTIVES: To describe the implementation and clinical outcomes of a multidisciplinary sepsis management program based on the 2012 Surviving Sepsis Guidelines and primary literature.

METHODS: A multidisciplinary team, consisting of physicians, pharmacy specialists, nurses, respiratory therapists, administrators, and sepsis consultants from Edwards Lifesciences©, was convened. Baseline data and the existing care paths were reviewed and used to develop a new sepsis pathway, centered on rapid identification, prompt acquisition of cultures and laboratory data, early fluid resuscitation and antibiotic administration. Pharmacy specialists were involved in program implementation, focusing on antibiotic stewardship, central venous and arterial hemodynamic monitoring, education, and order set development.

RESULTS: Data was collected utilizing the Crimson® database. Patients were identified using diagnosis related groups (DRG): 870 – sepsis with > 96 hours of mechanical ventilation, 871 – sepsis without 96+ hours of mechanical ventilation with major complication/comorbidity (MCC), and 872 – sepsis without 96+ hours of mechanical ventilation without MCC. Patients in "do not resuscitate" or palliative care status were excluded. Mortality and hospital length of stay (LOS) were calculated utilizing 2012 data as the baseline with an evaluation period of January-September 2013. For DRG 870 (n=36 for 2012, 35 for 2013), mortality decreased from 36.11% to 25.71% and LOS decreased from 32.64 days to 19.31 days. For DRG 871 (n=124 for 2012, 113 for 2013), mortality increased from 23.39% to 27.43% and LOS increased from 8.55 days to 8.71 days. For DRG 872 (n=59 for 2012, 61 for 2013), mortality was decreased from 3.39% to 1.64% and LOS was reduced from 6.53 days to 6.30 days.

CONCLUSIONS: Implementation of a multidisciplinary sepsis management program based on published guidelines, primary literature, and institution specific data can have a clinically significant impact on mortality and LOS, especially in the most critically ill patients.

Drug Information

73. Audit of the drug information services in "Alwazarat" Primary Health Care Center. *Nasser Hamdan, B.Sc., M.Sc.*[1], Ayla Tourkmani, B.Sc. Pharm., Pharm.D., BCPS[1]; (1) Family and community medicine, Prince Sultan Military Medical City, Riyadh, Saudi Arabia

OBJECTIVES: To evaluate the drug information services role in rational and evidence based drug therapy, Improve the drug information services and intending to introduce more valuable services to the health care providers.

METHODS: This was a descriptive retrospective analysis on the inquiries to the drug information pharmacist in "ALWAZARAT" primary health care center by reviewing the reported inquiries between February 2013 and July 2013. Data were collected including: the total number of inquiries per month, identity of the

caller, question category, and time frame for answering, then we analyzed each one alone.
RESULTS: During the period of evaluation a total of 423 inquiries were reported. Most of the reported inquiries were from physicians (57.2%) and then the pharmacists (42.55%), while only one inquiry reported was from the nurses. None of inquiries were from patients as the DIC in "alwazarat" primary health care provides services to the health care providers. The most frequent inquiries were about the doses of medications (58%), the second most frequent were regarding the therapeutic plans (21.7%), while the inquiries concerning the availability and supply of medications were in the third rank (18.2%). Other inquiries categories were as following: pregnancy (7.09%), drug interactions (4.96%), side effects and adverse drug reactions (3.07%), lactation (2.36%), and Inquiries concerning other drugs related issues (like stability, vaccines, and storage, etc) were presenting (9.92%) of the total inquiries. The total time that was reported to answer whole inquiries was (78.62 hours), with average of 13.1 hour (786 minutes) per month. The majority of inquiries were answered as soon as possible (0–5 minutes) 82.5% in which the answers were given verbally by phone calls.
CONCLUSION: Encourage physicians to use the drug formulary to check the drug availability, strengths and dosage forms. Encourage nurses to utilize the drug information services to answer their inquiries. Encourage clinical pharmacists to make protocols and guidelines for commonly asked therapeutic patients scenarios.

Education/Training

74. Student perceptions on employment during enrollment in pharmacy school in an accelerated program compared to a traditional program. *Amanda M. Morrill, Pharm.D.*[1], Kristine C. Willett, Pharm.D.[1]; (1) Department of Pharmacy Practice, School of Pharmacy-Worcester/Manchester, MCPHS University, Manchester, NH
OBJECTIVES: The purpose of this study is to assess student attitudes regarding employment and effect of employment during enrollment in a traditional compared to an accelerated Doctor of Pharmacy (PharmD) program. The aims for this study are to: (i) compare the frequency and field of employment; (ii) describe attitudes towards effect of employment on academic success and job placement; and (iii) identify an association between employment and self-reported GPA, career goals, and financial obligations.
METHODS: An online survey tool was administered to PharmD students on Advanced Pharmacy Practice Experience (APPE) rotations. Students were asked to answer demographic information, employment status and practice setting, reason(s) for seeking employment and perceived effect of employment on academic success and post-graduation job placement. Responses were stratified and analyzed by type of program (traditional vs accelerated). Study methods have been approved by the University's institutional review board.
RESULTS: Sixty-seven students (12%) completed the survey instrument with no difference in percentage of respondents in each group. Students in the traditional program (T) were significantly more likely than the accelerated (A) program to report having no dependents (97% vs75%, p=0.008) and were more likely to be employed (80% vs 50%, p=0.002). No significant difference in attitudes towards a positive correlation between working and academic performance or job placement was identified. Students in both groups who are employed were more likely to agree that employment increases academic success (p=0.002). More students in the accelerated program disagree with the statement that faculty and staff encourage employment compared to traditional program students (50% vs 22.9%, p=0.02).
CONCLUSION: Guidance from faculty and staff and potential for academic success may have a stronger association with seeking employment than number of dependents. Obtaining a larger sample may yield significant results to guide faculty and staff recommendations for students considering employment during pharmacy school.

75. Development of a preceptor development program at an academic health system. *Stacey Folse, Pharm.D., M.PH.*[1], Christopher Paciullo, Pharm.D.[1]; (1) Department of Pharmaceutical Services, Emory University Hospital, Atlanta, GA
OBJECTIVES: In 2013, Emory Healthcare (EHC) implemented a preceptor development (PD) program to foster teaching and professional skills of residency program directors (RPDs) and preceptors. New preceptor orientation is conducted and live interactive PD sessions are held bimonthly. A survey was distributed prior to and after implementation to assess desire and aptitude for teaching and identify areas where teaching skills can be enhanced.
METHODS: Surveys were distributed to all current RPDs and preceptors at EHC. General demographics including years served as a preceptor, number of students and residents precepted, and degree of interest in serving as a preceptor were obtained. Questions assessing the value and impact of PD sessions and future learning needs utilized a five-point Likert scale for responses, as well as a free text area for comments. Results were compared using non-parametric statistics.
RESULTS: A total of 19 responses were received (63% response rate). Respondents (70%) served as preceptors for $\leq$ 5 years prior to implementation vs post implementation (33%). The majority of preceptors were either very interested or interested in serving as a preceptor which was slightly increased after implementation of the PD program (100% vs 94%). Degree of interest in serving as a preceptor compared with prior years was increased following implementation of the PD program (28.5% vs 0%). Time constraints (80%) were the most commonly cited reason for similar or decreased interest in serving as a preceptor. There was high preceptor attendance rate at each PD session (83%). The majority of preceptors documented that PD sessions enhanced their values (60%), attitudes (60%), knowledge (100%), skills (75%), and improved their practice as a preceptor (75%).
CONCLUSION: PD sessions at EHC have been a successful endeavor, with high participation and value to both RPDs and preceptors. PD sessions will continue to be conducted bimonthly.

Emergency Medicine

77. Implementation of an emergency department pharmacist at a community teaching hospital. *Brittany Riley, Pharm.D., BCPS*[1], Rory Phillips, BSPh, MBA, RPH[2], Jeremy Janney, Pharm.D.[2]; (1) Department of Pharmacy Practice, Adminstration and Research, Marshall University, Huntington, WV; (2) Southern Ohio Medical Center, Portsmouth, OH
OBJECTIVES: It has been noted that the emergency department (ED) is one of three hospital departments with the highest rate of medication errors and a higher severity of errors. Studies to date have not shown an impact on hard dollar savings of the ED pharmacist. Southern Ohio Medical Center deployed an ED pharmacist as a 0.5 FTE in April 2012. There was no coverage in the ED when she was not present. This study was designed to determine the impact of an ED pharmacist on patient care, drugs costs and ED staff perceptions of pharmacy.
METHODS: This study was a combination of a retrospective review, a survey, and prospective review. The retrospective review assessed the average drug costs for ED patients during a pre-implementation and post-implementation period. The prospective review assessed the interventions that the ED pharmacist made during the post-implementation period. The survey assessed the ED staff's perceptions of pharmacy and the ED pharmacist before implementation and at the end of the post-implementation period. The pre-implementation period was April 16, 2011 through April 16, 2012. The post-implementation period was 1/1/13 through 6/30/13.
RESULTS: The presence of an ED pharmacist did not significantly decrease pharmacy acquisition costs per ED visit or overall readmission rates. After implementation 83.3% of respondents in the post survey responded that the ED pharmacist was an integral part of the ED team and 75% responded that the ED pharmacist had improved patient care. In the 6 month post-

implementation period the ED pharmacist worked a total of 66 days and made a total of 794 interventions.
CONCLUSION: The ED pharmacist is able to become integrated into the ED team and contributes to patient care. Further studies are necessary to determine if an ED pharmacist can decrease the hard dollars to further justify their positions.

78. Economic benefit of a dedicated clinical pharmacist on the trauma service. *Elaine DePrang, Pharm.D., BCPS*[1], Mark Lieser, M.D., FACS[2], Phyllis Blanco, RN[2]; (1) Trauma Department, Medical Center Hospital, Odessa, TX; (2) Medical Center Hospital
OBJECTIVES: To improve patient care and outcomes on the trauma service of our Level II trauma center, we evaluated the efficacy of clinical pharmacy specialist involvement in the trauma service. We focused on prevention of medication errors, goal directed therapy, containment of medication cost, aid in the education of medical staff, and a reduction in readmissions and delays in medication therapy.
METHODS: The study included trauma patients on the general surgical, neurosurgical and orthopedic services. The intensive pharmacy services were initiated upon the patient's arrival in the emergency department and continued through their stay in the intensive care unit and the surgical/orthopedic/neurologic units and concluded at discharge. Services were provided 8 hours per day, 5 days a week for a period of 90 days. The intensive pharmacy services consisted of, but were not limited to, comprehensive pharmaceutical care for patients through integrated drug distribution, clinical services and therapy recommendations, protocol development, and education. All interventions made by the trauma clinical pharmacist were documented at the time of occurrence in the computer program, Sentri 7. This allowed for the assessment of cost savings associated with the pharmacist's interventions.
RESULTS: During the trial period a total of 3020 interventions were made by the clinical pharmacist, which were evaluated to equal $376,879.00 in cost savings. The dedicated trauma pharmacist detected medication errors, streamlined antibiotic usage, and increased overall physician-pharmacist interaction and cooperation.
CONCLUSIONS: Specific improvements to patient care by a dedicated trauma clinical pharmacist included increased patient safety, cost effective medication management, and decreased medication errors. Projected cost savings appear to offset the cost of the pharmacist position and yield cost savings for the trauma department and the hospital.

79. Opiate use for treatment of migraine headache in the emergency department of a community hospital. *David Barile, R.Ph.*[1], Agnieszka Pasternak, Pharm.D., MBA, CNSC, BCPS[1], Christine Holuka, Pharm.D. Candidate 2014[2], Jeffrey Baron, Pharm.D. Candidate 2014[3]; (1) Huntington Hospital/North Shore-LIJ HS, Huntington, NY; (2) St. Johns University, Queens, NY (3) University of Buffalo, Buffalo, NY
OBJECTIVES: Practice guidelines recommend not using opioids in the acute treatment of migraine (*Neurology* 2000;55(6):754). Emergency and Pain physicians from the Cleveland Clinic developed an algorithm that resulted in 82% reduction in the use of opiates for headache (*Pharmacy Practice News, Sep 2013, Vol 40*). This study examined our treatment of migraine, evaluated return visits and determined areas for improvement.
METHODS: A retrospective chart review was conducted for migraine patients (ICD-9 346.9) from June 1-August 31, 2013. Patient demographics, administered medications and return ED visits using the same diagnosis were collected.
RESULTS: Sixty nine patients received pharmacological therapy for migraine during the study. At least one dose of an opioid was administered as a sole agent or in conjunction with other therapies in 25 patients (36%). This group accounted for a seven percent rate of return visits. The therapy was compared to the Cleveland Clinic's three-step algorithm. Seven patients (10%) in this study received triple therapy i.e., ketorolac, metoclopramide and diphenhydramine (Step 1) and had no return visits. Thirteen (19%) patients were given a combination of ketorolac and metoclopramide and one return visit was noted. This return patient was treated appropriately (Step 1). None of the patients received Step 2 (injectable dexamethasone, valproate and magnesium). Sumatriptan (Step 3) was administered to seven patients (10%) and one patient returned.
CONCLUSION: Patients treated with opioids for migraine are more likely to return to ED and may have a potential for opioid abuse (*Neurology*.2004; 62 (10):1695). One of the study's limitations was an unknown treatment history of migraine in these patients. Eliminating opioid use and creating an evidence-based guideline are the key improvement opportunities identified in our study.

Endocrinology

80. Quality improvement initiative: a pharmacy initiated effort to improve hepatitis B vaccination rates in diabetic veterans. *Jennifer Stark, Pharm.D., BCPS*[1], Michelle Rushano, Pharm.D.[1]; (1) Veterans Healthcare System of the Ozarks, Fayetteville, AR
OBJECTIVES: Hepatitis B virus (HBV) is a highly infectious virus that can cause both acute and chronic infection of the liver. HBV represents a significant morbidity and mortality burden worldwide despite availability of effective vaccinations. Recent data from the Center for Disease Control (CDC) revealed that a disproportionate number of HBV infection outbreaks in the United States involved adults with diabetes receiving assisted blood glucose monitoring. The Advisory Committee on Immunization Practices (ACIP) and the American Diabetes Association (ADA) now recommend that all previously unvaccinated patients with diabetes aged 19 through 59 years should be vaccinated against HBV as soon as possible following the diagnosis of diabetes.
METHODS: Clinical pharmacists participate in a weekly small group diabetes education class providing education on diabetic related medication. This quality improvement initiative has a multifaceted approach: (i) two pharmacists will integrate education on HBV vaccinations into the diabetes education class, (ii) education regarding HBV vaccinations in diabetic patients will be provided to prescribers in the form of a poster, pocket cards and oral presentations at staff meetings, (iii) pharmacists will systematically screen class participants' HBV immune status and (iv) pharmacists will contact the primary care provider of patients for whom the HBV vaccination is indicated.
RESULTS: Preliminary review of patients attending the diabetes education classes prior to this quality improvement initiative revealed that ninety-five percent of patients had no documented immunity to HBV. The quality improvement initiative is being implemented over a 16 week period in early 2014 and is expected to impact the care of approximately 150 diabetic patients over that time period.
CONCLUSION: Preliminary review of HBV vaccination rates in veterans attending diabetic education prior to the quality improvement initiative reveal significant underutilization of the HBV vaccination in adult diabetic veterans.

Geriatrics

81. Pharmacist review of medication reconciliation during an assisted living facility's conversion to an electronic medical record. *Kimberly Brown, Pharm.D.*[1], Linda Gooen, Pharm.D., M.S.[2], Timothy Reilly, Pharm.D.[1]; (1) Pharmacy, University Medical Center of Princeton at Plainsboro, Plainsboro, NJ; (2) Gooen Consulting, LLC, NJ
OBJECTIVES: To evaluate medication reconciliation at an assisted living facility and develop process improvements
METHODS: Medication records of residents in an assisted living facility who are medicated by the staff were reviewed for optimization of therapy as well as transcription errors between physician prescriptions, hand written medical record and electronic medical record. Problems were categorized according to The Joint Commission components of medication reconciliation or the type of transcription error. Errors were corrected or referred to the

appropriate individuals. A gap analysis was performed and the results were presented to the facility administration.
RESULTS: A total of 22 patient charts were reviewed; data from a representative sample of 11 reviews were compiled and presented to the facility. The total number of medications evaluated was 167 for those 11 patients, with a median of 14 medications per patient. Forty-two medication reconciliation discrepancies were found. Omissions of medication orders accounted for 50% (n=21) of the total discrepancies. In review of the transcription accuracy of the medication lists 166 issues were found. Errors deemed to be based on transcription alone were the most common (n=70, 42.2%). Of the 166 issues found, 94% (n=156) were able to be corrected by pharmacist review of the patient chart. Forty-eight medication orders, 28.7% of the total, were transcribed free of error. Recommendations based on best practices were made to the administration of the facility and were accepted.
CONCLUSION: The data highlights the need for facilities to incorporate a process to accurately transcribe medication orders during the conversation to electronic medical record. The pharmacist's involvement and interventions during the conversion process can reduce the incidence of potential medication errors and harm to the resident.

82. Reduction of zolpidem prescriptions in the elderly using clinical pharmacy services. *Jennifer Dugan, Pharm.D.*[1], Yamel Irizarry, Pharm.D.[2], Kara Rivera, Pharm.D.[2]; (1) Pharmacy Department, Kaiser Permanente Colorado, Evergreen, CO; (2) Pharmacy Department, Kaiser Permanente Colorado, Aurora, CO
OBJECTIVES: Prior to 2012, zolpidem was frequently prescribed for the treatment of insomnia in elderly patients because it was thought to be safer than alternatives. New evidence indicates that zolpidem can contribute to falls and fractures in patients 65 and older and was subsequently added to the HEDIS list of "Drugs to Avoid in the Elderly" in 2012.Interventions were initiated by members of Clinical Pharmacy Services in collaboration with physicians to reduce the number of zolpidem prescriptions prescribed for elderly patients at Kaiser Permanente Colorado (KPCO).
METHODS: The project was conducted between November 2012 and September 2013 by KPCO Clinical Pharmacy Services in partnership with Primary Care, Geriatrics, and Behavioral Health physician leadership. Data was pulled monthly from a prescription database to look for patients taking zolpidem who were 65 or older. The intervention included physician education, changes to prescribing tools in the electronic medical record, provider conversations with patients, and outreach to patients by Clinical Pharmacy Specialists to discuss the risks of zolpidem despite minimal benefits, with the goal of discontinuing or changing it to a safer alternative.
RESULTS: Prior to project implementation, there were 1327 prescriptions for zolpidem sold to patients 65 and older in October 2012. By September 2013, zolpidem prescribing in elderly patients decreased by nearly 60% with 535 prescriptions dispensed. Based on extrapolation from published literature, 5 hip fractures and 7 nonvertebral fractures were avoided. This results in an estimated cost avoidance of $295,113.
CONCLUSION: Intervention by KPCO Clinical Pharmacy Specialists significantly reduced the use of zolpidem in the elderly and ultimately, the risk of fractures. This project is easily transferable to other institutions that are able to identify zolpidem use in patients > 65 years of age.

