Abstracts for Senior Projects: College of Pharmacy
The University of Arizona
Class of 2016
Marion Slack, PhD, Course Coordinator

1. Title: Evaluating an APPE assessment tool using electronic surveys to assess preceptor attitudes and implementing improvements to more accurately measure student achievement
Project Advisors: Janet Cooley, PharmD; Sandi Thoi, PharmD
Students: Ranna Ardebili, Hilary Boles, Amanda Grear

Objectives: (1) To assess preceptors’ attitudes regarding the usefulness of the web-based assessments in evaluating rotation students. (2) To determine which assessment tool (original versus modified) provides more in-depth feedback for the evaluation of students.

Subjects: Preceptors for 4th year students completing their Advanced Pharmacy Practice Experiences (APPE) in a variety of pharmacy settings.

Methods: Electronic surveys anonymously collected ratings of preceptor attitudes toward the original and modified APPE assessment tools. Data on the usefulness, strengths, and limitations of both tools were analyzed through thematic analysis.

Results: Surveys assessing preceptor attitudes towards the original assessment tool (46 responses) and modified assessment tool (29 responses) were collected and analyzed. Similar representation was seen across all rotation settings, with an average of 7 years of precepting experience. Preceptor attitudes were more positive towards the modified tool. More preceptors “strongly agreed” or “agreed” that they were able to effectively evaluate students with the modified tool compared to the original tool (83% vs. 63%). Additionally, more preceptors “strongly agreed” or “agreed” that the modified tool incorporated all necessary competencies (79% vs. 48%) and aided student growth by addressing deficits compared to the original tool (73% vs. 50%)

Conclusions: APPE preceptors perceived both the original and modified assessment tools as effective, favoring their brevity and ease of use. However, preceptor attitudes were more positive towards the modified tool. The methods utilized in this study can be implemented again for future updates of the APPE assessment tool.

2. Title: Implementation of Health Information Exchange (HIE) at the Pima County Adult Detention Complex (PCADC): Lessons Learned
Project Advisor: Terri Warholak, PhD
Students: James Backus, Alyssa Hinchman, Sara Hodges

Objectives: To evaluate the successes and failures of the recent implementation of the Arizona Health-e Connection (AzHeC) health information exchange (HIE) at the Pima County Adult Detention Center (PCADC); to identify a generalized infrastructure and draft recommendations for implementing HIE at other correctional facilities.

Methods: Participants pertinent to the implementation by current staff at the PCADC were identified through snowball sampling. Interviews were conducted in-person or by telephone using a semi-structured interview guide. Demographics regarding roles and responsibilities during implementation were collected during each interview. Participants were asked for input regarding key aspects and lessons learned from the implementation. Interviews were audio-recorded, transcribed verbatim, and then analyzed with Atlas.ti software for common themes.

Results: A total of 12 individuals were interviewed, providing a comprehensive set of perspectives. Six common themes were identified: impact of being a novel implementer; challenges surrounding implementation; problems during implementation; what was done well; benefits of the system; and communication during implementation. Potential barriers that were successfully anticipated were establishing the value of the HIE through pilot studies to obtain early stakeholder buy-in, and addressing legal/privacy issues for the at-risk population in the corrections system. Problems that arose during implementation often involved information technology issues.

Conclusions: Despite challenges faced throughout the HIE implementation, improvements in patient care, workflow, and time-savings made a tremendous impact for those involved. The lessons learned and advice given by the participants of this study can provide guidance for other correctional health systems wishing to implement a HIE at their facility.
3. **Title:** A Pilot Study to Examine the Feasibility of Measuring the QT Interval at Community Health Fairs  
**Project Advisor:** Daniel Malone, PhD  
**Students:** Tyler Gallo, Joseph Beck, Daniel Clark  
**Objectives:** This study assessed the feasibility of using a hand-held single lead ECG device to collect readable electrocardiograms (ECGs) in a community setting among the general population. Next, the goal was to determine if QT intervals could be measured from the collected ECGs. Additionally, this study was designed to examine if patients who had a prolonged QT interval were taking medications that are associated with an increased risk of prolonged QT interval.  
**Methods:** This prospective pilot study involved collecting ECGs via an AliveCor hand-held device at community health fairs. ECGs were evaluated for usefulness and QT intervals were measured if possible.  
**Results:** Forty-eight subjects participated in this pilot study. Forty-five viable ECGs were recorded using the hand-held device. Of the 45 ECGs, 38 were of sufficient quality to measure the QT interval and calculate QTc interval. There were no prolonged QT intervals observed in this study.  
**Conclusions:** The hand-held device recorded sufficient information to extract QT intervals for the majority of subjects. Due to the lack of prolonged QTc intervals, there was insufficient data to determine if this device could be utilized in the detection of QT prolongation due to medication use.

4. **Title:** Optimization of Growth Conditions in Minimal Media for Production of Nucleolin Protein  
**Project Advisors:** Danzhou Yang, PhD; Megan Bruce Carver, PhD  
**Student:** William Ryan Brewer  
**Objectives:** The purpose of this experiment is to compare NUC1234 expression levels from E. coli cultures by manipulating cell cultures according to the optical density (OD$_{595}$) at which protein expression is induced, and the harvest time after induction.  
**Methods:** E. coli BL21(DE3) cells transformed with DNA to produce NUC1234 were plated and then grown in minimal media for protein expression. They were induced at a variety of optical densities and harvested at different times post-induction. Protein quantities from each sample were then compared using a protein determination assay and an SDS-PAGE gel.  
**Results:** The sample induced at an OD$_{595}$ of 0.5 yielded a lower concentration of protein (0.874409mg/ml) compared to other samples; however, it visualized as a stronger band in the SDS-PAGE gel. The sample harvested at 6 hours yielded the largest protein concentration (1.347215mg/ml) among all active samples and appeared as bold as, or bolder than, those harvested at other times.  
**Conclusions:** The results of the protein assay study and gel visualization suggest that the optimal conditions for the production of NUC1234 are growth to an OD$_{595}$ of 0.5 before induction of protein expression and a harvest time of 6 hours after induction.
6. Title: Qualitative Evaluation of the Rio Rico Fire Department Community Integrated Paramedic Program
Project Advisor: Terri Warholak, PhD
Students: Lien Do, Brieanna Flores-Keown, Alicia Vu
Objectives: Specific Aim #1: Assess the impact of the Community Integrated Paramedic program on the participants. Our working hypothesis is that the participants will find the program to be impactful in many aspects and beneficial. Specific Aim #2: The impact of the program on the participating paramedics. Our working hypothesis is that the paramedics will report positive themes as a result of participation in the program.
Methods: 5 individuals who were enrolled in the paramedicine program and 6 volunteer paramedics participated in semi-structured face-to-face interviews. Interviews were transcribed data was grouped into categories and subcategories to identify common themes associated with participation in a community paramedicine program for both participants and paramedics.
Results: Three primary themes emerged for participants: disease-self management, safety and support. Disease-self management included 7 subdomains: medication management, exercise, diet, resources and utilization, communication with providers, disease education, and self-awareness. Safety included 4 subdomains: medication safety, home safety, fall prevention, and environmental hazards. Support included 2 subdomains: physical and emotional. One primary theme emerged for volunteer paramedics: job satisfaction. Job satisfaction included 8 subdomains: helping people, decreasing emergencies, learning new skills, educating people, expand knowledge base, rewarding experience, building relationships, and documenting impact.
Conclusions: A community paramedicine program is positively correlated with emotional support, disease management and safety for participants involved. Additionally, the program is associated with increased job satisfaction for paramedics.

7. Title: Accuracy of Medical Information in the Seventh Season of the Medical Television show House, M.D
Project Advisors: David Apgar, PharmD; Edward Armstrong, PharmD; Terri Warholak, PhD
Students: Kristy Foote, Jackelyn Marciano, Joseph Pellerito
Objectives: To evaluate the level of accuracy of medical information presented in the seventh season of the medical drama, House M.D. To assess the accuracy of the presentation, diagnostic procedures and treatment presented in season seven.
Methods: A descriptive, retrospective assessment of the accuracy of all the episodes of the seventh season of House M.D. Three reviewers independently rated the accuracy (on a scale of one to four) for the presenting signs and symptoms, diagnostic procedures, and treatment in each episode. A rating of one meant a correct and usual representation while a rating of two indicated a correct but somewhat unusual representation. A three was given for a correct but extremely unusual representation and a rating of four indicated an incorrect representation. Each researcher independently rated the episodes, and an average for each rating was used for analysis.
Results: Results of the ANOVA test demonstrated no statistically significance differences between the three dependent variables (p=0.0782), therefore the Tukey HSD post-hoc test was unnecessary. The average rating for the treatment variable was 2.17 (±1.19), whereas the average ratings for the signs and symptoms and diagnosis variables were 2.74 (±0.92), and 2.87 (±1.14), respectively. The ratings for the treatment variable were more accurate compared to the other two variables.
Conclusions: All three dependent variables observed in season seven of House, MD were similar in regards to accuracy falling between a rating of 2.0-3.0 representing a correct but somewhat unusual to a correct and extremely unusual representation.
8. Title: Evaluation of newer drug therapies for hepatitis C at a specialty pharmacy  
Project Advisors: Kelly Mathews, Sarjit Patel  
Students: Michelle Garfunkel, David Hoehn, Kayleen Thompson  
Objectives: To compare the SVR12 rates of newer hepatitis C therapies, approved between November 2013 and December 2014, in patients at Avella Specialty Pharmacy to SVR12 rates from published literature. Insurance coverage rates will be compared to determine a difference among insurances.  
Methods: Data were collected electronically from patient charts utilizing the existing computer system and manually through chart review. A complete data collection form in excel compiled the collected data and included the SVR12 rates by therapy, and sub-analysis data such as demographic and descriptive variables. Therapies included Harvoni, Olysio + Sovaldi + Ribavirin (RBV), Viekira Pak + RBV, or Sovaldi + RBV. Demographic and descriptive variables included gender, medical insurance, hepatitis C genotype, fibrosis score, treatment-experienced, treatment-naive, and adverse effects. Insurance coverage rates were also collected through a separate electronic report.  
Results: A total of 578 patients were included in the analysis of SVR12 (mean age = 59, 60% male). There were 50% of patients with genotype 1a, 18% had cirrhosis, and 60% were treatment-naive. The overall SVR12 rate achieved by patients at Avella was not significantly different from published clinical trials (91% vs 91%, p = 0.75). Data for coverage rates included a total of 6,284 patients and revealed that Medicare had the highest coverage rate (85%) while Medicaid had the lowest (30%).  
Conclusions: Newer hepatitis C therapies used in a real world setting had similar SVR12 rates to published literature. Medicaid had a lower coverage rate compared to Medicare and commercial insurances while Medicare had the highest coverage rate.  

