2nd Annual
Southwestern States Residency Conference

June 10, 2016
The Sheraton Grand Wild Horse Pass Resort

Presented By: Arizona Pharmacy Association (AzPA)
<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almada-Quijada, Elena</td>
<td>Comparison of outcomes among patients being managed by a pharmacist-run antiocoagulation clinic versus primary care providers in rural areas</td>
<td>5</td>
</tr>
<tr>
<td>Almeleebia, Tahani</td>
<td>Retrospective chart review of the safety and efficacy of switching from insulin glargine to insulin detemir in patients with type 2 diabetes</td>
<td>5</td>
</tr>
<tr>
<td>Alshibani, Mohannad</td>
<td>Novel approach for comparison of antithrombotic potency amongst patients admitted to hospital with bleeding</td>
<td>6</td>
</tr>
<tr>
<td>Althaghi, Abdulhmid</td>
<td>Readmission and Antimicrobial Stewardship Introduction in Psychiatry Units</td>
<td>6</td>
</tr>
<tr>
<td>Alver, Kathryn</td>
<td>Retrospective review of ticagrelor versus clopidogrel after acute coronary syndromes in a veteran population</td>
<td>6</td>
</tr>
<tr>
<td>Antigua, Francisco</td>
<td>Retrospective Performance Review of HIV Linkage and Retention to Care in American Indian and Alaska Natives (AI/AN) at Phoenix Indian Medical Center</td>
<td>7</td>
</tr>
<tr>
<td>Badr, Aisha</td>
<td>Provider referral practices in response to implementation of an interprofessional transition-of-care program for high-risk patients</td>
<td>8</td>
</tr>
<tr>
<td>Baroy, Justin</td>
<td>Evaluation of Anti-methicillin-resistant Staphylococcus aureus Therapy Continuation and Discontinuation based on MRSA nares testing in Veteran Patients admitted with Pneumonia</td>
<td>8</td>
</tr>
<tr>
<td>Basalilov, Stella</td>
<td>Assessment of the efficacy and safety of fascia iliaca blocks for the treatment of pain associated with hip fractures in geriatric patients</td>
<td>8</td>
</tr>
<tr>
<td>Benanti, Grace E</td>
<td>Single-center Evaluation of the ABCDE Bundle Implementation</td>
<td>9</td>
</tr>
<tr>
<td>Broderick, Daniel</td>
<td>Characterization of pharmacologic interventions to prevent shivering during therapeutic hypothermia following cardiac arrest in adults</td>
<td>9</td>
</tr>
<tr>
<td>Caldwell, Lauren</td>
<td>Evaluation of the argatroban infusion protocol for systemic anticoagulation in adults with possible heparin-induced thrombocytopenia</td>
<td>10</td>
</tr>
<tr>
<td>Chambers, Alexandra</td>
<td>An evaluation of rasburicase utilization in a multi-institutional health system.</td>
<td>11</td>
</tr>
<tr>
<td>Choksi, Dimpa D.</td>
<td>Incidence of acute kidney injury in elderly patients receiving intermittent- versus extended-infusion piperacillin-tazobactam with or without vancomycin</td>
<td>11</td>
</tr>
<tr>
<td>Diallo, Issouf</td>
<td>Healthcare savings due to increased medication adherence in the hypertensive population of a dual eligible special needs plan</td>
<td>12</td>
</tr>
<tr>
<td>DiDominick, Sarah</td>
<td>Retrospective assessment of efficacy, safety, and satisfaction of updated pain management order sets at a community hospital</td>
<td>13</td>
</tr>
<tr>
<td>Diri, Reem</td>
<td>Retrospective evaluation of the new oral anticoagulants (NOACS) in the treatment of venous thromboembolism in gastrointestinal (GI) oncology patients</td>
<td>13</td>
</tr>
<tr>
<td>Do, Brian Cuong</td>
<td>Incidence of venous thromboembolism in surgical oncology patients</td>
<td>14</td>
</tr>
<tr>
<td>Do, Sylvia</td>
<td>Comparative analysis of adherence in hepatitis C, Medicare patients using medication therapy management interventions in a managed care setting: a pilot program</td>
<td>14</td>
</tr>
<tr>
<td>Dontai, Wannisa</td>
<td>Evaluation of amiodarone utilization for new onset atrial fibrillation in cardiac intensive care unit</td>
<td>15</td>
</tr>
<tr>
<td>Dwenger, Andrew</td>
<td>Beta-blocker review of agents in veterans with reduced ejection fraction</td>
<td>15</td>
</tr>
<tr>
<td>Ence, Matthew</td>
<td>Effectiveness of direct-acting antivirals (DAAs) for hepatitis C in veterans with focus on 8 vs 12 week regimens</td>
<td>16</td>
</tr>
<tr>
<td>Galdun, Patrick</td>
<td>Establishment of a pharmacist-managed hepatitis C clinic in a rural Indian Health Service hospital</td>
<td>16</td>
</tr>
<tr>
<td>Garica, Bente</td>
<td>Evaluation of compliance to the directoral anticoagulants in a Medicare population using electronic healthcare records and prescription claims data</td>
<td>17</td>
</tr>
<tr>
<td>German, Alexander</td>
<td>Impact of a diabetes shared medical appointment in patients with poorly controlled type 2 diabetes mellitus</td>
<td>17</td>
</tr>
<tr>
<td>Hewlett, David</td>
<td>D-dimer levels and outcomes in patients with mechanical circulatory devices</td>
<td>18</td>
</tr>
<tr>
<td>Hood, Evan</td>
<td>Transitions of care: outcomes of pharmacist support in transitional care management services</td>
<td>18</td>
</tr>
<tr>
<td>Hwang, Helen Herim</td>
<td>Pharmacist conducted medication therapy reviews for recently discharged dual-eligible patients: a transitions of care pilot program</td>
<td>19</td>
</tr>
<tr>
<td>Name</td>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Jordan, Vanessa</td>
<td>Effect of initial centruroides antivenom dose on patient outcomes after scorpion envenomation</td>
<td>20</td>
</tr>
<tr>
<td>Kho, Raymond</td>
<td>Impact of a pharmacist-driven dosing protocol on the management of warfarin in the inpatient setting</td>
<td>20</td>
</tr>
<tr>
<td>Kim, Sarah</td>
<td>Evaluation of continued efficacy in type 2 diabetes patients receiving sulfonylurea therapy</td>
<td>21</td>
</tr>
<tr>
<td>Korayem, Ghazwa B.</td>
<td>Urinary tract infections in renal transplant recipients</td>
<td>21</td>
</tr>
<tr>
<td>Lee, Stephanie</td>
<td>Hospitalization risk with benzodiazepine and opioid use in veterans with posttraumatic stress disorder</td>
<td>22</td>
</tr>
<tr>
<td>Leelathanalerk, Areerut</td>
<td>Evaluation of discontinuation of amiodarone in noncardiac critically ill patients with new onset atrial fibrillation</td>
<td>23</td>
</tr>
<tr>
<td>Ly, Stephen</td>
<td>Efficacy of a tobacco cessation program utilizing group sessions led by community health workers in a low socioeconomic population.</td>
<td>23</td>
</tr>
<tr>
<td>Martinez, Mardo</td>
<td>Student perception of post-graduate opportunities after an educational session</td>
<td>24</td>
</tr>
<tr>
<td>Mauro, Joseph</td>
<td>Effect of a “smart pill-bottle” on medication adherence in patients who have multiple myeloma and are new to lenalidomide therapy: interim analysis.</td>
<td>24</td>
</tr>
<tr>
<td>Mendoza, Kelly</td>
<td>Economic impact of pharmacist-managed conversion of intravenous immunoglobulin (IVIG) dosing from actual body weight to ideal body weight for non-obese patients</td>
<td>25</td>
</tr>
<tr>
<td>Merrick, Stephanie</td>
<td>Magnesium repletion in hospitalized patients: evaluation of the efficacy of a hospital system electrolyte replacement protocol</td>
<td>25</td>
</tr>
<tr>
<td>Millard, Jeff</td>
<td>Discontinuation of caffeine in the neonatal intensive care unit</td>
<td>26</td>
</tr>
<tr>
<td>Miller, Maelee</td>
<td>Efficacy and safety of 3-factor prothrombin complex concentrate versus fresh frozen plasma in a major or life-threatening bleed on warfarin, apixaban, and rivaroxaban</td>
<td>27</td>
</tr>
<tr>
<td>Molander, Laura</td>
<td>Impact of treatment guidelines on antibiotic use for urinary tract infections (UTIs) in the emergency department (ED)</td>
<td>27</td>
</tr>
<tr>
<td>Mortensen, Amber</td>
<td>Effect of pirfenidone on wound healing in lung transplant patients</td>
<td>28</td>
</tr>
<tr>
<td>Mrzljak, Katie</td>
<td>Evaluation of nurse-driven pneumococcal vaccination protocol for appropriate patient screening, administration, and documentation at a tertiary hospital</td>
<td>28</td>
</tr>
<tr>
<td>Murphy, Matthew</td>
<td>Safety of allopurinol use in chronic kidney disease: a Veterans Affairs perspective</td>
<td>29</td>
</tr>
<tr>
<td>Nguyen, Stephanie Mai</td>
<td>Anticholinergic medication use and the risk of community-acquired pneumonia in an older veteran population</td>
<td>29</td>
</tr>
<tr>
<td>Nocella, Meira</td>
<td>Antibiotic stewardship initiation and interventions at a rural hospital</td>
<td>30</td>
</tr>
<tr>
<td>Noroian, Nikki Sophia</td>
<td>Determining the impact of a piperacillin-tazobactam shortage on broad-spectrum antimicrobial prescribing in hospitalized adult patients</td>
<td>31</td>
</tr>
<tr>
<td>Oliver, Ashley</td>
<td>Prevalence of medication related hospital admissions and readmissions at the Phoenix Veterans Affairs Health Care System</td>
<td>31</td>
</tr>
<tr>
<td>Patel, Palna</td>
<td>Assessing Clinical Cure of Ceftriaxone for Urinary Tract Infections</td>
<td>32</td>
</tr>
<tr>
<td>Pham, Quan</td>
<td>Impact of PharmD outpatient transitions of care on hospital readmissions</td>
<td>33</td>
</tr>
<tr>
<td>Porras, Miseal</td>
<td>Evaluation of nurse-driven influenza vaccination protocol for appropriate patient screening, administration, and documentation at a tertiary hospital (25)</td>
<td>33</td>
</tr>
<tr>
<td>Qualls, Kathryn</td>
<td>Evaluation of albumin utilization in hospitalized adults</td>
<td>34</td>
</tr>
<tr>
<td>Richards, Emily</td>
<td>Prophylactic ondansetron administration with intravenous opiates in emergency department patients</td>
<td>34</td>
</tr>
<tr>
<td>Saad, Ahmad</td>
<td>Pharmacists’ experience with a medication safety committee's structure, responsibilities, and roles</td>
<td>35</td>
</tr>
<tr>
<td>Sandberg, Michelle</td>
<td>Non-dihydropyridine calcium channel blocker use in stable heart failure</td>
<td>35</td>
</tr>
<tr>
<td>Sisson, Michael</td>
<td>Appropriateness of vitamin K for warfarin reversal before and after initiation of a reversal of anticoagulation care set</td>
<td>36</td>
</tr>
<tr>
<td>Smith, Melissa</td>
<td>Appropriateness of warfarin reversal before and after initiation of a reversal of anticoagulation care set at Banner Baywood Medical Center</td>
<td>37</td>
</tr>
<tr>
<td>Stewart, Zachary</td>
<td>Evaluation of the safety and efficacy of bolus three percent sodium chloride in the management of cerebral edema in adults with stroke</td>
<td>37</td>
</tr>
<tr>
<td>Name</td>
<td>Title</td>
<td>Page</td>
</tr>
<tr>
<td>-----------------------</td>
<td>-----------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Suguitan, Christina</td>
<td>Evaluation of anti-methicillin-resistant Staphylococcus aureus therapy continuation and discontinuation based on MRSA nares testing in Veteran patients admitted with pneumonia</td>
<td>38</td>
</tr>
<tr>
<td>Suwannoi, Lakkana</td>
<td>Drug Related Issues in Lung Cancer Patients Who Have Received Oral Chemotherapy</td>
<td>38</td>
</tr>
<tr>
<td>Tamer, Diana</td>
<td>Impact of time to antibiotic initiation on mortality in septic patients admitted through the emergency department at a community hospital system</td>
<td>39</td>
</tr>
<tr>
<td>Temple, Ashlie</td>
<td>Implementing an appointment-based medication synchronization program in a grocery store community pharmacy</td>
<td>40</td>
</tr>
<tr>
<td>Thompson, Benjamin</td>
<td>Optimization of induction chemotherapy in AML: a retrospective comparison of 7+3 versus 4+3.</td>
<td>40</td>
</tr>
<tr>
<td>Toy, Cynthia</td>
<td>Is more always better? A retrospective chart review comparing combination therapy and monotherapy in the treatment of neonatal abstinence syndrome</td>
<td>41</td>
</tr>
<tr>
<td>Truong, Elaine</td>
<td>Cardiovascular outcomes related to testosterone supplementation in a male veteran population (CORTS Study)</td>
<td>41</td>
</tr>
<tr>
<td>Tsui, Tsz Yee</td>
<td>Prospective evaluation of clinical cure rates for uncomplicated cystitis in the emergency department using oral cephalosporin</td>
<td>42</td>
</tr>
<tr>
<td>Vernon, Martein D</td>
<td>Effectiveness and safety of hepatitis C treatment with direct-acting antivirals (DAAs) in a veteran population</td>
<td>42</td>
</tr>
<tr>
<td>Villanueva, Juan Elias</td>
<td>Hidden antimicrobials in surgical patients: Usage and documentation of antimicrobial content of bone cement</td>
<td>43</td>
</tr>
<tr>
<td>Werge, Dominique Ariel</td>
<td>Time in therapeutic range for a rural pharmacist-run anticoagulation clinic</td>
<td>43</td>
</tr>
<tr>
<td>Wooster, Jessica</td>
<td>Community pharmacists’ perceptions of a transition of care service in a grocery chain-based pharmacy</td>
<td>44</td>
</tr>
<tr>
<td>Yee, Kevin</td>
<td>Impact of a diabetes shared medical appointment in patients with poorly controlled type 2 diabetes mellitus</td>
<td>44</td>
</tr>
<tr>
<td>Zuo, Silu</td>
<td>Vitamin D deficiency in patients of an integrated mental health clinic</td>
<td>45</td>
</tr>
</tbody>
</table>
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**Title:** Comparison of outcomes among patients being managed by a pharmacist-run anticoagulation clinic versus primary care providers in rural areas

**Purpose:** Warfarin is a commonly used oral anticoagulant with high effectiveness for the prevention and treatment of thromboembolism when used optimally, but it requires frequent monitoring in order to decrease the incidence of adverse side effects. Warfarin monitoring in rural areas is complicated because patients often experience barriers to healthcare. Research shows pharmacist-run anticoagulation services prevent negative outcomes compared to anticoagulation management by traditional models of care. This retrospective, chart review project compared outcomes in anticoagulation therapy between patients managed by pharmacists and primary care providers (PCPs) in rural communities, to determine the need for expansion of clinical pharmacy services.