Hematology/Anticoagulation

83. Different methods for delivering discharge instructions for warfarin in a community hospital. *Agnieszka Pasternak, Pharm.D., MBA, CNSC, BCPS*[1], Omar Khalid, Pharm.D. Candidate 2014[2], Vadryn Pierre, Pharm.D. Candidate 2014[3]; (1) Huntington Hospital/North Shore-LIJ HS, Huntington, NY; (2) St. Johns Unviersity, Queens, NY; (3) University of Buffalo, Buffalo, NY
OBJECTIVES: This study evaluated the impact of different methods for delivering warfarin discharge instructions by 6th-year pharmacy interns.
METHODS: Warfarin Discharge Fact-Sheet, approved by the Health Literacy office, was created to fulfill VTE-5 core measure requirements addressing the following: compliance issues, dietary advice, follow-up monitoring and potential for ADR/interactions. Pharmacy wrote thirteen questions pre-and post-test, both administered on the same day of intervention, to evaluate two teaching methods. Patients were randomized to receive either face-to-face counseling with teach-back by pharmacy interns (Intervention group = IG) or Warfarin Discharge Fact-Sheet (Self-teaching group = STG) in August/September 2013 (11-days). The content in the IG corresponded to the material in the warfarin sheet. Thirty day return admissions were extracted for both groups.
RESULTS: Sixty patients with a median average age of 80 years were equally divided into the IG and STG. More patients in the STG were initiated on warfarin (17 vs 14). IG had a greater improvement rate in the post-test scores in all four VTE-5 criteria (33% vs 20%). This higher rate was also observed in patients who continued warfarin from home (20% vs 8%) and in the new starts (50% vs 21%), as compared to the STG. Ten readmissions within 30 days were identified in eight (13%) patients. Two had a diagnosis of VTE and one had epistaxis (INR = 2.27). These three visits were in the STG. In both groups there was a total improvement rate of 26% in the post-test scores with a predominant impact detected in dietary advice (28%) and follow-up monitoring (22%).
CONCLUSION: Face-to-face counseling by pharmacy interns and printed teaching materials improved patient education. However, only face-to-face counseling lead to clinically meaningful outcomes: reduction in 30-day readmissions, recurrent VTE and bleeding. Face-to-face counseling techniques may be a valuable tool to reduce ADE in patients on vitamin- K-antagonists. Larger study is needed to confirm these findings.

Infectious Diseases

84. Assessment of antibiotic posology modification and its impact on MDR bacterial strains in post-open heart surgery care. *Nehal Abd El Khalek, BCPS (AQ Cardiology)*[1], Fathy Moustafa, M.Sc.[2], Ahmed Abd El Aziz, M.D.[2], Iman Gaddoue, M.D.[3]; (1) Clinical Pharmacy Unit, National Heart Institute, Giza, Egypt; (2) Post Open Heart Critical Care Department, National Heart Institute, Giza, Egypt; (3) Infection Control Unit, National Heart Institute, Giza, Egypt
OBJECTIVES: Evaluating Impact of Antibiotic posology modification on MDR Bacterial strains in both number and resistance, through Clinical pharmacy involvement in post open heart Surgery at National Heart Institute, Egypt. Applied on 1218 patients from November, 2012 to April, 2013
METHODS: Baseline evaluation estimated a total rate of infection 30% of patients, among them mortality due to infection was 50%, when a screening was done for cultures of admitted patients from August till October 2012. The most common bacteria were GNB strains (70%) especially non ESBL strains. Clinical pharmacy role was defining the best antibiotic policy for the situation based on antibiogram. Piperacillin/tazobactam was chosen (sensitivity 78%) and was the most sensitive to non ESBL strains. Clinical pharmacist proposed to modify posology of the drug to be extended infusion over 4 hours every 8 hours instead of infusion over 30 minutes. Modified posology was tried for 6 months on 1218 patients with a monthly assessment of bacterial changes, antibiotics' sensitivity and cost reduction.
RESULTS: Rate of infection decreased to 20% after the second month with a mortality due to infection<1%. Bacterial strains decreased in both number and resistance to other antibiotics but only one strain remained problematic till April (non –ESBL Klebsiella pneumonia) mainly in sputum cultures. In addition, during the 6 months, sensitivity of piperacillin/tazobactam was not changed (between 70 and 78%) while dispensing of carbapenem has

decreased to one third the original rate, which has saved about 11473 USD from Carbapenems only.
CONCLUSION: Changing the posology of PiperacillinTazobactam to extended infusion by the clinical pharmacy can cause dramatic improvement in infection rates, mortality and cost reduction. Involving clinical pharmacy services with infection control team is essential for the choice of appropriate antibiotic and the reasonable posology modification.

85. A demographic analysis on the likelihood of first year college students to complete the human papillomavirus vaccine series after receiving at least one dose. *Jason Ciaramitaro, Pharm.D. Candidate*[1], Kristen Heiner, Pharm.D. Candidate[1], Matthew Lei, Pharm.D. Candidate[1], Nicholas Mercuro, Pharm.D. Candidate[1], Jeffrey Bratberg, Pharm.D.[1]; (1) University of Rhode Island
OBJECTIVES: This study aims to characterize the demographics of first year college students who have received at least one dose of the human papillomavirus (HPV) vaccine. Categorizing select populations will display the correlation of demographic traits with the interest level to complete the vaccine series.
METHODS: An IRB approved Survey Monkey® was used to poll freshmen at the University of Rhode Island (n=138) with a pre- and post-test separated by an informational video regarding HPV. All data was collected without incentives or subject identifiers. Three subgroups of individuals who received at least one dose of the vaccine (n=81) were defined as: students who were not interested or neutral in completing the series (n=32), students who were interested in completing the series (n=33), and students who completed the entire series (n=16). Descriptive statistics will be used to characterize these subgroups.
RESULTS: Upon initial analysis, students who completed the entire series: had more doctor visits, were first informed and offered the HPV vaccine by a healthcare provider (HCP), and were mostly female. Students who were not interested or neutral to completing the series were most likely to not be screened for sexually transmitted disease (STD), least likely to have been offered the vaccine, and had similar comfort levels with the other subgroups in discussing sexual health issues with a HCP. The students who were interested in completing the vaccine series valued their health more, had similar rates of being screened for STD and being offered the vaccine by a HCP in comparison to those who completed the series.
CONCLUSION: Data is still being reviewed and analyzed; expected completion is February 28, 2014. Current trends indicate potential clinical significance of certain demographic traits that correlate with the likelihood of individuals to either complete or not complete the vaccine series.

Medication Safety

86. Influence of pharmacy consultants on inappropriate use of antipsychotic medications in long-term care facilities as part of a multidisciplinary quality improvement project. *Nicole Skyer-Brandwene, M.S., R.Ph., BCPS, CCP*[1], Andrew Yao, Pharm.D. Candidate[1]; (1) Healthcare Quality Strategies, Inc. (HQSI), East Brunswick, NJ
OBJECTIVES: Pharmacy consultants provide a wide array of clinical pharmacy services to long-term care facilities. Part of a national effort advocating a patient-centered approach to care, this project aimed to engage pharmacy consultants as leaders of a multidisciplinary, quality-improvement effort to reduce inappropriate use of antipsychotic medications and reduce antipsychotic-related adverse drug events.
METHODS: HQSI, the federally-designated quality improvement organization for New Jersey, recruited four pharmacy consultants serving six facilities to participate in the project. Each pharmacist identified a team comprised of key staff members from their facility, including but not limited to nurses, unit managers, administrators, therapeutic recreation staff, and physicians, to support/coordinate the effort. Pharmacists updated an HQSI-developed Google(R) spreadsheet and dashboard monthly for the purpose of tracking and analyzing de-identified resident data regarding inappropriate use of antipsychotics, dose reductions and drug discontinuations, potential and actual adverse drug events, and pharmacist recommendations made and implemented. Almost two hundred Medicare residents on antipsychotics, regardless of diagnosis, were included in the project.
RESULTS: Over a 10-month period, use of antipsychotic medications was reduced thirty-two percent. In residents with dementia, drug use was reduced forty-two percent. Off-label use saw a forty-five percent relative reduction and adverse drug events (ADEs) were reduced from 0.07/resident to 0.02/resident. Seventy-nine percent of residents were impacted by at least one intervention. Eighty-five percent of recommendations made were actively addressed by the provider.
CONCLUSIONS: A consultant pharmacist-led quality improvement initiative can reduce inappropriate use of antipsychotic medication in the long-term care setting.

Pediatrics

87. Pharmacy TPN services on the neonatal intensive care unit. *Martha Rumore, Pharm.D,, J.D., LLM, F.A.Ph.A.*[1], Uzma Afzal, Pharm.D.[2], Rachel Sussman, Pharm.D.[2], Jennifer Chon, Pharm.D. Candidate[2]; (1) Department of Pharmacy, Cohen Children's Medical Center, New Hyde Park, NY; (2) Department of Pharmacy, Cohen Children's Medical Center, New York, NY
OBJECTIVES: At Cohen Children's Medical Center our staff pharmacists were being told by prescribers that they should not be calling with unnecessary questions, nor should they be monitoring laboratory values. The relationship between pharmacy and GI and nutrition was less than ideal. No TPN policy existed, nor do resources for a Clinical Pharmacist Nutrition Coordinator for NICU.
METHODS: An audit was conducted of our near misses, medication errors, and adverse drug events pertaining to Total Parenteral Nutrition (TPN) from October 2012–October 2013. We categorized and drilled down all events and identified areas for improvement. Many of the events involved prescribing errors; osmolarity, addition of electrolytes, and addition of cysteine. As no TPN policy existed, pharmacy reached out to nutrition services and GI/NICU medical leadership to develop a TPN policy which addressed areas of common errors. In October 2013, this policy was approved at P&T and implemented. Concurrently, a pharmacist TPN training module was which was required training for all our staff pharmacists was implemented. To address the issue of recurring questions we brought a patient-care model to the NICU for our staff pharmacists whereby our staff pharmacists round weekly with the nutrition and medical team prior to TPN order writing. Pre- and post- TPN medication events as a result of our multi-faceted pharmacy initiatives will be detailed.
RESULTS: Our staff development program, pharmacist rounding, and TPN policy collectively significantly impacted patient safety. Additionally, we have expanded the clinical role of our staff pharmacists. To date, our efforts have been well received by the nutrition and medical staff.
CONCLUSION: Pharmacists are the health professional responsible for consultative optimization of the composition of TPN and advising on compounding/stability, and drug-nutrient interactions.

88. Drug stability test of tuberculosis powder. *Azrifitria Syauki*[1]; (1) Departement of Pharmacy, UIN Syarif Hidayatullah Jakarta, South Tangerang, Indonesia
OBJECTIVES: Notterman DA (1986) reported that isoniazid given in the form of a powder with applesauce cause low INH plasma levels and therapeutic failure occurs. There are no adequate data on the stability of solid drugs are converted into powder in preparation.
METHODS: Stability test is done by simulating the prescription powder and processing at the hospital pharmacy. Recipes must be blended in a pharmacy where to buy medicines into powder to be tested stability. Stability test includes chemical and physical stabil-

ity. Chemical stability of the active substances includes drugs that still persist in the powder at two storage temperatures are 80C temperature (cool temperatures) and 270C (room temperature). Measurement of drug levels every week for 4 weeks performed using high performance liquid chromatography (HPLC) and a qualitative test by thin layer chromatography (thin layer chromatography), by calculating the value of Rf (retention factor). Stability physics with organoleptic checks includes odor, color and taste.
RESULTS: Decreased levels of INH were mixed with vitamin B6 and INH were mixed with rifampicin in the powder were significantly at weeks 2, 3 and 4 at 80C storage compared to week 0 (p=0.05), while storage at 270C decreased levels of INH in meaningful starting from week 1 to week 4 (p=0.05). Decreased levels of single rifampicin and rifampicin were mixed with INH in the powder were significantly at weeks 1, 2, 3 and 4 at 8 and 27 0C storage (p=0.05). Powder TB drugs INH and rifampicin containing both single and unstable mixture stored at 8 and 270C, chemical degradation resulting in changes in the levels and Rf values of both the drug compounds
CONCLUSIONS: Prescription drug of powder tuberculosis INH and rifampicin is not recommended.

Pharmacoeconomics/Outcomes

89. Understanding intravenous iron utilization post CMS PPS and FDA label revision for erythropoiesis stimulating agents. *Shaffeeulah Bacchus, Pharm.D.*[1]; (1) Pharmacy Department, Yankee Alliance Inc, Andover, MA
OBJECTIVES: To assess the impact of CMS PPS and FDA label revisions of erythropoiesis stimulating agents on IV iron utilization
METHODS: Wholesaler purchase data for erythropoiesis stimulating agents and all intravenous iron products was accessed through a group purchasing organization comprising of 120 hospitals within the northeast region of the United States. All hospitals included in study were members of the same group purchasing organization (GPO) for entire study period and purchased both erythropoiesis stimulating agents and intravenous iron products within the same contractual pricing agreements. Only outpatient purchase accounts were included in study. A cost trend analysis was preformed utilizing a proprietary data analysis tool to characterize and compare purchase data of both erythropoiesis stimulating agents and intravenous iron products during the time period of 2011 to 2013.
RESULTS: Purchase volume for erythropoiesis stimulating agents progressively decreased from $9,972,289 in 2011 to $9,110,534 in 2012 to $7,686,886 in 2013, showing an overall 22.92% decrease in purchase volume. Whereas intravenous iron purchase volume remained essentially the same at $1,713,837 in 2011, to $1,608,408 in 2012 and $1,738,631 in 2013 with an increase in purchase volume of 1.45%.
CONCLUSION: While both the CMS PPS and FDA label changes resulted in reduction of overall outpatient purchase volume of erythropoiesis stimulating agents, there was no corresponding change in intravenous iron purchase volume.

90. Quality and economic impact of an Antimicrobial Stewardship Program intervention on procalcitonin (PCT) utilization at a community health-system in central Ohio. *Lauren Lopez, Pharm.D., BCPS*[1], Sara Jordan, Pharm.D., BCPS[1]; (1) Pharmacy Services, Grant Medical Center, Columbus, OH
OBJECTIVES: To optimize institutional use of procalcitonin (PCT) to guide antibiotic duration.
METHODS: Internal analyses of the impact of PCT use on antibiotic duration in critical care patients at the system's two largest facilities suggested no mortality benefit over antimicrobial therapy without the use of PCT. Additionally, the PCT populations had significantly greater antibiotic days, ICU and hospital LOS, and medication-related charges. These trends were apparent regardless of compliance with a recommended PCT-guided treatment algorithm. Based on these internal data and lack of consistent positive outcomes supporting PCT use in published literature, the Antimicrobial Stewardship Program pursued a system-wide educational initiative in concert with key critical care players. The institutional Antimicrobial Stewardship Program developed and disseminated a position statement discouraging the routine use of PCT to guide antimicrobial therapy. Education was provided to key stakeholders, including Critical Care, Emergency Department, and Internal Medicine physicians. PCT ordering was also discouraged by removal from standard order sets and treatment protocols. Baseline and followup PCT utilization data and associated costs were captured to measure impact of intervention.
RESULTS: Approximately 1 month after completion of intervention, the number of system-wide PCT levels ordered had decreased by > 50%, resulting in an estimated cost savings of at least $100,000 annually. Additionally, a significant cost-avoidance was experienced due to a retracted decision to purchase additional laboratory equipment.
CONCLUSION: The use of a novel biomarker to guide antibiotic duration at our facilities was associated with increased antibiotic use and costs without improving clinical outcomes. An Antimicrobial Stewardship Program-led intervention resulted in significantly reduced use of this laboratory value to improve quality and cost of care.

Pharmacoepidemiology

91. A comparison of vancomycin susceptibility results when using the Prompt™ inoculation method vs the turbidity inoculation method. *Narina Wyar, Pharm. D.*[1], Robert Wood, IV, Pharm. D.[1]; (1) Pharmacy Department, Non-profit Hospital System, NJ
OBJECTIVES: The facilities witnessed a > 200% increase in the number of Vancomycin minimum inhibitory concentration (MIC) results that were ≥ 2 when the Prompt™ inoculation method was newly utilized for antibiotic susceptibility testing. Testing method was then changed to the turbidity inoculation method to determine (i) if the Prompt™ inoculation method was responsible for the sudden increase and (ii) if the turbidity inoculation method resulted in a decreased rate of Vancomycin MIC results that were ≥ 2.
METHODS: Vancomycin MIC results using the Prompt™ inoculation method from January 1, 2013 to June 30, 2013 were compared to Vancomycin MIC results using the turbidity inoculation method from July 1, 2013 to December 31, 2013. Inclusion criteria consisted of Vancomycin MIC laboratory results for all patients testing positive for Methicillin-resistant Staphylococcus aureus bacteremia.
RESULTS: When utilizing the Prompt™ inoculation method for susceptibility testing the incidence rate of Vancomycin resistance (defined as MIC ≥ 2) was 45% (25 out of 55 laboratory results) over the course of 6 months. When utilizing the turbidity inoculation method for susceptibility testing the incidence rate of Vancomycin resistance was 13% (6 out of 45 laboratory results) over the course of 6 months.
CONCLUSION: A sudden increase in the rate of antibiotic resistance during susceptibility testing warrants investigation into the testing method utilized by the laboratory. Accurate susceptibility results allow healthcare practitioners to avoid selecting therapies reserved for patients with truly resistant organisms. Doing so may offset the occurrence of antibiotic resistance in the future and alleviate further financial strain on the healthcare system.