9. Title: Grapefruit-Statin Interactions: Patient Awareness, Knowledge and Contributing Factors  
Project Advisors: Jenene Spencer, PharmD; Elizabeth Hall-Lipsy, JD, MPH  
Students: Cameron Hannum, Kevin Hawkins  
Objectives: The goals of this study were: to assess patients’ knowledge of grapefruit interactions when taking statin class (dyslipidemia) medications, to identify any pertinent demographic characteristics that may influence knowledge of grapefruit statin interactions, and to identify patient preferred sources of health information.  
Methods: Questionnaires were administered at community health fairs during the academic school year 2014 through 2015. The survey addressed grapefruit consumption, frequency and amount, for both whole fruit and juice; examined knowledge of the potential for harmful interactions of grapefruit juice with statin medications; and how or where the participant learned this information.  
Results: A total of 74 participants completed surveys, of which, 72 submitted fully completed surveys, mean age was 64 (SD=+/− 15.6), 71.2% were female (N=52), and 78.1% were white. Of those surveyed, 63.5% (N= 47) reported consuming grapefruit in the past 12 months, and 36.1% (N=26) reported taking a statin. Those taking statins, 50% (N=13) reported consuming grapefruit as well. The majority of people, 61.3% (N=45), reported obtaining health related information from healthcare sources. Those with a college education were more likely to have consumed grapefruit in the last 12 months (X²=4.88, p=0.027) and to have ever consumed grapefruit (X² =4.40, p=0.036).  
Conclusions: The majority of the health fair attendees surveyed were highly educated, reported having health insurance, had consumed grapefruit in the past year, and had heard about grapefruit-drug interactions.
10. Title: The Perception of Patient Satisfaction among Public Health and Pharmacy graduate students: A Retrospective Analysis

Project Advisor: Terry Urbine, PhD

Students: Chris Obeso, Hoang Phan, Tan Ho

Objectives: To explore the difference in patient satisfaction with pharmacy services between Public Health and Pharmacy students.

Methods: We conducted a retrospective analysis of the results of a 20-item questionnaire regarding patient satisfaction with community pharmacy services that was administered to pharmacy and public health graduate students at the University of Arizona. Pharmacy students (n = 95) and Public Health students (n = 67) completed the questionnaire and a Chi Square test was utilized to compare the results. Scores of 4 and 5 (Very Good and Excellent, respectively) were compared against 1, 2, and 3 (Poor, Fair, and Good, respectively). Questions were stratified into domains of “Friendly Explanation” and “Managing Therapy.”

Results: Sixty-two percent of pharmacy students answered “Excellent” and “Very Good” on all 20 questions compared to 37% of public health students (p<0.001). In the “Friendly Explanation” domain, 73% of pharmacy students answered “Excellent” and “Very Good” compared to 57% of public health students (p<0.001). The “Managing Therapy” domain also yielded a higher percentage of satisfied pharmacy students compared to public health students (48% vs 36%, p<0.001). Areas with the highest degree of difference involved availability of the pharmacist, professionalism of pharmacy staff, and promptness of pharmacy services.

Conclusions: Pharmacy students were more satisfied with pharmacy services than public health students. Increasing the availability of the pharmacist to answer patient questions, improving professionalism of staff, and providing prompt services may improve patient satisfaction with community pharmacy services among the general public.

11. Title: Effect of pneumatic tubing on regular insulin concentration

Project Advisor: Eric Bergstrom, PhD

Students: Bryant Wong, Deo Mopera

Objectives: To describe the effect of time spent in pneumatic tube system on the concentrations of bags of regular insulin.

Methods: Twelve intravenous bags of regular insulin in normal saline with a concentration of one unit per milliliter were prepared, with six bags acting as the control group and six bags as the experimental group. Bags in the experimental group were transported to stations labeled X, Y, and Z which were at varying distances from the pharmacy. Bags in the control group were walked the same tube stations. Three samples from each bag were analyzed using the ValiMed™ medication validation system before and after transport and the standard deviations (SDs) from the mean were recorded.

Results: At baseline there were no statistically significant differences in the standard deviations (SDs) between the control and experimental group (p = 0.1008). SDs after transport compared to baseline SDs produced statistically significant differences (p < 0.005) except for the control group transported to tube station Z (p = 0.0867). The SDs after either transport produced a statistically significant difference when compared to baseline except for one group of insulin bags. This indicates that concentration may not be affected by method of delivery, since statistically significant difference occurred regardless of transport method. It appears to be safe to transport insulin IV infusion bags by pneumatic tube system.
12. Title: Rattlesnake Envenomation Demographic and Situational Statistics: a retrospective database analysis 2002-2014

Project Advisor: Keith Boesen, PharmD

Students: Jessica Reilly, Morgan Robertson, Deanna Molina

Objectives: The purpose of this study was to assess trends in the anatomical bite location, circumstances, and legitimacy of rattlesnake envenomations managed by the Arizona Poison and Drug Information Center (APDIC) between the years of 2002 to 2014.

Methods: The Institutional Review Board approved this retrospective database analysis in which deidentified patient case information was extracted from the APDIC electronic medical record database. Descriptive and demographic variables collected included: age, gender, anatomical bite location, circumstance, and alcohol involvement. Variables were analyzed by student researchers to determine the legitimacy. Researchers compared demographic variables by year and month to assess for trends.

Results: A total of 1,738 rattlesnake envenomations were analyzed for the 13 year study period. The number of cases per year varied, but not significantly, p=0.069. A statistically significant (p<0.005) upward trend in average age occurred. No significant difference in cases involving females was found between study years (p=0.171). Alcohol involvement was not statistically significant, p=0.46. An upward trend (p<0.005) in legitimate rattlesnake envenomations was demonstrated.

Conclusions: Envenomations from 2002 to 2014, showed an upward trend in age, but similar distribution of gender. An increasing number of envenomations were determined to be legitimate, possibly related to the increasing number occurring to the foot/ankle, as well as the increasing number related to gardening and walking outside/taking out the trash. This trend may also be due to the lack of adequate data related to alcohol involvement.

13. Title: Electronic prescribing requirements for mid-level practitioners in the United States

Project Advisor: Terri Warholak, PhD

Students: Melissa Shreve, Tatiana Sawyer, Mel Nelson

Objectives: To identify which types of mid-level practitioners have prescribing authority in each state in the United States (US), compare the types of prescriptive authority for scheduled medications for mid-level practitioners, and delineate differences between state and federal requirements for electronic prescribing (e-prescribing) for mid-level practitioners in each state.

Methods: A data extraction tool was developed and utilized to collect e-prescribing requirements and mid-level practitioner prescriptive authority from publically accessible state and federal websites. Dependent variables were analyzed using frequencies and percentages. A comparison of regional mid-level practitioner prescriptive authority patterns was conducted.

Results: Mid-level practitioner prescriptive authority and e-prescribing requirements were collected from 50 states, the District of Columbia, and the Drug Enforcement Administration (DEA). For e-prescribing requirements, 19 (37%) states listed federal law requirements, 28 (55%) states listed requirements in addition to federal law, and 4 states (8%) did not specify requirements. Overall, over half of the US had more stringent e-prescribing requirements than federal law. States varied in which mid-level practitioners had authority to prescribe controlled substances: 98% of states allow nurse practitioners to prescribe; 96% allow physician assistants; 84% allow optometrists; 14% allow naturopathic doctors; 12% allow registered pharmacists; 8% allow certified nurse midwives, 4% allow homeopathic physicians, medical psychologists, and nursing homes; and 2% allow doctors of oriental medicine, certified chiropractors, clinical nurse specialists and/or advanced practice registered nurses.