**Methods:** The electronic medical records (EMRs) of patients on warfarin attending the pharmacist-run anticoagulation (INR clinic) at North Country HealthCare (NCHC) in Flagstaff, AZ were compared to the EMRs of patients on warfarin being managed by their PCP in NCHC satellite clinics across rural northern Arizona from July 1, 2014 to June 30, 2015. Inclusion criteria consisted of patients being 18 years of age or older, having a warfarin prescription, and having at least four INR values within the project timeframe. Patients were excluded if their indication for warfarin was venous thromboembolism (VTE) prophylaxis. The primary outcome measured the time in therapeutic range (TTR); which is a percentage of time spent in the target international normalized ratio (INR) range for each patient. The secondary outcome observed the occurrence of anticoagulation therapy related complications; including thromboembolic or hemorrhagic events, hospitalizations and emergency department (ED) visits.

**Results:** A total of 272 patient met inclusion criteria, 81 patients in the INR clinic group and 191 patients in the PCP group. Patients being managed by a pharmacist in the INR clinic had an average TTR of 63.5% compared to 53.1% in patients managed by their PCP. The ten percent difference in TTR was found to be statistically significant (p < 0.05). Low numbers of anticoagulation therapy-related complications were observed, 14% in the INR clinic group compared to 15% in the PCP group.

**Conclusion:** Better anticoagulation control, as seen by a higher TTR, was achieved when anticoagulation therapy was managed by a pharmacist-run INR clinic. The data obtained from this project supports the need for the expansion of clinical pharmacy services to NCHC satellite clinics and potentially initiate a discussion about establishing collaborative practice agreements.

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Presentation category: Ambulatory Care
IRB Status: Approved

**Title:** Retrospective chart review of the safety and efficacy of switching from insulin glargine to insulin detemir in patients with type 2 diabetes

**Purpose:** To assess the safety and efficacy of switching from insulin glargine to insulin detemir in patients with type 2 diabetes. Both insulin glargine and insulin detemir are FDA approved as long acting insulin products. Insulin glargine has a longer duration of action compared to insulin detemir. Previous clinical trials have demonstrated that insulin glargine is associated with higher weight gain than insulin detemir, however, the efficacy outcomes varied among clinical trials. This study will assess the clinical outcomes before and after conversion from glargine to detemir. The results of this project can help to identify patients’ need for closer monitoring after switching insulin products.

**Methods:** A retrospective chart review will be performed at a federally qualified health center to examine the efficacy and safety of switching from insulin glargine to insulin detemir. Patients were switched from glargine to detemir using 1:1 conversion ratio. The primary outcome is change in HbA1c. Secondary outcomes include proportions of patients achieving HbA1c goal per ADA guideline (< 7-8%), episodes of hypoglycemia, and changes in weight and body mass index (BMI). Eligibility criteria include patients with type 2 diabetes aged 18 years or older who have been on insulin glargine for at least 6 months prior to switching, and a length of detemir therapy for at least 3 month after switching. Patients with body mass index higher than 35 kg/m^2^ were excluded due potential insulin resistance. T- Tests will be performed comparing patients’ HbA1c, weight, BMI, and insulin doses prior and post conversion. Proportions of patients achieving HbA1c goal will be analyzed using Chi-square d test. The differences prior and post conversion will be analyzed, assuming a type I error of α = 0.05.

**Results:** The research is in progress.
Title: Novel approach for comparison of antithrombotic potency amongst patients admitted to hospital with bleeding

Purpose: The combination of oral anticoagulants (OACs) and dual-antiplatelet therapy (DAPT) to treat patients with cardiovascular diseases is associated with an annual risk of fatal and nonfatal bleeding episodes of approximately 10%. The relative bleeding risk of certain antithrombotic agent combinations thereof is yet to be elucidated while no definitive measure of antithrombotic effects exists. Multiple scoring systems have been validated for the risk of major bleeding in atrial fibrillation populations. These tools can compare populations for baseline risk of bleeding. The HEMORR2HAGES score may be an attractive method to estimate both warfarin and non-warfarin regimens. The purpose of this study is to evaluate whether a relationship exists between baseline HEMORR2HAGES score and antithrombotic potency amongst patients presenting with bleeding complication.

Methods: This is a retrospective chart review study of patients who were admitted to BUMCT with a diagnosis of bleeding, not limited to: intracranial hemorrhage, subdural hematoma, GI bleeding, hemoptysis, hematemeses, retroperitoneal bleeding, or fatal bleeding. Electronic medical records were reviewed as collected on admitting diagnosis, indication for antithrombotic therapy, type antithrombotic regimen, and concomitant medications. HEMORR2HAGES scores were calculated and compared amongst groups on different antithrombotic medications and combinations. Study groups will include: single antiplatelet, single anticoagulant, dual antiplatelet, dual antithrombotic (antiplatelet + anticoagulant), and triple antithrombotic (dual antiplatelet + anticoagulant).

Results: Research in progress.

Conclusion: Research in progress.

Title: Readmission and antimicrobial stewardship introduction in psychiatry units

Purpose: The purpose of this study was to compare the rate of all-cause 30-day readmissions in patients admitted to an acute inpatient psychiatric unit at an academic medical center before and after implementation of an antimicrobial stewardship intervention.

Methods: This was a retrospective chart review study. Patients were included in the study if they were 18 years or older, had an admission to an inpatient adult acute psychiatric unit at Banner University Medical Center South between August 1, 2013 and August 31, 2015, and had been ordered at least one antibacterial medication. Eligible patients were identified through use of the hospital electronic database. Antimicrobial stewardship intervention was implemented on August 1, 2014. Data from the period of August 1, 2103 to July 1, 2014 represents the pre-intervention group in which no antimicrobial stewardship intervention was introduced. Data collection from the period of August 1, 2014 to August 1, 2015 represents the post-intervention arm. The following data was collected: age, gender, race, ethnicity, type of infection, psychiatric diagnosis at discharge, antibiotic used, hospital length of stay for both admission and readmission antibiotic prescription on discharge from the first admission, reason for readmission which will categorized: Infection-related readmission, psychiatric-related readmission, or other. Also, if available, urine and other body fluid cultures were collected. A chi-square test was used to measure all categorical variables. An independent t test was used to measure all continuous variables.

Results: Will be presented in the conference

Conclusion: Will be presented in the conference

Title: Retrospective review of ticagrelor versus clopidogrel after acute coronary syndromes in a veteran population

Purpose: The American Heart Association and the American College of Cardiology recommend treatment following percutaneous intervention post-acute coronary syndrome (ACS) with aspirin and a P2Y12 inhibitor for up to 12 months. Recent literature indicates significant benefit with ticagrelor versus other P2Y12 inhibitors without differences in bleeding, leading to preference of ticagrelor at this institution. The purpose of this retrospective chart review was to assess if differences exist in the composite of thrombosis, myocardial infarction (MI), stroke, death, or bleeding and to determine
Risk factors for bleeding in a veteran population treated with ticagrelor or clopidogrel after ACS.

**Methods:** The primary and secondary outcomes were evaluated by reviewing cardiology progress notes, and bleeding events were evaluated using the Thrombolysis in Myocardial Infarction scoring system. The hypothesis was that there will be no difference in thrombosis, myocardial infarction, stroke, death, or bleeding between the use of ticagrelor and clopidogrel. The first cohort of patients included in the study had received a prescription for ticagrelor between 9/1/2009 and 6/1/2015 with the ICD-9 codes for acute coronary syndromes. Since this cohort of patients was expected to be around 60-70 patients, another cohort of patients that received clopidogrel and met similar criteria were selected. The expected sample size was 60-70 in the ticagrelor cohort and 60-70 in the clopidogrel cohort for a total of 120-140 patients. Patients were followed for 90 days after the initial prescription for ticagrelor or clopidogrel was written. Baseline characteristics were evaluated using descriptive statistics. The primary and secondary outcomes were evaluated using Chi Square tests for nominal data.

**Results:** Eighty-nine patients were included in the clopidogrel group and 50 in the ticagrelor group. The majority of the patients were male with an average age of 68 years. At baseline, there were significantly more patients with unstable angina, prior ACS, prior use of a P2Y12 inhibitor, aspirin use prior to ACS, and stent placement in the ticagrelor group and more presenting with non-ST segment myocardial infarction (NSTEMI) in the clopidogrel group. Composite of death, stroke, thrombosis, or ACS within 3 months occurred in 30% of patients in the ticagrelor group and 19% in the clopidogrel group (p=0.14). There were no statistically significant differences in the secondary outcomes between the groups. Significant risk factors for bleeding were not identified.

**Conclusions:** There was no difference in death, stroke, thrombosis, ACS, or bleeding events between ticagrelor and clopidogrel after ACS, however power was not met. Risk factors for bleeding were not identified. There was a trend towards more bleeding if 81mg of aspirin was used prior to ACS, however, this was not significant. Ticagrelor and clopidogrel appear to be equally efficacious and safe in the Southern Arizona VA Healthcare System veteran population. If no contraindications exist, our institution can continue to use clopidogrel or ticagrelor after acute coronary syndromes. In the future, could consider conducting a similar study using multi-site data.

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**Time:** Provider referral practices in response to implementation of an interprofessional transition-of-care program for high-risk patients  

**Purpose:** Medication complications are responsible for an estimated 20 percent of hospital readmissions in the United States. To help address this problem, innovative, interprofessional Transition-of-Care (TOC) programs are being implemented. To date, little is known about how such programs influence provider referral practices. The purpose of this project was to examine providers’ hospital referral practices; and evaluate the impact of an interprofessional TOC program on referral preferences.  

**Methods:** An interprofessional, pharmacist- and nurse-managed Discharge Companion (DC) Program was initiated in a community hospital providing services to high-risk patients; follow-up occurred at 1- and 3-weeks post discharge. From November 2015 to March 2016; a sample of providers practicing within close proximity (8-mile radius) to the studied hospital were surveyed. Online survey links were emailed to potential participants. All responses to the questionnaire items were anonymous. Questionnaire items included: (1) provider characteristics; (2) current referral practice and motivational factors influencing this practice; (3) familiarity with the DC Program and potential changes in referral practices as a result; and (4) additional suggestions on current DC program. Qualitative analysis included use of grounded theory coding methods to generate themes from open-ended questions. Coding was completed by one researcher and verified by a second; a third researcher ensured accurate interpretation of responses. Thematic analysis of coding was used to identify patterns, trends, shared beliefs, and unanticipated items.  

**Results:** Of the 500 emailed providers, 56 completed the questionnaire (11 percent response rate). Commonly reported practice settings included: family medicine (34 percent); pediatrics (23 percent); and internal medicine (16 percent). Over half of respondents practiced for more than 10 years and 69 percent reported having professional autonomy in referring patients to hospitals. Most providers cited hospital-related factors for referral reasons. These factors included: (1) availability of specialist services; (2) hospital proximity; and (3) contracted hospitals. Other provider-related factors included: (1) prior personal or patient experience at the hospital; and (2) established communication channels with hospital personnel. Patient-related factors included: (1) patient or family hospital preference; and (2) covered insurance services. Most providers were motivated to refer patients to hospitals offering: (1) broader range of available specialists; (2) higher quality of care; and (3) better overall communication along with post-discharge electronic health record access. After learning about the program, 89 percent were more likely to refer patients to hospitals with this service. Respondents mainly cited added service, benefit and quality of care as reasons for likely referrals followed by improving medication utilization and preventing medication errors. Project results will be shared with the community hospital to help optimize this program.  

**Conclusion:** The findings from this quality improvement project provide insight into providers’ hospital referral practices. Additionally, these results suggest that the availability of this DC program may influence provider future referral practices.

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**IRB Status:** Approved  

**Title:** Assessment of the efficacy and safety of fascia iliaca blocks for the treatment of pain associated with hip fractures in geriatric patients  

**Purpose:** Hip fracture is a common, painful emergency in geriatric patients. Opioids are standard treatment for hip fracture pain despite adverse outcomes linked to geriatric patients. An ultrasound-guided Fascia Iliaca Compartment (FIC) nerve block can relieve pain for hours and is optimal in patients at high risk for opioid induced adverse events. The purpose of this study is to assess the efficacy and safety of FIC blocks for the treatment of pain in hip fractures in patients’ ≥ 65 years old by comparing pain scores and opioid use in patients who have received the FIC blocks to those who did not.  

**Methods:** A retrospective chart review of admitted hip fracture patients from Banner Boswell Medical Center from December 2013 to October 2015. The primary objective was to compare pain scores at hours 4,8,12, and 24 in patients who received fascia iliaca blocks to those who did not. The dose and type of local anesthetic administered was collected for each blocked patient. Secondary objectives compared groups based on total 24 hour opioid usage (via equivalent morphine dosing), presence of adverse events within the first 24 hours and total hospital length of stay, and adverse drug event severity. Additionally, Emergency Department admission to orthopedic surgery time was measured and compared between groups. Pain scores were analyzed and reported via repeat measures analysis of variance (ANOVA).
An independent-samples t-test was utilized to compare opioid use, length of stay, and time to surgery between groups. Adverse events were compared with chi-square analysis.

Results: One hundred and eight hip fracture patients were included in the study (58 with a fascia iliaca block, 50 without). No significant difference was seen between groups regarding sex (p=0.471), age (p=0.577), or past medical history (p=0.251). Age was equally distributed between groups; 44% of studied hip fracture patients were ≥ 85 years old. Intertrochanteric hip fractures represented 56% of all patients collected. Mean baseline ED pain scores showed no difference between groups. However, mean pain scores at hour 4 (4.6 vs. 7.4), 8 (3.6 vs 6.3), 12 (5.4 vs. 6.9) and 24 (4.6 vs. 6.2) in patients who received fascia iliaca blocks were lower. The non-block group had a higher total mean amount of opioids documented within 24 hours of ED admission. Total length of stay and time to surgery did not differ between groups. Adverse events were more common in the non-blocked patients (22% vs. 6.8%; p=0.02).

Conclusion: Hip fracture pain in geriatric patients requires fast, effective, and safe management. Opioid use among geriatric patients in this and previous studies both represent a higher risk of adverse drug events. This study was underpowered, but represented a clinically significant difference in mean pain scores. FIC blocks are safe, effective bedside procedures that improve pain scores and provide consistent long lasting analgesia. FIC blocked patients experienced less adverse medication-related outcomes. Overall, the ultrasound-guided fascia iliaca compartment block is ideal for hip fracture pain among geriatric patients at risk for opioid associated adverse outcomes.

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Title: Single-center evaluation of the ABCDE bundle implementation

Purpose: Several strategies have shown promise in reducing the risk of intensive care unit (ICU)-acquired delirium and neuromuscular weakness. A standardized framework of the awakening and breathing coordination, delirium identification, and early mobility (ABCDE) bundle has been recommended to prevent delirium as well as neuromuscular weakness. Over several years, the ABCDE bundle has been implemented at this institution. The purpose of this study is to evaluate the performance and rates of adherence to each aspect of the bundle among various ICUs.

Methods: This retrospective, cohort study was performed in adult medical, surgical/trauma, and cardiovascular ICUs at a large university medical center between January 25th, February 19th, 2016. Patients ≥18 years and requiring mechanical ventilation for ≥48 hours were included. Exclusion criteria were patients on chronic ventilator support, extracorporeal membrane oxygenation, prone positioning, traumatic brain injury, status epilepticus, alcohol withdrawal, comatose, drug overdose, or administered continuous infusion neuromuscular blocker. Bundle adherence rates were compared between medical and non-medical ICUs (combined trauma/surgical and cardiovascular). Clinical outcomes including ICU and hospital length of stay, duration of mechanical ventilation, and in-hospital death were also evaluated. Descriptive statistics were used to compare groups.