Pharmacogenomics/Pharmacogenetics

92. The effect of alpha 1 antitrypsin deficiency and bacterial loads on the efficacy of chronic obstructive pulmonary disease pharmacotherapy in Egyptian patients. *Marwa G. el-Hennawy, Bachelor of Pharmaceutical Sciences*[1], Hussein Sultan, Bachelor of Pharmaceutical Sciences, Noha Elhosseiny, Assistant Lecturer of Microbiology and Immunology, Nermin A. Sabry, Assistant Professor of Clinical Pharmacy and Pharmacy Practice, Ahmed S. Attia, Assistant Professor of Microbiology and Immunology; (1) Cairo University
OBJECTIVES: Chronic obstructive pulmonary disease (COPD) is caused by the combination of smoking, genetic susceptibility

and exacerbated by bacterial infection. The genetic cause of COPD is a_1-antitrypsin (AAT) deficiency. The goal of the study is to screen for AAT deficiency in the Egyptian population both phenotypically and genotypically to assess the contribution of (PI*S, PI*Z, PIMmalton and $Q0_{Cairo}$) in the development of COPD in Egypt. The role of the bacterial burden in the COPD patients and its possible link to the AAT- deficiency genotype will be determined. Finally, any correlations between the identified mutations and/or the bacterial loads and the patients' response to the medication will be determined.
METHODS: Three medical centers in Egypt participated in the study. Eligible patients (> GOLD II, < GOLD IV, FEV_1/FVC ratio < 0.7, with post-bronchodilator FEV_1 < 80% predicted) were offered testing for AATD, 6 minutes walk test and arterial blood gas (ABG).
RESULTS: A total of 21 patients were tested, of whom 20 were eligible. 25% were carriers (MZ). 65% showed single microbial species, 25% showed 2 microbial species and 10% had no microorganisms. Distribution of the isolated microorganisms based on Gram-reactions showed that 52.2% are Gram Positive while 47.8% are Gram Negative bacteria. Upon receiving treatment (LABA and Corticosteroid inhaler) for 6 months; 6 minutes walk test results increased by average 14.14%, FEV_1/FVC ratio increased by average 20.75% and Oxygen Saturation increased by average 0.51%. Still the correlation between the gene variation and response to treatment is under investigation.
CONCLUSION: The prevalence of AATD among patients undergoing pulmonary function test was 25% MZ variant carriers. Pulmonary Function testing was effectively conducted throughout the study.

Women's Health

93. Health literacy of obstetric patients at a university women's clinic. *Miranda Jordan, Pharm.D.*[1], Nalin Payakachat, Ph.D.[2], Denise Ragland, Pharm.D.[2]; (1) Department of Pharmacy, Central Arkansas Veterans Healthcare System, Little Rock, AR (2) College of Pharmacy, University of Arkansas for Medical Sciences, Little Rock, AR
OBJECTIVES: This study assessed health literacy of patients who received prenatal care at a university women's clinic. The objectives were to inform healthcare professionals regarding patients' health literacy levels and to test the feasibility of the health literacy instrument, the Newest Vital Sign (NVS), for future routine clinic use.
METHODS: A retrospective study using de-identified data from a convenience sample of obstetric patients in a university women's clinic was conducted. The data, collected July through August 2013, contained patients' age, race, and NVS scores. The NVS is an interview-administered health literacy instrument that measures prose and numeracy literacy. It takes 3–5 minutes to complete. The NVS score ranges from 0 to 6. A score of 0 to 1 suggests high likelihood (50% or more) of limited literacy, a score of 2–3 indicates the possibility of limited literacy, and a score of 4–6 almost always indicates adequate literacy. In this study, we categorized patients into two groups: limited health literacy (NVS scores of ≤ 3) and adequate health literacy (NVS scores > 3). Descriptive statistics were used to explore health literacy in this sample.
RESULTS: The average age of 140 patients was 26.8 years (SD = 6.4). Fifty percent (n=70) were White and 38.6% were Black (n=54). The average NVS score was 3.0 (SD = 2.2). Forty-nine percent had limited literacy. Blacks had a higher proportion of limited health literacy when compared to Whites (57.4% vs 37.1%). Young patients (age < 21 years) had a higher proportion of limited health literacy (78.9%) when compared to older groups.
CONCLUSION: Nearly half of the patients in this sample had limited health literacy. Healthcare providers should be aware of patients' health literacy so they can provide appropriate health education/instructions to better serve this population. It is feasible to use the NVS instrument to routinely screen health literacy in a clinic setting.

Resident and Student Research-in-Progress ADR/Drug Interactions

94. Comparison of warfarin and acetaminophen drug-drug interaction warnings between prescription and OTC drug labels in acetaminophen-containing products. *Anthony Shaver, Pharm.D. Candidate*[1], John Horn, Pharm.D.[1]; (1) School of Pharmacy, University of Washington, Seattle, WA
OBJECTIVES: The drug-drug interaction between acetaminophen and warfarin is well defined but may be underappreciated by practitioners and consumers. This study examined drug labels for acetaminophen-containing products to determine (i) the prevalence of drug-drug interaction warnings for warfarin in the acetaminophen labels, and (ii) if there is a difference in the prevalence of these warnings between prescription and OTC drug labels.
METHODS: Acetaminophen-containing labels for human OTC and prescription products (2049 OTC, 588 prescription) from the National Library of Medicine's DailyMed website were identified in August of 2013. The XML label files were parsed and the full text was searched using a Python script for inclusion of a warning about a drug-drug interaction between warfarin and acetaminophen using the search term "warfarin".
RESULTS: The interaction warning was found far more frequently in the OTC drug labels compared to the prescription drug labels. 90% of OTC drugs labels contained the warning compared to only 10% of prescription drug labels. Among the prescription labels that contained the warning, 26% were found in the "Precautions" section and 37% were found in the "Drug Interactions" subsection of the "Precautions" section. Among the OTC labels that contained the warning, 94% were found in the "Ask Doctor/Pharmacist" section.
CONCLUSIONS: While the majority of OTC acetaminophen-containing drug labels warn patients about a drug interaction with warfarin, few prescription drug labels contain the warning. This data suggests that consumers taking OTC products may be appropriately warned about this drug interaction, while prescription product labeling may be inadequate to warn practitioners and patients.

Adult Medicine

95. The impact of a pharmacist-provided anticoagulation-focused discharge service on anticoagulation control in patients receiving warfarin following total hip or knee replacement. *Elyse Weitzman, Pharm.D.*[1], Paula Horn, Pharm.D.[2], Tucker Freedy, Pharm.D.[2]; (1) Allegheny General Hospital, Pittsburgh, PA; (2) Allegheny General Hospital
OBJECTIVES: To describe the impact of pharmacist-provided education and transition planning at the point of discharge on anticoagulation control in patients initiated on warfarin venous thrombosis prophylaxis for orthopedic surgery and receiving follow-up outpatient pharmacist care.
METHODS: Patients who were enrolled into the outpatient anticoagulation clinic via referral from an affiliated orthopedic surgeon were included. Next, a retrospective electronic chart review (inpatient and outpatient) was conducted to identify patients meeting exclusion criteria. The following data is being collected: age, gender, race, procedure, baseline warfarin use, length of stay (LOS), duration of therapy, INR values during warfarin therapy, and readmissions/ER visits within 90-days of surgery. Primary outcomes being measured: time to therapeutic INR, percentage of INRs in therapeutic range from day 1 and day 5 onward, and time in therapeutic range (TTR) from day 5 onward, calculated using the Rosendaal method.
RESULTS: Fifteen patients were reviewed and 13 met criteria for enrollment. No patient had baseline use of warfarin prior to surgery; 46% men; mean age 56 years (32–80); 84.6% white; mean

LOS 3.7 days; mean duration of warfarin therapy 19.7 days (9–40); and 77% were TKR. Mean within-patient proportion of INRs in range was 30.5% ± 5.5 and from day 5 onward was 39.7% ± 7.5; mean time to therapeutic range 11.8 days ± 1.8; and mean TTR 34.8% ± 8.1. Additionally, 2 patients never had an INR measured between 2 and 3, 4 patients never had an INR measured > 2, only 1 patient was readmitted within 90 days post-surgery (weeks beyond warfarin discontinuation), and no patients were lost to follow-up.
CONCLUSION: With additional enrollment, data will be compared to historical literature-based control groups.

96. Evaluation of a subcutaneous Basal-Bolus Insulin protocol on the rates of hyperglycemia and hypoglycemia compared to sliding scale insulin. *Julie Craft, Pharm.D. Candidate*[1], Nathan A. Pinner, Pharm.D., BCPS[2]; (1) Harrison School of Pharmacy, Auburn University, AL (2) DCH Regional Medical Center, Tuscaloosa, AL
OBJECTIVES: To determine the lasting impact of an educational program on the utilization of a basal-bolus (BB) insulin protocol, and to evaluate its effectiveness compared to sliding scale (SS) insulin on rates of hyperglycemia and hypoglycemia.
METHODS: We retrospectively reviewed the charts of all patients receiving the BB protocol for a one-year period starting 6 months after the educational program (May 2012–April 2013). We selected an identical number of patients receiving the SS protocol during the same time period and from similar wards. No patients were excluded that received the BB protocol. Episodes of hyperglycemia (BG > 180 mg/dL) and hypoglycemia (BG < 70 mg/dL) were collected.
RESULTS: No BB protocols were ordered the month preceding the educational intervention whereas 6 were ordered during the month following the intervention, and during the post-intervention study period 142 were ordered (approximately 12/month). A total of 284 patients were included in the analysis (142 in each group). The mean HbA1c was 9.3% and 8.2% and the mean admission blood glucose was 309 and 204 mg/dL for the BB and SS groups, respectively. One hundred thirty (92%) patients receiving the BB protocol experienced 2074 episodes of hyperglycemia, while 114 (80%) patients receiving the SS protocol experienced 964 episodes of hyperglycemia ($p<0.01$). Twenty-seven (19%) patients receiving the BB protocol experienced 47 episodes of hypoglycemia, while 33 (23%) patients receiving the SS protocol experienced 51 episodes of hypoglycemia ($p=0.467$).
CONCLUSION: Utilization of the BB protocol continued 18 months after the educational intervention. Use of the BB protocol was not associated with lower rates of hyperglycemia than the SS protocol, however patients selected by prescribers for the BB protocol presented with more poorly controlled diabetes. The number of episodes of hypoglycemia between the two protocols was similar.

Ambulatory Care

97. Maintenance of therapeutic goals after discharge from a pharmacist-managed risk reduction clinic at a veterans affairs medical center. *Christina Sherrill, Pharm.D.*[1], Angela Pentecost, Pharm.D.[1], Emily Wood, Pharm.D.[1]; (1) Charles George Veterans Affairs Medical Center, Asheville, NC
OBJECTIVES: This study is investigating (i) whether therapeutic goals for diabetes, dyslipidemia, and/or hypertension can be maintained during the first two years following discharge from the pharmacist-managed Risk Reduction Clinic (RRC) at the Charles George Veterans Affairs Medical Center (CGVAMC), (ii) the factors that may be associated with deterioration in the monitoring parameters for these disease states, and (iii) the frequency of re-consultation to the RRC.
METHODS: Electronic medical records are being reviewed to include a total of 150 veterans discharged from the RRC prior to August 15, 2011 due to goal attainment who have pertinent data for the two years following discharge. The following data are being documented: demographics (age at discharge, sex, race, diagnoses); date of first consult to the RRC; date of discharge from the RRC; hemoglobin A1c, low-density lipoprotein (LDL), systolic blood pressure (SBP), and weight at initial consultation, at discharge, and during the two years following discharge; and date of re-consultation to the RRC, if applicable. This material is the result of work supported with resources and facilities at the CGVAMC.
RESULTS: Demographics for the first 57 veterans included are as follows: average age 66 years, 98% male, 89% white, 68% with diabetes, 98% with dyslipidemia, and 84% with hypertension. Preliminary results for patients with all pertinent data are presented in the table below. Eighteen percent of patients were re-consulted. Data collection is ongoing and should be completed prior to the 2014 ACCP Virtual Poster Symposium.

Average change in monitoring parameters	Consultation to discharge	Discharge to 12 months	Discharge to 24 months
A1c (%)	−1.86	+0.40	+0.61
LDL (mg/dL)	−29.2	+8.6	+8.6
SBP (mm Hg)	−5.8	+8.1	+8.8

CONCLUSION: Preliminary results show that the benefits of A1c and LDL lowering achieved during enrollment in the RRC persist during follow-up, but SBP is less durable.

98. Ambulatory blood pressure monitoring for measuring the effectiveness of amlodipine and hydrochlorothiazide in treating urgent and stage 2 hypertension. *John Bucheit, Pharm.D.*[1], Evan Sisson, Pharm.D., M.H.A.[1], Dave Dixon, Pharm.D.[1]; (1) Department of Pharmacotherapy and Outcome Science, Virginia Commonwealth University School of Pharmacy, Richmond, VA
OBJECTIVES: This study seeks to evaluate the safety and efficacy of the two-drug combination, amlodipine plus hydrochlorothiazide, for the treatment of hypertensive urgency and stage 2 hypertension in the outpatient setting.
METHODS: This prospective, open-label, non-randomized, single-group study enrolled patients presenting to a primary care clinic with stage 2 hypertension or hypertensive urgency between November 2013 through April 2014. Each subject received amlodipine 5 mg plus hydrochlorothiazide 25 mg and was asked to wear an ambulatory blood pressure monitoring device for 24 hours. A baseline basic metabolic panel and pregnancy test (if applicable) were obtained at the initial visit and reviewed the next day. Patients with baseline hypokalemia were excluded from the study. Study participants returned for two additional visits, the first within 72 hours and the second 2 weeks from the initial visit. Efficacy was assessed by the rate of lowering in systolic and diastolic blood pressure in 24 hours. Subsequent utilization of emergency department (ED) services will also be measured.
RESULTS: After 1 month, four patients met inclusion criteria with an average initial blood pressure of 164.58/104.75 mm Hg. The average decrease in systolic blood pressure was -15.1% (139.81 mm Hg) and −8.8% (95.56 mm Hg) at the first follow up visit. All four patients returned for the second scheduled visit with only one patient not able to finish the study due to hypokalemia at the initial visit. No cardiovascular events or ED visits occurred.
CONCLUSION: A preliminary analysis of this data indicates that the two drug combination of amlodipine 5 mg plus hydrochlorothiazide 25 mg effectively reduces blood pressure for patients with urgent and stage 2 hypertension. This study is ongoing until an adequate sample size is obtained for statistical analysis.

99. Assessment of chronic disease state management in a pharmacist-run chronic care clinic in an urban free health clinic. *Amber Ladak, Pharm.D.*[1,2]; (1) School of Pharmacy, University of Missouri - Kansas City, MO; (2) Practice site: Kansas City Care Clinic, Kansas City, MO

OBJECTIVES: The purpose of this study is to assess the effectiveness of a pharmacist-driven chronic care clinic, as compared to general medicine clinics run by medical doctors and nurse practitioners.
METHODS: A random list of patients from the Kansas City CARE Clinic with hypertension, diabetes, and/or dyslipidemia was generated. These patients were either managed by a pharmacist (PharmD) in a pharmacist-driven chronic care clinic, or by a Doctor of Medicine (MD), Doctor of Osteopathic Medicine (DO), or Nurse Practitioner (NP), in a general medicine clinic. Patients must have been seen at least two times in the same clinic between January 2013 and December 2013. The patient's Electronic Medical Record (EMR) was accessed to collect a variety of data including: the number of medications the patient was taking for specific indications, and whether or not the patient is at goal for A1C, blood pressure, and low-density lipoprotein (LDL). Data will be analyzed to identify any differences in outcomes between the two groups of patients.
RESULTS: Data collection is on-going.
CONCLUSION: By directly comparing outcomes from the two separate clinics, we hope to quantitatively show the impact of pharmacists' management of chronic disease states.

100. Pharmacy and medical student perceptions of an interprofessional primary care clinic experience in an underserved community setting. *Michael Dail, Pharm.D.*[1]; (1) Department of Pharmacotherapy and Outcomes Science, VCU School of Pharmacy, Richmond, VA
OBJECTIVES: Interprofessional Education (IPE), defined as, when students from two or more professions learn about, from and with each other to enable effective collaboration and improve health outcomes, can lead to an improvement for public health and address social determinants of health utilizing a multidimensional approach to healthcare. Existing descriptive reports detail IPE experiences in didactic settings, however, limited data is available that describe IPE experiences in a clinical setting prior to advanced training. An interprofessional primary care clinic experience was developed to partner medical, pharmacy, and language interpreter students together to care for patients in an uninsured community safety-net setting. Students were oriented to IPE and teamwork principles by an IPE preceptor team, which also precept the students during weekly clinic sessions.
METHODS: Mixed-methods data were collected for two years (n=68) from student course evaluations and surveys.
RESULTS: Quantitative data utilizing 4-point Likert scales demonstrated that the course stimulated student thinking (mean = 3.85) and motivated them to learn (mean = 3.84). Inductive thematic analysis revealed students strongly valued resulting interprofessional teamwork and found the experience to connect didactic learning with clinical experience. Students emphasized the integration of knowledge and experience of other professions to inform care decisions and interprofessional roles and responsibilities as aligned with the Core Competencies for Interprofessional Collaborative Practice.
CONCLUSION: Pharmacy and medical students find it beneficial to learn in an interprofessional environment and perceive the experience to promote critical thinking, an important theme in healthcare professional education. This poster describes the interprofessional clinical experience and reflects on the inclusion of other healthcare professional students while considering how the model may be replicated in other health education environments.

101. Evaluating the clinical and economic outcomes of an integrated pharmacy primary care service. *Terrance Yu, Pharm.D.*[1]; (1) Pharmacy Department, Kaiser Permanente Los Angeles Medical Center, Los Angeles, CA
OBJECTIVES: Under a new Pharmacy Primary Care Service (PPCS) paradigm, ambulatory care clinical pharmacists at Kaiser Permanente Los Angeles Medical Center (KP LAMC) can reach out to more patients by performing both diabetes management and medication therapy management, rather than in separate silo clinics, without compromising the percentage of patients' achieving therapeutic outcomes while adding opportunities to convert new members to formulary drug use to lower health system's cost burden.
METHODS: A retrospective chart review was conducted from 2012 to 2013 of the KP LAMC patient encounters by ambulatory care pharmacists before and after the implementation of PPCS. Patients were included if they had an encounter (face to face or telephone) with the KP LAMC ambulatory care pharmacist. Patients were excluded if they were in skilled nursing facility, hospice, or palliative care or were noncompliant with visits. If the patient to pharmacist hours are within 5% of each year, 80% power can be established to detect a difference between the 2 years. The primary endpoint was the total number of patients outreached per full time employee (FTE) pharmacist hour before and after program implementation. The secondary endpoints looked at the following before and after program implementation: percentage of patients to achieve HgbA1C < 8.0%, comprehensive medication review (CMR) completion rate, and financial saving in total dollar amounts from nonformulary drug conversion to formulary alternatives per pharmacists. Paired t test will be performed.
RESULTS: 7.5 FTE equals 14550 hours and 9 FTE equaled 17550 hours in 2012 and 2013, respectively. Unique number of patients seen for diabetes management in 2012 and 2013 were 1589 and 2258, respectively. Total patient CMR rate of 2012 and 2013 are 1289/1443 (89%) and 1214/1614 (75%), respectively. Rest of the data pending.