Conclusions: There are differences in e-prescribing requirements and varying levels of prescriptive authority for mid-level practitioners between US states.
14. **Title:** The Effect of Ipilimumab on the Endocrine Function  
**Project Advisor:** Ali McBride, PharmD  
**Student:** Ollga Qyra  
**Objectives:** To test whether ipilimumab therapy affects the endocrine system in patients with Metastatic Melanoma.  
**Methods:** A retrospective chart review was performed that included patients with Metastatic Melanoma that had at least one dose of ipilimumab.  
**Results:** The primary finding of this study is that 38% of patients used at least 20 mg of prednisone daily or more while on Ipilimumab therapy. Only 33% of patients had endocrine lab values reported.  
**Conclusions:** There was not enough data collected to adequately show that Ipilimumab affects the endocrine system. There was also insufficient reporting of appropriate serum levels. More research on the importance of reporting lab values while on ipilimumab therapy needs to be conducted.

15. **Title:** Effectiveness of an interactive approach to educate older adults and caregivers on Alzheimer’s disease  
**Project Advisor:** Jeannie Lee, PharmD  
**Students:** Rona Zhou, Wendy Wong, Caitlin Vaughn  
**Objectives:** To promote Alzheimer’s disease (AD) awareness in older adults and caregivers by creating and implementing an interactive educational program in several Southern Arizona senior centers, evaluate the helpfulness of the intervention, the confidence and the motivation of the participants.  
**Methods:** A 30-minute educational program consisting of a PowerPoint presentation with various interactive learning methods and a 10-minute question and answer session was delivered to those 55 years of age and older at senior centers across Southern Arizona. An anonymous questionnaire was conducted after each educational program to assess the helpfulness of the program, the subject’s familiarity with AD and their motivation to create a personal action plan after participation, and demographic information. Responses from the participants were compared with a priori alpha at 0.05.  
**Results:** A majority of participants in the study were female (69.9%) the median age was 75. One hundred (98%) of the participants strongly agreed or agreed that the interactive educational program was helpful in understanding AD, and 95 (96.9%) stated they were more motivated to create a personal care plan. There was no difference between the males or females’ self-reported familiarity with dementia (p = 0.25) or AD (p = 0.75) after program participation, but >50% of overall participants who were not already very familiar with Alzheimer’s disease increased in familiarity. **Conclusions:** An interactive approach to educating community-dwelling older adults and their caregivers on AD was helpful to the participants, and they were more motivated to create personal care plans.
16. Title: Comparing the efficacy of direct acting antiviral agents for the treatment of hepatitis C virus genotype 1
Project Advisors: Dan Malone, PhD; Marcella Honkonen, PharmD
Students: Rahma Ali, Sylvia Trinh, Jared Turley
Objectives: To compare the efficacy of direct acting antiviral agents for the treatment of hepatitis C virus genotype 1. Our primary null hypothesis is there will be no significant difference in efficacy among the treatment regimens for hepatitis C virus, genotype 1.
Methods: This meta-analysis study will use published literature identified from Embase and PubMed for phase II or III clinical trials evaluating direct acting antiviral drug regimens to treat adults with hepatitis C virus (HCV) genotype 1 infection. The primary outcome of interest is SVR at 12 weeks after treatment initiation. Data will be analyzed both descriptively as well as using Bayesian mixed treatment comparison methods. After extracting the outcome data from individual studies, the data will be analyzed using Winbugs version 1.4.3. Moreover, a random effects model and indirect/mix-treatment comparison will be used during the analysis. The random effects model accounts for both between-study and within-study variance, and is exempted from normality assumption, possessing a wider credible interval. All pair-wise odds ratios will be generated and treatment regimens will be ranked based on the likelihood of achieving SVR.
Results: Overall, combinations containing sofosbuvir and ledipasvir were significantly better than all other treatments except for simeprevir (OR 0.52, 95% CI 0.28-1.00). On the other hand, daclatasvir containing regimens were non-inferior only to simeprevir (OR 0.69, 95% CI 0.35-1.31) and grazoprevir (OR 0.66, 95% CI 0.41-1.04) while being inferior to other treatments. Sofosbuvir with ledipasvir was ranked highest in terms of obtaining a sustained viral response, followed by ABT-450, grazoprevir, simeprevir, and daclatasvir respectively. In previously treated patients, sofosbuvir with ledipasvir again demonstrated the best efficacy with only grazoprevir and ABT-450 being non-inferior (OR 0.64, 95% CI 0.336-1.212 and OR 0.73 95% CI 0.29-1.88 respectively). Sofosbuvir with ledipasvir was followed by grazoprevir, ABT-450, simeprevir, and daclatasvir containing regimens respectively. Finally, in treatment naive patients, simeprevir containing regimens were non-inferior to all other treatment groups, including sofosbuvir regimens (OR 1.24, 95% CI 0.28-9.93). With the exception of simeprevir, sofosbuvir with ledipasvir demonstrated superiority over all treatments. Simeprevir regimens and sofosbuvir with simeprevir regimens were followed by ABT-450. In treatment naive patients daclatasvir was found to be non-inferior to grazoprevir (OR 1.26, 95% CI 0.75-2.10). Treatment naive patients were the only group we analyzed in which daclatasvir was not the least effective regimen, with grazoprevir claiming the last position.
Conclusions: Our results reject our null hypothesis that there will be no difference between different treatment regimens in HCV genotype 1 patients. Generally, the combination of sofosbuvir and ledipasvir appears to be the most effective, while daclatasvir appears to be the least.

17. Title: A Descriptive Analysis of OTC Drug Prices in Southern Arizona Pharmacies
Project Advisor: David Lee, BSPharm
Students: Cameron Beatty, Justin Cossette, Walter Putnam
Objectives: To describe the prices of brand versus generic OTC drug products in a variety of pharmacies and to compare the differences in lower income areas.
Subjects: Over-the-counter products available in both brand and house generic forms in all pharmacies. House generic was defined as a line of products sold strictly by a company and its affiliates.
Methods: Prices were collected across one week from all stores and locations, in each identical product. Once all the data was collected for the brand and generic medications, the data was evaluated using t tests.
Results: The house generic brands (mean = $6.21) were significantly cheaper (p=2.14 x 10^-23) than the brand products (mean = $10.84 ). Also, generic drug prices are significantly cheaper at grocery stores (p=2.19 x 10^-11). Lastly, The price differences in all four areas were not significantly different in each of the brand and generic calculations (p=0.837 and p=0.910, respectively).
Conclusions: House generic brands are significantly cheaper than brand products in all pharmacies in Arizona. In addition, all four areas of Arizona had similar brand and generic OTC prices.
18. **Title:** Effect of Adherence to the GOLD Guidelines on Chronic Obstructive Pulmonary Disease Related Readmissions in a Community Hospital  
**Project Advisors:** Edina Hall, MS, PharmD; Ferena Salek, PharmD; Jon Glover, PharmD  
**Students:** William Binder, Scott Clark  
**Objectives:** To assess the relationship between adherence to the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines for the management of chronic obstructive pulmonary disease (COPD) exacerbations and the corresponding 30-day, all-cause readmissions rate in a community hospital.  
**Methods:** A retrospective chart review was conducted on patients admitted with the primary diagnosis of a COPD exacerbation. Medications administration records relevant to the GOLD guidelines were examined as separate independent variables in relation to a readmission within 30 days of discharge. Additional factors examined included: demographic data, resident of a long-term care facility, pre-index hospitalization, pulmonary consult, vaccines, length of stay (LOS), discharge medications, and follow-up appointments.  
**Results:** Electronic health records of 120 patients were reviewed and divided into non-readmitted patients (n = 65, mean age 73.4 ± 10.1 years), all-cause readmissions (n = 55, mean age 70.15 ± 9.69 years), and COPD-related readmissions (n = 21, mean age 70.7 ± 11.1 years). Patients with heart failure (p = 0.024), a LOS >5 days (p = 0.045), a pre-index hospitalization (p = 0.001), or who were long-term care residents (p = 0.024) experienced more all-cause readmissions. Females experienced less all-cause readmissions (p = 0.035). Significantly more patients with a pre-index hospitalization had a COPD-related readmission (p = 0.027). Lastly, adherence to the GOLD treatment parameters was not significantly different across all groups.  
**Conclusions:** COPD is a complex disease and adherence to the GOLD guidelines during an exacerbation is unlikely to significantly impact 30-day readmission rates.