Results: Sixty unique patients consisting of 432 patient-days were evaluated. Overall, the documentation rate for sedation awakening trial (SAT) screen completed was 66% (288/432 patient-days). The documentation rate of SAT performed in those patients passing the screen in the medical and non-medical ICUs were similar (91% and 92%, respectively, p=N.S). Documentation rates for spontaneous breathing trial screening and performance were both <5%. Documentation rates for delirium assessments with the confusion assessment method for ICU (CAM-ICU) were 85% in the medical ICU compared to 83% in non-medical ICUs (p=N.S). Mobility conducted by nursing was >83% in both ICUs, while physical therapy involvement was low in medical and non-medical ICUs (2% vs. 7%, respectively).

Conclusion: Documentation rates for each component of the ABCDE bundle were similar in medical and non-medical ICUs. High rates of documentation were found for nurse-conducted mobility activities and delirium assessment. Potential areas of improvement identified were SBT screening and completed as well as early involvement of physical therapy.

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Title: Characterization of pharmacologic interventions to prevent shivering during therapeutic hypothermia following cardiac arrest in adults

Purpose: The American Heart Association recognizes that therapeutic hypothermia after cardiac arrest improves neurologic outcomes. Shivering management with pharmacologic agents is an important aspect of achieving target hypothermia temperature. The objective of this study was to determine which pharmacologic agents were being used for the prevention and management of shivering during
induced hypothermia, in what sequence, to evaluate monitoring parameters associated with therapeutic hypothermia pharmacotherapy medications, and to determine the presence of any potential adverse effects. The secondary outcome was to evaluate which anti-shivering medications were associated with shorter time to target temperature.

**Methods:** Retrospective chart review of patients admitted between January 1, 2015 and June 30, 2015 who received orders from the inpatient hypothermia post cardiac arrest care set. Once identified, the following information was collected: facility, age, gender, location of cardiac arrest, actual body weight, ideal body weight, serum creatinine, height, time cooling initiated, time of first temperature less than or equal to 33 degrees Celsius, attainment target hypothermia temperature, and initial administration times of propofol, midazolam, and paralytic therapy. Additional data included initial administration times of the following medications: oral acetaminophen, rectal acetaminophen, intravenous meperidine, oral buspirone, and intravenous magnesium sulfate infusion. Administration of magnesium sulfate infusion with a serum magnesium level greater than 2.4, monitoring of serum magnesium concentrations, highest magnesium serum concentration, total meperidine dose in 24 hours after hypothermia initiation, and continuous electroencephalogram monitoring was also collected. All data was recorded without patient identifiers and maintained confidentially. Outcomes gathered included: frequency of medications used, time to target temperature, mean time to target temperature per medication, and incidence of proper monitoring and adverse effects for specific medications. Data collected was used to validate the current hospital care set and to determine need for further research.

**Results:** One hundred and twenty-eight patients were analyzed in the study with 83 patients reaching target temperature. Demographics and outcomes were gathered from the included patients. The overall mean time to target temperature was 230.4 minutes. Overall, propofol was the most used anti-shivering medication (57.0%), followed by midazolam infusion (25.8%), fentanyl (22.7%), and meperidine (17.9%). No significant correlation was found between first line agent administered and time to target temperature ($p=0.801$). There was also no correlation found between selection of medication regardless of sequence and time to target temperature. Patients who underwent paralysis for shivering management did not have a higher frequency of reaching target temperature in less than or equal to 240 minutes (76.2% without paralytic, 77.5% with paralytic, $P=0.888$). Only 28.6% of patients who received a paralytic for shivering management were monitored with continuous electroencephalography. There was an insufficient data to determine proper usage and monitoring of meperidine in renal impairment.

**Conclusion:** No correlation was found between sequence or choice of medications used for shivering management and time to target temperature. The use of paralytics for shivering management did not achieve shorter times to target temperature and proper monitoring parameters were not always implemented. Alterations to the medications available through the care set as well as requiring certain monitoring parameters should bring about more standardization of shivering management in therapeutic hypothermia.

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**Title:** Evaluation of the argatroban infusion protocol for systemic anticoagulation in adults with possible heparin-induced thrombocytopenia.

**Purpose:** Argatroban is the preferred agent for anticoagulation in patients with heparin-induced thrombocytopenia. This evaluation was designed to identify ways to improve an argatroban protocol for patients with possible heparin-induced thrombocytopenia. By identifying appropriate initial doses based on specific patient characteristics we can ensure patients reach therapeutic aPTT within an appropriate time frame. The primary outcomes of this evaluation were to determine if the argatroban protocol for HIT care set led to subtherapeutic or supratherapeutic levels based on patients’ aPTT scores and a delayed time to reach therapeutic aPTT of more than 24 hours.

**Methods:** Using the Cerner database, adult patients who received argatroban were identified. Data was collected through retrospective chart review of patients who received the argatroban protocol for HIT care set. Patients included must be 18 years of age or older and received argatroban utilizing the argatroban protocol for HIT care set. Patients were included if they did not receive argatroban or if the argatroban protocol for HIT care set was not utilized. The following data was collected: initial dose of argatroban, ICU status, argatroban start date/time, dose at first therapeutic aPTT, time to first therapeutic aPTT, baseline platelet count, baseline aPTT, aPTT at hours 3,6,9,12,24 after initiation of argatroban, argatroban dose at hours 3,6,9,12,24 after initiation, if a HIT panel was ordered, HIT panel threshold reported, categorization of percent fall in baseline platelets, timing of platelet count fall relative to heparin exposure, acute thrombosis, evaluation of other causes of thrombocytopenia, total bilirubin, albumin, INR, categorization of AST/ALT, presence of encephalopathy, presence of ascites, major bleed, minor bleed. Once all data was collected, the argatroban protocol for HIT was evaluated based on the findings.

**Results:** One hundred and twenty-seven patients were included in the analysis: fifty-one patients received hepatic...
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Title: An evaluation of rasburicase utilization in a multi-institutional health system.

Purpose: Rasburicase is used to treat elevated uric acid in tumor lysis syndrome. The manufacturer recommends a dose of 0.15-0.2mg/kg/day for five days, however, comparative studies have used fixed dosing strategies and have found both to be efficacious. The purpose of this study was to evaluate how rasburicase has been used and determine the potential for cost savings from the development of a standardized dosing protocol/careset within a multi-institutional health system.

Methods: This was a retrospective, cohort study assessing patients who were 18 years of age or older and received at least one dose of rasburicase from January 1, 2011 to March 31, 2015. The primary endpoint of this study was to determine potential cost savings based on inappropriate utilization. Inappropriate dosing regimens were defined as doses administered when initial uric acid was less than 7.5mcg/mL, multiple doses given within 48 hours, or single doses greater than 6mg. Potential cost savings per year were estimated by comparing the annual cost of inappropriate dosing regimens to the cost of appropriate doses. Patients were grouped by whether they received an appropriate or inappropriate rasburicase dosing regimen and baseline demographic information such as age, weight, baseline serum creatinine, and type of underlying malignancy were compared. Secondary endpoints included percentage of patients who developed acute kidney injury, percentage of patients who required hemodialysis despite rasburicase exposure, and percentage of doses administered without a corresponding rasburicase uric acid level.

Results: A total of 140 patients treated at 8 different facilities within a multi-institutional health system were assessed, as well as the appropriateness of 204 overall doses. The potential cost savings of standardized dosing per year decreased during the study period from $176,495.17 in 2011 to an estimated $56,196.88 in 2015. Similarly, the percentage of inappropriate doses out of total doses administered per year also decreased. Throughout the study period, the percentage of inappropriate regimens which met more than one study criteria and doses greater than 6mg were consistently high. While the rates of multiple doses administered within 48 hours and prophylactic doses trended down. The development of acute kidney injury between the two patient groups was similar, 60% in the appropriate group and 56% in the inappropriate group. However, progression to hemodialysis despite rasburicase exposure was higher in the appropriate dosing group (23% vs 12%). When assessing rasburicase monitoring, approximately half of all doses administered in previous years did not have a single corresponding rasburicase uric acid level. In more recent years included in the study period, the percentage of doses monitored without utilization of rasburicase uric acid levels decreased.

Conclusion: While standardization of rasburicase dosing and monitoring through a formal protocol/careset would provide a lesser cost savings than anticipated, it may be beneficial in decreasing the rate of inappropriate doses. A protocol would also improve patient care through the implementation of pertinent monitoring parameters.

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Title: Incidence of acute kidney injury in elderly patients receiving intermittent- versus extended-infusion piperacillin-tazobactam with or without vancomycin.
**Purpose**: Piperacillin-tazobactam is a broad spectrum antibiotic used to treat infections in the hospital setting and is frequently used in combination with vancomycin to provide broad-spectrum coverage. The concomitant use of vancomycin and piperacillin-tazobactam may potentially increase risk of acute kidney injury in geriatric patients due to the pharmacokinetic properties of both of these medications. This study aims to investigate the incidence of acute kidney injury (AKI) by comparing intermittent-infusion dosing versus extended-infusion dosing of piperacillin-tazobactam with or without vancomycin use, specifically in the geriatric patient population, as they are at an increased risk of developing AKI.

**Methods**: Data was collected in a retrospective chart review of inpatients 65 or older who received either vancomycin monotherapy (control group), intermittent-infusion or extended-infusion piperacillin-tazobactam with or without vancomycin between May 2013 - May 2015. AKI was defined as a 2x increase in SCR from baseline value, similar to RIFLE criteria. Key inclusion criteria include age ≥65 years old, baseline and 4 consecutive SCR levels, documented use of intermittent-infusion or extended-infusion piperacillin-tazobactam for ≥48 hours. In addition to listing patients' disease states and infection sites, any nephrotoxic agents, defined by a pre-determine list, were also noted for patients. Patients were excluded if they had AKI upon admission, end-stage renal disease, received the agents <48 hours, along with patients whose medical charts were missing data.

**Results**: Three hundred and thirty patients met inclusion criteria out of five hundred patients that were reviewed. An increase of SCR by 2x, 48-hours after initiation of agent(s) occurred in 5 of 47 (10.6%) patients in the extended-infusion piperacillin-tazobactam monotherapy group, 8 of 59 (13.6%) patients in the intermittent-infusion piperacillin-tazobactam monotherapy group, 6 of 116 (5.2%) in vancomycin monotherapy group, compared to treatment with both agents which occurred in 5 of 50 (10%) of patients receiving intermittent-infusion of piperacillin-tazobactam with vancomycin and 9 of 56 (16.1%) of patients receiving extended-infusion of piperacillin-tazobactam with vancomycin (p=0.191). There was no difference between intermittent- versus extended-infusion piperacillin-tazobactam with or without vancomycin; however, patients receiving a nephrotoxic agent had a statistically significant increase in SCR by 2x in 23 of 176 (13.1%) compared to the patients that did not receive a nephrotoxic agent in 10 of 154 (6.5%) patients (p=0.049).

**Conclusion**: Based on the results of this study, there is no difference in incidence of AKI in intermittent-infusion versus extended-infusion piperacillin-tazobactam with or without vancomycin in elderly patients. However, the concomitant use of a nephrotoxic agent led to a significant increase in AKI.

**Purpose**: Improved medication adherence has long been associated with better health outcomes and reduced health care use. However, it has been more difficult to demonstrate a causal relationship between medication adherence and medical cost savings. This study aimed to determine the changes in healthcare costs that result from increasing medication adherence in the hypertensive patient population of Mercy Care Advantage.

**Methods**: A third party vendor, SinfoniaRx, was used to provide adherence interventions to Arizona Mercy Care Advantage patients prescribed renin-angiotensin system (RAS) antagonists. Interventions included telephonic patient and provider outreach and began on October 15th 2013 and continued until October 31st 2014. The study was divided into 2 periods; pre-intervention from November 1st 2012 to October 31st 2013, and post intervention from November 1st 2013 – October 31st 2014. Medication adherence was measured using proportion days covered (PDC). Healthcare expenditure was defined as an aggregate of pharmacy and medical spend. The data for this study was obtained through Aetna Medicaid pharmacy and medical claims databases.

**Results**: The pre-intervention period included 8,853 patients prescribed RAS antagonists. During the post-intervention period, there was an increase to 9,132 patients. Adherence for the population increased from 71.4% to 71.9% PDC (p = 0.212). Average days supply per member increased from 37.5 days to 38.2 days between the pre-intervention and post-intervention periods. There was decreased utilization of inpatient, outpatient, and emergency services. Claims analysis showed a net savings of $306,516.

**Conclusions**: Based on claims data, increasing patient adherence to antihypertensive agents can reduce healthcare spending.
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Title: Retrospective assessment of efficacy, safety, and satisfaction of updated pain management order sets at a community hospital

Purpose: Opioids are commonly used to treat pain, but are associated with significant adverse reactions. Pain management orders were updated at a community hospital network to remove dose ranges from opioid pain medication order sets and provide individual medication orders for each level of pain intensity. The primary objective of this study is to compare the efficacy of pain management pre- and post-implementation of the order set. Secondary objectives include evaluating safety and patient satisfaction between groups, and to determine whether any factors resulted in higher pain scores.

Methods: A retrospective chart review was performed on qualifying HonorHealth Scottsdale Medical Center patients who underwent a total knee arthroplasty (TKA) or total hip arthroplasty (THA). Patients were identified using the electronic medical record. Opioid status was determined using hospital medication reconciliation records and the Arizona Controlled Substance Prescription Monitoring Program (CSPMP). Patients taking ≥ 60 mg/day morphine equivalence for at least one week were defined as opioid tolerant. Primary endpoints included mean pain scores and total morphine equivalence on post-operative days (POD) 1, 2, and 3 between pre- and post-implementation groups. Secondary endpoints included naloxone use and Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) scores between groups. Additional endpoints included use of liposomal bupivacaine or other capsular injections, patient controlled analgesia (PCA), and scheduled opioid use. Mean pain scores and total morphine equivalence on POD 1, 2, and 3 were analyzed using the student’s t-test between pre- and post-implementation. A univariate analyses was used to factor liposomal bupivacaine, capsular injection, PCA, and scheduled opioid use as confounders in mean pain score for day 1. A P-value <0.05 was considered statistically significant.

Results: A total of 200 patients were identified for the study; 100 patients in both the pre-implementation and post-implementation group. Mean pain scores on POD 1, 2, and 3 in the pre-implementation and post-implementation group were 3.7 vs. 3.4 (P=0.26; 95% CI, -0.22-0.81), 4.7 vs. 5.1 (P=0.20; 95% CI, -0.97-0.21), and 4.2 vs. 4.2 (P=0.90; 95% CI, -0.98-0.87), respectively. Mean total morphine equivalence on POD 1, 2, and 3 in the pre-implementation group versus the post-implementation group were 78.8 mg vs. 64.8 mg (P=0.16; 95% CI, -5.34-33.4), 91 mg vs. 67.8 mg (P=0.06; 95% CI, -1.13-47.5), and 68.1 mg vs. 50 mg (P=0.08; 95% CI, -1.86-38.1), respectively. There was one case of naloxone use in the pre-implementation group and none in the post-implementation group (P=1.0). HCAHPS scores regarding pain control was comparable between groups (P=0.223). Patients that received liposomal bupivacaine in both groups reported higher pain scores than those that did not, 3.74 and 3.93 vs. 3.56 and 2.33 (P=0.013), respectively.