Cardiovascular

102. Antithrombotic usage patterns in the era of new oral anticoagulant options for atrial fibrillation. *Jacob Marler, Pharm.D.*[1], Justin B. Usery, Pharm.D., BCPS[2], Shambria Nolan, Pharm.D., BCPS, BCPP[1], Carrie S. Oliphant, Pharm.D., BCPS, (AQ, Cardiology)[2]; (1) Methodist University Hospital, Memphis, TN; (2) Methodist University Hospital and University of Tennessee College of Pharmacy, Memphis, TN
OBJECTIVES: Antithrombotic therapy is important for patients with atrial fibrillation (AF) to reduce cardioembolic stroke risk. Despite the known benefits of warfarin, anticoagulation prescribing rates remain inadequate. The goal of this investigation is to determine the effect new oral anticoagulants (dabigatran and rivaroxaban) have on the rate of anticoagulation prescribing upon hospital discharge in patients with AF and a $CHADS_2$ score of 2 or greater.
METHODS: A retrospective chart review of patients presenting with AF in the Methodist Healthcare System was conducted using a historical control group of patients from 2009 compared to patients admitted in 2012 following formulary availability of dabigatran and rivaroxaban. In addition to antithrombotic therapy prescribed, subsequent hospitalizations during a one year period were reviewed for major bleeding and stroke events. Patients with a documented reason for not being prescribed an anticoagulant were excluded.
RESULTS: Currently, 152 patients have been enrolled with anticipated completion by April 2014. The rate of anticoagulant prescribing in the 2009 and 2012 groups was 70.1% and 72.9%, respectively (p=0.70). Of the patients in the 2012 group prescribed an anticoagulant, 42 (67.7%) received warfarin, 14 (22.6%) received dabigatran and 6 (9.7%) received rivaroxaban. One patient (2.1%) in the 2009 group and three patients (4.8%) in the 2012 group had a major bleed (p=0.63). In the 2012 group, each of the major bleeding events occurred with a different anticoagulant. There was no difference in the incidence of stroke between the 2009 (1 ischemic, 1 hemorrhagic) and 2012 (1 ischemic) groups. Length of stay and readmission rate was similar between the anticoagulant groups in the 2012 population.
CONCLUSION: Despite the availability of new oral anticoagulants, the overall rate of anticoagulant use was the same as well

as the incidence of major bleeding and stroke between the two time periods. Additional data analysis is ongoing.

Community Pharmacy Practice

103. Impact of screening and immunization services on diabetes patients in the community pharmacy setting. *Janis Rood, Pharm.D.*[1], Matthew Osterhaus, R.Ph.[2], Angela Spannagel, Pharm.D., BCACP[2], Linnea Polgreen, Ph.D.[3], Karen Farris, R.Ph., Ph.D.[4], Stevie Veach, Pharm. D., BCACP[5]; (1) Osterhaus Pharmacy, University of Iowa College of Pharmacy, Maquoketa, IA; (2) Osterhaus Pharmacy, Maquoketa, IA; (3) Division of Health Sciences Research, University of Iowa College of Pharmacy, Iowa City, IA; (4) Clinical, Social & Administrative Sciences, Univeristy of Michigan College of Pharmacy, Ann Arbor, MI; (5) The University of Iowa College of Pharmacy, Iowa City, IA

OBJECTIVES: To demonstrate the ability of community pharmacists, using Advisory Committee on Immunization Practices (ACIP) immunization recommendations, to: identify patients with diabetes who are not up-to-date with immunizations; bring up-to-date patients with diabetes who are not up-to-date either through pharmacy services or referral to physician services; and, identify barriers when pharmacist intervention is unsuccessful.

METHODS: This is a cohort study being implemented at an independent community pharmacy in a rural Midwest town. Eligible patients are 18 years or older who are documented in the pharmacy processing system as having diabetes or fill any FDA-labeled diabetes medications. An ACIP-based screening tool was developed to determine which vaccinations each patient requires. The Iowa Immunization Registry Information System (IRIS), with supplementary data from physicians and patient report, is used for screening. During dispensing, patients are targeted by pharmacists for participation. All patients who consent will be immunized in the pharmacy or referred to physician care if necessary.

RESULTS: There were 260 current patients identified with diabetes. In-store marketing has occurred with 143 patients, 10 of whom declined. Of the remaining 133 patients, 2 were already up-to-date, 26 have been brought up-to-date through pharmacist intervention, 6 have been referred to physician care due to insurance requirements, and 99 await records collection and consultation. An additional 117 patients are yet to be marketed. Barriers to service have been lack of understanding of the pharmacist's role in clinical services and cost.

CONCLUSION: Pharmacists in the community setting are able to identify which diabetes patients are up-to-date with ACIP recommendations and bring up-to-date those who are not. Patient education and assistance programs may be effective in addressing barriers.

104. Rural community perspectives on childhood immunizations administered by pharmacists. *Autumn Hayes, Pharm.D.*[1], Gina Davis, Pharm.D.[1], Rex W. Force, Pharm.D., BCPS, FCCP[2]; (1) College of Pharmacy, Idaho State University, Pocatello, ID (2) Departments of Family Medicine and Pharmacy Practice, Idaho State University, Pocatello, ID

OBJECTIVES: Idaho ranks low in childhood immunization rates with fewer than 60% of children fully vaccinated. In addition, access to health care is limited due to rural geography and the lowest rates of primary care physicians per capita in the nation. Idaho pharmacists can administer immunizations to persons of any age and this service may be the only resource in some rural communities, however, it is underutilized. The purpose of this survey was to determine how the public viewed childhood immunizations and if they would utilize these services if available in two rural community pharmacies.

METHODS: A 16-question survey was administered to a convenience sample of parents at two rural community pharmacies. Questions were designed to gather demographic data, perceptions of the importance of immunizations, and likelihood of utilizing services in community pharmacies. Data are being collected and tabulated in Excel.

RESULTS: The research is currently in progress. The targeted response is approximately 100 completed surveys between January and March of 2014. Preliminary data show that 20/22 parents deemed receiving childhood immunizations as very important on a scale of 1–5. In addition, 16/21 (76.2%) of parents were interested in having their children immunized at their local pharmacy. Eleven out of twenty-one parents were comfortable with a pharmacist administering immunizations to persons of any age.

CONCLUSION: Preliminary data indicate that access to childhood immunizations is important to parents in rural communities. The majority was willing to have rural pharmacists administer immunizations to their children. An economic analysis of this service should be done to help determine feasibility. With appropriate training of personnel, this service could allow for improved access to immunizations and increases in childhood immunization rates.

Critical Care

105. Impact of initiation of antimicrobial therapy and timing on survival in patients with septic shock. *Tania Pini, Pharm.D.*[1], Jill Cwik, Pharm.D.[1], Robert Citronberg, M.D.[2], Amish Doshi, Pharm.D.[1]; (1) Pharmacy, Advocate Lutheran General Hospital, Park Ridge, IL; (2) Medicine Office, Advocate Lutheran General Hospital, Park Ridge, IL

OBJECTIVES: Current evidence suggests the most important interventions for a septic patient are to initiate early goal-directed therapy (EGDT), obtain cultures, and begin early and appropriate antimicrobial therapy within the first hour of recognition. The timing of antimicrobial initiation upon recognition of sepsis has been published; however, the appropriateness of antimicrobials has not been evaluated in literature. The aim is to review appropriate initiation, timing and selection of antimicrobial therapy in subjects that present with septic shock based on our current empiric use guideline at Advocate Lutheran General Hospital (ALGH).

METHODS: A 2:1 comparative analysis of retrospective subjects presenting to the ED that have a suspected infection meeting 2 or more of the SIRS criteria with an admitting diagnosis of sepsis that survived (n=125) and those that expired (n=65). The primary objective is to determine if the empiric use guidelines are adhered to with appropriate selection of antimicrobial initiation in the ED. Our secondary objectives include mortality, length of stay, and transfer to the ICU, appropriate antimicrobials based on culture and sensitivity data, and antimicrobial initiation and continuation after transfer from the ED.

RESULTS: A total of 190 subjects were reviewed and 153 had a primary diagnosis of sepsis, 22 with septic shock, and 15 with unspecified septicemia. The appropriate antimicrobial was given to 174 patients (91.6%) and empiric guidelines were followed in 184 (96.8%) of the subjects. The majority of subjects (n=62) were administered antimicrobials within 2.01–3 hours from presentation to the ED (32.6%), whereas only 12.2% (n=23) of subjects received antimicrobials between 0 and 1 hours. The effect of appropriate antimicrobials administered on mortality did not show statistical significance (p=0.401). There was also no difference in timeliness to initial antimicrobial on mortality (p=0.453).

CONCLUSION: Our preliminary analysis showed that antimicrobial administration and timing did not affect mortality in the septic patient.

106. Evaluation of the use of dexmedetomidine in alcohol withdrawal. *Christina Stafford, Pharm.D.*[1], Diane McClaskey, R.Ph.[1]; (1) Department of Pharmacy, CoxHealth, Springfield, MO

OBJECTIVES: The purpose was to evaluate the use of dexmedetomidine in alcohol withdrawal and to compare it with the current protocol that utilizes benzodiazepines. The primary objective compared benzodiazepine use and the length of ICU and hospital stay in each group. Secondary objectives included determining the costs associated with longer ICU and hospital stay.

METHODS: This is a retrospective, cohort medication-use evaluation in patients who were treated for alcohol withdrawal over a 27-month period (Aug 2011-Oct 2013).
RESULTS: A total of 66 patients met all of the criteria to be included, 35 in the dexmedetomidine plus benzodiazepine (DEX) group and 31 in the benzodiazepine only (BZD) group. The patients in the DEX group used an average of 156 mg of lorazepam more during their hospital stay and were using benzos for an average of 5.7 days longer that the BZD group. Current use of dexmedetomidine was associated with an average extra 5.9 days spent in the ICU and an average extra 8.5 days spent in the hospital. The average cost of dexmedetomidine per patient was $3407. The additional cost due to extra days in the ICU per patient was $8403. The additional cost due to extra days in the hospital was $1849. The estimated additional cost to the hospital per DEX patient was $13,659. The total estimated extra cost for DEX treated patients in the studied sample was $478,065.
CONCLUSION: The established protocol has not been followed as it was written, with benzodiazepines not being started right away and adjunctive medications not being utilized in all patients. Dexmedetomidine was used in patients that were not intubated. SAS scores were frequently outside of desired range, showing both severe agitation and oversedation.

Drug Information

107. Ease of access to and availability of drug information on selected free websites. *Bisrat Hailemeskel, M.S., Pharm.D, R.Ph.*[1], Sharon Ihezue, B.S.[1], Kin-Sang Lam, Fourth Year Pharmacy Student[1]; (1) College of Pharmacy, Howard University, Washington, DC
OBJECTIVES: The goal of this study is to explore the relationship of availability and perceived ease of use of six selected web-based drug information resources (Rxlist, DrugDigest, Medscape, MedicineNet, Drugs.com, and Mayoclinic.com).
METHODS: A sample of 61 first year pharmacy students completed a survey as a part of their Drug Informatics class assignment. The survey was graded for accuracy and analysis performed to determine the correlation between users' rating on ease of use and the total percentage score on correct responses.
RESULTS: Majority of the pharmacy students were in the age group of 20–25 (52.5%) holding a Bachelor's degree (60.7%) and had 0–2 years of work experience (65.6%).Students answered questions with the most accuracy with Drugs.com (Mean = 9.3 $\pm$ 1.4) and the least accuracy with Medscape.com (Mean = 7.8 $\pm$ 1.7). Medscape.com. Drugs.com was rated the easiest to use (Mean = 4.2 $\pm$ 0.92) and Mayoclinic.com was rated the most difficult to use (Mean = 3.5 $\pm$ 1.02). Drugs.com had the highest positive variance score and Medscape.com had the highest negative variance score (−77). Medscape.com (r = 0.279, p=0.03) and Drugs.com (r = 0.256, p=0.046) had a significant weak positive relationship between the total scores and the corresponding ease of use rating by students.
CONCLUSION: In this study, there is no strong correlation found between the ease of use rating and total score. It is concluded that the ease of use of the Drug Information databases assessed in this study may include factors other than just the availability of the information. Future studies need to be conducted to determine what these factors are to help understand how users perceive the ease of use of health information databases.

Education/Training

108. Twelve month impact of countryside diabetes, a social media diabetes educational tool, by quantifying membership response rates to post type and topic for enhancing future care of disease management. *Ee Vonn Yong, B.S., Biology*[1], Heather Whitley, Pharm.D., BCPS, CDE[2], Rebecca Lee, Pharm.D.[3]; (1) Harrison School of Pharmacy, Auburn University, Auburn, AL; (2) Harrison School of Pharmacy, Auburn University, AL; (3) DCH Regional Medical Center
OBJECTIVES: The Facebook page, Countryside Diabetes, is administered by a multidisciplinary healthcare team as a network for those living with and caring for diabetes. This study retrospectively objectifies impact of Countryside Diabetes on membership from April 1, 2013 through March 30, 2014. The purpose is three-fold: (i) to describe the membership demographics and Facebook reach; (ii) to determine the impact and reach of content; and (iii) to utilize this data to shape future topics.
METHODS: Data collection utilized Facebook Insights, a feature of Facebook pages that provides administrators with site activity and audience demographics. Activity was determined by impact and reach of each category. Impact measured the amount of responses made per post while reach measured the number of users who viewed a post. Results were stratified by one of six categories (health, medications, nutrition, personal challenges, physical activity, and current events) to determine interest.
RESULTS: In a preliminary analysis from November 2012 to October 2013, the demographics are mainly females ages 25–34 located in the southeastern States. "Health" had the highest impact (32%) and reach (33%) while "Physical Activity" consistently had the lowest rate of impact (2) and reach (54) per post.
CONCLUSION: These findings suggest that those affected by diabetes prefer information pertaining to disease management rather than exercise, which necessitates more education in this area of diabetes management.

109. Risks in pharmacist prescribing. *Maresca Attard Pizzuto, M.Sc (Clinical Pharmacy)*[1], Anthony Serracino-Inglott, Pharm.D[1], Lilian M. Azzopardi, B.Pharm. (Hons.). M.Phil., Ph.D., MRPharmS[2]; (1) Department of Pharmacy, Faculty of Medicine and Surgery, University of Malta, Msida, Malta; (2) Department of Pharmacy, University of Malta, Msida, Malta
OBJECTIVES: To evaluate practitioners' perceptions on antibiotic prescribing and to establish the risks and competencies of pharmacist prescribing as perceived by practitioners.
METHODS: A questionnaire to study practitioners' perceptions on antibiotic prescribing and to establish the pharmacists' contribution in prescribing and dispensing antibiotics was developed.The Delphi technique was adopted to validate the questionnaire and an expert group comprising of microbiologists, general practitioners and pharmacists was formed.
RESULTS: The developed questionnaire contains 23 close-ended questions with 4 different sections, namely: Section A: Demographics, Section B: Antibiotic prescribing by physicians, Section C: Antibiotic prescribing by pharmacists and Section D: Physician-Pharmacist collaboration.This questionnaire aims to answer questions including: What are the risks for physicians when prescribing antibiotics?,Will these risks be greater for pharmacists?, What is the greatest problem you envisage if antibiotic prescribing rights are given to pharmacists?, Are pharmacists competent to prescribe the broad-spectrum antibiotics (example: co-amoxiclav or clarithromycin) to treat common infections? A list of different topical and systemic antibiotics used for mild conditions, namely bacterial skin infections, bacterial conjunctivitis, urinary tract infections and mild to moderate acne was drawn up to evaluate which antibiotics, would physicians allow pharmacists to prescribe in different clinical scenarios. The collaboration between physicians and pharmacists will be assessed to evaluate whether teamwork can ultimately benefit the patient.
CONCLUSION: Evaluating the perceptions and beliefs of medical practitioners of the risks associated with pharmacist prescribing within different scenarios that range from managing minor conditions to prescribing within a collaborative practice is essential before embarking on proposing national structures for pharmacist prescribing.

110. Evaluation of a pharmacist driven insulin education program on internal medicine resident knowledge. *Adina Feng, Pharm.D.*[1], Janna Fett, Pharm.D.[2], Colleen Lauster, Pharm.D.[2], Sarah Muench, Pharm.D.[2], Sara Dadayan, Pharm.D.[2]; (1) Beaumont Hospital, Royal Oak, MI; (2) Beaumont Hospital, Royal Oak

OBJECTIVES: Insulin is the treatment of choice for management of type 1 DM, and an option for initial therapy in type 2 DM. With the rise in DM, physician knowledge of insulin regimens will continue to grow in importance. Pharmacists have long been involved as educators in medical resident training programs, although data evaluating the outcomes is limited. This study will assess the knowledge of Internal Medicine residents on insulin pharmacokinetics, and insulin and syringe prescribing before and after an educational session provided by a pharmacist.
METHODS: A review of insulin prescriptions prescribed in by our medicine residents was conducted to assess the need for further education prior to study implementation. As part of the study protocol medical residents will be given a pre-test. The pre-test will assess their knowledge of insulin pharmacokinetics and of prescribing insulin and syringes, and comfort level with insulin pharmacokinetics and writing insulin prescriptions. Following the pre-test, the pharmacist will provide a educational session reviewing insulin pharmacokinetics and correct prescribing of insulin and syringes. A post-test will be given immediately after the session to assess if the education improved insulin regimen knowledge, it will then be repeated during the last week of the rotation to assess retention of knowledge. This process will be repeated for four consecutive months. A paired difference test will be used to assess if a statistical difference exists between the pre-test and the post-tests.
RESULTS: The initial review of outpatient insulin prescriptions revealed that only 5% of prescriptions had the correct insulin quantity prescribed. Twenty-five percent of prescriptions did not provide a route of administration, and only 10% of patients were prescribed an optimal syringe size. Results comparing the pre-test to each of the post-tests given to medical residents will be available by April 2014.