19. **Title:** Intent to Provide the Influenza Vaccination to Children ages 6-18: An Analysis of Law Implementation by Community Pharmacies  
**Project Advisor:** Sandra Leal, PharmD, MPH  
**Students:** Bradley Bingham, Andrew Vo, Aaron Leyba  
**Objectives:** To determine the prevalence and incidence of community pharmacies not vaccinating children down to six years of age and to identify the reasons for non-compliance with Arizona State Board administrative rule R4-23-411.  
**Subjects:** 103 community retail pharmacies from six corporations in the Tucson metropolitan area established by December 2014.  
**Methods:** Funnel questionnaire administered via phone call to collect pharmacist response if he or she would vaccinate a six-year-old child; data for reasons why he or she would or would not vaccinate and gender of pharmacist was also collected.  
**Results:** Responses were collected from 103 pharmacists (male n = 55, female n = 48). 87% (n =90) of pharmacies stated they would not vaccinate a six-year-old, while 13% (n =13) would vaccinate. The rationale for not vaccinating varied from corporate policy (45%) to state law (37%).  
**Conclusions:** The majority of six retail pharmacy chains in Tucson, Arizona are not vaccinating down to six-years old, although Arizona administrative amendments allow pharmacists to do so. More pharmacies that would choose not to vaccinate may be related to a better understanding of corporate policies versus state administrative rule change.
20. Title: A Comparison of the Minimum Age to Receive an Influenza Vaccination Between Rural and Urban Pharmacies  
Project Advisor: Sandra Leal, PharmD, MPH  
Student: Paul Dunlavy  
Objectives: To compare the minimum vaccination age to receive an influenza vaccine of rural and urban pharmacies. Rural pharmacies are defined in all Arizona pharmacies in counties other than Pima or Maricopa, urban pharmacies are defined as all pharmacies within the Tucson city limits.  
Methods: Pharmacies were called for a phone interview asking what the minimum age someone needs to be to receive an influenza vaccination from their store is. Pharmacies were called during their operating hours during a 4-week period at the end of January and early February.  
Results: 269 pharmacies were included in the study. Pharmacies consisted of 153 rural pharmacies and 116 urban pharmacies. The median minimum vaccination age for both rural and urban pharmacies was 8. Overall, there was found to be no significant difference between the minimum vaccination age between rural and urban pharmacies (p = 0.242).  
Conclusions: The minimum age to receive an influenza appears to be similar between rural and urban pharmacies.

21. Title: Pharmacists Use of Over-the-Counter Vitamins, Minerals, and Herbal Supplements  
Project Advisor: Marion Slack, PhD  
Students: Martin Faridian, Saul Ortega, Pearce Engelder  
Objectives: This study aims to evaluate the use and rationale of dietary supplement use by pharmacists and to assess whom pharmacists are recommending them to.  
Methods: Arizona licensed pharmacists were surveyed using Qualtrics software. The survey consisted of questions starting with listing common vitamin, mineral and herbal products used personally. Respondents were then asked to indicate a purpose for use and if they would recommend personally used products to patients, family or friends. Demographics such as area of practice, gender and age were also collected. Data were analyzed by calculating summary frequency and percentages with a priori alpha level of 0.05.  
Results: Of the 10,899 surveys sent, 528 respondents completed the survey. The average respondent age was 46.6 ± 14.4, 40% were male and 42% practiced in community pharmacy. Overall vitamin/mineral use was higher: multivitamin (95.54%), vitamin C (78.24%), vitamin D (73.31%), calcium (73.13%), and B vitamin(s) (70.03%). Meanwhile, supplement use lower; Overall use of supplements was lower; 58% for fish oil while only 25% used chondroitin. More community pharmacists used all types of dietary supplements (p < 0.05). The most common reasons for use were “general health and wellness” and “to treat or cure a specific disease or health problem.” Most pharmacists would recommend the noted products to patients.  
Conclusions: Pharmacists use dietary supplements at rates similar to the general public and would recommend the noted products to patients. This is particularly relevant because existing well designed studies evaluating efficacy and safety of the products in question are limited.
22. **Title:** Evaluation of Adherence to Empiric Antibiotic Recommendations in Treatment of Diabetic Foot Infections  
**Project Advisor:** Kathryn Matthias, PharmD  
**Students:** Sue Lee-Chu, Chyi-Jade Fann, Caroline Kim, Larry Le  
**Objectives:**  
1. To compare appropriateness of therapy and the time it takes for appropriate empiric antibiotic therapy to be given from when patients are first admitted for treatment of diabetic foot infection.  
2. To compare the time it takes for physicians to “streamline” therapies or switch from empiric antibiotic therapy to specific antibiotics after culture results are obtained.  
3. To compare the incidence of readmission within 30 days to the hospital after initial discharge.  
**Methods:** In this IRB approved, retrospective study, antibiotic therapy prescribing patterns before and after the distribution of a health network specific empiric antibiotic reference material were compared in patients admitted for diabetic foot infection. Patients were excluded if no antibiotic therapy prescribed, if under the age of 18 years, or if admitted for less than 48 hours (including time spent in the emergency department). The following data were collected and analyzed between the two groups: number of appropriate antibiotic therapy administered, timing of appropriate therapies relative to when appropriate culture samples were obtained if applicable, time it takes to streamline antimicrobial therapy, and the incidence of 30-day readmission.  
**Results:** A total of 400 patients were evaluated with 17 pre-intervention and 10 post-intervention patients who meet the inclusion criteria. The pre- and post- intervention groups did not show significant difference in demographics except for comorbid conditions (p=0.055). Overall, there was no significant difference between the pre- and post-intervention group on appropriate empiric therapy given (p=0.382), timing to streamline therapy (p=0.4035), and readmission rates (p=0.401).  
**Conclusions:** The health network specific empiric antibiotic recommendations reference material did not influence the timing and appropriateness of empiric antibiotic therapy in treatment of diabetic foot infections and the patient 30-day readmission rates.  

24. **Title:** Evaluation of student and hospital administrator perceptions of student involvement in completion of community health needs assessments  
**Project Advisor:** Elizabeth Hall-Lipsy, JD, MPH  
**Students:** Julia Olson, Cassia Griswold  
**Objectives:** The objectives of this study were to (1) evaluate student perceptions of completing a Community Health Needs Assessment (CHNA) and (2) determine hospital administrators’ awareness of potential student roles and interest in future student involvement in completing their mandated CHNA.  
**Methods:** Rural Health Professions Program (RHPP) participants who completed the CHNA course were emailed a link to a survey addressing demographics and satisfaction with the CHNA experience. Rural, not-for profit hospitals who were members of the Arizona Hospital and Health Care Association were selected for inclusion. Representatives from eligible hospitals completed a telephonic interview regarding their CHNA process, results, and interest in collaborating with RHPP students.  
**Results:** Twenty-nine students completed the survey (60% participation). In thematic analysis addressing overall satisfaction with the process, the top response was that it was a good learning experience (9 responses). Participants strongly agreed that communities can benefit from student involvement (65%) and 83% believed their CHNA could benefit the community.  
Of 19 eligible hospitals, 12 completed phone interviews (63% participation). The most commonly reported obstacles to completing a CHNA were: lack of resources, time, and community participation. Pharmacy was involved in the process at five of the facilities (41%). After describing the RHPP, 10 respondents indicated interest in student involvement in their CHNA (83%).  
**Conclusions:** There is potential for a mutually beneficial student-community collaboration, providing hospitals with additional resources while enhancing student engagement and community impact. This partnership could also increase pharmacy representation in the CHNA process, as less than half of hospitals reported pharmacy involvement.
25. Title: Self-management of Pain Among Pharmacy Students  
Project Advisor: Marion Slack  
Student: Carlos Hernandez  
Objectives: The purpose of this study is to determine if pharmacy students are more likely to use pharmacological agents to manage pain and if men and women are equally likely to use pharmacological agents.  
Methods: Questionnaires were administered after a regularly scheduled class for first, second and third year pharmacy students. Data collected included a pain intensity rating, whether pain was acute or chronic, how the pain was managed (medication, exercise, etc.) and if pain interfered with activities.  
Results: A total of 218 students (41% men, 71% aged 19-25) participated; 70% reported acute pain, 16%, chronic pain, and 14%, no pain. Pain intensity was greater in the chronic pain group (5.8 ± 1.7) than in the acute pain group (5.0 ± 2.1; p = 0.028). Chronic pain respondents were more likely to use prescription NSAIDs, muscle relaxers, physical therapy, transdermal electrical nerve stimulation, steroid injections and beta blockers (p < 0.02). There were few differences between men and women; women used OTC NSAIDs and acetaminophen at higher rates than men (p < 0.02). Women also used two non-pharmacological strategies (changed position and relaxation) at higher levels than men (p < 0.02). Students with chronic pain reported more pain interference with daily and leisure activities (p < 0.005) and work (p = 0.003) than students in the acute pain group.  
Conclusions: Different strategies were used for pain management between acute and chronic pain participants, and also between both men and women. Students with chronic pain reported more interference with activities than those with acute pain.

26. Title: Verification of non-English-language prescription label translations  
Project Advisor: Janet Cooley, PharmD  
Students: Kammi G. Humed; Kenneth T. Olson  
Objectives: To verify a set of translated medication labels in consultation with native speakers of non-English languages, specifically for this study: Amharic, Arabic, Chinese (Mandarin), Somali, Spanish, Tigrinya, and Vietnamese.  
Methods: Native speakers of target languages were recruited from academic and community organizations in the Tucson area. Participants were asked to review a set of translated directions and complete a survey regarding the validity and comprehensibility of the translations. In some cases, a short interview was used to clarify any comments or corrections made by the participants.  
Results: Surveys were completed by 23 participants, 12 men and 11 women, covering seven languages, with an uneven distribution between languages. Directions in Somali were the least problematic, with relatively strong agreement between respondents. Amharic directions were rated poorly and scored consistently worse than the overall average. Tigrinya had the most variation between respondents compared to other languages. Chinese, Spanish, and Vietnamese all received rather high scores, but analysis is complicated by a small sample size for each. Among responses to the open-ended questions, comments regarding word choice were the most common, for various reasons.  
Conclusions: We were able to validate some of the provided translations, but found that certain languages posed more problems than others, and these translations would need to undergo further review before they can be reliably used in clinical practice.
27. **Title:** Effectiveness of Prophylactic Fluconazole at Low Doses for Allogeneic Hematopoietic Stem Cell Transplant Patients  
**Project Advisor:** Ali McBride, PharmD  
**Students:** Lawrence Taylor Hunt, John Zachary Riddle  
**Objectives:** The purpose of this study was to evaluate if fluconazole 200 mg is an acceptable alternative to the fluconazole 400 mg for fungal prophylaxis in allogenic hematopoietic stem cell patients. Lower fluconazole doses will decrease cost of therapy and may reduce adverse events associated with higher doses.  
**Methods:** This study was a retrospective chart review conducted at the Arizona Cancer Center. A total of 58 patients qualified for the study. Primary endpoints were number of days on fluconazole 200 mg and type and number of fungal infections that occurred within 1 year post transplant.  
**Results:** Out of the fifty-eight patients who qualified for the study, only eight patients had a breakthrough fungal infection while on 200 mg (13.7%) after one year. Three of those eight were identified as having systemic fungal infections (5.2%).  
**Conclusions:** Fluconazole 200 mg is a reasonable low-cost and low side effect alternative to fluconazole 400 mg for antifungal prophylaxis in allogenic hematopoietic stem cell patients.