Conclusions: The updated order set showed comparable efficacy, safety, and patient satisfaction compared to the previous order set. In patients undergoing TKA or THA, removing range orders had no impact on the quality of pain control, while utilizing less total morphine equivalence. Interestingly, the use of liposomal bupivacaine was associated with significantly higher mean pain scores on POD 1 in both the pre-implementation and post-implementation groups.

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Title: Retrospective evaluation of the new oral anticoagulants (NOACS) in the treatment of venous thromboembolism in gastrointestinal (GI) oncology patients

Purpose: The American College of Chest Physicians Evidence-Based Clinical Practice Guidelines suggests low-molecular weight heparins (LMWH) over vitamin K antagonists (VKA) therapy for patients with venous thromboembolism (VTE) and cancer. New oral anticoagulants (NOAC’s) are more attractive to patients and clinicians because they are taken by mouth in fixed doses, have few drug and food interactions, and do not require laboratory monitoring. The purpose of this study is to evaluate the safety and efficacy of the NOAC agents in gastrointestinal cancer patients.

Methods: We performed a single-institution retrospective review of electronic medical records of patients with gastrointestinal cancers who received NOAC’s with an active VTE diagnosis. Data collected included patient demographics, diagnosis, previous and active chemotherapy, previous history of VTE, and clinical outcomes.

Results: Forty patients were identified, with 32 patients on rivaroxaban, and 8 patients on apixaban. NOAC’s were administered to treat DVT in 27 patients and pulmonary embolism (PE) in 10 patients, and DVT+PE in 3 patients. One patient developed new portal vein thrombosis while he’s on apixaban, and one patient developed new PE while he’s on rivaroxiban. Overall, 14 out of 40 (35 percentage) patients experienced a bleeding episode; 8 patients had their dose held and 6 patients were noted to have minor bleeding.
Conclusions: In our retrospective study, NOAC did show efficacy in secondary prophylaxis for VTE in patients with active cancer, but further studies need to be evaluated for secondary prophylaxis in the oncology setting.

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Title: Incidence of venous thromboembolism in surgical oncology patients

Purpose: Current guidelines published by the American Society of Clinical Oncology (ASCO), National Comprehensive Cancer Network (NCCN), and American College of Chest Physicians (ACCP) recommend pharmacologic thromboprophylaxis for at least four weeks postoperatively in high-risk cancer patients. The purpose of this study was to assess the incidence of venous thromboembolism (VTE) and compliance to current guideline recommendations in high-risk surgical oncology patients at the Southern Arizona VA Healthcare System (SAVAHCS).

Methods: The computerized patient record system was utilized to identify oncology patients aged 18 to 89 years old undergoing general or urologic surgeries related to malignancy at SAVAHCS from June 1, 2013 to June 30, 2015. The following data was collected: patient age, renal function, type and stage of malignancy, concurrent use of chemotherapy, risk factors for VTE, prior use of anticoagulation, type, duration and use of anesthesia during procedures, type, dose, and duration of perioperative anticoagulation, incidence and type of VTE, patient outcomes if VTE developed, and adverse events with VTE prophylaxis (including heparin-induced thrombocytopenia and bleeding). The primary objective was the incidence of VTE up to 30 days postoperatively in patients receiving optimal (OT) thromboprophylaxis (4 weeks of anticoagulation if no contraindications) compared to patients receiving suboptimal (ST) management (less than 4 weeks of anticoagulation) according to guideline recommendations. Secondary objectives included compliance to guidelines, incidence of early (days 0 to 7) and late (days 8 to 30) postoperative VTE in patients receiving OT versus ST, severity of VTE, and hematologic toxicities associated with VTE prophylaxis. Logistics regression with an alpha of 0.05 was utilized to analyze the primary outcome. Other outcomes were reported as descriptive statistics.

Results: A total of 250 patient charts were evaluated, of which 83 charts were excluded. Of the remaining 167 patients, there were 136 patients in the ST group and 31 patients in the OT group. There were 4 (2.9%) VTEs in the ST group and 1 (3.2%) VTE in the OT group (odds ratio [OR] = 0.10; 95% confidence interval [CI], 0.23 to 2.32; P > 0.05). All VTEs occurred during the late VTE period; the average time to VTE incidence was 12 days versus 10 days in the ST and OT group, respectively. In the ST group, 2 patients presented with an uncomplicated pulmonary embolism (PE), 1 patient had an uncomplicated deep venous thromboembolism, and 1 patient died due to thromboembolic complications. In the OT group, 1 patient had an uncomplicated PE. No patients in the OT or ST groups were discharged with pharmacologic prophylaxis; all patients in the OT group completed anticoagulation once they were transitioned to the inpatient rehab ward. There were no significant differences between patients receiving pharmacologic versus non-pharmacologic thromboprophylaxis with regards to postoperative bleeding (11.4% versus 14.4%) or thrombocytopenia (45.7% versus 47.4%).

Conclusion: Provision of optimal thromboprophylaxis was low at SAVAHCS for high-risk surgical oncology patients; this was not associated with an increase in VTEs. There were no differences in bleeding or thrombocytopenia in those receiving pharmacologic versus non-pharmacologic thromboprophylaxis. Education is needed to increase compliance with guideline recommendations for postoperative thromboprophylaxis in high-risk surgical oncology patients at SAVAHCS.

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Title: Comparative analysis of adherence in hepatitis C, Medicare patients using medication therapy management interventions in a managed care setting: a pilot program

Purpose: Adherence to hepatitis C medications has shown positive correlations to achieving favorable sustained virologic response, with pharmacists playing an influential role in encouraging patient adherence. The exponential growth of the Medicare population warrants greater need for monitoring of hepatitis C medications, since the number of future Medicare enrollees contributes to 75% of the hepatitis C virus population. This comparative analysis measures adherence of Medicare members with Hepatitis C enrolled in Mercy Maricopa Advantage Plan (MMA) or Mercy Care Advantage Plan (MCA). Proportion of members meeting 80% adherence are compared pre- and post-pharmacy medication therapy management intervention.

Methods: Members with pharmacy claims for hepatitis C medications within December 1, 2015 through February 29,
2016 are included in intervention phase. Adherence rates are calculated according to Proportions of Days Covered as recommended by Pharmacy Quality Alliance (PQA). This is a methodology used by Centers for Medicare & Medicaid Services (CMS) to measure Part D Star adherence metrics. Proportion of members in the intervention group reaching 80% adherence is compared to the proportion of members reaching the same metric in the control group. Adherence rates are further compared among different genotypes. During intervention phase, members are contacted telephonically to provide medication therapy management service. If provider notification is necessary regarding member’s medication therapy, pharmacist faxed intervention letter to provider(s). Medication-related issues resulting from completed interventions are reported as a secondary outcome.

**Results:** Research in progress

**Conclusions:** Research in progress

**Title:** Evaluation of amiodarone utilization for new onset atrial fibrillation in cardiac intensive care unit

**Purpose:** Atrial fibrillation (AF) is an irregular rhythm commonly seen in critically ill patients. Amiodarone is frequently prescribed for new onset AF in the intensive care unit (ICU) due to its favorable side effect profile when given for short periods of time. However, long-term use of amiodarone is associated with serious side effects involving the lung, liver, heart and thyroid gland. The purpose of this study is to evaluate the appropriateness of patients being discharged from the hospital on amiodarone among those initiated on this medication for new onset AF in the cardiac ICU.

**Methods:** The study is a retrospective chart review of patients admitted to the cardiac ICU with new onset AF who were initiated on intravenous followed by oral amiodarone between November 1, 2013 and September 17, 2015. Patients were excluded if they had been previously on amiodarone prior to admission, underwent coronary artery bypass graft (CABG) surgery, and those that received only intravenous or oral amiodarone. The primary outcome of this study is to evaluate the incidence of patients discharged from the hospital on amiodarone among those initiated on this medication in the cardiac ICU at Banner University Medical Center Tucson. In addition, the study will assess the appropriateness for continuation of therapy, whether patients are discharged with appropriate follow-up with a cardiologist, and whether anticoagulation was initiated for stroke prevention.

**Results:** Research in progress

**Conclusion:** Research in progress

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**Title:** Beta-blocker review of agents in veterans with reduced ejection fraction

**Purpose:** Target doses of the beta-blockers bisoprolol, carvedilol, and metoprolol succinate have been correlated to a reduction in both morbidity and mortality in patients with heart failure with reduced ejection fraction (HFrEF). A lack of data exists comparing these drugs directly, and the selection of drug is often based not on efficacy, but other factors, such as price, availability, and side-effect profile. The purpose of this retrospective chart review was to provide further information to fill gaps in literature and guidelines regarding appropriate beta-blocker selection in patients with HFrEF.

**Methods:** A retrospective chart review of veterans aged 18 to 89 with a HFrEF diagnosis based on an echocardiogram demonstrating an ejection fraction (EF) of less than or equal to 45 percent who were followed at the Southern Arizona VA Health Care System between 07/31/2000 and 07/31/2015 was performed. The primary outcome was to compare the number of hospitalizations for heart failure exacerbations over 2 years post-diagnosis with HFrEF in patients utilizing different beta-blocker or no beta-blocker therapy. Data collected included age, sex, EF, hospitalizations, death, beta-blocker therapy and dose, adverse reactions or documentation preventing reaching optimal beta-blocker dosing, use of angiotensin-converting enzyme inhibitor, use of angiotensin-receptor blocker, use of aldosterone antagonist, use of digoxin, use of diuretics, use of metolazone, use of statin, use of hydralazine, use of long-acting nitrate, and specialty monitoring beta-blocker therapy. Many secondary outcomes compared baseline data versus data at 2 years. These included EF, beta-blocker therapy, and dose of beta-blocker used. Death at 5 years post-diagnosis was an additional secondary outcome. Descriptive and comparative statistics were utilized where appropriate to compare groups.

**Results:** Forty-four patients were determined to be eligible for the study after inclusion and exclusion criteria were applied. Of the 44 patients, 32 survived at least 2 years after diagnosis with the remaining 12 having died prior to this time.
point. Patients who died prior to having 2 years of data were statistically older and were less likely to be on ACE-I or ARB therapy in comparison to those who were alive at 2 years. Other baseline characteristics were similar between the groups. The following rates of beta-blocker usage were observed for patients with at least 2 years of data: atenolol (1/32; 3.1 percent), no beta-blocker (3/32; 9.3 percent), carvedilol (8/32; 25.0 percent), metoprolol tartrate (10/32; 31.3 percent), metoprolol succinate (10/32; 31.3 percent). Eight patients accounted for a total of 13 hospitalizations for heart failure at 2 years with no statistically significant findings identified between beta-blocker therapy and the incidence of hospitalizations. Eighteen of the forty-four (40.9 percent) patients died by 5 years following diagnosis with no statistically significant differences between beta-blocker therapy and incidence of death observed. Additionally, no statistically significant findings were identified between beta-blocker therapy and percent EF change at 2 years.

Conclusion: This retrospective chart review was unable to identify statistical differences between beta-blocker agents and the incidence of hospitalizations at 2 years, death at 5 years, and change in EF at 2 years following a diagnosis of HFrEF. A younger age and use of ACE-I or ARB therapy was associated with a statistically significant increase in the likelihood of survival at 2 years following HFrEF diagnosis.

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Title: Effectiveness of direct-acting antivirals (DAAs) for hepatitis C in veterans with focus on 8 vs 12 week regimens

Purpose: Chronic hepatitis C virus (HCV) affects about 1.8 percent of the general population of the United States and about 5 percent of veterans. Research has shown similar efficacy between ledipasvir (LDV) plus sofosbuvir (SOF) for 8 weeks versus the standard 12 weeks in a specific population, however, some have speculated that 8 weeks is less effective in practice. The objectives of this presentation include comparison of 12-week sustained virologic response (SVR12) between Veterans who were treated with LDV plus SOF for 8 weeks versus those treated for 12 weeks and determining the number of Veterans that relapsed after SVR12.

Methods: This is a retrospective, observational study. We included Veterans receiving HCV (genotypes 1-6) treatment regimens with DAAs between 10/1/2014 through 9/8/2015 at Phoenix Veterans Affairs Health Care System. Subject data regarding hepatitis C therapy was collected retrospectively through 9/8/2015. We excluded Veterans who were treated with DAAs long-term pending liver transplant, transferred HCV care to a provider outside of the Phoenix VA and treatment records were not adequately evaluatable, transferred HCV care from a non-VA provider to the Phoenix VA and treatment records were not adequately evaluatable, or had SVR12 date after 9/8/2015. Refill gap was calculated to evaluate adherence to DAA therapy.

Results: research in progress

Conclusions: research in progress

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Title: Establishment of a pharmacist-managed hepatitis C clinic in a rural Indian Health Service hospital

Purpose: Hepatitis C (HCV) affects 3.2 million people and is currently the leading cause of liver transplants in the U.S. Hepatitis C rates plateaued for every race in 2004, but have continued to increase in American Indian/Alaska Natives. Fortunately, new direct acting antiviral (DAA) therapies have been introduced to treat HCV that are both effective and safe. In Whiteriver, many patients with the advice of their provider, put off treatment until there were more tolerable alternatives to interferon. Hepatitis C is now almost entirely pharmacologically treated, which puts pharmacists in an ideal place to manage the disease.

Methods: The HCV clinic consists of two pharmacists and a physician. Patients positive for HCV are identified through the hospital's data management system, and are contacted to discuss treatment. Inclusionary criteria consists of a positive qualitative HCV RNA test. The pharmacists work with the patient and their primary care provider to coordinate care to identify a course of treatment. Exclusionary criteria consists of patients less than 18 years of age, current substance abuse, and/or those who don't medically qualify for treatment. Upon initiation of treatment, the pharmacist will stress adherence, counsel on side effects, and explain the purpose of the medication. All patients will be followed-up by the pharmacists in HCV clinic as required. Pharmacists are able to order necessary laboratory tests and medications through a collaborative practice agreement with the physician. Outcome measures include the number of patients that achieve normalized LFTs and a sustained virologic response.

A flag in the electronic medical record (EMR) was implemented to test baby boomers as recommended by the CDC to identify patients with HCV. Both a note template and consult have been installed into the EMR enabling providers to identify patients with HCV and provide appropriate treatment.
to send a notification to the HCV pharmacist and physician regarding prospective patients.

**Results:** Once the flag to screen baby boomers was implemented, screening for hepatitis C has more than doubled. From 2011 to 2015, Whiteriver screened 2,106 patients for the antibody (43.9 patients/month). Since the implementation of the flag in June of 2015, Whiteriver has screened 1,299 patients (130 patients/month). During this time 16 patients were found to be positive (1.3%). Since starting the clinic five patients have been enrolled. Of those five, three are currently in treatment and two have finished. For the patients that have finished treatment, one has experienced a sustained virologic response at 12 weeks, and the other is 10 weeks post treatment. All patients still in treatment now have undetectable viral loads and their liver function tests have returned to normal. An unforeseen result is the reimbursement the hospital has received for HCV medications. For all patients that have been treated, drug costs have totaled $71,812.27 and reimbursements have totaled $158,521.12.

**Conclusion:** Hepatitis C has become a treatable chronic disease with the primary barrier to care for patients being the cost of the medications. In Whiteriver a pharmacist is in an optimal position to help both the patient and the provider through the process of obtaining treatment for the medications. Furthermore, the pharmacist is the best suited to ensure adherence and educate the patient regarding the medications and the disease. Thus far the hepatitis C patients managed by a pharmacist have obtained third party payment for the medications and have shown a positive response to treatment.