111. Effect of an interprofessional global health mission on medical and pharmacy students' attitudes and perceptions of physician-pharmacist collaboration. *Nellie Jafari, Pharm.D. Candidate 2015*[1], Diana Mack, Pharm.D.[2], Lisa Phipps, Pharm.D., Ph.D.[1], Emily Peron, Pharm.D.[1]; (1) Virginia Commonwealth University, Richmond, VA; (2) Mayo Clinic, Rochester, MN
OBJECTIVES: The aim of the current study is to assess the attitudes and perceptions of medical and pharmacy students regarding physician-pharmacist collaboration before and after participating in a global, interprofessional medical outreach brigade.
METHODS: Twenty five medical and pharmacy students were selected to participate in one of four interprofessional global health brigades in June and July of 2013 through the Virginia Commonwealth University Humanitarian Outreach Medical Brigade Relief Effort (HOMBRE). Student participants were contacted via e-mail and asked to complete surveys regarding perceptions of physician-pharmacist collaboration before and after trip completion.
RESULTS: Pre and post surveys for 12 students were completed between May 2013 and January 2014. Median (interquartile range) Scale of Attitudes Toward Physician-Pharmacist Collaboration (SATP2C) Scores before and after the trip were 50 (48, 61) and 62.5 (61, 64), respectively. Wilcoxon Signed Rank test revealed a statistically significant difference of 7.34 points ($p=0.005$, 95% CI 3.75, 11.09). The majority of the students surveyed (91.7%) indicated they would participate in such a trip again. Overall, there was an increase in the positive perceptions of physician/pharmacist collaboration.
CONCLUSION: Pharmacy and medical students expressed positive attitudes toward interprofessional collaboration after participating in an interdisciplinary global health brigade. Existing literature supports interprofessional education for health professions students to improve their learning experience and ultimately, patient health outcomes. Interprofessional national and global outreach brigades are one way for future healthcare providers to gain exposure to interprofessional collaboration. Additional results are in-progress and should be completed by February 2014.

112. Pain assessment improvement initiative at a nursing facility. *Kasey Malotte, B.A., Pharm.D.*[1], Christine O'Neil, B.S., Pharm.D., CGP, FCCP[1]; (1) Mylan School of Pharmacy, Duquesne University, Pittsburgh, PA
OBJECTIVES: Pain often goes untreated in nursing home residents due to an array of challenges including, but not limited to, poor documentation. Therefore, the objective of this study is to provide and evaluate effectiveness of nursing education regarding adequate pain documentation during as needed medication administration.
METHODS: Education was given by a pharmacist to nursing staff on a one-on-one basis. The in-service also included an explanation on three elements needed for adequate documentation. These elements included location and severity of the pain before the medication was given and severity of the pain ~1 hour after the medication was given. A score from 0 to 3 was given based on level of compliance to these three elements. These scores were averaged for each nurse to determine their compliance with pain documentation before and after the education.
RESULTS: Preliminary results showed that in-service education was provided to 61.5% of the 39 nurses included in the initial analysis. Before the education was given there was no significance found between those who did and did not receive education ($p=0.112$). There was a significant difference was found before and after for pain compliance documentation for all nurses ($p<0.001$), nurses who received the education ($p<0.001$) and nurses who did not receive the education ($p=0.017$).
CONCLUSION: From these preliminary results, it seems as though the education improved pain documentation for the 3 critical elements. The result of both groups improving despite education is probably due the close environment in which they all work. This project will hopefully will yield to better pain control and pain care due to increased documentation evidence of the residents' pain level as well as efficacy of current regimen.

113. Evaluation of a motivational interviewing series on student's confidence level during experiential rotations. *Adrianne Remigio, Pharm.D Candidate*[1], Krupa Gohil, Pharm.D Candidate[1], Laura Tsu, Pharm.D, BCPS, CGP[2], Nicole Murdock, Pharm.D, BCPS[2]; (1) Midwestern University-College of Pharmacy, Glendale, AZ; (2) Department of Pharmacy Practice, Midwestern University-College of Pharmacy, Glendale, AZ
OBJECTIVES: To assess the confidence levels of first and second year pharmacy students in applying classroom-taught motivational interviewing techniques during their introductory pharmacy practice experiences (IPPE) and advanced pharmacy practice experiences (APPE).. There may also be factors outside of the motivational interviewing lecture and workshop that contribute to the student's confidence levels. Midwestern University, College of Pharmacy - Glendale is a three-year program in which APPEs begin after the students' second year of didactics.
METHODS: Following a three-hour motivational interviewing lecture, second year students will be surveyed on their confidence levels to conduct motivational interviewing with patients prior to the start of their first APPE rotation. First year students who have not yet received the core motivational interviewing lecture series will also be surveyed prior to their first IPPE rotation. Students will be surveyed again after completion of 2 IPPE and APPE rotations. The survey will include questions regarding the students' self-reported confidence levels, attitudes about the lecture series, interviewing skills, and previous work or volunteer experience. Data will be collected and analyzed at the end of each survey conductance.
RESULTS: Table 1 includes baseline demographic information regarding the two pharmacy classes that have been collected.

	First year students	Second year students
Age (years)	26.1	25.8
% Females	57.4	48.4
Average GPA at matriculation	3.33	3.36
% with Bachelor's degree or higher	81	73

CONCLUSION: We expect that the second year students who have completed the motivational interviewing class to have higher confidence in utilizing motivational interviewing skills. Therefore, this study will help determine if an integrated motivational interviewing sequence should be provided throughout the core curriculum. We are also interested in observing which variables affect student confidence levels in motivational interviewing skills as this may be an area to explore for future educational development.

114. Interactive web-based training modules prior to advanced pharmacy practice experiences. *Alex N. Isaacs, Pharm.D.*[1], Sarah A. Nisly, Pharm.D.[1], Alison M. Walton, Pharm.D.[2]; (1) Butler University College of Pharmacy and Health Sciences & Indiana University Health, Indianapolis, IN; (2) Butler Unviersity and St Vincent Joshua Max Simon Primary Care Center, Indianapolis, IN

OBJECTIVES: Implement and evaluate interactive web-based training (WBT) modules prior to an ambulatory care or general medicine advanced pharmacy practice experience (APPE).

METHODS: Six WBT modules were developed, three for a general medicine APPE (inpatient anticoagulation, pneumonia, antibiotic pharmacokinetics and pharmacodynamics) and three for an ambulatory care APPE (outpatient anticoagulation, diabetes, medication therapy management). Students were contacted for voluntary study enrollment 10 days prior to the APPE. Students eligible for inclusion were all participating in a general medicine or ambulatory care APPE facilitated by a Butler University faculty member. Students were excluded if they had participated in the WBT modules on a previous APPE or did not complete all study components. Students completed identical pre- and post-assessments to evaluate the efficacy of the modules. Additionally, students completed a perception survey at the conclusion of the APPE to determine the utility of these modules and the impact on student learning experiences.

RESULTS: A total of 49 students have completed both the pre- and post-assessments, with 100% (20/20) ambulatory care students and 65.9% (29/44) general medicine students completing all study components. For the general medicine APPE modules, post-assessment scores increased to 63.6% from 30.1% on the pre-assessment. The ambulatory care APPE modules pre- and post-assessment scores were 66.4% and 77.7% respectively. A majority of participants agreed or strongly agreed that the WBT modules supplemented the APPE and were a positive learning experience.

CONCLUSION: Implementation of interactive WBT modules prior to an APPE improve baseline knowledge and were a unique learning experience well received by pharmacy students.

Emergency Medicine

115. First dose antibiotic administration in the emergency department increases visit duration in patients with cellulitis. *Ahmed Altyar, Pharm.D.*[1], Abdulaziz Mohammed, Pharm.D.[1], Hussain Bakhsh, Pharm.D.[1], Asad E. Patanwala, Pharm.D.[1]; (1) University of Arizona, Tucson, AZ

OBJECTIVES: Patients who present to the emergency department (ED) with cellulitis and directly discharged home often require antibiotic therapy. However, patients commonly receive a single dose of an intravenous or oral antibiotic in the ED prior to discharge. This first dose in the ED is not known to improve patient outcomes, but it may increase ED visit duration. The objective of this study was to determine the effect of antibiotic administration in the ED on length of visit.

METHODS: This was a cross-sectional study using data from the National Hospital Ambulatory Medical Care Survey database of ED visits from 2008 through 2010. Patients were included who presented to the ED with a diagnosis of cellulitis, discharged home directly from the ED, and prescribed an antibiotic on discharge. Patients were categorized into two groups: (i) first dose antibiotic given in ED, (ii) first dose antibiotic not given in ED. The primary outcome of interest was the ED visit duration, which was compared between groups. A multivariate regression analysis was conducted to adjust for potential confounders.

RESULTS: There were 3,000,895 ED visits that were included in our study cohort. Of these, 46.8% received a first dose of antibiotic in the ED. In the overall cohort, the mean age was 31.1 years (95% CI 29.5 to 32.6), 50.9% were male, and 68.9% were white race. The mean (geometric) ED visit duration was significantly greater in the group that received antibiotics in the ED (129 vs 97 minutes, $p<0.001$). After adjusting for potential confounders in the multivariate analysis, first dose antibiotic use in the ED was associated with increased visit duration (log-transformed) (coefficient 0.17, 95% CI 0.04–0.31, $p=0.011$, $R^2 = 15.9\%$).

CONCLUSION: The administration of the first dose antibiotic in the ED prior to discharge is associated with an increased ED visit duration in patients with cellulitis.

Endocrinology

116. Assessment of blood glucose control in general medicine patients treated with subcutaneous insulin in a community hospital. *Catherine Mattli, Pharm.D.*[1], Kelly K. Nystrom, Pharm.D., BCOP[2], Gregory Schardt, Pharm.D., BCPS[1], Kevin T. Fuji, Pharm.D., M.A.[3], David Schmidt, Pharm.D., BCPS[1], Stacey K. Friedman, Pharm.D., BCPS[2]; (1) Pharmacy, Alegent Creighton Health, Omaha, NE; (2) Pharmacy Practice, Creighton University SPAHP, Omaha, NE; (3) Center for Health Services Research and Patient Safety, Creighton University SPAHP, Omaha, NE

OBJECTIVES: The primary objective is to determine the percentage of patient-days that the mean blood glucose (BG) is within the target range of 100–180 mg/dL in general medicine patients treated with subcutaneous insulin at our institution. The secondary objectives are to identify the mean BG (mBG) value, determine the incidence of hypo- and hyperglycemic events, and compare BG control between different subcutaneous insulin regimens.

METHODS: A retrospective chart review of 278 adult, general medicine patients who were prescribed subcutaneous insulin during September 2013 is underway. The subcutaneous insulin regimen utilized and point-of-care glucose readings have been collected for 136 eligible patient-days from 100/278 patients. Other data collected included the patient's diabetes status, home diabetic regimen if applicable, and receipt of total parenteral nutrition, enteral nutrition, glucocorticoid therapy, or an oral antidiabetic agent during the patient-day.

RESULTS: The mBG was within the target range 45.6% (62/136) of patient-days. The average patient-day mBG was 198.6 mg/dL. Hypoglycemia (BG < 70 mg/dL) occurred during 4 (2.9%) patient-days. Hyperglycemia (BG > 180 mg/dL) was present during 103 (75.7%) patient-days. The mBG was within the target range 61.5% (40/65) and 24.2% (15/62) of patient-days for the correctional insulin regimen and the basal insulin plus correctional insulin regimen respectively ($p<0.001$). The average patient-day mBG for the correctional insulin strategy and the basal insulin plus correctional insulin strategy was 173.7 and 229.7 mg/dL respectively ($p<0.001$).

CONCLUSION: Blood glucose in general medicine patients treated with subcutaneous insulin at our institution is not well controlled. Better glucose control was achieved when correctional insulin was used alone. This may be a result of selection bias if patients who have poorer glucose control are those who receive the basal insulin plus correctional insulin regimen. Further review

is needed. These results will aid us in improving the blood glucose control in our institution.

Gastroenterology

117. End of treatment analysis and predictors of adverse events of direct-acting antiviral use in veterans with chronic hepatitis C. *Jenna Kawamoto, Pharm.D.*[1]; (1) Pharmacy, Department of Veterans Affairs, Los Angeles, CA

OBJECTIVES: The objectives of this study was to assess the safety and efficacy of triple therapy with direct-acting antivirals (DAAs) boceprevir (BOC) and telaprevir (TVR) and to determine predictors of treatment discontinuation due to adverse events.

METHODS: Using the Veterans Affairs (VA) Computerized Patient Record System (CPRS), this study retrospectively reviewed all veterans within the Veterans Integrated Service Network (VISN) 22 who received at least one prescription for BOC, TVR, pegylated interferon (pegIFN), or ribavirin during the time period of October 1, 2011 to October 1, 2012. We evaluated efficacy at the end of treatment and safety while on therapy. Our safety analysis specifically looked at the rates of hematologic adverse events, serious adverse events, discontinuations, and predictors of discontinuation.

RESULTS: Overall, 47% of patients treated with BOC achieved an end of treatment response compared to 48% of patients treated with telaprevir (NS). There were no significant differences in terms of hematologic adverse events between BOC and TVR. Serious adverse events (SAE) occurred in 15% of patients in the BOC group compared to 32% of patients treated with TVR. Significant predictors of drug discontinuation due to an adverse event were platelets < 150, albumin, APRI score > 1.5, FIB-4 score > 3.25, and stage of fibrosis.

CONCLUSION: In this real-life study of HCV-infected veterans, high rates of adverse events and serious adverse events were observed. Identification of pre-treatment predictors of adverse events may be useful in deciding which population may be at risk when treated with a DAA.

Geriatrics

118. Awareness of medication-related fall risk: a survey of community-dwelling older adults. *Gia Leonetti, Pharm.D. Candidate*[1], Jeannie Lee, Pharm.D., BCPS[1]; (1) College of Pharmacy, University of Arizona, Tucson, AZ

OBJECTIVES: To assess older adults' knowledge of medications associated with an increased risk of falls and to evaluate the impact of pharmacist counseling on knowledge of medication-related fall risk. Subjects: Community-dwelling adults 60 and older.

METHODS: Data were collected using an online questionnaire consisting of 15 knowledge-based items to determine awareness of medication-related fall risk, four items to determine participant experiences, fall history, and number of medications taken, and two items to collect demographic information (age and gender).

RESULTS: Two hundred and six community-dwelling older adults (mean age = 69.07 years, SD = 5.59) participated in the study by completing all or part of the online questionnaire. The number of older adults who reported having fallen within the last five years was 90 (43.7%). The knowledge-based portion of the questionnaire was completed in its entirety by 162 older adults (80 males, 81 females, one unreported gender; mean age = 68.7 years; SD = 5.12). One hundred and nineteen of 162 (73.5%) questionnaire respondents scored below 70% on the knowledge assessment. The 12 respondents (7.6%) who reported having received counseling from a pharmacist regarding medication-related fall risk scored higher on the knowledge assessment than the 145 respondents who did not (mean score 61.66% vs 48.09%, p=0.01).

CONCLUSION: A majority of community-dwelling older adults lacked knowledge of medications associated with an increased risk of falling. Furthermore, pharmacist counseling – though infrequently received by this study population – appeared to significantly improve awareness of medication-related fall risk.

Health Services Research

119. Utilization of a point-of-care device in identifying patients with pre-diabetes and diabetes within the Chinese American Immigrant Community. *Sheron Mui, Pharm.D.*[1], Sheila Wang, Pharm.D., BCPS AQ-ID[1], Jill S. Borchert, Pharm.D., BCPS, FCCP[2], Tze Li, Pharm.D. Candidate 2014[1]; (1) College of Pharmacy, Midwestern University Chicago College of Pharmacy, Downers Grove, IL; (2) Dreyer Medical Clinic & Midwestern University Chicago College of Pharmacy, Downers Grove, IL

OBJECTIVES: The objective of this study is to assess the utility of a point-of-care (POC) A1c device in identifying pre-diabetes and diabetes in Chinese American patients in a low-resource, underserved community health center.

METHODS: Chinese American patients previously seen at the clinic, age 18 or older, with any of the following characteristics: triglycerides > 250 mg/dL, fasting plasma glucose (FPG) ≥ 100 mg/dL, BP ≥ 140/90 mmHg, and HDL < 35 mg/dL, and no previous diagnosis of diabetes, were identified and asked to return to clinic to receive POC A1c testing performed by a pharmacist.

RESULTS: Of the 270 patients contacted, 80 underwent a screening appointment. Thus far, 15 patients have been tested, of which 10 (66.7%) patients had an A1c of 5.7–6.4% indicating pre-diabetes and none had an A1c indicating diabetes (≥ 6.5%). Of these 10 pre-diabetic patients, 6 (60%) were included due to elevated FPG alone, 1 was included due to both elevated FPG and elevated BP. The other 3 patients were included for other reasons including low HDL, high BP, and one patient for a combination of high BP and triglycerides.

CONCLUSION: Based on these preliminary results, the POC A1c device has proven useful to identify pre-diabetic patients in an underserved community clinic in those exhibiting either elevated blood glucose, triglycerides, BP, or low HDL. Most patients with an A1c indicating pre-diabetes were included due to an elevated FPG. However, many pre-diabetic patients were included for reasons other than FPG, indicating the importance of recognizing other clinical abnormalities for diabetes screening.

Hematology/Anticoagulation

120. An evaluation of intravenous vitamin K for warfarin reversal at a large academic medical center: are the 2012 chest guidelines being followed? *Ryan Rivosecchi, Pharm.D.*[1], Jeffrey Garavaglia, Pharm.D., BCPS[1]; (1) University of Pittsburgh Medical Center - Presbyterian Hospital, Pittsburgh, PA

OBJECTIVES: The 2012 *CHEST Guidelines* recommend the use of intravenous vitamin K (phytonadione) to reverse the effects of warfarin for the treatment of anticoagulant-related major bleeding. The primary objective of this evaluation is to determine if our institution is following recommendations in the published guidelines.

METHODS: A retrospective review was conducted on a convenience sample of patients with intravenous vitamin K medication charges from September through November 2013. All patients eighteen years of age or older who were on warfarin prior to admission and received at least one dose of intravenous vitamin K were included. Exclusion criteria included history of cirrhosis or acute liver injury. Use of vitamin K was deemed adherent if it met guideline criteria or required reversal for emergent surgery.

RESULTS: Of 86 patients who have been reviewed thus far, 28 met inclusion criteria. By the conclusion of this evaluation, expected 3/2014, a total of 365 patients will be reviewed. At this point, 71.4% (20/28) have been treated in an intensive care unit and 53.6% (15/28) have been admitted by a surgical service. The median baseline INR of those receiving vitamin K has been 2.9. The most frequent documented reasons for reversal were active bleeding (47.8%), surgical procedure (26.1%), and elevated INR (13%). A one-time intravenous 10 mg dose was most frequently

ordered, occurring 13 times. Fifteen patients (52.2%) received vitamin K inappropriately per CHEST guidelines, of which nine (60%) of which were for elevated INR.
CONCLUSION: The preliminary results have demonstrated that our institution is poorly adherent to the 2012 *CHEST Guidelines* recommendation for warfarin reversal with intravenous vitamin K. It appears that these patients typically required reversal while in a therapeutic INR range. Additionally, it demonstrates a need for education of both physicians and pharmacists to improve the usage of intravenous vitamin K.