28. **Title:** Evaluation of Extended Dual Antiplatelet Therapy with Aspirin and Clopidogrel Among Men and Women Patients at El Rio Health Center  
**Project Advisor:** Amy Kennedy, PharmD  
**Students:** Alina Jaeger, Kimberly Pham  
**Objectives:** Analyze trends in prescribing extended dual antiplatelet therapy (DAPT) with aspirin and clopidogrel between men and women patients at El Rio community health center.  
**Methods:** Patients at a community health center who were on DAPT for longer than one year were identified through retrospective chart review. Demographic and descriptive data were recorded, including patient age, gender, indication for therapy, and type of prescriber. Based on prescribing guidelines, acute coronary syndrome (ACS) with bare-metal stent or drug-eluting stent, and drug-eluting stent without ACS were considered to be appropriate indications of extended DAPT. All other indications were considered inappropriate.  
**Results:** Data was collected for 27 men (mean age = 68; SD = 9.82; 70.4% hispanic or latino) and 31 women (mean age = 70; SD = 10.49; 83.9% hispanic or latino). Dual antiplatelet therapy was appropriately prescribed for 17 men and 20 women (63% and 64.5%, p=0.08).  
**Conclusions:** Overall, the difference in adherence to prescribing guidelines for men and women was not significant.

29. **Title:** An Assessment of Medication Synchronization on Improving Medication Adherence  
**Project Advisor:** Terri Warholak, PhD  
**Students:** Shahene Badie, Elizabeth Jing, Carissa Fernandez  
**Objectives:** Our specific aim is to assess the changes in patient adherence in response to medication synchronization. Our working hypothesis is that medication synchronization will have a positive impact on patient adherence.  
**Methods:** This retrospective pre-post cohort study assessed medication adherence 365 days before and 365 days after enrollment into a prescription synchronization program. There were 5,994 patients included in the study. Seven medication classes and three demographic groups were chosen to assess for adherence. Adherence was determined by calculating mean proportion of days covered. A paired t-test was used to determine statistical significance for each drug class and demographic group. Exploratory analyses were done at 90 days and 180 days before and after the sync date to determine differences in terms of time. An alpha a-priori was set at 0.05 before analysis was started.  
**Results:** Current Fry’s Pharmacy patients greater than 18 years old that met the Centers for Medicare and Medicaid Services (CMS) for STARs rating criteria were included in the study. Results at 365 days showed a statistically significant decrease in PDC (p<0.0001), and was not affected by demographics.  
**Conclusions:** One year after the implementation of medication synchronization program at Fry’s Pharmacy, a statistically significance decrease in PDC is seen across all categories of chronic medications: statins, ACE-I/ARBs, beta-blockers, CCBs, metformin, thiazides, loop-diuretics, and inhaled corticosteroids. As such, medication synchronization may decrease patient adherence to the maintenance medications evaluated.
30. **Title:** A Retrospective Evaluation of Eribulin Dosing Schedules in Metastatic Breast Cancer  
**Project Advisor:** Harmony Bowles, PharmD  
**Students:** Camille Gagliardo, Megan Lybeck  
**Objectives:** To determine the number of patients treated with eribulin who required an alternate dosing schedule other than “day 1/day 8” due to side effects.  
**Methods:** Chart reviews were conducted on all patients who met inclusion criteria. Data collected included patient demographics, history of surgery/radiation, number of past chemotherapy treatments, and lab values prior to each eribulin cycle.  
**Results:** A total of 37 patients met inclusion criteria for this study. Ten patients were initially started on the “day 1/day 8” schedule and 3 of those patients required a change to the extended “day 1/day 15” schedule. The remaining 27 patients were started on the extended schedule.  
**Conclusions:** The number of patients requiring a dosing schedule change due to side effects was not statistically significant. This finding was due to the fact that the majority of patients were started on an alternate dosing schedule in the beginning of treatment. More extensive studies would be required to determine if a majority of patients would require this alternate dosing schedule, and if this should be initiated in all patients starting on eribulin.

31. **Title:** Second generation antipsychotic prescribing patterns in an acute inpatient psychiatric setting  
**Project Advisor:** Lisa Goldstone, PharmD  
**Students:** Raina Lad, Nisha Maymana, Trishna Kuber  
**Objectives:** To determine if prescribers took into consideration patients’ metabolic risk factors when prescribing a low, medium or high risk second generation antipsychotic and if non-metabolic risk factors influenced prescribing.  
**Methods:** Adults 18 years or older who were admitted to an acute inpatient psychiatry unit and ordered at least one SGA were included in the study. Each patient’s metabolic syndrome risk score was determined using retrospective chart review and they were subsequently divided into low or high-risk groups. Clozapine and olanzapine were categorized as high risk for causing weight gain and diabetes, risperidone and quetiapine were moderate risk, and all others were considered low risk. A chi square test compared the two groups in regard to type of SGA selected, gender, and race, while an independent t-test analyzed the differences in age.  
**Results:** 300 patients were analyzed and divided into high (n=57) and low (n=253) risk groups. For the low risk group, 10.7%, 55.1%, and 34.2% were prescribed a low, moderate, or high risk SGA, respectively. For the high risk group 17.5%, 56.1%, and 26.3% were prescribed a low, moderate, or high risk SGA, respectively. The type of SGA selected was not significantly different between the groups (p=0.262). Equivalence was shown between the two groups in terms of gender and race (p=0.68, p=0.65 respectively). Age was significantly different (p< 0.01).  
**Conclusions:** Prescribers may not consider metabolic risk factors when prescribing high risk SGAs such as clozapine and olanzapine.
32. Title: Evaluating the relationship between diabetes and beverage intake by assessing hemoglobin A1c  
Project Advisor: Amy Kennedy, PharmD  
Students: Diana Kung, Dhara Patel, Caroline Riedel  
Objectives: The purpose of this study is to determine whether there is a correlation between diabetes control and beverage consumption. We hypothesize that diabetes control (as measured by A1C) is inversely related to consumption of sugary sweetened beverages (SSB) in patients with type 2 diabetes.  
Methods: This study will be a retrospective chart review evaluating the relationship between intake of sugary sweetened beverages and hemoglobin A1C values (HgA1C). Individuals will be eligible for inclusion in the study if they are current patients at El Rio Community Health Center with type 2 diabetes and were 18 years of age or older at the time of the study. Exclusion criteria are as follows: not seen by a clinical pharmacist for diabetes within the last year (Jan 2015 – Feb 2016), no beverage consumption information available in electronic chart and/or no A1C value listed in the patient’s profile. The anticipated study population will be comprised of 330 patients. The data will be analyzed using a t-test to determine the relationship between A1C and beverage consumption.  
Results: 150 patients were identified from the patient pool as meeting inclusion criteria. The mean fluid ounces of SSB consumption in the low SSB intake group and high SSB intake group were 7.2 (SD=2.441) and 30.269 (SD=21.197) respectively. The mean A1C in the low SSB intake group was 8.35 (SD=2.038) and in the high SSB intake group was 8.799 (SD=1.852). There was no statistically significant difference between the mean A1C in the low SSB intake group and the high SSB intake group (p=0.2451).  
Conclusions: The mean A1C between high SSB intake and low SSB intake appears similar.  