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**Title:** Evaluation of compliance to the direct oral anticoagulants in a Medicare population using electronic healthcare records and prescription claims data

**Purpose:** Direct oral anticoagulants (DOACs) have become increasingly popular alternatives to vitamin K antagonists for the prevention of thrombosis associated with atrial fibrillation. A prior review of prescription claims data at Banner Health showed poor patient compliance with the DOACs. Near perfect compliance is essential for effective thrombosis prevention when utilizing a DOAC. This project was a retrospective chart-review designed to evaluate possible reasons for non-compliance with the DOACs including, cost, medication burden and co-morbid conditions.

**Methods:** The electronic health record, medical and prescription claim databases were utilized to identify patients with a Banner Health Network Medicare Advantage insurance plan, a diagnosis of atrial fibrillation and a prescription for a DOAC between October 1, 2013 and March 31, 2016. Exclusion criteria included a prescription for warfarin or a DOAC within the previous 180 days prior to the first diagnosis of atrial fibrillation. Primary outcome measures include differences in DOAC adherence at 180 days after initiation (measured by proportion of days covered, PDC ≥ 80%) as well as primary non-adherence (patients fail to pick up first fill), based on age, sex, number of chronic medications, comorbid conditions, number of office visits during the 180 days, CHADS2/CHA2DS2VASC score, and DOAC co-payment amount. Logistical regression analyses were performed to control for the other factors while measuring each individual factors impact on PDC and primary non-adherence. All analyses completed using Microsoft Access, with statistical analyses completed using Minitab version 17 and alpha=0.05.

**Results:** Research in progress

**Conclusion:** Research in progress

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**Title:** Impact of a diabetes shared medical appointment in patients with poorly controlled type 2 diabetes mellitus

**Purpose:** To investigate the sustained effects of a diabetes (DM) shared medical appointment (SMA) clinic model on select glycemic outcomes. The primary objective was to assess the change in hemoglobin A1c (HbA1c), and secondary objectives were to assess and/or describe the percentage (%) of subjects meeting the HbA1c goals of less than 7% (American Diabetes Association/ADA) or less than 9% (Healthcare Effectiveness Data and Information Set/HEDIS), change in total daily insulin dose, and number of DM-related emergency room (ER) visit and/or hospitalizations.

**Methods:** This study was an extension of a previous prospective investigation of the DM SMA clinic. This was a retrospective chart review from date of clinic discharge (ranging from 8/2012 to 12/2013) through 9/07/2015. Subjects included Veterans who completed at least 3 out of 4 DM SMA clinic visits and obtained at least 1 follow-up HbA1c. Subjects were excluded if investigators were unable to obtain verbal consent. Obtaining verbal consent was required by the institutional review board (IRB) because Veterans had previously provided written consent to only the prospective investigation, thus consent was needed to perform a retrospective evaluation. Data collected included date of
clinical discharge/last appointment, age at clinic discharge, gender, ethnicity, HbA1c, total daily insulin dose, and DM-related ER visits and/or hospitalizations. Applicable data points were collected at baseline (time of clinic discharge) and at subsequent yearly increments up to but no later than 9/07/2015. A paired Student’s t-test and McNemar’s test were used for continuous and categorical variables, respectively. The a priori alpha level was set at 0.05.

**Results:** Ninety-five subjects met inclusion criteria, however investigators obtained verbal consent from 71 subjects. The average age at baseline was 60.8 years (SD 8.3 years). Most participants were white (61.1%) males (97.2%). At baseline the average HbA1c was 8.50%, while 12.7% and 66.2% of participants met HbA1c goals of less than 7% and less than 9%, respectively. Additionally the average total daily insulin dose at baseline was 99.2 units (SD 8.48 units). There was a non-significant 0.35% increase in HbA1c from baseline to end of follow-up (95% CI -0.15% to 0.83%; p = 0.17). There was also a non-significant 2.8% increase in participants meeting an HbA1c goal less than 7% (95% CI -8.1% to 13.9%; p = 0.59) and 8.5% decrease in participants meeting an HbA1c goal less than 9% (95% CI -23.0% to 6.3%; p = 0.26). In addition, there was a non-significant 6.6 unit increase in total daily insulin dose from baseline to end of follow-up (95% CI 10.7 to 23.8; p = 0.45). Thirteen participants had at least 1 DM-related ER visit or hospitalization, with a total number of 21 ER visits or hospitalizations. The most common reasons being hyperglycemia.

**Conclusions:** The DM SMA clinic resulted in sustained effects on select glycemic outcomes after participants returned to standard care. The results of this study support the use of SMA clinics in the management of DM – as they align with the ADA’s recommendation of using an integrative, patient-centered care model and are resourceful in terms of provider utilization. Notable limitations of the study include its limited generalizability to other practice sites, small population size, and having no comparator group. Future areas of research include investigating various formats of the DM SMA clinic and comparing the DM SMA clinic to other clinic models.

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**Title:** D-dimer levels and outcomes in patients with mechanical circulatory devices

**Purpose:** For patients with end-stage heart disease, a heart transplant offers a life-saving therapy. However, for patients unable to receive an immediate transplant, mechanical circulatory support (MCS) devices are available. Despite the overall survival benefit of MCS devices, major complications are associated with their use. MCS devices are known to trigger hemostatic alterations leading to hemorrhagic and thrombotic complications. To date, there has been little data published on biomarkers, other than lactate dehydrogenase, as a prognostic indicator to predict poor outcomes in MCS device patients. This study attempts to evaluate whether a high D-dimer concentration is a predictor for mortality in MCS device patients.

**Methods:** This was a single-center, retrospective, observational study at an academic medical center. Adult patients were identified using our institution’s database of patient’s with MCS devices. Patients aged 18 years or older who had a MCS device implanted between October 1, 2002 and November 1, 2015 were included. A chart review was performed on all identified patients. D-dimer concentrations, fibrinogen, bilirubin, activated thromboplastin time, international normalized ratio, and thromboelastography were recorded for each patient at the time of explant/discharge or death. The primary outcome evaluated D-dimer concentrations in MCS device patients amongst those who survived to explant/discharge versus those who expired on MCS. The secondary outcome evaluated if antithrombotic regimens correlated with D-dimer concentrations among the mortality group versus the survival group.

**Results:** A total of 86 patients were included in the study. Twenty-nine patients expired on MCS with an average D-dimer concentration of 8.7µg/mL compared to 4.7µg/mL in patients who survived to explant/discharge (p=0.001). In terms of the secondary outcome, no difference was determined in antithrombotic regimens among the mortality group versus the survival group.

**Conclusion:** This study demonstrated an association between elevated D-dimer concentrations and prognosis, however no single D-dimer concentration break point has been determined.

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**Title:** Transitions of care: outcomes of pharmacist support in transitional care management services

**Purpose:** Two billing codes for Transitional Care Management Services (TCM) were adopted by CMS in 2013. These TCM codes help to set standards for post-discharge care coordination in the community setting and align with the
evidence on effective strategies that have been shown to reduce readmissions. Requirements of TCM services include a face-to-face provider visit along with certain non-face-to-face services, which can be provided by a licensed pharmacist. The purpose of our study was to evaluate the clinical and financial outcomes of a transitions of care program that aligns with TCM requirements in which a pharmacist provided the non-face-to-face services.

Methods: This was a retrospective chart review of Medicare patients who received TCM services between December 2015 and March 2016 at a Banner Health Center Internal Medicine clinic. Patients were eligible for study inclusion if they were 18 years or older, admitted to a Banner Health hospital for an inpatient or observational encounter, discharged to home and received TCM non-face-to-face services by a pharmacist. These TCM services included telephonic interactive contact with the patient within two business days of discharge, medication management and ensuring that the patient had a face-to-face provider appointment within seven to 14 calendar days from discharge. The pharmacist's documentation of the non-face-to-face TCM services was entered into the patients' electronic medical record using a template progress note. The documentation included a description of the interactive contact, an assessment and medication therapy recommendations where applicable. This documentation was communicated to the provider with whom the patient had a face-to-face appointment. The primary outcome of this study is the number of TCM codes reimbursed by the payer. Secondary outcomes include: 30-day hospital readmission rate and provider acceptance of pharmacist recommendations. Demographic information and study outcomes were evaluated using descriptive statistics.

Results: A total of 75 subjects were included in this study for evaluation. A majority of the study subjects were Caucasian women with an average age of 79.5. Forty-five percent of submitted TCM codes have been reimbursed by the payer, however there are still charges pending reimbursement. The 30-day hospital readmission rate observed in the study population was 7%. Overall, 21% of pharmacist recommendations made were accepted by the physician based upon manual review of provider documentation for the face-to-face appointment.

Conclusion: The results of our study show a low 30-day hospital readmission rate in Medicare patients who received TCM services when a pharmacist provided the non-face-to-face requirements. TCM reimbursement is higher than the traditional evaluation and management codes used for an established outpatient provider encounter by approximately $58 to $88 per encounter in our study’s geographical region. Our study evaluated a novel transitions of care practice model for pharmacists and suggests that the pharmacist providing non-face-to-face TCM services is both a clinical and financial value added service within a health system modeling value based care.

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Title: Pharmacist conducted medication therapy reviews for recently discharged dual-eligible patients: a transitions of care pilot program

Purpose: Transitions of care is currently seen as a necessity in today’s health-care to reduce readmissions. Pharmacists have been shown to contribute to this process by completing medication reconciliations and reduce errors. Currently, Mercy Care Advantage utilizes a single point of contact model with a customer service call team that contacts patients within 24 hours of discharge. However, this model does not incorporate direct patient contact with a medical professional. The objective of this project was to determine the impact on medication adherence and hospital readmissions by having a pharmacist conduct medication reviews for recently discharged dual-eligible members.

Methods: This program utilized the pharmacists on the Clinical Quality team at Aetna Medicaid to conduct telephonic medication therapy reviews for recently discharged Mercy Care Advantage patients with a primary admissions diagnosis of pneumonia, congestive heart failure, diabetes, and chronic obstructive pulmonary disease. Discharge lists were emailed on a daily basis to the team and screened for Mercy Care Advantage patients with the respective diagnoses. The pharmacist would contact the patient post-discharge (at least 3-5 days since discharge). During the phone call, the patient answered a brief pre-survey and received a medication review that discussed indication, directions, and possible side effects for each drug. The final part of the program was a follow-up call made 2-3 weeks after for a post-survey. Proportion of days covered was measured for medication adherence using 3 months of post-intervention pharmacy claims data, and 30-day readmission rates used medical claims data to compare against the control group from the pre-intervention time period.

Results: Research in progress

Conclusion: Research in progress
Title: Effect of initial centruroides antivenom dose on patient outcomes after scorpion envenomation

Purpose: The purpose of the study was to assess if starting with a lower initial dose of centruroides antivenom was linked to longer emergency department length of stay. This study also aimed to identify if the initial dose had a correlation to total dose used, rate of intubation, or hospital admission.

Methods: A retrospective chart review of all patients who were administered centruroides antivenom at a Banner Health Facility between October 1, 2011 - September 30, 2015. A total of 520 patients were included in this study. Extracted data included age, grade of envenomation, initial dose, total dose, length of stay in the emergency department, adverse drug reactions, intubation, and hospital admission. Fisher exact test was used for categorical variables and t-tests were used for continuous variables. A two-tailed p < 0.05 was considered significant.

Results: A total of 227 patients (43.7%) had an initial dose of one vial and 278 patients (53.5%) had an initial dose of three vials. An initial dose of three vials was given more frequently to patients with grade 4 envenomation versus one vial, 70.1% and 64.3% respectively, but this was not statistically significant (P = 0.181). Length of stay in the emergency room was longer for patients with an initial dose of one vial (4.40 hours, standard deviation of 1.84) than those with an initial dose of three vials (4.02 hours, standard deviation of 1.62) and this was statistically significant (P = 0.02). Patients who received an initial dose of one vial used a significantly lower total dose (1.72 vials, standard deviation of 0.88) than those who received three vials initially (3.34 vials, standard deviation of 0.57, P< 0.001). There was no significant difference in the number of patients requiring intubation (0.9% for one vial vs. 2.5% for three vials, P= 0.196) or admission to the hospital (7.5% for one vial vs. 9.0% for three vials, P= 0.628).

Conclusion: An initial centruroides antivenom dose of one vial reduced the total drug used while it only slightly increased the length of stay in the emergency department. A lower initial dose had no effect on rate of intubation or hospital admission.

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Title: Impact of a pharmacist-driven dosing protocol on the management of warfarin in the inpatient setting

Purpose: Studies have shown that protocol-driven warfarin management can improve selection of appropriate initiation doses and decrease the incidence of supratherapeutic INRs among inpatients. The purpose of this project was to compare the efficacy and safety of pharmacist-managed warfarin dosing with and without a standardized protocol at Maricopa Integrated Health System (MIHS).

Methods: This was a single-center, retrospective chart review of patients initiated on warfarin therapy before and after the implementation of a warfarin dosing protocol on the inpatient services at MIHS. Adult patients were included in this protocol if they were initiated or reinitiated on warfarin therapy while admitted to inpatient services at Maricopa Medical Center, continued pharmacy-to-dose warfarin management for at least 5 consecutive days after initiation, had a target INR of 2 to 3 or 2.5 to 3.5, and did not have active bleeding, elevated baseline INR greater or equal to 1.3, or recent administration of argatroban or vitamin K prior to warfarin induction. Primary outcomes included percentage of patients with therapeutic INR within 5 days of warfarin initiation, percentage of patients with INR levels greater than 4, and average number of days from first dose to first therapeutic INR.

Results: A total of 63 patients were included in this evaluation with 31 patients in the comparison group and 32 patients in the protocol group. Mann-Whitney U test was utilized for comparison between the two groups and sample size was met to detect between-group differences with 80 percent power and an alpha of 0.05. An increased rate of therapeutic INR within 5 days of warfarin initiation was observed in the protocol group (62.5 percent vs 58.1 percent), though this was not statistically significant (p=0.80). A decreased incidence of INR greater than or equal to 4 was observed with the protocol group (6.3 percent vs 12.9 percent) but was also not statistically significant (p=0.43). The average days between first dose and first therapeutic INR was similar with 4.69 days in the protocol group and 4.04 days in the non-protocol group (p=0.35). For secondary endpoints, no incidences of new onset major bleeding or new onset thromboembolism were observed in either group. Strict pharmacist adherence to the protocol was achieved in 50 percent of (16/32) the protocol group. An exploratory subset analysis within the protocol group comparing strict and loose adherence revealed similar results as the pre-specified analysis.

Conclusion: The use of a dosing protocol for initiation and management of warfarin among inpatients at MIHS correlates with trends toward increased therapeutic INR within 5 days of new start warfarin management and...
decreased incidence of INR greater than or equal to 4, but neither outcome reached statistical significance. Further analysis of the protocol group revealed fifty percent adherence to the protocol without deviation in dosing; however both the adherent and non-adherent subsets of the protocol group showed a trend towards increased therapeutic INR within 5 days from warfarin initiation.

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Title: Evaluation of continued efficacy in type 2 diabetes patients receiving sulfonylurea therapy

Purpose: Sulfonylurea (SU) drugs have been associated with poor long-term clinical durability due to the risk of secondary failure in patients with type 2 diabetes. This project was a retrospective chart review designed to determine whether an extended treatment with SU medication results in inadequate glycemic control. Long-term SU use was defined as 3 or more years of treatment, and short-term SU use was defined as less than 3 years of treatment. Results of this study will describe the potential decline in efficacy associated with prolonged SU use in the setting of today's diabetes management practices.