121. Development of an electronic order template for vitamin K administration. *Candy Still, Pharm.D.*[1], Melanie Claborn, Pharm.D.[1]; (1) Department of Pharmacy, Veterans Healthcare System of the Ozarks, Fayetteville, AR
OBJECTIVES: The primary objective of this project was to create an electronic order template that would decrease the incidence of potentially inappropriate administration of vitamin K (phytonadione) at the Veterans Health Care System of the Ozarks.
METHODS: This project was a retrospective chart review of the last 100 outpatients treated at the Veterans Health Care System of the Ozarks who were taking warfarin with a supratherapeutic INR that received vitamin K administration. Data collected from the electronic medical record included active problems, patient demographics, current medications, indication for warfarin therapy, length of warfarin therapy, INR results, dose of vitamin K, date of INR follow up after vitamin K administration, evidence of thrombosis following vitamin K administration and documentation of an active bleed. The data collected were analyzed to determine inappropriate administration of vitamin K as defined in the American College of Chest Physicians Evidence-Based Clinical Practice Guidelines (CHEST 2012).
RESULTS: Compliance with CHEST 2012 guidelines for vitamin K administration was seen in < 50% of the patients. Prescribing consistent with CHEST 2012 guidelines trended towards decreased time out of INR range.
CONCLUSION: The data from the retrospective chart review was analyzed to develop an electronic order template for vitamin K administration. The electronic order template set was developed to enhance patient safety and improve patient outcomes.

HIV/AIDS

122. Impact of a HIV clinical pharmacist on HIV care. *Hana Kim, Pharm.D.*[1], Danielle Ciuffetelli, Pharm.D.[1], Margee Parikh, Pharm.D.[1], Michael Horberg, M.D.[1]; (1) Kaiser Permanente of the Mid-Atlantic States, Beltsville, MD
OBJECTIVES: A clinical pharmacy service was initiated in January 2013 for HIV-infected patients with adherence issues. For this service, the HIV clinical pharmacist provides education on HIV and related therapy, addresses potential barriers to adherence, implements a plan to overcome barriers and periodically assesses the effectiveness of the plan. The goal of the proposed study is to look at the impact the HIV clinical pharmacist has on the care of these patients.
METHODS: Patients, who were nonadherent to antiretroviral therapy (ART), were identified by the HIV clinical pharmacist or referred by an Infectious Diseases (ID) physician. For the primary objective, we will investigate proportion of patients who achieved undetectable HIV viral load before and after HIV clinical pharmacist intervention. Secondary endpoints will compare the change in CD4 count, adherence to ID office visits, and the proportion of days covered (PDC) with ≥ 90% antiretroviral adherence with at least two fills in the three to 6 months before intervention and 3–6 months after intervention. HIV-positive patients on ART, > 18 years old, referred by HIV clinical pharmacist or ID providers and documented or suspected nonadherence are the selected population. This retrospective study received an exemption for patient informed consent.
RESULTS:

- 47 patients are included in the study.
- Majority of patients enrolled in the program were African American (78.7%) and male (63.8%).
- The reasons for documented/suspected nonadherence were: adherence to ARV < 90% based on refill history (n=14); detectable HIV viral load (n=8); and patient self-reported nonadherence (n=4). There were patients who also met two of the mentioned criteria (n=17) or three of the criteria (n=2).
- 68.8% of patients had a pill burden of 3 individual antiretroviral (ARV) pills per day.
- 40.4% of patients had a detectable viral load (> 200 copies/mL) before intervention.

CONCLUSION: Pending; anticipated completion date: May 2014.

Infectious Diseases

123. Improved target vancomycin trough levels and monitoring based on vancomycin minimum inhibitory concentration data in a pediatric hospital. Devona Williams, Pharm.D.[1], *Kristen Welsh, Pharm.D.*[1]; (1) Department of Pharmacy, Children's National Medical Center, Washington, DC
OBJECTIVES: The aim of this study is to assess the effectiveness of vancomycin as associated by patient specific vancomycin MIC values in comparison to the corresponding vancomycin trough levels achieved. Treatment outcomes will be assessed between defined MIC ranges to determine appropriate monitoring and optimal goal serum trough levels.
METHODS: A single-center, retrospective chart review of patient admissions to a tertiary pediatric referral center from January 1, 2008-January 1, 2013 who received vancomycin therapy will be conducted. Patient admissions will be included if patient < 18 years old, received vancomycin during their admission and contain positive microbiological cultures with reported minimum inhibitory concentration (MIC) data. Vancomycin MIC values and vancomycin trough levels will both be stratified into defined MIC ranges. Data collection will include demographic information, concomitant medications and vital signs. Additional data includes microbiology cultures, MIC values, dosing information, serum vancomycin trough values, and infection and mortality information. Vancomycin safety will be assessed in regard to nephrotoxicity. Treatment outcomes will then be compared between the specified categories and between the contained ranges. The primary endpoint measured will be persistent infection. Secondary endpoints include duration of persistent infection and mortality and incidence of nephrotoxicity. Institutional Review Board approval will be obtained prior to data collection.
RESULTS: Preliminary institutional data includes 62 patient orders of vancomycin from all patient units from June 1, 2013–June 30, 2013. The average vancomycin dose is documented as 12 mg/kg. The average vancomycin serum trough level reported is 8 μg/mL.
CONCLUSION: Data collection will be completed prior to April 2014. Data will be compiled and assessed to prepare a platform presentation and virtual poster presentation in April 2014.

124. Effect of nursing education on timing of vancomycin administration after trough levels are in progress. *Jennifer McPhee, Pharm.D.*[1], Benjamin Boyd, Pharm.D.[2]; (1) Sacred Heart Health System, Pensacola, FL; (2) Sacred Heart Health System
OBJECTIVES: Vancomycin doses are often delayed after trough levels are drawn while nurses await the results. This study aimed to determine the magnitude of that delay, and to improve timing of doses through nursing education.
METHODS: Data collected includes the number of doses held, time delay in vancomycin dose, trough level, and goal trough level. All vancomycin doses scheduled for administration immediately following the collection of a trough level for patients who had a pharmacy consult were included. Data was collected for a month before and after nursing education. Pre-education data

was used to formulate nursing education, and pre- and post- education data will be compared.
RESULTS: Pre-education data included 81 vancomycin doses, of which 52% were delayed past the acceptable administration window while awaiting trough level results. Of those that were delayed, 71% were therapeutic or subtherapeutic. The mean time delay was 2 hours 32 minutes ± 2 hours 7 minutes. The median time delay was 1 hour 42 minutes.
CONCLUSION: Data collection is currently in progress and scheduled to be completed by March 1, 2014.

Managed Care

125. Medication costs associated with non-optimal dosing orders for atypical antipsychotics. *Rajal Patel, Pharm.D.*[1], Linda Westbrook, Pharm.D., CDE[1]; (1) Louis A. Johnson VA Medical Center, Clarksburg, WV
OBJECTIVES: National spending on prescription medications continues to increase every year. Atypical antipsychotics represent a high cost burden which may be further increased by dose titrations and computerized default entries at this facility. The objective of this study is to assess the prescription medication cost associated with non-optimal dosing for atypical antipsychotics.
METHODS: A query of the electronic prescription records is run daily to identify prescriptions for selected atypical antipsychotics (aripiprazole, olanzapine, quetiapine, and ziprasidone) for which refills have been requested. Prescriptions with non-optimal dosing of these atypical antipsychotics are being included in the study. Data collection time is October 1, 2013 through March 31, 2014. The following data are being collected to quantify the annual cost associated with each prescription: date, prescription number, drug name and strength, directions for use, cost per dosage unit, number of dosage units per day, day's supply, and number of dosage units per prescription. The only Protected Health Information being used in the data extraction is prescription numbers. All data are being recorded without patient identifiers and maintained confidentially. The study investigator employs Pharmacy & Therapeutic Committee approved dosing optimization strategies, which include tablet splitting and minimizing multiple tablets or capsules per dose. The annual costs of the prescriptions before and after intervention are calculated to determine cost savings.
RESULTS: Preliminary data from the first 12 weeks show total annual savings of $14042.23 from 17 prescriptions. Majority of annual savings is attributed to aripiprazole prescriptions.
CONCLUSION: Preliminary results reveal that higher costs are associated with non-optimized dosing of selected atypical antipsychotics. Pharmacist's interventions to optimize dosing of selected atypical antipsychotics are effective to significantly reduce costs within the facility.

Medication Safety

126. Evaluation of dabigatran use at Alaska Native Medical Center (ANMC): assessment of dosing, criteria for use, and bleeding events. *Michelle Locke, Pharm.D.*[1], Adam Harris, Pharm.D., BCPS, NCPS[2], Madalene Mandap, Pharm.D., BCPS[3], Sara Doran-Atchison, Pharm.D.[1]; (1) Pharmacy, Alaska Native Tribal Health Consortium of the Alaska Native Medical Center, Anchorage, AK; (2) Quality Assurance, Alaska Native Tribal Health Consortium of the Alaska Native Medical Center, Anchorage, AK; (3) Pharmacy, Southcentral Foundation or the Alaska Native Medical Center, Anchorage, AK
OBJECTIVES: (i) Assess appropriateness of dabigatran dosing and any required dosing adjustments. (ii) Evaluate prescribing of dabigatran for FDA-approved criteria for use. (iii) Determine frequency of bleeding events related to initial dabigatran dispense.
METHODS: A retrospective review was conducted on all patients who received outpatient prescriptions for dabigatran between October 1, 2011 to July 31, 2013 with the first fill or earliest fill included in analysis. A dispense report was generated for dispense date, dose, instructions for use and interacting medications. Additional laboratory data and ICD-9 codes were also collected. The investigator calculated renal function for dose determination and used ICD-9 codes to identify criteria for use.
RESULTS: A total of 153 patients received a dabigatran prescription. The majority of patients were male (68%; 104/153), over 65 years old (52%; 80/153) and resided in the Anchorage Service Unit (57.5%; 88/153). Appropriate dosing was found in 91.5% (140/153) of patients. Most patients (80.4%; 123/153) had a serum creatinine value within 90 days prior to initial dispense. A total of 7.2% (11/153) of patients were on concomitant interacting medications, however, none of these required dose adjustments. Approximately 85% (140/153) of patients were prescribed dabigatran for atrial fibrillation. Bleeding events were recorded in 4.6% (7/153) of patients but none were a result of the initial dabigatran dispense.
CONCLUSION: Overall, the majority of patients received dabigatran for appropriate criteria for use and dosing. Most patients had serum creatinine values within 90 days of initial dispense and had no drug associated bleeding events. However, a small percentage of indications and dosing did not meet manufacturer recommendations. To improve overall prescribing and patient safety, additional staff education should be provided to ensure prescribing guidelines are followed with the addition of system alerts to review criteria for use and current renal function prior to drug therapy initiation.

127. Safety profile of adalimumab, etanercept and infliximab: analysis of disproportionalities in a Pharmacovigilance database. *Diogo Mendes, Pharm.D.*[1], Carlos Alves, Pharm.D.[1], Francisco Batel-Marques, Pharm.D., Ph.D.[1]; (1) School of Pharmacy, University of Coimbra, Coimbra, Portugal
OBJECTIVES: This study is aimed at comparing the safety profiles of adalimumab, etanercept and infliximab by analyzing the disproportionalities of the associations between the different adverse events (AEs) and the different biologics in a spontaneous reporting database.
METHODS: AEs spontaneously reported to the Portuguese Pharmacovigilance System between 2009 and 2011 were included. AEs were classified according to MedDRA® in the primary System Organ Class. The reporting odds ratio (ROR) and its 95% confidence intervals (CI) were calculated for each biologic regarding the various categories of AEs. Defined daily doses/1,000 inhabitants/day were calculated order to estimate a proportion of the population treated with biologics. Microsoft Excel® was used to perform all the calculations.
RESULTS: The use of each biologic was estimated for adalimumab at 1,439 patients/year, etanercept 1,944 patients/year, and infliximab 3,211 patients/year. Compared with the all other drugs, adalimumab, etanercept and infliximab were all disproportionately associated with "infections and infestations" (ROR: 6.65, 95% CI: 4.50–9.83; ROR: 2.74, 95% CI: 1.56–4.81; ROR: 2.95, CI 95%: 2.16–4.02, respectively) and with "neoplasms benign, malignant and unspecified" (ROR: 7.23, 95% CI: 3.92–13.33; ROR: 6.26, 95% IC: 3.12–12.57; ROR: 3.94, 95% CI: 2.41–6.44, respectively), etanercept with "general disorders and administration site conditions" (ROR: 2.01, 95% CI: 1.38–2.92), and infliximab with "immune system disorders" (ROR: 5.17, 95% CI: 3.50–7.64), "respiratory, thoracic and mediastinal disorders" (ROR: 1.80, 95% CI: 1.31–2.48) and "investigations" (ROR: 1.82, 95% CI: 1.19–2.78).
CONCLUSION: When interpreting the results one should take into consideration the number of patients exposed and should not only rely on the number of AEs reported. The disproportionalities found for adalimumab and etanercept may suggest strong associations with particular categories of AEs, but caution is needed when drawing conclusions on the association between infliximab and the AEs analysed. In the light of the present findings, these results deserve further evaluation.

128. Review of an electronic ordering process for prescribing anti-infective agents in outpatients taking warfarin. *Lucy Nguyen, Pharm.D.*[1], Meredith White, Pharm.D.[1], Jennifer Stark, Pharm.D., BCPS[1]; (1) Veterans Healthcare System of the Ozarks, Fayetteville, AR

OBJECTIVES: Results from a retrospective chart review prompted a review of the ordering process when anti-infective agents are ordered for patients taking warfarin. The primary objective is to review the current dosing and monitoring information prescribers view when ordering anti-infective agents in outpatients receiving concomitant warfarin.
METHODS: A retrospective chart review of outpatients taking warfarin during a 6 month period was completed. Patients were stable on warfarin and were prescribed at least one oral anti-infective agent. Results identified sulfamethoxazole-trimethoprim (SMX-TMP), azithromycin, ciprofloxacin, and moxifloxacin as agents that increased international normalized ratio (INR) to > 4.5. Beta-lactams and tetracycline had a negligible impact on INR. Median follow-up lab ranged from 12 to 20 days. Investigators set out to evaluate the electronic ordering process of anti-infective agents in patients on concomitant warfarin. Data was collected on whether an alert occurs, the content of the alert, whether alerts include information or recommendations on warfarin dose adjustments or INR monitoring, and steps required to order additional follow-up INR in the electronic ordering system.
RESULTS: Preliminary review of the ordering process reveals that the alerts generated use wording that may be unclear regarding the severity of the drug interaction with different anti-infective agents. Alerts do not currently provide information on warfarin dose adjustments or closer INR monitoring. The current process does not include a mechanism to order labs from the same time as the alert is triggered in the electronic ordering system.
CONCLUSION: Certain anti-infective agents have been identified that may warrant a proactive dose adjustment in warfarin as well as closer monitoring. Improvements to the current ordering process when initiating an anti-infective in stable outpatients taking warfarin may help decrease supratherapeutic INR rates in this patient population.

Neurology

129. Influence of topiramate therapy duration on serum bicarbonate levels in adults. *Marija Jovanovic, MPharm*[1], Dragoslav Sokic, M.D.[2], Iztok Grabnar, Pharm.D.[3], Milica Prostran, M.D.[4], Radmila Obrenovic, Pharm.D.[5], Katarina Vucicevic, Pharm.D.[1], Branislava Miljkovic, Pharm.D.[1]; (1) Department of Pharmacokinetics and Clinical Pharmacy, Faculty of Pharmacy, University of Belgrade, Belgrade, Serbia; (2) Clinic of Neurology, Clinical Centre of Serbia, Belgrade, Serbia; (3) Department of Biopharmaceutics and Pharmacokinetics, Faculty of Pharmacy, University of Ljubljana, Ljubljana, Slovenia; (4) Department of Pharmacology, Clinical Pharmacology and Toxicology, School of Medicine, Belgrade, Serbia; (5) Centre of Medical Biochemistry, Clinical Centre of Serbia, Belgrade, Serbia
OBJECTIVES: Topiramate (TPM) is a broad-spectrum antiepileptic drug associated with inhibition of carbonic anhydrase activity. This may lower bicarbonate levels and consequently cause metabolic acidosis. The goal of the study was to explore impact of TPM therapy (dose, duration, concentrations) on bicarbonate levels in adult epileptic patients.
METHODS: In the study were included 59 patients (38.2 ± 10.3 years) treated with TPM for different time period (57.57 ± 29.75 months), at least 1 week for the assurance that steady state was reached. Serum bicarbonate levels were available from all patients, while TPM trough concentrations were measured in 54 patients by high performance liquid chromatography with fluorescence detection. Regression analysis was undertaken to explore association of characteristics of TPM therapy with serum bicarbonate level using SPSS® software (version 17, Chicago, Illinois, USA).
RESULTS: Final model included TPM therapy duration, as the only factor with statistically significant impact ($p<0.01$) on bicarbonate levels. Residuals of final model were normally distributed and in narrow range. Decrease of bicarbonate level in function of duration of TPM therapy was best described by linear model. No correlation was detected between the TPM dose or trough concentration and bicarbonate levels.
CONCLUSION: Results emphasize the frequent occurrence of lower bicarbonate levels related to prolonged TPM therapy. Monitoring bicarbonate levels and clinical symptoms might be useful not only at the beginning of therapy but also in patients on chronic TPM therapy.