33. Title: Prospective Evaluation of Antibiotic Sensitivities for Uncomplicated Cystitis at Banner – University Medical Center Tucson’s Emergency Department  
Project Advisors: Chris Edwards, PharmD; Colgan Sloan, PharmD  
Student: Douglas Lee-Chan  
Objectives: To determine if the uncomplicated cystitis population at Banner - University Medical Center Tucson’s (BUMCT) emergency department (ED) is significantly different from the hospital-wide antibiogram.  
Methods: A prospective, analytical, observational study was performed in the ED at BUMCT. Electronic health records were used to include or exclude patients in the study. Cultures were then compiled and compared to the hospital-wide, 2014 BUMCT antibiogram using a one sample Chi-square goodness of fit test to determine if there was a significant difference between the two proportions.  
Results: 159 cultures and susceptibilities were analyzed with E. coli and K. pneumoniae being the most common organisms. For E. coli, it was observed that 46.92% were susceptible to ampicillin while 45% was reported by the hospital’s antibiogram (P=0.772), 93.08% compared to 88% for cefazolin (P=0.185), 94.62% compared to 93% for ceftriaxone (P=0.611), 83.08% compared to 78% for ciprofloxacin (P=0.332), 89.23% compared to 90% for nitrofurantoin (P=0.850), and 63.85% compared to 66% for TMP/SMX (P=0.735). For K. pneumoniae, it was observed that 100% of isolates were susceptible to cefazolin, ceftriaxone, and ciprofloxacin compared to 95%, 96%, and 95%, respectively (P=0.254; P=0.309; P=0.254); 40% compared to 28% for nitrofurantoin (P=0.243); and 88% compared to 91% for TMP/SMX (P=0.649).  
Conclusions: The observed and predicted susceptibilities were not different for any of the drugs and organisms. Our study indicates that the hospital-wide antibiogram used at BUMCT is adequate in treating patients with uncomplicated cystitis coming into their ED.
Objectives: The specific aims of this study were: 1) describe the frequency of off-label medication use in pediatric discharge medication regimens, 2) compare the frequency of FDA-approved and off-label medication use in pediatric discharge medication regimens, and 3) identify potential patient-specific risk factors, including use off-label use of medications, associated with 90-day readmission.

Methods: This was a retrospective chart review of pediatric patients admitted to a tertiary academic medical center during a 6-month period. Inclusion criteria included age less than 18 years of age and admission between January 1, 2014 and June 30, 2014. Exclusion criteria included admission for oncology chemotherapy, admitted < 24 hours, admission to NICU only and patient expiration prior to discharge. Data collection included patient demographics, types and number of medications, and FDA approved and off-label indication of medications. Data analyses were completed on STATA 11.0 (College Station, TX) including student t-test/Mann Whitney U and Chi square/Fisher Exact test with a priori of α= 0.05.

Results: A total of 706 admissions were included in the study. There were no significant differences in demographic characteristics between groups (readmitted within 90 days of discharge vs. not readmitted within 90 days of discharge) except sex (males vs. females, 56.3% vs. 44.2%, p=0.034). Length of hospital stay was significantly higher in subjects readmitted within 90 days of discharge compared to those who were not (8.55 ± 12.5 vs. 3.79 ± 4.43 days, p<0.001). Number of medications at discharge (7.31 ± 5.92 vs. 2.91 ± 2.93, p<0.001) and total number of non-FDA approved medications (3.16 ± 3.81 vs. 1.12 ± 1.44, p<0.001) were all significantly higher in subjects readmitted within 90 days of discharge compared to those who were not. The percentages of patients taking medications related to cardiovascular (6.1% vs. 2.4%, p=0.002), electrolytes and nutrition (12.2% vs. 8.5%, p=0.007), and gastrointestinal (19.2% vs. 14.3%, p=0.004) disorders were significantly higher in the subjects readmitted within 90 days of discharge compared to those who were not. Additionnally, subjects readmitted within 90 days of discharge (versus those not readmitted within 90 days) demonstrated less use of medications related to neurology (17.7% vs. 25.8%, p<0.001) and respiratory (16.4% vs. 21.4%, p=0.008) disorders. A significantly higher percentage of subjects whose third party payor was Medicaid, were readmitted within 90-days of discharge (69.7% vs. 58.3, p=0.045).

Conclusions: In comparing several characteristics of pediatric patients readmitted to a tertiary medical center within 90 days of discharge versus those who were not, it was noted that several factors may be associated with readmission, including: sex, length of initial hospital stay, third-party payor, and the number of medications as well as the types of medication a patient takes. Future research may be warranted to further investigate these potential patient-specific factors in helping identify children at increased risk for readmission and develop more effective approaches to patient education, discharge planning, and continuity of care to reduce preventable readmission.
35. **Title:** Development of a standardized parenteral nutrition protocol for the obese population  
**Project Advisors:** Carol J. Rollins, PharmD; Kathryn R. Matthias, PharmD  
**Students:** Eric T. Ly, Scott N. Mirgeler  
**Objectives:** To determine if obese patients receiving parenteral nutrition (PN) require an increased amount of potassium, magnesium, and phosphorous electrolyte provisions compared to non-obese patients.  
**Methods:** The project design was an institutional review board-approved, retrospective, descriptive chart review. Electronic medical records and physical parenteral nutrition order cards were accessed to identify patients who met the inclusion and exclusion criteria of the study. The total amounts of potassium, phosphorous, and magnesium received by patients over the initial seven days of PN therapy were calculated. The Chi-squared and independent t-tests were utilized to evaluate the statistical significance for all nominal and interval data respectively.  
**Results:** 112 samples met the inclusion criteria of the study. There were 75 samples in the non-obese group (mean age=55.1 years, mean BMI=22 kg/m², 53% female), and 37 samples in the obese group (mean age=57.1 years, mean BMI=33.8 kg/m², 51% female). The daily average and seven-day totals of potassium, magnesium, and phosphorus did not significantly differ between the non-obese and obese groups (average daily potassium (P=0.6224), weekly total potassium (P=0.7551), average daily magnesium (P=0.8068), weekly total magnesium (P=0.3863), average daily phosphorus (P=0.9698), weekly total phosphorus (P=0.0603)).  
**Conclusions:** Potassium, magnesium, and phosphorous electrolyte provisions administered through PN over a week appear to be similar for both non-obese and obese patients. Our study results indicate that the same standard set for dosing initial PN electrolyte provisions in a non-obese patient may be applied to dosing similar provisions for an obese patient.

36. **Title:** An Inpatient Multidisciplinary Educational Approach to Reduce 30-day Heart Failure Readmissions  
**Project Advisor:** Ferena Salek, PharmD  
**Student:** Kyle Malhotra  
**Objectives:** An estimated 5.7 million Americans had heart failure (HF) in 2012 with an economic cost of $30.7 billion. By 2030 the prevalence of the disease is expected to increase by 46%. Centers for Medicare and Medicaid Services penalizes hospitals for 30-day readmissions. This study evaluated the effect of our multidisciplinary HF intervention on readmissions.  
**Methods:** This is a retrospective cohort study. Patients were identified from electronic inpatient admission records from January 1 to December 31, 2014. Patients who received any component of intervention were compared to patients who did not receive any intervention. Intervention included student pharmacist medication counselling, HF education, and post-discharge phone calls with Modified Morisky questionnaire. Age, sex, admission/discharge dates, readmission diagnosis, smoking status, ejection fraction, medications, and Charlson Comorbidity Index (CCI) conditions were collected.  
**Results:** A total of 221 patients with 249 discrete admissions were identified. No difference in age (p=0.42), sex (p=0.48), smoking status (p=0.10) existed between the groups. No difference in readmissions was found between patients receiving complete intervention and control (p=0.41) or patients receiving 1 or 2 intervention components and control (p=0.41). Patients with CCI score ≥ 8 had greater risk of readmission compared to CCI scores 0-2 (OR 7.7, 95% CI 1.6-36.3, p=0.01).  
**Conclusions:** This analysis did not identify an intervention impact on 30-day readmissions in patients with HF; high CCI scores were associated with increased readmission risk. The intervention may be best targeted towards patients with high CCI scores as they have the highest readmission rate.
37. Title: Evaluation of Adjunctive Analgesics to Reduce Pediatric IV Morphine Requirements of Patients Cared for in the Emergency Department  
Project Advisor: Hanna Phan, PharmD  
Student: Meghan Menke  
Objectives: Pain management in the pediatric population is crucial when providing emergency medical care, as inadequate pain control is a significant cause of morbidity and mortality. The use of adjunctive therapy can potentially decrease opioid requirements, thereby reducing potential opioid related adverse effects. The purpose of this study was to evaluate the use of adjunctive therapy and impact on morphine dose requirements for pediatric pain management in the emergency department (ED).  
Methods: This study was an IRB approved retrospective review of pediatric patients ages 1 to 18 years, who received intravenous (IV) morphine therapy in the ED. Patients were excluded based on opioid-tolerance (using opioids prior to ED visit), diagnosis of sickle cell disease, and oncologic disorders. Data collection included baseline demographics, medical diagnoses and comorbidities, morphine total dose by weight, type, dose by weight and frequency of adjunctive analgesia agents, and pain scores.  
Results: The use of adjunctive analgesia in addition to morphine did not reduce the total morphine doses given, repeat morphine dose requirements, admission rates, or length of stay but did increase the time to a repeat dose of morphine. In those patients who received adjunctive analgesia before morphine, we saw a statistically significant decrease in the total amount of morphine received, total morphine doses given, repeat morphine dose requirements, and admission rates.  
Conclusions: In pediatric patients who require pain management in the ED, adjunctive analgesia should be given before morphine to reduce the amount of morphine required.