Methods: Electronic health record search was conducted to identify patients who were started on metformin and SU as initial treatment regimen between January 2007 and January 2016. Inclusion criteria consisted of the following: age greater than 18 years of age, followed by a provider at El Rio Community Health Center for at least 1 year, diagnosis of type 2 diabetes, on metformin and SU medications as initial medication therapy, minimum of 3 months of SU therapy, at least 1 reported hemoglobin A1C (HgA1C) reading of <7% within first year of SU initiation, and minimum of 1 reported HgA1C reading after 1 year of SU therapy. Patients who were pregnant, started medications other than metformin or SU for initial therapy, or started on insulin or non-insulin injectables were excluded.

Results: Three hundred and sixty-six patients met inclusion criteria (183 patients in short-term user group and 183 patients in long-term user group, respectively). 8 out of 183 patients in short-term user group (4%) failed SU therapy, while 38 out of 183 patients in long-term user group (21%) failed SU therapy (p < 0.0001). In short-term user group, mean A1C achieved within first year of therapy was 6.41 ± 0.41, mean A1C after first year of therapy was 7.01 ± 0.95, and mean A1C at the end of follow-up period was 7.22 ± 1.22. In long-term user group, mean A1C achieved within first year of therapy was 6.44 ± 0.38, mean A1C after first year of therapy 7.15 ± 0.94, and mean A1C at the end of follow-up period was 7.41 ± 1.39. Differences in A1C were not statistically significant. Adjusted multivariate logistic regression analysis showed that long-term SU use was associated with increased likelihood of failure (OR 5.57, 95% CI 2.46-12.628, p < 0.01). American Indian race was associated with higher failure rates (OR 3.42, 95% CI 1.01-11.63, p <0.05), and Hispanic ethnicity was also associated with higher failure rates ( OR 2.93, 95% CI 1.03-8.29, p=0.04).

Conclusion: Long-term SU use is associated with significantly higher rates of secondary failure in comparison with long-term SU use. American Indian race and Hispanic ethnicity were associated with increased rates of SU failure. It is important to consider the possibility of secondary failure in patients with uncontrolled diabetes who have been on long-term SU therapy.

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Title: Urinary tract infections in renal transplant recipients

Purpose: The use of solid organ transplantation has been established as standard of care for end-stage disease of the kidneys for over 30 years. Infections remain a major cause of morbidity and mortality in transplant recipients. Urinary tract infection (UTI) is the most common bacterial infection in kidney recipients. The incidence of UTI in renal transplant patients is higher than general population ranging from 20% to 75%. The association between UTI and allograft function or survival results are conflicting due to various criteria used to define UTI. Many risk factors have been associated with the development of UTI including host factors, pathologic agents, and or anatomical abnormalities. Catheter use has been found to increase the risk of UTI by 1.5 times per day. Female gender, age, and African American race have a higher risk of experiencing a UTI. The intensity of immunosuppressive regimen and anti-thymocyte globulin induction as well have been found to increase infection rates including UTIs. Gram-negative bacteria account for most of the UTIs that also accounts for most of blood stream infections after the kidney transplant. Higher risk of allograft failure and death have been found in renal kidney transplant patients who developed gram-negative blood steam infections. The recurrence of UTI is common among renal transplant recipients and more frequent in patients with previous multi-drug resistant organism UTIs. But, the benefit of increasing the duration of therapy in patients with recurrent UTI caused by MDR organism or the use of
antibiotic prophylaxis to prevent recurrent UTI remain unclear.

**Methods:** The study design will be a retrospective, cohort study at a single-center, with data collected from transplant patients over the past 5 years. All data will be collected from patients that were admitted to the Banner University Medical Center Tucson from 8/1/10-09/1/15 for urinary tract infection and had a kidney transplant. Our estimated sample size is 300 patients. Inclusion criteria include adult age (18 years and older), diagnosed with a UTI, and had kidney transplant. A master list will initially be generated to identify these particular patients during this time period. After data collection, the master list will be destroyed. Each subject will be de-identified by assigning unique identifier numbers and all collected data will be transferred to an Excel spreadsheet.

**Results:** This study results are not finalized yet. By the time the conference, data will be collected and analyzed.

**Conclusion:** Treatment of UTI and duration depend on the severity of illness, time elapsed since transplant and type of organism, yet there is no consensus about the duration of therapy in renal transplant patients. Although this study results have not been determined yet, but it may provide further insight into a possible treatment algorithm for urinary tract infections in transplant patients. This may assist in creating strategies to optimize therapy by choice of antibiotics, duration of therapy, decreasing over utilizing of antibiotics. This could provide benefit of reducing medication costs and decrease length of hospital stay.

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**Title:** Hospitalization risk with benzodiazepine and opioid use in veterans with posttraumatic stress disorder

**Purpose:** To evaluate hospitalization risk in veterans who have been newly-prescribed first-line pharmacotherapies for posttraumatic stress disorder (PTSD) compared to those who have also been prescribed benzodiazepines and/or opioids.

**Methods:** The records of all veterans diagnosed with and treated for PTSD at the Southern Arizona Veterans Affairs Health Care System (SAVAHCS) who were newly-prescribed first-line pharmacotherapy with either a selective serotonin reuptake inhibitor (SSRI) or serotonin norepinephrine reuptake inhibitor (SNRI) between November 1, 2010 and August 1, 2013 were evaluated (N=1,703). Data collected included number of unique hospitalizations, time to first hospitalization, presence of previous hospitalizations, and demographic information (gender, age, comorbid mental health disorders, comorbid substance use disorders, comorbid insomnia, comorbid pain, and concomitant psychotropic medications). The primary outcome of overall two-year risk of hospitalizations between patients prescribed SSRI/SNRI monotherapy, concurrent SSRI/SNRI and benzodiazepine therapy, concurrent SSRI/SNRI and opioid therapy, and concurrent SSRI/SNRI, benzodiazepine, and opioid therapy was analyzed using Weibull proportional hazard regression models. Kaplan-Meier survival curves were generated based off of time-to-first-hospitalization data. Secondary outcomes included risk of mental health hospitalizations, risk of medical/surgical hospitalizations, and all-cause mortality within two years of index date. Index date was designated as the first date of SSRI/SNRI prescription in the monotherapy group or the first date of therapy overlap in the concurrent therapy groups.

**Results:** A total of 613 subjects met all criteria to be included in the study. Using the SSRI/SNRI monotherapy group as a reference, the adjusted hazard ratio (AHR) of overall two-year hospitalization risk in the concurrent SSRI/SNRI and benzodiazepine therapy group was 2.6 (95% confidence interval [CI], 1.1-5.7), with a number needed to harm (NNH) of 46. The AHR of the concurrent SSRI/SNRI and opioid therapy group was 6.1 (95% CI, 2.6-14.0), with a NNH of 15. The AHR of the concurrent SSRI/SNRI, benzodiazepine, and opioid group was 3.9 (95% CI, 1.1-14.6), with a NNH of 25. AHR of mental health hospitalizations for the SSRI/SNRI and benzodiazepine, SSRI/SNRI and opioid, and SSRI/SNRI, benzodiazepine, and opioid groups were 5.5 (95% CI, 1.6-18.7), 12.3 (95% CI, 3.3-46.2), and 20.0 (4.0-101), respectively. AHR of medical/surgical hospitalizations for the SSRI/SNRI and benzodiazepine and SSRI/SNRI and opioid groups were 1.9 (95% CI, 0.67-5.6) and 4.4 (95% CI, 1.6-12.0), respectively. AHR of medical/surgical hospitalizations that excluded those with a previous hospitalization within six months was undefined. All-cause mortality within two years of index date was significantly higher in the concurrent SSRI/SNRI, benzodiazepine, and opioid group compared to the SSRI/SNRI monotherapy group (21.4% vs 1.1%, P<0.01).

**Conclusion:** Combat veterans with PTSD prescribed benzodiazepines and/or opioids in addition to first-line pharmacotherapy had a significantly higher risk of overall hospitalizations within two years. All concurrent therapy groups had a higher risk of mental health hospitalizations. Patients prescribed an SSRI/SNRI and an opioid also had a higher risk of medical/surgical hospitalizations. Those who were prescribed an SSRI/SNRI, a benzodiazepine, and an opioid had a significantly higher rate of all-cause mortality.
Efficacy of a tobacco cessation program utilizing group sessions led by community health workers in a low socioeconomic population.

**Purpose:** The primary objective of this study was to evaluate the efficacy of a comprehensive smoking cessation program using point prevalence smoking cessation rates at 6 months. The program included group-sessions led by community health workers in addition to standard intensive counseling led by health care providers. Secondary outcomes included changes in CO levels (using PICO smokeryizers) and nicotine dependence (as measured by the Fagerstrom Test) from baseline to program end, patient satisfaction via a survey, and self-reported adherence to smoking cessation medications.

**Methods:** This study was a pilot comprehensive smoking cessation program utilizing standard intensive counseling sessions in addition to a group-based program to help patients become and stay smoke-free. Adult patients 18 and older at a primary care clinic who were ready to become smoke free within 30 days were eligible to participate in the study. Patients were provided with all counseling sessions and smoking cessation pharmacotherapy at no cost. The program included four 30-minute one-on-one in person visits with a clinical pharmacist or a behavioral health professional during six months. The first visit assessed baseline demographics and tobacco history and an individualized cessation plan was created. Each follow-up visit consisted of additional counseling and assessment of smoking cessation progress, number of cigarettes smoked since last visit, adverse drug reactions and medication adherence to smoking cessation products. Patients were also asked to attend at least 6 out of 12 group-counseling sessions led by a community health worker that were offered every two weeks.

**Results:** Of the 11 patients enrolled in the study, 18.2% (2 of 11) were able to successfully quit smoking and stay smoke-free after 6 months. No patients attended all four 30 minute one-on-one visits and three patients were lost to follow-up before the final one-on-one visit. The mean number of one-on-one visits completed was 2.6. In terms of group sessions, 5 patients did not attend any group sessions and no patients attended six or more sessions. Of the remaining 6 patients, the mean number of group-counseling sessions attended was 1.8. For the 8 patients who were followed up with at 6 months, the mean difference in tobacco use was 13.0 [95%CI
(19.6, 6.4) cigarettes/day. Mean difference in measured CO was 18.1 [95%CI (29.0, 7.2)], and mean difference in Fagerstrom Test score was 3.4 [95%CI (4.7, 2.0)]. Of the completed surveys (n=8), all patients were satisfied with the overall program.

**Conclusion:** This comprehensive smoking cessation program helped 2 patients successfully quit smoking after 6 months. Overall, patients who participated in the program showed a decrease in tobacco use, nicotine dependence, and carbon monoxide levels after 6 months. The biggest barrier to implementing this program included loss of patients to follow-up.

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**Title:** Changes in knowledge and opinions of 1st and 2nd year pharmacy students regarding post-graduate opportunities after an educational session

**Purpose:** To implement and evaluate the impact of a resident created educational session on 1st and 2nd year pharmacy students regarding post-graduate opportunities.

**Methods:** An educational session was developed giving the students information on background knowledge of post-graduate opportunities, day-to-day activities, and specific ways to improve their applications. Two separate sessions were held for the pharmacy students enrolled in Midwestern College of Pharmacy-Glendale, one session was made mandatory for the 1st year students and the other was optional and included the 2nd year students. In order to measure the potential impact an educational session has on opinions and knowledge of 1st and 2nd year pharmacy students, a pre-survey and post-survey composed from published literature was conducted. The pre-survey obtained a baseline of student knowledge and student opinions. After the informational session concluded, a post-survey was administered to assess potential changes. The surveys separated question types into two subcategories “Background Knowledge” and “Continuing Education.” These surveys were then compared in three independent procedures: 1. Primary Observation: 1st year and 2nd year pharmacy students combined pre-surveys versus 1st year and 2nd year pharmacy students combined post-surveys. 2. Secondary Observation: 1st year pharmacy students’ pre-surveys versus 1st year pharmacy students post-surveys. 3. Secondary Observation: 2nd year pharmacy students’ pre-surveys versus 2nd year pharmacy students post-surveys.

**Results:** Results suggest that the intervention has significant impact on the education of the participating students in the areas of general knowledge of post-graduate students' pre-surveys versus 2nd year pharmacy students had a significant effect on the students’ background knowledge of the variety of post-graduate opportunities. The number of students moving toward participation in post-graduate opportunities had a positive percent increase although not significantly. Top identified barriers for the student population were “Intimidated by the process” and “Burned out.”

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**Title:** Effect of a smart pill-bottle on medication adherence in patients who have multiple myeloma and are new to lenalidomide therapy: interim analysis.

**Purpose:** According to the NEHI, the United States spends $750 billion on wasted health care. Poor medication adherence, alone, accounts for $290 billion of the annual wasted healthcare spend. In many disease states, such as oncology, newer, targeted oral therapy has allowed patients to take their medication at home. However, medication non-adherence with these complex regimens can lead to ineffective treatments, hospitalizations, and unnecessary disease progression. The purpose of this study is to evaluate the effect of a smart pill-bottle on medication adherence in patients who have multiple myeloma and are new to lenalidomide therapy.

**Methods:** In this prospective, randomized, single-blind, controlled study, 40 patients were provided with smart pill-bottles. Available features of the bottle include reminder
ringtones, lights, and text messages. Once patients were enrolled in the study they were randomized into one of two groups. The intervention group (N=20) received a pill bottle with activated lights, noise alerts, and text message reminders plus pharmacist follow up for weekly adherence rates <85%. On the other hand, the control group (N=20) received an identical pill bottle with all alerts deactivated and no additional pharmacist followup. Using real-time data from individual pill bottles adherence rates between the intervention group and control group were compared.

**Results:** Between January 2016 and February 2016 we were able to enroll 40 new lenalidomide patients. After approximately 3 months of therapy we gathered preliminary data. We found adherence was significantly greater in intervention group when compared to the control group (100% vs. 90.75%, p=0.001).

**Conclusion:** The present findings suggest that the smart pill-bottle device significantly improves patient adherence when compared to control group. However, further investigation with longer use of the device is needed to determine if smart pill-bottles lead to improved medication persistence and overall healthcare outcomes.

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**Title:** Economic impact of pharmacist-managed conversion of intravenous immunoglobulin (IVIG) dosing from actual body weight to ideal body weight for non-obese patients

**Purpose:** Currently in the United States, dosing criteria using actual, ideal, or adjusted body weight are not specified in guidelines for the use of IVIG in non-obese patients. Previous methods involve dosing IVIG based on actual body weight for non-obese patients, but recently has been a shift in dosing strategies at major US hospital systems towards using ideal body weight, based mostly on the pharmacokinetic properties of the drug. The primary objective of this study is to determine the facility wide cost savings derived from dosing non-obese patients treated with IVIG using ideal body weight instead of actual body weight.

**Methods:** This is a retrospective study comprised of chart reviews of patients who were treated with IVIG between October 2015 and March 2016. Via the new P&T-approved dosing protocol, a pharmacist identified and adjusted the dosing of non-obese patients (actual body weight (ABW) < 125% of ideal body weight (IBW)) that had been prescribed IVIG. The pharmacist reviewed the medication order per standard Banner Estrella pharmacy verification protocol and, once it was determined that the medication was appropriate, the pharmacist calculated the dose from the physician order using the patient’s IBW. Obese patients continued to be dosed based on adjusted body weight (AdjBW). This retrospective study included all patients who were eligible to receive IVIG during the study period. All ethnicities and age ranges were included in the study and there were no exclusion criteria. Information on any adverse reactions that the patient may have reported as well an information relating to the indication for use of IVIG were collected. The cost per patient (non-obese) associated with ideal body weight dosing was compared to the theoretical cost of treating the same patient using actual body weight dosing using a paired t-test with p value <0.05 to indicate statistical significance.