Oncology

130. Development and justification of a pharmacist-led oral chemotherapy management program. *Jason Bergsbaken, Pharm.D.*[1], Jessica Fischer, Pharm.D., M.S., BCOP[1], Michael Reed, R.Ph., BCOP, BCPS[1], Jill Kolesar, Pharm.D., BCPS, FCCP[2], Mary Mably, R.Ph., BCOP[1]; (1) Department of Pharmacy, University of Wisconsin Hospital and Clinics, Madison, WI; (2) University of Wisconsin Carbone Comprehensive Cancer Center, Madison, WI
INTRODUCTION: A paradigm shift in the treatment of cancer from the use of mainly parenteral therapies to the use of an increasing number of oral chemotherapeutic agents has created significant implications for patients and providers. Many potential barriers exist including accessibility, drug interactions and adverse effects which contribute to medication non-adherence, disease progression and lower quality of life.
OBJECTIVES: (i) Convene multidisciplinary steering committee to optimize workflow, including a pharmacist role, in the management of oral chemotherapy at University of Wisconsin Carbone Cancer Center (UWCCC). (ii) Establish systems for ongoing measurement and documentation of pharmacist patient care activities and interventions as they pertain to oral chemotherapy. (iii) Perform a pilot of the proposed multidisciplinary workflow within the Gastrointestinal (GI) and Genitourinary (GU) Clinic. (iv) Measure the impact of this program on adherence and secondary endpoints. (v) Create a business plan for program expansion and present to leadership
METHODS: This quality improvement project aims to develop and justify a pharmacist-led oral chemotherapy management program at the UWCCC through a piloted three-pronged approach. First, increase pharmacist interventions through implementation of prospective pharmacist electronic order review of all oral chemotherapeutic orders. Second, increase pharmacist role in patient education for select oral chemotherapeutic agents. Third, implement pharmacist-led adherence assessment at initial and subsequent clinic appointments and follow-up callbacks. Eligible patients for the 8 week pilot are adults maintained or initiated on oral chemotherapy within the GI or GU oncology clinic.
RESULTS: Expected results include a 15% increase in treatment plan adherence compared to pilot baseline, 15% increase in patient, provider and nurse satisfaction with UWCCC pharmacy services and 5% increase in oral chemotherapy prescription capture rate at UWCCC. In addition, estimated cost avoidance secondary to pharmacist interventions will be calculated.
CONCLUSIONS: Patient outcomes and pharmacist interventions remain under investigation, with data collection and evaluation currently being conducted.

131. Single 3 mg rasburicase dose in the management of tumor lysis syndrome. *Zachary Schlei, Pharm.D., Candidate*[1], Angela Urmanski, Pharm.D.[2], Felicia Falvo, Pharm.D.[2], Mindy Waggoner, Pharm.D.[2], Elizabeth Dow, Pharm.D.[2], Julie Karpinski, Pharm.D.[2]; (1) University of Wisconsin School of Pharmacy, Madison, WI; (2) Department of Pharmacy, Froedtert Memorial Lutheran Hospital, Milwaukee, WI
OBJECTIVES: Recent literature evaluating rasburicase in the management of tumor lysis syndrome (TLS) has sparked debate about appropriate dosing. There is data supporting a fixed 3 mg and 6 mg dose, and a weight-based dose. As a result, there is a lack of uniformity, which creates opportunities for pharmacists to improve the quality and consistency of rasburicase dosing. The purpose of this study is to evaluate the efficacy of a single 3 mg dose of rasburicase in the management of TLS.

METHODS: This evaluation was a retrospective analysis of 3 mg rasburicase doses given from August 2012 to August 2013.
RESULTS: A total of 44 rasburicase doses of 3 mg were administered. Approximately 89% and 94% of doses achieved uric acid (UA) < 7.5 mg/dL at 24 and 48 hours, respectively. When patients were stratified by low, intermediate, and high risk of developing TLS, at least 75% of each risk group achieved UA < 7.5 mg/dL at 24 and 48 hours. Approximately 84% and 93% of obese patients (defined as having a body mass index [BMI] > 30) who received 3 mg of rasburicase achieved UA < 7.5 mg/dL at 24 and 48 hours, respectively. When obese patients were stratified based on risk for developing TLS, at least 75% of each group achieved UA < 7.5 mg/dL at 24 and 48 hours. In patients with hyperuricemia at baseline, 82.6% and 88% of doses resulted in UA < 7.5 mg/dL at 24 and 48 hours, respectively.
CONCLUSION: A single dose of 3 mg of rasburicase appears to be effective in reducing UA in patients with TLS. Regardless of BMI, baseline UA, and the risk for developing TLS, a 3 mg dose effectively decreased UA to < 7.5 mg/dL in the majority of patients. This information will help guide treatment in this patient population at an academic medical center.

132. Efficacy and cost-effectiveness of oral vs intravenous premedications in patients receiving taxanes. *Joanna Lee, Pharm.D.*[1]; (1) Kaiser Permanente Los Angeles Medical Center, Los Angeles, CA
OBJECTIVES: (i) To describe the incidence of hypersensitivity reaction (HSR) associated with paclitaxel and docetaxel treatment in patients receiving oral vs intravenous premedications. (ii) To describe the time- and cost-savings associated with all-oral premedication regimens for paclitaxel and docetaxel.
METHODS: This retrospective observational study was conducted between February 2011 and February 2014. The primary endpoint was the incidence of HSR in patients receiving paclitaxel or docetaxel when premedicated with oral vs intravenous prophylactic regimens. Premedication regimens included a corticosteroid and histamine-1 and histamine-2 receptor antagonist (H2RA). The secondary endpoint was the clinic time- and cost-savings associated with oral premedication administration. Taxane-naive adults (> 18 years of age) were included if they received a standard taxane-containing chemotherapy regimen and were prophylaxed with all-oral or a combination of oral and intravenous premedications. Patients were excluded if they were enrolled in another research protocol, unable to tolerate oral medications or had an active prescription for systematic or inhaled corticosteroids for chronic medical conditions. Those enrolled in the study were categorized into two cohorts: patients receiving oral dexamethasone, famotidine and cetirizine prior to taxane infusion vs patients receiving intravenous premedications.
RESULTS: Final results pending. Preliminary data was collected from a small sample of patients (n=23) initiated on a new paclitaxel- or docetaxel-containing chemotherapy regimen between October 2013 and December 2013. Data analysis suggests that oral premedication regimens are effective for HSR prevention with reports of only two patients who experienced mild flushing and rash. Oral regimens saved approximately 68 hours of premedication administration time when compared to intravenous regimens. The time-savings provided a labor cost savings of approximately $5200 during the 2 months.

Pain Management/Analgesia

133. Pharmacist guided methadone opioid rotation in hospice patients through an interdisciplinary methadone follow-up program. *Lacey Shumate, Pharm.D.*[1], Kyna Setsor Collier, RN[2], Bridget McCrate Protus, Pharm.D.[2], Maureen Jones, Pharm.D.[2], Jason Kimbrel, Pharm.D.[2]; (1) HospiScript, a Catamaran Company and The Ohio State University College of Pharmacy, Dublin, OH; (2) HospiScript, a Catamaran Company, Dublin, OH
OBJECTIVES: Methadone can be used effectively for pain management in patients with a poor response to other opioids; however, despite the potential clinical and economic benefits, methadone is used less commonly than other opioids in the hospice setting. Review of existing literature reveals limited studies regarding the efficacy of conversion to methadone in hospice patients, and no studies exist describing a methadone follow-up program in the hospice setting. The purpose of this study is to evaluate methadone opioid rotation in hospice patients who were referred to a methadone follow-up program.
METHODS: This was a retrospective study at a national pharmacy benefits management company which has an established methadone follow-up program. Pre-methadone and post-methadone pain scores were used to determine if conversion to methadone was successful which was defined as at least a 33% decrease from the patient's baseline pain score following initiation of methadone. Data regarding the acceptance rate of the pharmacists' dosing recommendations for methadone was also collected.
RESULTS: A total of 344 patients were referred to the program between May 1, 2013 and November 30, 2013, and methadone was initiated in 285 of these patients. Pre-methadone and post-methadone pain scores were documented in 110 patients, and 76 (69.1%) patients met the definition for successful conversion. Overall, pharmacists' methadone dosing recommendations were fully accepted 71% of the time.
CONCLUSION: The preliminary results of this study provide support to methadone opioid rotation in hospice patients as well as the role of pharmacists in an interdisciplinary methadone follow-up program.

Pediatrics

134. Comparison of a pediatric-specific and an institution-wide antibiogram. *Christina Smith, Pharm.D.*[1], Jonathan Bourque, Pharm.D.[1], Renee Fallon, Pharm.D.[1], Jennifer Jubulis, M.D.[1]; (1) Maine Medical Center
OBJECTIVES: Many pediatric hospitals within larger institutions have cumulative antibiograms combining pediatric and adult pathogen susceptibilities, although resistance patterns may vary between these populations. The purpose of this study is to determine if differences exist in susceptibility patterns between a pediatric-specific and an institution-wide antibiogram at Maine Medical Center (MMC).
METHODS: Susceptibility rates for all isolates from patients < 18 years collected between January 1 and December 31, 2012 will be gathered and compared to the 2012 institution-wide antibiogram at Maine Medical Center utilizing Chi-square analysis.
RESULTS: Based on preliminary data, *S. aureus* was more susceptible to oxacillin (77% vs 68%) in the pediatric vs the institution-wide population. For *E. coli*, the pediatric population was also more susceptible to ciprofloxacin (94% vs 82%) and levofloxacin (95% vs 84%) than the hospital-wide population. Alternatively, for *P. aeruginosa*, the pediatric population compared to the hospital-wide population was less susceptible to aztreonam (65% vs 74%), cefepime (75% vs 90%), imipenem (80% vs 88%), meropenem (82% vs 91%), piperacillin/tazobactam (80% vs 92%), and tobramycin (80% vs 89%), respectively. The final pediatric antibiogram is underway and detailed analysis of the antibiogram will be completed by the end of February.
CONCLUSION: Preliminary results suggest differences exist in susceptibility between the pediatric-specific and institution-wide antibiograms at MMC. Providing a pediatric-specific antibiogram could help guide selection of appropriate empiric therapy and improve patient outcomes.

135. Evaluation of oral vs intravenous acetaminophen for the management of fever/pain in pediatric post-operative neurosurgical patients at Peyton Manning Children's Hospital at St. Vincent. *Andrew Noda, Pharm.D., BCPS*[1], Maria Whitmore, Pharm.D.[1], Karen Samaan, Pharm.D., BCNSP[2]; (1) Peyton Manning Children's Hospital at St. Vincent, Indianapolis, IN; (2) St. Vincent Hospital Indianapolis, Indianapolis, IN

OBJECTIVES: The utility of the intravenous (IV) form of acetaminophen (Ofirmev®) compared to oral acetaminophen has come under question at our hospital not only from a cost consideration, but also an efficacy perspective. At our institution, pediatric neurosurgeons use a regimen of scheduled IV acetaminophen and oral ibuprofen post-operatively to prevent fevers and control pain. Prior to formulary addition of IV acetaminophen in 2011, the oral preparation of acetaminophen was administered for this regimen. A PubMed search was conducted and to the authors' knowledge, no trials evaluating IV and oral acetaminophen in the pediatric neurosurgical population are available. The objective of this study is to compare intravenous to oral administration of acetaminophen for prevention of central fevers and pain control, including the opioid sparing effects, in pediatric post-operative neurosurgical patients.
METHODS: A retrospective, case-control study of patients admitted to Peyton Manning Children's Hospital (PMCH) between February 1, 2009 and September 30, 2013 was conducted. Patients included in the study were < 18 years old and had a neurosurgical procedure performed during their hospitalization and received an alternating acetaminophen and ibuprofen regimen. Patients were excluded if more than one acetaminophen preparation was administered during the study period. Patient information was collected through the first 48 hours post-operatively.
RESULTS: Of the 285 patients that were screened, 35 patients met the inclusion and exclusion criteria. A majority of patients did not meet inclusion criteria (alternating regimen of acetaminophen and ibuprofen). Intravenous acetaminophen was utilized in 14 patients and oral acetaminophen was used in 11 patients. In the group of patients who received IV acetaminophen, five developed a fever in the first 48 hours compared to eight in the oral acetaminophen group. Further evaluation of the results will be completed by March.
CONCLUSION: Will be presented at the 2014 ACCP Virtual Poster Symposium.

136. Evaluation of anti-Xa monitoring in children receiving enoxaparin in a cardiac intensive care unit. *Samantha Engdahl, Pharm.D.*[1], Jason Corcoran, Pharm.D., BCPS[1]; (1) Department of Pharmacy, Children's National Medical Center, Washington, DC
OBJECTIVES: Because of the unpredictability of enoxaparin in children, our institution protocol requires anti-Xa level monitoring for all patients on therapeutic doses of enoxaparin. The target range is 0.5 to 1.0 units/mL when obtained 4–6 hours after enoxaparin administration. Based on recent studies demonstrating higher enoxaparin dose requirements for neonates and children with cardiac disease, our protocol was recently updated. This study is evaluating anti-Xa levels of pediatric patients treated with enoxaparin in the cardiac intensive care unit (CICU) in order to determine the length of time required to achieve therapeutic levels with our current protocol.
METHODS: Medical records of patients treated with enoxaparin in the CICU at a single tertiary pediatric referral center from July 2011 to July 2013 are being reviewed. The primary endpoint is length of time required to achieve therapeutic anti-Xa levels in CICU patients. Secondary endpoints include occurrence of bleeding or thrombosis, appropriateness of anti-Xa levels, and dose required to achieve therapeutic anti-Xa levels. Data is being collected on patient demographics, cardiac diagnosis, anticoagulation indication, enoxaparin initial dose, enoxaparin dose required for therapeutic anti-Xa level, timing of enoxaparin doses and anti-Xa levels, anti-Xa levels, number of dose adjustments, serum creatinine, and occurrence of bleeding or thrombosis.
RESULTS: Based on preliminary data, forty-eight patients have been identified as receiving enoxaparin treatment in the CICU. Patients are between the ages of 5 days and 18 years and have a variety of cardiac conditions, with the most common being hypoplastic left heart syndrome (29%). Initial enoxaparin doses ranged from 0.64 to 1.86 mg/kg twice daily administered subcutaneously.
CONCLUSION: Data collection and analysis is currently in progress and expected to be completed by April 2014 in order to present at a national meeting. Therefore, this project will be complete prior to the virtual poster symposium.

137. Ursodiol dosing in the prevention of hepatic veno-occlusive disease in pediatric patients undergoing hematopoietic stem cell transplant. *Gabrielle Flash, Pharm.D.*[1], Devona Williams, Pharm.D.[2]; (1) Pharmacy, Children's National Medical Center, Washington, DC; (2) Department of Pharmacy, Children's National Medical Center, Washington, DC
OBJECTIVES: Ursodiol may be used for prophylaxis of Veno-Occlusive Disease (VOD) during hematopoietic stem cell transplant (HSCT). Busulfan is a chemotherapy agent used during stem cell prep that may increase the risk of VOD. Based on pediatric pharmacokinetic principles and existing literature data, a pharmacist initiated change in ursodiol dosing was implemented at our institution. The purpose of this study is to compare the incidence of VOD for two different dosing regimens in the prevention VOD. This review will examine the incidence of VOD in patients who receive a daily dose of 10 mg/kg vs 30 mg/kg of ursodiol.
METHODS: This study will be conducted at a single center tertiary pediatric referral center as a retrospective evaluation reviewing electronic medical records to identify patients who received prophylactic doses of ursodiol for VOD from June 2011 to June 2013. Primary outcome is the incidence of diagnosed VOD. Secondary outcome is mortality rate 100 days post HSCT. Inclusion criteria are patients eight years old and younger who were treated with busulfan as part of their HSCT conditioning regimen. The following data will be collected on each patient; age; gender; admission weight; baseline liver function, bilirubin; pre-existing liver disease; diagnosis for HSCT; type of transplant; type of donor; donor source; HSCT regimen; graft vs host disease (GVHD) prophylaxis; GVHD status.
RESULTS: Based on preliminary institutional data, 21 patients underwent HSCT with busulfan in the specified timeframe. Of note, 10 subjects were identified as male and 11 were identified as female. The following diagnosis were identified among the patients admitted for HSCT: hemoglobinopathy:6; solid tumor:3; leukemia:3; immunodeficiency:6; anemia:1; histiocytic disorder:1; other:1. To date, four patients are deceased.
CONCLUSION: Data collection is ongoing and will be completed prior to April 2014. Data will be compiled and assessed to prepare a platform presentation and virtual poster presentation in April 2014.

Pharmacoeconomics/Outcomes

138. How to best allocate clinical pharmacy services? A retrospective cohort study to evaluate PCMH patients with diabetes. *Matthew Lau, B.S.*[1], Vincent Marshall, M.S.[1], Peter Batra, M.Sc.[1], Karen Farris, Ph.D.[1]; (1) Department of Clinical, Social, and Administrative Sciences, College of Pharmacy, University of Michigan, Ann Arbor, MI
OBJECTIVES: To determine the basis of physician's referral and pharmacist's intervention in patients with controlled and uncontrolled diabetes, with a goal to identify and improve clinical pharmacy resource allocation
METHODS: *Design:* Retrospective cohort study (enrollment from *January 1, 2011* to *June 30, 2011*, with follow-up through *June 30, 2013*). *Setting:* University of Michigan Health System (UMHS) Patient-Center Medical Home (PCMH) clinics. *Participants:* 572 eligible patients with diabetes (defined as having their very first visit within the selection period)
*Data analysis:*The eligible patients were divided into two groups: patients with well-controlled diabetes (HbA1c $\leq$ 7%) or poorly controlled diabetes (HbA1c > 7%). We assessed clinical pharmacists' interventions (therapeutic interventions, medication reconciliation, and other interventions) in these two groups of patients using data from the PharmD Intervention Checklist. The group

of well-controlled patients was subdivided further based on the number of visits (patients with one-time visit or patients with multiple visits at the clinics).
RESULTS: Among the eligible PCMH patients (N=572), 321 had a known HbA1c value at baseline. Of the 321 patients, 33.96% (N=109) had controlled HbA1c and 66.04% (N=212) had uncontrolled HbA1c. Patients with uncontrolled diabetes are associated with receiving more therapeutic and patient education interventions ($p<0.001$). In patients with controlled diabetes, 66.97% (N=73) had multiple visits and 33.03% (N=36) had one-time visit. Among these patients, the multiple-visit group had a higher number of total non-therapeutic interventions compared to patients with one-time visit (7.90 vs 1.08, $p<0.001$); this finding was driven by patient education services.
CONCLUSION: Overall, patients with uncontrolled diabetes compared to controlled diabetes received more therapeutic and patient education interventions. Among controlled patients, non-therapeutic interventions appeared to be the basis of multiple visits at clinics. A better description of pharmacists' care activities for patients with controlled diabetes is needed, and a cost model will be developed.