38. Title: Reflecting on How the Quality Improvement Class is Utilized in Practice  
Project Advisor: Terri Warholak, PhD  
Student: Gillian Mitchell  
Objectives: Discover what is working within the class, and what is not working in the class.  
Methods: Three focus groups were held on the University of Arizona College of Pharmacy campus in January 2016. Participants were recruited via electronic mail invitation and given the opportunity to attend in person or call in via conference call. During each focus group participants were asked a series of questions designed to illicit a discussion regarding their opinions of the course and identify which areas of the curricula they still utilize. These focus groups were recorded via hand-held digital recording device. The recordings were transcribed verbatim into a word processing computer program, with all names and other identifying agents removed to maintain anonymity. The transcriptions were then imported into Atlas.Ti analysis software for descriptive coding. Once coded, the quotations were organized into a network to identify trends in answers.  
Results: A total of 8 students participated in the three focus groups. Students were able to reflect on both the course and project as well as explain and demonstrate their application of the knowledge they learned as a result, as well as areas in which they feel the course can be improved.  
Conclusions: The QI course taught the students how to perform a formal quality improvement research project, while performing the project helped solidify skills learned not only in the class but also previous courses. The students still utilize the skills they learned in both the class and project as they continue on in their professions outside a classroom setting.
39. Title: A population-based comparison of health-related quality of life (HRQoL) scores among stroke survivors by gender and race/ethnicity
Project Advisor: Sandipan Bhattacharjee, PhD
Students: Mel Nelson, Melissa Shreve
Objectives: To compare health-related quality of life (HRQoL) among stroke survivors by gender and race/ethnicity to identify gender and racial/ethnic disparities.
Methods: This study adopted a retrospective cross-sectional research design utilizing data from the 2013 Behavioral Risk Factor Surveillance System (BRFSS), a state-based telephone survey administered to noninstitutionalized United States citizens. Inclusion criteria for this project were adults aged 50 or older who: participated in the 2013 BRFSS survey; indicated they had ever been told by a provider that they had experienced a stroke (of any type); and reported data on seven questions aimed to assess HRQoL (general, physical, and mental health; life satisfaction; emotional support; activity limitations; and sleep quality). Chi square tests and logistic regression models were used to compare HRQoL responses by gender and race/ethnicity.
Results: In the 2013 BRFSS database 20,391 of 491,773 respondents reported experiencing stroke. Of those, 16,561 met the inclusion criteria. The majority were female (61.1%) and identified their race/ethnicity as white (78.6%). Logistic regression analysis revealed females were more likely than males to report worse outcomes across the following three HRQoL domains: activity limitations (AOR=0.752, 95% CI 0.617-0.918); mental health (AOR=1.398, 95% CI: 1.110-1.761); and general health (AOR=0.764, 95% CI: 0.588-0.993). Minority populations (African American, Hispanic, and Other) were more likely to report activity limitations (AOR=0.766, 95%CI: 0.614-0.955) and fair/poor general health (AOR=1.837, 95%CI: 1.324-2.549).
Conclusions: Analysis identified gender and racial/ethnic disparities in HRQoL indicators among stroke survivors. Females and minority populations were more likely to report poorer outcomes.

40. Title: Evaluation of Benzodiazepine Use in Adults at a Community Health Center
Project Advisor: Amy Kennedy, PharmD
Students: Huong Nguyen, Wendy Sanchez, Guan Wang
Objectives: To describe the patterns of benzodiazepine use at a community health center in adults and to identify common demographic factors and chronic conditions that are associated with an increased usage rate.
Subjects: Patients 18 years and older who had been treated at El Rio Community Health Center with an active benzodiazepine prescription on file.
Methods: Data were collected from patient charts using a data collection form. Assessment included current benzodiazepine patients were taking, concurrent use of opiates and/or antispasmodics, indication for benzodiazepine use, concurrent medications for anxiety, depression, or insomnia, and prescriber type. Demographic data on age, gender, race, ethnicity, insurance type, and use of tobacco or alcohol were also collected.
Results: Data were collected on 102 patients currently taking a benzodiazepine; 60 patients (mean age = 61.2, SD = 13.6) had concurrent first-line therapy for anxiety, depression, or insomnia and 42 patients (mean = 61.1, SD = 13.6) did not. There were a significantly higher proportion of women taking a benzodiazepine with first-line therapy than without first-line therapy (88.3% vs. 71.4%; p = 0.031). Additionally, higher proportion of benzodiazepine was prescribed with first-line therapy for depression than other indications (p = 0.002).
Conclusions: More patients were prescribed benzodiazepines with concurrent first-line therapy for depression than other indications such as anxiety, insomnia, or other panic disorders. For this reason, health care professionals should be aware of the patterns of benzodiazepine use and comply with current recommended practice guidelines.
41. Title: Drug Therapy Interactions with New Oral Anticoagulants in Oncology Patients: a retrospective database analysis 2013 - 2015
Project Advisor: Ali McBride, PharmD
Students: Jeffrey Blaskowsky, Adam Odeh, Tyler Stuntz
Objectives: To identify common and serious drug-drug interactions involving novel anticoagulant drugs in cancer patients.
Subjects: 60 patients who were treated at the Banner University of Arizona Cancer Center between November 1, 2013 and April 1, 2015 with rivaroxaban, dabigatran, or apixaban.
Methods: A retrospective chart review was performed for patients who received a NOAC (novel oral anticoagulant) to determine if a medication regimen contained a drug-drug interaction involving the NOAC.
Results: When analyzing the DDIs involving rivaroxaban, dabigatran, and apixaban, Micromedex® detected a total of 123 interactions, compared to Lexicomp®, which detected 111 interactions. When using Lexicomp®, there were 59 (32%) instances of no detected interactions, 19 (10%) moderate interactions, 27 (15%) major interactions, and 65 (36%) contraindicated DDIs with rivaroxaban. When using Micromedex®, there were 47 (26%) instances where no interaction was detected, 4 (2%) moderate interactions, and 119 (65%) major interactions, and no interactions were classified as contraindicated with rivaroxaban. Lexicomp® detected 3 (50%) interactions as major, and found no DDIs in 3 (50%) instances for dabigatran, and detected 1 (7%) moderate, 2 (14%) major and 6 (43%) contraindicated interactions for apixaban. Micromedex® detected 3 (50%) interactions as major, and found no DDIs in 3 (50%) instances for dabigatran, and detected 12 (86%) of interactions as major and found no DDIs in 2 (14%) instances for apixaban.
Conclusions: There was significant variation in DDI detection between current literature and the drug information databases, Lexicomp® and Micromedex®, however most interactions detected were major or contraindicated.

43. Title: Prescription Stimulant Medication Attitudes and Beliefs of Undergraduate Students Involved in Social Sororities
Project Advisor: Lisa W. Goldstone, PharmD
Students: Carol Rim, Nicholas Ong
Objectives: To first educate undergraduates involved in social sororities about prescription stimulant medications and to evaluate the effectiveness of an educational intervention in influencing the attitudes and beliefs regarding prescription stimulant medication use of undergraduates involved in social sororities.
Methods: The intervention, an educational session, was presented to undergraduates involved in social sororities. The questionnaire collected demographic data regarding gender, age, ethnicity, race, undergraduate year, grade point average, type of sorority member, history of an attention-deficit/hyperactivity disorder (ADHD) diagnosis, and previous or current non-medical use of prescription stimulants. The participants’ attitudes and beliefs on nine statements regarding prescription stimulants were queried pre- and post-intervention using a four-point Likert scale ranging from strongly disagree to strongly agree. To analyze changes in attitudes and beliefs, Mann-Whitney test was used.
Results: One hundred sixty-three sorority members participated in the study. The average age of participants was 19 years with the majority of respondents identifying as an active sorority member (81%) and in their first year of undergraduate study (69%). There was a statistically significant change in beliefs regarding the safety (p < 0.01) and health risks (p = 0.02) associated with prescription stimulants. There was no significant difference in topics relating to addiction, legal issues of taking someone else’s prescription medications, emotional and academic outcomes from the use of prescription stimulants.
Conclusions: The educational program presented by pharmacy students was effective in changing the beliefs and attitudes regarding safety and health risks of prescription stimulants among undergraduate students involved in social sororities.
44. Title: Impact of a specialty pharmacy-based oral chemotherapy adherence program on patient adherence

**Project Advisors:** Marion Slack, PhD; Janet Cooley, PharmD; Kelly Mathews, PharmD

**Student:** Kathy Russell

**Objectives:** Patient medication adherence is a basic requirement for treating chronic myelogenous leukemia (CML) with oral tyrosine kinase inhibitors (TKIs). When imatinib adherence rates are less than 80 or 90 percent, major and complete molecular responses, respectively, do not happen. The purpose of this study was to determine the effect of a real-time medication monitoring (RTMM) reminder system adherence program on the medication possession ratio (MPR).

**Methods:** This analytic study was a retrospective cohort study and used data extracted from chart reviews for patients who received services from 2011 to 2015. It was approved by the Institutional Review Board. The study consisted of an intervention group and a control group (50 patients each). MPRs, demographic, descriptive, and categorical variables were summarized using means, standard deviations (SD), and frequencies/percentages.

**Results:** The study population consisted of adult patients (mean age=62.2, SD=2.7, 50% male) treated by Avella Specialty Pharmacy who received imatinib or nilotinib as treatment for CML, gastrointestinal stromal tumors (GIST), or a similar positive Philadelphia chromosome cancer. Only 4% of patients in the intervention group had an < 85% MPR, compared to 46% in the control group (p < 0.001).