**Results:** During the 6-month study period, 16 patients (11 obese; 5 non-obese) were treated with IVIG at our facility. In the non-obese population, a total of 240g IVIG over 9 doses (26.7 gm/dose) was administered based on IBW versus a theoretical 310gm (34.4 gm/dose) if those same patients had been dosed based on ABW. Converting the non-obese patients from ABW to IBW saved an average of 6gm/dose + 2.24gm/dose (p=0.002, 95% CI 3.22, 8.78). This change resulted in a cost savings of $402/dose + $149.82/dose (p=0.002, 95% CI 215.98, 588.02). In the obese population, a total of 1000gm over 33 doses (30.3gm/dose) was administered based on AdjBW versus a theoretical 775gm (23.5gm/dose) based on IBW. This would create a theoretical additional cost savings of $456.82/dose (p=0.0001, 95% CI 274.74, 638.90). The majority of the patients were female (75%) and >60 yo (56%). Thirty-eight percent of patients were treated for Guillain-Barre syndrome (n=6), 25% (n=4) for hypogammaglobulinemia, 13% (n=2) for each Myasthenia Gravis and polymyositis, and 6% (n=1) for each ITP and CVID. Two patients in the obese group had documented adverse drug reactions (injection site reaction, positive syphilis serological test). No incidence of hypotension, allergic reaction, or acute kidney injury occurred.

**Conclusion:** A pharmacist-led conversion of IVIG dosing based on IBW versus ABW in non-obese patients resulted in a significant total cost savings of $4,690 during our study period. In addition, an expansion of the IBW-based dosing protocol to all patients, including obese patients, could have provided an additional cost savings of $15,075. During this time, no serious adverse effects were documented in either group. This study was purely a cost-savings analysis and did not evaluate differences in clinical outcomes between the dosing strategies.

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**Title**: Magnesium repletion in hospitalized patients: evaluation of the efficacy of a hospital system electrolyte replacement protocol

**Purpose**: Electrolyte abnormalities are a common finding throughout hospitalized patients, specifically those in critical care units. Recently, electrolyte replacement protocols have become a more common practice in response to these frequent abnormalities, and have enabled more timely and uniform patient care. The goal of this study was to evaluate the efficacy of a magnesium replacement protocol established for the general in-patient population and critical care patients throughout a multi-state hospital system.

**Methods**: This multi-state, retrospective study reviewed patient charts within 24 hospitals who received magnesium replacement within a two week time-frame in October 2015. Per the protocol, patients received magnesium oxide 400 mg oral (PO) for two doses or magnesium sulfate 2 gm intravenous (IV) for one or two doses, depending on initial magnesium level, with a follow-up level ordered 4 hours after the last dose. The goal magnesium level was defined as 2.0 mg/dL, all patients with levels <2.0 mg/dL were eligible for replacement. Inclusion criteria were patients 18 years or older admitted with a general medical or critical care status who received magnesium replacement ordered through the protocol. Exclusion criteria included: end-stage renal disease, acute kidney injury defined as an increase of serum creatinine of 0.5 mg/dL or greater, dialysis, complete parenteral nutrition, pregnancy, diabetic ketoacidosis, or scheduled magnesium orders. The primary outcome was reaching the goal magnesium level after the initial replacement dose was administered. Secondary outcomes included comparing route of administration (IV or PO) and location (general medical or critical care), and determining the number of additional replacement doses necessary if the initial replacement was not sufficient. Data was evaluated using chi square and logistic regression analyses.

**Results**: Of 500 randomly selected charts included in this study, 329 (65.8%) patients reached the goal serum magnesium level after the initial replacement protocol. A comparison between route of administration showed that IV magnesium sulfate was associated with a higher percentage of patients reaching goal compared to PO magnesium oxide, 87.9% vs 30.6%, respectively (p<0.001). No difference was observed when comparing location of the patient and number of patients reaching goal magnesium (p=0.639). An average of 1.35 additional protocols were administered to 99 patients who did not reach goal serum magnesium after the initial magnesium dose. Only 6.5% of IV doses required additional replacement doses compared to 40.9% of PO doses (p<0.001). The time range of follow-up magnesium levels ranged from 1 – 12 hours. Independent predictors of reaching goal serum magnesium included the initial magnesium level, route, and time of level after the magnesium dose was received.

**Conclusions**: Based on the results of the study, a significantly greater number of patients reached the goal serum magnesium level after receiving the IV magnesium replacement dose(s) compared to the PO doses, and required less additional replacement doses. The timing of the follow up serum magnesium level after the replacement dose appeared to impact the outcome of reaching the goal magnesium level, warranting future research.

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IRB Status: Approved

**Title**: Discontinuation of caffeine in the neonatal intensive care unit

**Purpose**: The purpose of this study is to assess the relationship between neonatal chronic lung disease and the age that caffeine therapy was discontinued. Current evidence confirms that use of caffeine in premature neonates with apnea of prematurity decreases the incidence of chronic lung disease. However, evidence is lacking to determine the optimal time to discontinue caffeine therapy in these patients.

**Methods**: This retrospective study pooled data from two Level III Neonatal Intensive Care Units within the same health system. Patients were eligible for enrollment if they were born at a gestational age of less than 32 weeks and received a maintenance dose of caffeine for at least 2 weeks. We evaluated incidence of chronic lung disease, and corrected gestational age at last use of endotracheal tube, positive pressure ventilation, and supplemental oxygen.

**Results**: Of the 200 patients enrolled, mean gestational age was 28.2 weeks and mean body weight was 1117.8 grams. There was a lower incidence of chronic lung disease when caffeine therapy was continued to a cGA 34 weeks, however no difference was found when therapy was discontinued between cGA 34 and 36 weeks. There was no association between duration of caffeine therapy and age at last use of endotracheal tube, positive pressure ventilation, or supplemental oxygen.

**Conclusion**: A lower rate of chronic lung disease was observed in patients where caffeine was discontinued at 34 weeks or later. Corrected gestational age at caffeine discontinuation did not affect age at last use of endotracheal tube, positive pressure ventilation, or supplemental oxygen. Future prospective, randomized studies are needed to determine ideal cGA to discontinue caffeine.
Title: Efficacy and safety of 3-factor prothrombin complex concentrate versus fresh frozen plasma in a major or life-threatening bleed on warfarin, apixaban, and rivaroxaban

Purpose: The purpose of the study is to assess the efficacy and safety of 3-factor prothrombin complex concentrate (PCC3) in comparison to fresh frozen plasma (FFP) for the reversal of warfarin, apixaban, and rivaroxaban in a major or life-threatening bleed as ascribed in the Banner Health (BH) Anticoagulant Reversal careset.

Methods: A retrospective chart review of patients from 9 BH facilities from May 1, 2015 to December 31, 2015 who received the BH Anticoagulant Reversal careset. Inclusion criteria included patients who received PCC3 or FFP while experiencing a major or life-threatening bleed as defined by the International Society on Thrombosis and Haemostasis/Scientific and Standardization Committee (ISTH/SCC) from warfarin, apixaban, or rivaroxaban. The primary outcome measured was the incidence of stabilization of the bleed in 24 hours or INR less than 1.5 within 15 minutes of PCC3 or FFP in order to assess efficacy of the reversal agents. The secondary outcome was incidence of cerebrovascular attack (CVA), myocardial infarction (MI), deep venous thrombosis (DVT), pulmonary embolism (PE), and/or death within 30 days after administration of PCC3 or FFP to assess safety of the reversal agents. Hospital length of stay for each patient was also collected. An additional secondary outcome was to determine if efficacy and safety of the reversal agents varied if a patient was receiving warfarin versus apixaban or rivaroxaban.

Results: Forty-eight of the 189 patients for whom the BH Anticoagulant Reversal careset was initiated met criteria for inclusion in the study. The incidence of stabilization of the bleed within 24 hours after administration of the reversal agent was 27 out of the 32 (84.4%) patients receiving PCC-3 and 7 out of the 15 (46.7%) patients receiving FFP (p-value = 0.013). None of the INR measurements were completed within 15 minutes of administration of the reversal agent to assess if INR was less than 1.5. The composite of CVA, MI, PE, and DVT in the PCC-3 arm resulted in 6 events (18.8%) compared to 2 events (12.5%) in the FFP arm (p-value = 0.701). The median hospital length of stay in the PCC3 arm was 3 days compared to 4 days in the FFP arm. Efficacy and safety with regard to the reversal of warfarin versus apixaban or rivaroxaban with PCC3 versus FFP could not be assessed due to small sample size.

Conclusion: In this retrospective chart review, PCC3 had a higher incidence of stabilization of the bleed within 24 hours compared to FFP. Neither PCC3 nor FFP were associated with a higher incidence of cerebrovascular attack (CVA), myocardial infarction (MI), deep venous thrombosis (DVT), pulmonary embolism (PE), and/or death within 30 days. Further studies are indicated to assess a larger cohort that captures a greater number of adverse events related to reversal agents.

Title: Impact of treatment guidelines on antibiotic use for urinary tract infections (UTIs) in the emergency department (ED)

Purpose: The purpose of this study was to improve prescriptive adherence to national practice guidelines for UTIs in the ED as well as facilitate an Indian Health Service (IHS) initiative to establish an antimicrobial stewardship program (ASP). An ASP is dedicated to optimizing the treatment of infections, reducing adverse effects associated with antibiotic use, and limiting the selection of antibiotic-resistant bacterial strains. This quality improvement project utilized data to compare two time periods before and after an intervention to evaluate its impact on antibiotic use at Phoenix Indian Medical Center (PIMC).

Methods: Retrospective and prospective chart reviews were performed surrounding the implementation of a treatment guideline and electronic health record (EHR) order set following two separate preliminary education sessions intended to orient pharmacists and ED providers to its anticipated utility. Patients were identified by conducting a series of drug utilization evaluation (DUE) reports for oral antibiotics commonly prescribed for UTIs. American Indian/Alaska Native females eighteen to sixty-four years of age who have received an oral antibiotic for the treatment of an uncomplicated UTI as diagnosed by a PIMC ED provider were considered for review. Those with a genitourinary tract abnormality, positive pregnancy status, disease or drug-induced immunosuppression, current catheter placement or catheterization within the preceding forty-eight hours, or an active order for suppressive antibiotic therapy to prevent UTIs were excluded. Patient selection occurred in two phases utilizing two reviewers. Appropriateness of antibiotic use was assessed by one reviewer using a modified Centers for Disease Control and Prevention (CDC) Get Smart for Healthcare assessment tool with a primary endpoint of either adherent or nonadherent. Secondary endpoints included effectiveness of preliminary education to alter prescribing practices and trends in attributable factors relating to
Purpose: Pirfenidone can slow the progression of idiopathic pulmonary fibrosis (IPF) and decrease mortality. The exact mechanism is unknown, though is likely due to inhibition of transforming growth factor beta (TGF-beta) which is also a known contributor of wound healing. The purpose of this study was to evaluate whether continuation of pirfenidone until lung transplant increases the risk of impaired wound healing after transplant. This information will provide guidance on whether to continue pirfenidone in patients who have been listed for transplant, or whether it needs to be stopped prior to listing to allow for a wash out period.

Methods: A retrospective chart review was completed of patients who underwent lung transplantation for pulmonary fibrosis at Norton Thoracic Institute from 1/1/14 to 12/31/15. Patients who received a lung transplant who had been treated with pirfenidone were placed in the pirfenidone group and lung transplant patients with no pirfenidone exposure were placed in the control group. The primary endpoint was occurrence of impaired wound healing, defined as: delayed or defective healing of surgical incision, anastomotic dehiscence, or sternal malunion. This endpoint was measured as a categorical variable. Pirfenidone dosing regimen and duration of therapy was also reported. Patient characteristics included: age, sex, body mass index (BMI), glucose, renal function, liver function, and whether patients were receiving steroids prior to transplant. It was also reported whether patients were inpatient prior to the transplant and whether patients were on an ECMO bridge to transplant. Immunosuppressant medications post-transplant were also collected. Demographic and clinical characteristics for both groups were reported using chi-square, Fisher’s exact and t-tests with alpha = 0.05.

Results: There were 18 patients who received pirfenidone and 18 control patients with no exposure to pirfenidone. Baseline characteristics were similar between the two groups, including: age, sex, BMI, renal function, liver function, glucose, pre-transplant corticosteroid use, and immunosuppressant therapy post-transplant. In the pirfenidone group, 2 patients were inpatient prior to transplant, compared to 4 control patients (1 control patient was on ECMO as a bridge to transplant). The majority of patients received double lung transplants, however the pirfenidone group included 3 single lung transplants. Pirfenidone was discontinued more than one day prior to transplant in 5 patients and these were excluded, 5 corresponding controls were also excluded. The final review included 13 patients who continued treatment with pirfenidone until lung transplant and 13 control patients. After a minimum follow up time of 84 days there were no occurrences of impaired wound healing in either group. In the pirfenidone group, 9 patients were being treated with a dose of 801 mg three times a day, however 4 patients were receiving reduced doses due to tolerability. All 13 patients had been on pirfenidone for at least 30 days and 9 patients had been on pirfenidone for greater than 90 days.

Conclusion: In this series, patients had no evidence of delayed/defective healing of surgical incision, anastomotic dehiscence, or sternal malunion within 90 days of lung transplantation despite continuing pirfenidone up until lung transplantation.
documentation of vaccine administration in the electronic medical record. Appropriateness was based on the current immunization protocol, which consists simply of a quick order without a written formal, standardized immunization protocol in place.

**Results:** Of the 1445 patients screened, 990 met the inclusion criteria and 671 were deemed eligible for vaccination and 319 were deemed ineligible for vaccination at discharge per the Centers for Disease Control recommendations. Of the 319 ineligible patients, 259 had already received the appropriate pneumococcal vaccine and did not require further vaccination at the time of discharge. The majority of patients included were white males with an average age of approximately 66. Overall, the pneumococcal vaccine was appropriately administered in 2 of the 671 eligible patients and no individuals received the vaccination if they were ineligible. The immunization protocol was ordered by the physician in 782 (79%) patients and of these patients, 2 of the 533 patients who were deemed eligible for vaccination per guideline recommendations actually received the pneumococcal vaccine. Of the 990 patients, only 2 were appropriately screened and documented by nursing.

**Conclusion:** Success of overall pneumococcal vaccination at discharge was low. These results were consistent regardless if the physician initiated the immunization protocol or not at discharge. With the current protocol, approximately 669 eligible patients missed an opportunity for screening and administration of the pneumococcal vaccine in a two month time frame. We believe it is crucial to implement a written formal, standardized immunization protocol that can be uniformly used across all services.

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**Title:** Safety of allopurinol use in chronic kidney disease: a Veterans Affairs perspective

**Purpose:** Management of hyperuricemia in chronic kidney disease (CKD) with allopurinol is a controversial topic. There is no validated treatment strategy, nor is there general consensus in guiding therapy. The American College of Rheumatology makes no firm recommendations past initial starting doses and admits a lack of evidence in the topic. Additionally there are several alternative methods in the literature for renally adjusted dosing of allopurinol, none of which have been validated in clinical practice. The purpose of this study was to evaluate the use of allopurinol in subjects with CKD and assess the incidence of adverse drug events (ADEs).