Pharmacoepidemiology

139. Safety alerts issued by regulatory authorities: usefulness of meta-analysis in predicting earlier risks. *Carlos Alves, Pharm.D.*[1], Ana Filipa Macedo, Pharm.D., Ph.D.[2], Francisco Batel-Marques, Pharm.D., Ph.D.[1]; (1) School of Pharmacy, University of Coimbra, Coimbra, Portugal; (2) Health Sciences Research Centre, University of Beira Interior, Covilha, Portugal
OBJECTIVES: Meta-analytic cumulative analysis of evidence has demonstrated that appropriate and timely decisions regarding cardiovascular events associated with rofecoxib could have been taken three years before the drug withdrawal from market. This study aimed at evaluating how risk estimates generated from cumulative meta-analysis performs over time for drugs having their B/R ratio reviewed by regulatory authorities due to safety issues.
METHODS: The websites of four major regulatory authorities were searched for safety alerts which have been supported by longitudinal, comparative studies (experimental and/or observational studies). Cumulative meta-analyses pooled evidence over time, including studies according to the year they first became available. Random-effects model was used to pool the odds ratios (OR) and respective 95% confidence intervals.
RESULTS: A total of 17 safety alerts corresponding to 9 different clinical safety questions were included. In 2008, proton pump inhibitors (PPIs) were associated with an increased risk for bone fractures (OR 1.25, 95% CI 1.00–1.55, p=0.049); the first safety alert was issued in 2010 by US FDA, concluding in adding warnings to label. An increased risk for Clostridium difficile associated diarrhea was pooled for PPIs in 2004 (OR 1.89, 1.19–3.02, p=0.007); US FDA issued the first safety alert in 2012, adding warnings to the label. PPIs were associated with pneumonia in 2009 (OR 1.40, 1.06–1.85, p=0.017); US FDA issued the first alert in 2012 but concluded that B/R ratio remains positive. Statins were associated to an increased risk for diabetes (OR 1.07, 1.01–1.15, p=0.033) in 2008. However, the inclusion of a cohort study of 2012 in the pooled analysis retrieved a statistically non-significant result.
CONCLUSION: It is not possible to confirm in advance all the safety alerts issued by regulatory authorities using the meta-analytic technique, despite in some situations earlier risks could be estimated.

140. Assessment of the maine all-payer claims database data quality and descriptive analysis of the cancer cohort. *Erin Maggie Jones, Pharm.D. Candidate, 2015*[1], Gary Cattabriga, B.S.[2], Edward C. Li, Pharm.D., BCOP[1]; (1) College of Pharmacy, University of New England, Portland, ME; (2) Center for Community and Public Health, University of New England, Portland, ME
OBJECTIVES: The Maine All-Payer Claims Database (MEAPCD) contains HIPAA-compliant data regarding paid healthcare claims for 95% of public/private insured Maine residents. Analyzing the MEAPCD could help characterize and optimize health outcomes in Maine. However the data quality and clinicodemographic profiles of specific disease cohorts are unknown. The purposes of this study are to describe within the MEAPCD: (i) data quality via a macro-level assessment of claims data; and (ii) demographic and clinical information of a cancer cohort.
METHODS: We inspected the MEAPCD (2004-2012) for problems with incomplete tumor diagnosis, medical, and prescription claims by examining the number of respective claims per month. Data is stratified by place of service and insurance type (public vs private). We characterized a cancer cohort by: tumor prevalence/incidence, clinicodemographics, comorbidities, and antineoplastic receipt using descriptive statistics.
RESULTS: Years 2007-2010 comprised the best data quality with 20,729 cancer cases (Mean 62 y/o, 56% F, 44% M). Common cancers were: breast (11%), prostate (7.8%), lung (7.5%), colorectal (6.2%), and lymphoma (5.9%). About 10% of cases received antineoplastic treatment.
CONCLUSIONS: The MEAPCD may be useful for assessing practice trends. We recommend linking this data to the state cancer registry data to provide a better understanding of cancer treatment utilization and outcomes in Maine.

Pharmacogenomics/Pharmacogenetics

141. Acetylation in the control of the NLRP3 inflammasome. *Tracy Okoli, Pharm.D. Candidate*[1], Javier Traba, Ph.D.[2], Michael Sack, Ph.D., M.D.[2]; (1) College of Pharmacy, Belmont University, Nashville, TN; (2) Center for Molecular Medicine, National Heart, Lung and Blood Institute, National Institutes of Health, Bethesda, MD
OBJECTIVES: The goal of this study is to investigate the relationship between the family of sirtuins deacetylase proteins, Sirt1 to Sirt5, the acetylase GCN5L1, and caloric restriction on the modulation of the NLRP3 inflammasome that is thought to be an important process involved in the low-grade inflammation noted in diabetes, gout, atherosclerosis, among others. Our hypothesis is that caloric restriction inhibits the NLRP3 inflammasome in a sirtuin-dependent fashion.
METHODS: The THP-1 monocytes were grown in complete RPMI media. Upon sufficient growth, the cells were transfected with siRNAs that suppress Sirt1, Sirt2, Sirt3, Sirt5, or GCN5L1 via electroporation. Once genetic depletion was verified via Western Blot, the monocytes were treated with 5 ng/mL PMA for macrophage differentiation, incubated in either RPMI or HBSS in which HBSS imposed caloric restriction, exposed to concentrations of LPS ranging from 0 to 1000 ng/mL to induce transcription of the cytokines and TNFα release, and exposed to 5 mM ATP to induce IL-1β release. The media per transfection was collected and the extent of cytokine release was quantified via ELISA.
RESULTS: The suppression of Sirt3 resulted in enhanced IL-1b release contrary to GCN5L1 suppression thus proving that Sirt3 and GCN5L1 have inverse roles in NLRP3 inflammasome activation. Thus, Sirt3 appears to play an active anti-inflammatory role whereas GCN5L1 play an active pro-inflammatory role. Unexpectedly, there was an increase in IL-1β release in HBSS treated macrophages. This is thought to be due to cellular damage caused by combined transfection and caloric restriction. Cell model optimization is being investigated for further experiments and therefore, the project is unlikely to be completed by the presentation date.
CONCLUSION: By identifying the anti-inflammatory capabilities of GCN5L1 knockdown and Sirt3 activation, there is potential for it use in genetic screening and drug targeting to treat inflammatory conditions.

Pharmacokinetics/Pharmacodynamics/Drug

142. Prediction of tacrolimus dose based on estimated clearance using population pharmacokinetic approach in adult kidney transplant patients. *Bojana Golubovic, MPharm*[1], Katarina Vucicevic, Pharm.D.[1], Dragana Radivojevic, M.D.[2], Sandra V. Kovacevic, Pharm.D.[1], Milica Prostran, M.D.[3], Branislava Miljkovic, Pharm.D.[1]; (1) Department of Pharmacokinetics and Clinical Pharmacy, Faculty of Pharmacy, University of Belgrade, Belgrade, Serbia; (2) Nephrology Clinic, Clinical Centre of Serbia, University of Belgrade, Belgrade, Serbia; (3) Department of Pharmacology, Clinical Pharmacology and Toxicology, School of Medicine, University of Belgrade, Belgrade, Serbia
OBJECTIVES: The aim of the study was to explore the influence of demographic and clinical covariates on tacrolimus (TAC) pharmacokinetic variability, and to develop a model for clearance (CL/F) estimation and consequent dose prediction.
METHODS: Population analysis was performed on retrospective data from routine therapeutic monitoring of 105 adult kidney transplant patients who received TAC two times daily to achieve desired TAC trough levels. In the first 2 weeks following transplantation desired ranges TAC trough blood concentrations were between 15 and 20 ng/mL, 10–15 ng/mL till the end of the first month, and 7–10 ng/mL after that. Volume of distribution and constant of absorption were fixed on literature values during modeling. Modeling was performed using NONMEM (ver. 7.2; Icon Development Solutions, Ellicott City, MD).
RESULTS: The most significant covariates were haematocrit and post transplantation day. TAC CL/F decreased with haematocrit increasing. In patients with haematocrit < 0.33 average TAC CL/F was 10.35 L/h, while in patients with haematocrit > 0.33 CL/F was 9.52 L/h. According to the derived model, dose needed to achieve desired trough concentration of 15 ng/mL in first 14 days after transplantation was approximately 9.77 mg. To achieve desired trough concentration of 10 ng/mL in the first month and in period of one to 6 months after transplantation doses needed were approximately 5.25 and 4.73 mg. Variance for TAC CL/F in derived model was 0.023, and unexplained variability was 4.07 ng/mL.
CONCLUSION: The study described effect of identified factors on TAC pharmacokinetic variability. The final model demonstrates the feasibility of estimation of individual TAC CL/F and corresponding doses to achieve desired TAC levels. Hence, understanding of factors influencing the TAC pharmacokinetics could assist in individualization of therapy and drug dosage decisions.

143. Vancomycin pharmacokinetics in obese patients. *Brandon Mullins, Pharm.D.*[1], Karrie Derenski, Pharm.D., BCNSP, CNSC[1], Melissa Steenhoek, Pharm.D., BCPS[1], Kris Jones, BS Pharm[1], Robin Trotman, D.O.[2], Jennifer Catlin, Pharm.D.[1]; (1) Pharmacy Services, CoxHealth South Medical Center, Springfield, MO; (2) CoxHealth Infectious Diseases Specialty Clinic, Springfield, MO
OBJECTIVES: Limited studies have been conducted on vancomycin pharmacokinetics in obese patients, most of which are limited by small sample size or retrospective study design. The main objective of this study is to determine the steady-state pharmacokinetic (PK) parameters of obese patients receiving intravenous vancomycin. The secondary objectives of this study are to determine if there are any differences in PK between critically ill and non-critically ill patients as well as if there are any differences between body mass index (BMI) groups (30–39, 40–49, ≥ 50).
METHODS: This is a prospective, single center, cohort study of obese patients being treated with vancomycin. Inclusion: hospitalized patients aged ≥ 18 years, BMI > 30, and receiving intravenous vancomycin. Exclusion: acute kidney injury and/or chronic renal failure (defined as serum creatinine [SCr] ≥ 1.5 mg/dL, SCr increase of 0.5 mg/dL in 24 hours, or receiving any form of dialysis), liver failure with ascites requiring paracentesis, patients requiring the massive transfusion protocol, if treatment was discontinued before steady state, if care was being withdrawn, pregnancy, incarceration, or any underlying psychological disorders that would preclude the patient from giving informed consent.
RESULTS: To be presented during the 2014 ACCP Virtual Poster Symposium.
CONCLUSION: To be presented during the 2014 ACCP Virtual Poster Symposium.

Psychiatry

144. Adjunctive minocycline in clozapine treated schizophrenia patients: analyzing the effects of minocycline on blood clozapine levels. *Teresa Elsobky, Pharm.D*[1], Bethany DiPaula, Pharm.D, BCPP[1], Deanna Kelly, Pharm.D, BCPP[2], Robert McMahon, Ph.D.[2]; (1) School of Pharmacy Department of Pharmacy Practice and Science, University of Maryland, Baltimore, MD; (2) Maryland Psychiatric Research Center
OBJECTIVES: The two primary objectives are to analyze clozapine blood levels in the two groups, minocycline group and placebo group, and to analyze baseline demographics and determine if these parameters affect clozapine levels in the two treatment groups. The secondary objective of the study is to identify if any symptom progression or regression occurs from this potential interaction between clozapine and minocycline.
METHODS: This is a 10-week, prospective, IRB-approved, randomized, double-blind, placebo-controlled study being condcuted at the Maryland Psychiatric Research Center. 50 patients with either a DSM-IV diagnosis of schizophrenia or schizoaffective disorder were enrolled. All patients enrolled must have been receiving clozapine therapy and not have achieved complete symptom resolution as measured by the Brief Psychiatric Rating Scale (BPRS) or the Clinical Global Impression (CGI) Scale. Incomplete resolution was defined as a BPRS total score of 45 or greater or a CGI score of 4 or greater. Patients were randomized to the minocycline group or the placebo group. Matched placebo capsules were created. Outpatients received their medications on a weekly basis, while inpatients received their medications daily from a nurse. During the first week of intervention, 50 mg minocycline or placebo capsule twice daily was given/prescribed and 100 mg minocycline or placebo capsule twice daily was given/prescribed from weeks 2–10. Clozapine plasma levels were obtained 4 weeks before Week 1 of intervention and then 5 additional times throughout the 10 weeks of intervention.
RESULTS: Data is currently being unblinded and organized. Data analysis will begin next month (February 2014). Results still pending. Results will be ready at the time of the 2014 ACCP Virtual Poster Symposium. Poster will also have been presented once before the virtual poster symposium - at the University of Maryland School of Pharmacy Research Day in April 2014.

Pulmonary

145. Evaluation of a therapeutic interchange from fluticasone/salmeterol to mometasone/formoterol in patients with chronic obstructive pulmonary disease. *Elaine Yip, Pharm.D.*[1], Sahar Karimi, Pharm.D., BCPS, CGP[1], Linda Pien, Pharm.D., BCPS[1]; (1) Kaiser Permanente
OBJECTIVES: The objective of this study is to evaluate the impact of a therapeutic interchange from non-formulary fluticasone/salmeterol to formulary mometasone/formoterol on health outcomes in patients with chronic obstructive pulmonary disease (COPD).
METHODS: The investigators are conducting this retrospective cohort study via chart reviews with patients serving as their own controls (n=549). Patients who were at least 18 years old, had a COPD diagnosis, and had an active prescription for fluticasone/salmeterol that was subsequently converted to mometasone/formoterol between March 6, 2012 to March 6, 2013 were considered for inclusion. Those on fluticasone/salmeterol 100/50 μg, which has no equivalent mometasone/formoterol dose, and patients who did not have a fluticasone/salmeterol prescription for at least 6 months pre-conversion were excluded. Ongoing data collection is focused on the difference in the occurrence of any COPD exacerbation 6 months pre- and post-conversion. Secondary outcomes include whether patients experienced any difference

in the occurrence of intensive care unit (ICU) admissions, hospitalizations, or non-routine clinic, urgent care (UC), or emergency department (ED) visits for COPD.
RESULTS: This study is currently in progress. Based on the retrospective review of 67 charts, the preliminary data demonstrates that 22 patients (33%) experienced a COPD exacerbation while on fluticasone/salmeterol vs 18 patients (26%) while on mometasone/formoterol. In the fluticasone/salmeterol group, 20 patients (30%) had a non-routine clinic visit, 10 patients (15%) had a UC/ED visit, and 3 patients (4%) had a hospitalization for COPD. In the mometasone/formoterol group, 5 patients (7%) had a non-routine clinic visit, 7 patients (11%) had a UC/ED visit, and 7 patients (11%) had a hospitalization for COPD. Thus far, no patients in either group experienced any COPD-related ICU admissions.
CONCLUSION: Upon completion in April 2014, this study will provide further data regarding mometasone/formoterol's use for its unlabeled COPD indication and determine if there was a difference in COPD exacerbations pre- and post-therapeutic interchange.

Transplant/Immunology

146. Minimized dosing of rabbit anti-thymocyte globulin induction for prevention of acute renal transplant rejection. *Tania Kapoor, Pharm.D*[1], Sarah Hutton, Pharm.D[2], Larry Burris, D.O.[3], Tyler Turek, Pharm.D[4]; (1) Sanford Pharmacy Department, Sanford USD Medical Center, Sioux Falls, SD; (2) Sanford Transplant Clinic, Sanford USD Medical Center, Sioux Falls, SD; (3) Sanford USD Medical Center, Sioux Falls, SD; (4) Sanford USD Medical Center, SD
BACKGROUND: Rabbit anti-thymocyte globulin (rATG) has emerged as the agent of choice for induction of renal transplantation for the prevention of acute rejection. rATG is a polycolonal antibody that acts as a lymphocyte depleting agent and is used for immunosuppressive induction of organ transplantation in the United States. Many renal transplant centers commonly use a rATG dose of 1.5 mg/kg/day for five to ten doses as the standard of care for transplant induction therapy. With increased use, there has also been an emergence of infectious and hematologic complications that correlate with antibody depleting therapy.
Initially our renal transplant program typically gave a standard of ≥ 4 doses of rATG. Since 2011, our program instituted a protocol change using T-cell monitoring ($CD3^+$ cell counts) to guide our dosing decisions to minimize the number of rATG doses given until initiation of maintenance immunosuppression.
OBJECTIVES: To compare outcomes of the Sanford Health Renal Transplant Center's $CD3^+$ guided rATG minimized dosing with the standard rATG dosing (≥ 4 doses) for the induction of immunosuppression.
METHODS: A retrospective chart review of patients who received a renal transplant at Sanford USD Medical Center between April 2007 and September 2013with rATG induction. Subjects were split into 2 groups: minimized rATG and standard rATG. The study outcomes analyzed: acute rejection, patient mortality, graft survival, delayed graft function, and adverse effects such as white blood cell count, filgrastim use, thrombocytopenia, Aranesp use, and incidence of infection.
RESULTS: Preliminary results indicate comparable rates of acute rejection between both groups and a lower rate of graft losses in the minimized rATG group than the standard rATG group.
CONCLUSION: Initial data suggests that there is not a higher rate of acute rejection and graft failure when using $CD3^+$ count guided minimized rATG dosing compared to administering a standard of ≥ 4 doses of rATG.

147. Pilot program of pharmacist managed penicillin allergy skin testing on inpatients at a medical center to determine cost-benefit. *Nicholas Skibba, Pharm.D.*[1], Janet Fischer, Pharm.D.[1], Beth Loecker, Pharm.D.[1]; (1) Inpatient Pharmacy, Sanford USD Medical Center, Sioux Falls, SD
OBJECTIVES: To determine the cost-benefit of penicillin allergy skin testing by pharmacists. Background: Penicillin allergies are one of the most commonly patient-reported allergies. About 10% of the population report a penicillin allergy, however this is an over estimate of the true penicillin allergies as they are often misdiagnosed. When allergy testing is employed the true allergy rate in the population is around 1%. A penicillin allergy frequently leads to the selection of more expensive alternative antibiotics.
METHODS: A pilot program was performed to determine the cost-benefit of penicillin allergy skin testing using the FDA approved Pre-Pen®. The test was ordered by a physician when a penicillin allergy was impacting antibiotic selection. Upon receipt of the order the pharmacist performed the test after collecting an allergy history and reviewing inclusion and exclusion criteria. The test results were reported to the ordering physician so that antibiotic adjustments could be made if applicable. Patients were monitored for allergic reaction if they were switched to a beta-lactam antibiotic. Data was collected on antibiotic selection (dose, frequency, route, and cost) prior to and after penicillin allergy skin testing. The actual antibiotic costs after penicillin allergy skin testing were compared to the estimated antibiotic costs if a penicillin allergy skin test was not performed. A cost benefit analysis was performed.
RESULTS: Preliminary results show that 100% of patients tested have had a negative penicillin allergy skin test and when challenged with a beta-lactam have had no allergic reaction. Initial analysis shows a positive cost-benefit with penicillin allergy skin testing.
CONCLUSION: Initial data from this pilot suggest that penicillin allergy skin testing is safe and easy to perform, that true penicillin allergies are rare, and there is a cost-benefit in testing for penicillin allergies.