**Conclusions:** In those patients who had an MPR of ≥ 85%, the difference between the groups was statistically significant. As past studies have shown, adherence rates greater than 90% have a higher likelihood of a major or complete molecular response and a greatly reduced risk of disease progression.
45. **Title:** Patient Satisfaction with Pharmacist Intern Intervention and Consultation in Hormone Replacement Therapy  
**Project Advisor:** Dana Reed-Kane, PharmD  
**Students:** Farhana Alam, Peter D. Semonche  

**Objectives:** Specific Aim #1: Assess no difference in patient satisfaction. Our working hypothesis is that there is no difference in satisfaction with follow-up calls in women receiving HRT from pharmacists or pharmacy intern students at Reed’s Compounding Pharmacy.  
Specific Aim #2: Assess patient satisfaction with follow-up calls from pharmacy student interns. Our working hypothesis is that women receiving HRT are satisfied with follow-up calls for their therapy when it is conducted by pharmacy student interns, which enhances proper treatment guidance and adherence.  

**Methods:** This study will be a descriptive, direct comparison study that will use data obtained through an online questionnaire consisting of the following: four questions determining the patient’s demographics and eighteen questions on patient satisfaction with follow-up calls from Reed’s Compounding Pharmacy with pharmacy student interns.  

**Results:** Of the estimated 60 patients sample size, only 31 questionnaires were completed. The largest proportion of patients was between the ages of 51 and 60 (58%). The length of therapy in participating women varied quite significantly with one-fourth of patients on HRT for 4-5 years or more (26%).  

The patient satisfaction of follow-up calls conducted by pharmacy intern students survey results indicated, in general, that patients agreed that they were satisfied with the service that they were receiving from the pharmacy interns. There was no disagreement with the items, the intern provides education that will help me understand how to take my medications, being pleased that the intern is following-up, having input on hormone therapy, and with the items regarding intern professionalism and intern knowledge. The greatest disagreement was with three items asking about comfort talking with either a female or male intern, and the item about paying extra to ensure follow-up calls.  

Results from this study were compared with results from five questions adapted using a questionnaire from DiMaggio et al. Note that this study used 7 response fields: strongly disagreed, somewhat disagreed, disagreed, no opinion, agreed, somewhat agreed, strongly agreed. Data from DiMaggio et al used 5 response fields: strongly disagreed, disagreed, no opinion, agreed, strongly agreed. Responses were grouped by strongly disagreed, somewhat disagreed, disagreed, and no opinion in one and strongly agreed, somewhat agreed, and agreed in the second. The data from both studies were compared by considering proportion of patients who agreed at some level with each item. There was no statistical difference between the two groups (p > 0.08); both groups showed a high level of agreement on the five satisfaction items.  

**Conclusions:** The women receiving hormone replacement therapy in this study were satisfied with follow-up calls from pharmacy student interns at Reed’s Compounding Pharmacy. There is no difference in satisfaction with follow-up calls in women receiving HRT from pharmacists or pharmacy student interns. In addition to satisfaction, women are satisfied with follow-up calls for their therapy when it is conducted by pharmacy student interns, which enhances proper treatment guidance and adherence.
46. Title: Identifying Concerns in Arizona with the Inclusion of the Indication or Reason for Use on the Prescription through Focus Groups  
Project Advisors: Terri Warholak, PhD, Michael T. Rupp, PhD  
Student: Kaitlyn Skulkan  
Objectives: To identify stakeholder concerns regarding a potential requirement that all prescriptions include the reason for use or indication.  
Methods: This was a mixed methods study that employed focus groups. Participants were invited by the Chief Executive Officer (CEO) of the Arizona Pharmacy Association (AzPA) to attend focus groups via webinar. E-mail invites were sent to AzPA members and members of Arizona healthcare professional associations with prescriptive authority except for prescribers who care for animals. The discussion began with a PowerPoint presentation and then questions were presented to guide discussion. Afterwards, questionnaires were distributed through e-mail. Interval level data were analyzed using means and standard deviations. The commentary of the focus group discussion was summarized in themes.  
Results: Preliminary findings, from two focus groups with a total of seven participants, reflected the following concerns with the inclusion of the indication on prescriptions: compromise of patient privacy; technology capabilities; prescriber time; prescriber compliance; and prior authorization complications. The proposed benefits were: enhanced communication; better medication counseling; reduced prescribing errors; decreased controlled substance diversion; and increased accuracy of a prospective drug use review by pharmacists for patients with complicated disease states.  
Conclusions: In conclusion, stakeholders were concerned with the implementation of including the indication on prescription orders.

47. Title: Analysis of Electronic Prescribing Errors and Impact on Patient Care: Would a Collaborative Practice Agreement be Beneficial?  
Project Advisor: Richard Herrier, PharmD  
Students: Charity Smith, Theresa Swartzfager, LeAnna Lugo  
Objectives: Analyze electronic prescription errors made by a community health center. Determine the time it takes to correct electronic prescription errors in a community pharmacy. Ascertain whether or not a collaborative practice agreement would be beneficial.  
Methods: The store computer system was used to generate a report of all prescriptions received at a community pharmacy from a community health center during a 6-month period. Using an Excel sheet, one author kept track of how many electronic prescriptions were received, the number and type of errors, and the time it took to get an error corrected.  
Results: There were 1896 electronic prescriptions sent from a community health center to a community pharmacy; 61 contained an error (3.24%). On average, it took the doctor’s office 111.7 hours to call back and clarify the mistake.  
Conclusions: There was not a significant amount of prescribing errors that occurred during the data collection period. However, the time it took for the doctor’s office to call back was significant and translates to patients not being able to get their medications on time.
48: Title: Evaluation of Systemic Steroid Dosing, Asthma-Related Readmissions, and Body Mass Index in Pediatric Patients with Asthma  
Project Advisors: Hanna Phan, PharmD; Richard Haftmann, PharmD  
Student: Soba Thamararajah  
Objectives: The purpose of this study was to evaluate whether overweight/obese children with asthma have different systemic steroid dosing practices and asthma related readmission rates compared to normal/underweight children with asthma.  
Methods: Medical charts of patients admitted between October 2013 and October 2014 for an acute asthma exacerbation were reviewed retrospectively. The primary objective was to compare the average weight based systemic steroid dose between overweight/obese (Group 1) and normal/underweight (Group 2) with asthma. The secondary objective was to compare asthma-related readmissions between both groups. Data collected included demographic data; 30 day, 90 day and 6-month asthma-related readmissions; asthma medications prior-to-admission, during hospitalization and upon discharge.  
Results: One hundred fifty nine admissions (147 patients with recorded BMI) were evaluated. There was no significant difference in the proportion of obese, overweight, healthy and underweight patients who had 6-month asthma readmissions (p > 0.05). The mean systemic steroid, including prednisone and methylprednisolone, weight based dosing was similar between Group 1 and Group 2 (p > 0.05). Likewise, the proportion of patients with 6-month readmissions was similar in both groups (p > 0.05).  
Conclusions: Acute asthma exacerbation pediatric patients whom are overweight/obese were not being dosed differently to normal/underweight patients and were not at risk for increased asthma-related readmission in the following 6 months.

50. Title: Trends in Student Sentiment Toward Pharmacy Services  
Project Advisor: Terry Urbine, Ph.D.  
Students: Daniel Einfrank  
Specific Aims: In order to explore the trajectory of trends in student sentiment toward the pharmacy profession a survey was administered to two graduating classes in their third year of a four-year Doctor of Pharmacy program attending a large land-grant university in the Southwest.  
Methods: A questionnaire administered during a regularly scheduled class period probed various measures of satisfaction with pharmacy services.  
Main Results: Measures related to pharmacist availability and ability to provide patients and/or students with drug information showed statistically significant declines relative to the baseline graduating class.  
Conclusions: Although there were statistically significant declines observed in certain measures, it is difficult to get a full picture or draw strong conclusions without accompanying demographic data.

51: Title: Patient Perception of Nurse Administered Review of Basic Diabetes Self-management Skills During Hospitalization  
Project Advisors: Marcella Honkonen, PharmD; Maryam Fazel, PharmD; Merri Pendergrass, MD  
Student: Lynda Idouraine  
Objectives: The purpose of this study is to assess patients’ perception of the review of basic diabetes self-management skills as administered by nursing staff during hospitalization in our academic medical center to determine if the program should be continued, modified and/or expanded.  
Methods: This descriptive study included patients 18 years and older with a diagnosis of diabetes admitted for any reason to Banner – University Medical Center Tucson (BUMC-T) - between October- December 2015. A phone interview was conducted within 7 days of the patient’s recorded discharge date to assess each patient’s perception of the review they received during their inpatient stay. The questionnaire collected ratings about helpfulness of the medication instructions, understanding of diabetes, and confidence in hypoglycemia management. Data on the likelihood for an outpatient follow-up appointment were collected too.  
Results: Of the 96 patients included in this study, 44% (n=42) received the basic diabetes self-management skills review, among them 48% (n=20) reported that the review was very helpful, 43% (n=18) reported being very comfortable with understanding diabetes, and 48% (n=20) reported being very confident with hypoglycemia management. Out of 50% of patients referred for outpatient follow-up for diabetes management, only 38% made an appointment.
Conclusions: Most patients that received the basic diabetes self-management skills review feel comfortable with diabetes management and its understanding. Review of basic diabetes self-management skills appeared to be helpful when initiated in a hospital setting; however, measures need to be taken to provide the review to all eligible patients and it needs to be supported by effective planning for outpatient follow-up.