**Methods:** This is a retrospective chart review performed by identifying veterans aged 18-80 years, with ICD-9 documented CKD stages II-V and a new prescription for allopurinol over a 3 year period. Data was collected for 1 year following date of a new prescription for allopurinol. The primary outcome was to assess allopurinol dose ranges and ADE occurrence. Dose ranges were defined as <100mg/day, 101-299mg/day, and >300mg/day of allopurinol. Secondary outcomes were to assess ADE occurrence with respect to dialysis status, index allopurinol dose, and final allopurinol dose. Demographic data and concomitant medication exposures were also collected. Of note, a power calculation to power this study was not performed due to variability of allopurinol related ADE rates in the literature, meaning this study may not have been adequately powered for statistical analysis.

**Results:** The primary outcome was not statistically significant for ADE occurrence with respect to allopurinol dose range (p=0.15). Patients receiving dialysis were found to be more likely to have an ADE related to allopurinol than patients who were not on dialysis (p=0.0036). The average index and final allopurinol doses were not found to be different in patients who had an ADE and those who did not (p=0.25 for index dose, p=0.34 for final dose). Of note, approximately 30% of patients were prescribed non-steroidal anti-inflammatory drugs (NSAIDs) during the study given the cautionary use in the setting of CKD.

**Conclusions:** Results of this study suggest that there is not a link between escalating doses of allopurinol and ADE occurrence in the setting of CKD amongst veterans. The study did find significantly more ADEs in patients on dialysis. As a result, patients utilizing dialysis may benefit from increased monitoring, more conservative dosing, and more thorough counseling by providers in the setting of allopurinol therapy. Given the limitations of this study more prospective research with larger populations, longer observation periods, and multiple sites are needed to better elucidate the possible risk of ADE occurrence in patients utilizing allopurinol with concurrent CKD.

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**Title:** Anticholinergic medication use and the risk of community-acquired pneumonia in an older veteran population

**Purpose:** Community-acquired pneumonia (CAP) is a leading
cause of morbidity and mortality among older patients. Identifying medications that pose risk of CAP in the aging population can help health care providers take preventive action to reduce use of these medications in their older patients. The purpose of this study was to investigate the association between anticholinergic medication use and the rate of community-acquired pneumonia among an older veteran population.

**Methods:** Using electronic health records, the study identified veterans aged 65 to 89 years. Among this population, the study found a case group of patients who have CAP diagnosis, matched these patients by age at the time of CAP diagnosis to a control group of patients without CAP diagnosis, then looked back to compare anticholinergic medication use in each group. To determine if there was an increased rate of CAP with anticholinergic agent use, any fill of anticholinergic medication within the one year prior to CAP diagnosis was noted. To determine if there was a difference between acute versus chronic anticholinergic use in relation to the rate of CAP, acute use was defined as a fill of any anticholinergic medication in the 90 days prior to CAP diagnosis, and chronic use was defined as 3 or more fills in the one year prior to CAP diagnosis. Data collection also included age, sex, and smoking status as well as relevant concurrent medications and comorbidities. The case and control groups were compared using Chi-square test with a priori alpha set at 0.05.

**Results:** Two hundred and two patients met inclusion criteria (mean age 73, 97.6% male). Case subjects were found to have significantly higher rates of the following risk factors: smoking, COPD, dementia, stroke, opioid and home oxygen use. Use of any anticholinergic medication in the year prior to index date was observed in 35% of cases with CAP and 17% of controls without CAP (odds ratio (OR) = 2.683, 95% confidence interval (CI) = 1.480-4.863). Acute use of anticholinergics was observed in 23% of cases and 7% of controls (OR = 3.887, 95% CI 1.755-8.605), and chronic use was observed in 21% of cases and 10% of controls (OR = 2.260, 95% CI 1.102-4.634). Any anticholinergic use, acute anticholinergic use, and chronic anticholinergic use were all found to be significantly associated with increased risk of CAP.

**Conclusions:** In this study of an older veteran population, anticholinergic medication use is significantly associated with increased risk of CAP. This was seen with any anticholinergic use in the year prior to CAP, acute use (at least 1 fill) in the 90 days before CAP, and with chronic use (3 or more fills) in the year prior to CAP.
An average of 11 days of carbapenem use was spared per patient (220 days spared total). Third, the survey of HO-CDI cases exposed that 20% were possibly mis-diagnosed due to unnecessary C. difficile polymerase chain reaction (PCR) testing. One in five HO-CDI patients were administered laxatives within 24 hours of their positive PCR lab result. These patients may have been noninfectious C. difficile carriers who had laxative-induced diarrhea but were erroneously diagnosed and treated for CDI.

**Conclusion:** Three quality improvement initiatives of a newly established ASP have actionable results. The inappropriate concurrent use of MTZ and PIP-TAZ inspired a provider education intervention event. The substitution of fosfomycin for carbapenems in MDRO UTIs will be continued because it was successful for most patients and substantially decreased carbapenem use. To address HO-CDI mis-diagnosis, a new CDI PCR order set was implemented where the provider answers questions about laxative use before order release. The ASP will continue to document its progress.

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**Title:** Determining the impact of a piperacillin-tazobactam shortage on broad-spectrum antimicrobial prescribing in hospitalized adult patients

**Purpose:** Piperacillin-tazobactam is a broad-spectrum antibiotic with aerobic and anaerobic activity that has been FDA approved for the following indications: intra-abdominal infections, skin and skin structure infections, female pelvic infections, community-acquired pneumonia, and nosocomial pneumonia. Recently, there has been a national shortage of piperacillin-tazobactam. In response to this shortage, HonorHealth restricted use of piperacillin-tazobactam and informed providers that alternative agents should be used for empiric therapy in patients during the critical shortage. The objective of this study was to analyze the impact of the piperacillin-tazobactam shortage on broad-spectrum antibiotic prescribing of meropenem, ertapenem, cefepime and levofloxacin.

**Methods:** This was a retrospective drug-use evaluation of patients greater than or equal to 18 years of age who received at least one scheduled dose of a study medication. Broad-spectrum antibiotic prescribing was compared during three time periods: prior to the national shortage, during the shortage, and after the shortage ended. Medication dispense data from the pharmacy dispensing system was utilized to determine the number of doses dispensed for each study antibiotic and the prescribing physician’s specialty. The primary outcome of this study was to compare the differences in days of therapy (DOT) per 1000 patient days for patients on meropenem, ertapenem, cefepime and levofloxacin. Secondary outcomes included comparison of prescribing between physician specialties (infectious diseases, critical care, internal medicine, etc.), hospital-acquired Clostridium difficile infection (HA-CDI) and vancomycin-resistant Enterococci (VRE) rates between groups. Patient days were calculated based on the internal hospital quality database. This project received institutional review board (IRB) approval.

**Results:** During the piperacillin-tazobactam shortage, there was increased use of almost all study antimicrobials. Meropenem and ceftazidime were the agents with the greatest increase in utilization during the shortage period; meropenem use increased by 150 percent and ceftazidime by close to 70 percent. After the shortage, the use of both agents returned close to baseline. Levofloxacin use increased by approximately 20 percent during the shortage and did not return to baseline following the shortage. In contrast, use of ertapenem remained stable throughout the shortage period. Among hospitalists, levofloxacin use initially increased during the shortage; however, ceftazidime use increased throughout the shortage. During the shortage, use of meropenem, levofloxacin and ceftazidime all increased by greater than 50 percent by the intensivists; however, the use of meropenem and ceftazidime by infectious disease physicians increased only by approximately 20 percent. There was not a well-defined alteration in the rates of HA-CDI; however, rates of VRE appeared to increase during the shortage and decreased initially post-shortage.

**Conclusion:** The piperacillin-tazobactam shortage was associated with alterations in antimicrobial prescribing. In this study, meropenem and ceftazidime use increased to a greater extent than the other agents included. Although not proven statistically, increased VRE rates were measured during the shortage period where ceftazidime use increased by greater than 50 percent.

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**Title:** Prevalence of medication related hospital admissions and readmissions at the Phoenix Veterans Affairs Health Care System
Purpose: As our healthcare system continues to evolve, preventative care and quality measures remain a priority to reduce both hospital admissions and re-admissions. However, approximately 16.2 million emergency department visits result in hospital admissions annually. Additionally, 20 percent of Medicare beneficiary discharges result in 30 day re-admissions and incur avoidable costs. Identifying medication related admissions would be of benefit to improve quality of care provided to patients, reduce healthcare costs and reduce preventable admissions. The purpose of this study is to determine the prevalence of medication related hospitalizations and subsequent 30 day re-admissions at the Phoenix Veterans Affairs Healthcare System (PVAHCS).

Methods: A protocol describing this research project was approved by the Institutional Review Board (IRB) at PVAHCS. Patients 18 years and older admitted to the Veterans Affairs medicine or critical care units between March 1st, 2015 and March 31st, 2015 were included in this retrospective chart review. Patient profiles were reviewed and information including demographic information and hospital admission data were collected. The data was assessed utilizing the Amended Hallas criteria to determine if the hospital admission was medication related or not. If the hospitalization scored definite or probable for causality on the Amended Hallas criteria, the Winterstein et al criteria was used to determine preventability of the medication related admission. The underlying cause for the medication related hospitalization was also categorized. The disease state associated with all of the admissions and re-admissions were identified and collected. Descriptive statistics were used to analyze and report the results from the study.

Results: Results to be presented at conference.

Conclusion: Conclusion to be presented at conference.

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Title: Assessing Clinical Cure of Ceftriaxone for Urinary Tract Infections

Purpose: Urinary tract infections (UTIs) are among the most prevalent bacterial infections in the United States. The Infectious Diseases Society of America (IDSA) guidelines recommend levofloxacin or ciprofloxacin as empirical therapy for patients with complicated UTIs where resistance of community pathogens to fluoroquinolones is not known to exceed 10%. In response to the decreasing susceptibility of Escherichia coli to quinolones per the local antibiogram, the Northwest Medical Center (NMC) recommends ceftriaxone for the empirical treatment of complicated UTIs. The purpose of this study is to assess the clinical cure rate of UTIs at 30 days after the initiation of antibiotics.

Methods: This was a prospective observational study of non-pregnant, non-lactating adult patients admitted to NMC with a positive urine culture from December 2015 to May 2016. Electronic medical records were reviewed to collect the following data: diagnosis of UTI, clinical signs and symptoms of UTI and the use of an antibiotic for ≥3 days. Indication for urinary catheterization or urologic intervention and treatment for asymptomatic bacteriuria or an infection other than a UTI excluded patients from this study. Thirty days (+/- 5 days) after initial antibiotic treatment was initiated and after the patient was discharged from the hospital, a telephone survey was conducted to assess if clinical resolution was achieved. The primary endpoint was the clinical cure rate of inpatient UTIs in patients discharged from NMC at 30 days post-treatment initiation. Clinical failure is defined as persistent symptoms or initiation of additional antimicrobial treatment after discharge for UTIs, as reported upon follow-up at 25-35 days post-treatment initiation. Secondary endpoints included antibiotic adherence post-discharge, clinical cure rates of empirical treatment with ceftriaxone vs. non-ceftriaxone, antibiotic side effects, and clinical cure rate based on duration of therapy. This study was approved by the NMC Institutional Review Board.

Results: Chart review was completed on a total of 66 patients; however, 18 were excluded for being treated for asymptomatic bacteriuria. At approximately 30 days post-antibiotic initiation, the clinical cure rate of UTIs in patients discharged from NMC as reported by resolution of signs and symptoms was 81% (25 of 31). Clinical cure of empirical antibiotic therapy with ceftriaxone versus a non-ceftriaxone antibiotic was 78% versus 75%, respectively (95% CI, 3.0-9.6; P = 0.85). Among patients who received a beta-lactam antibiotic as definitive inpatient therapy, 92% reported UTI resolution UTI compared to only 43% of those who received a non-beta-lactam antibiotic for definitive therapy (95% CI, 31.2-66.4; P = 0.004). The majority of patients were prescribed a cephalosporin upon discharge for outpatient therapy and 93% (25 of 27) reported adherence to outpatient antibiotics. Of the 25 patients who experienced clinical cure of their UTI, 3 patients received less than 5 days of antibiotics, 10 patients received 5-10 days of antibiotics, and 12 patients received more than 10 days of antibiotics.

Conclusion: This study demonstrates that the clinical cure rate of UTIs in patient discharged from NMC is 81%, which is within the reported range of clinical cure rates in published literature. It also suggests that beta-lactam antibiotics tailored on the basis of local resistance data and susceptibility results are an effective treatment of UTIs. Additionally, longer durations of antibiotic therapy are not necessarily associated with a higher rate of clinical cure. Several patients were excluded for being treated for asymptomatic bacteriuria. Education to reinforce withholding treatment of...
asymptomatic bacteriuria may help prevent undesirable outcomes, including antimicrobial resistance and cost.

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IRB Status: Exempt

Title: Impact of PharmD outpatient transitions of care on hospital readmissions

Purpose: In 2006, the Institute of Medicine reported at least 1.5 million preventable medication-related adverse events occur each year. Preventable medication errors often lead to hospital readmission which in turn increases heath care costs and is also linked to higher mortality rates. Studies show clinical pharmacists can aid to reduce these readmissions through medication therapy management (MTM). The objective of this study is to compare 30-day and 60-day readmission rates for high risk patients who received a comprehensive medication review (CMR) by a pharmacist after hospital discharge compared to those who did not.

Methods: North Country HealthCare (NCHC) incorporated a pharmacist into the transition of care (TOC) program in July 2014 after a pilot project identified the need for a reduction of medication errors in hospitalized high risk patients. The TOC team reviews upcoming hospital follow-up appointments and identifies high risk patients that would benefit from pharmacy services utilizing the BOOST (Better Outcomes for Older Adults through Safe Transitions) tool. These patients then receive a CMR by the clinical pharmacist prior to the appointment with the provider. The effectiveness of this program for hospital readmission has not been assessed. This is a quality improvement project to determine the impact of the program. The study is a retrospective, observational, chart review to look at high risk patients discharged from Northern Arizona Healthcare (NAH), specifically at Flagstaff Medical Center (FMC), between July 2013 to June 2014 (no CMR performed) and July 2014 to June 2015 (CMR performed). The primary outcomes are to compare FMC readmission rates at 30 and 60 days. Secondary outcomes are the percent of patients seen at the clinic within 7 days after hospital discharge and percent of medication reconciliation performed.

Results: A total of 459 patients were included in the study. Patients who received a CMR had a 30-day readmission rate of 20.34% (59/290) and a 60-day readmission rate of 34.14% (99/290) compared to 23.08% (39/169) and 36.09% (61/169), respectively in the no CMR group. The results were analyzed using Pearson’s Chi-Squared test with Yates’ continuity correction, and were not statistically significant. Surprisingly, for the secondary outcome, 40% (116/290) of patients with CMR had an office visit within 7 days of discharge compared to 61.5% (104/169) of patients without a CMR (p <0.001). Lastly, medication reconciliation was done for 99.3% (288/290) of patients in the CMR group compared to 81.7% (138/169) of patients in the no CMR.

Conclusion: The pharmacist-led TOC program trends towards reduction of 30 and 60-day hospital readmissions. Unfortunately, the sample size did not allow for detection of the small reduction rates. Additionally, there was a decrease in patients being seen by a NCHC provider within 7 days of hospital discharge. The data obtained from this study will help initiate discussion around improving collaboration on the interdisciplinary care team and implementing strategies to expedite patient’s access to care.

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IRB Status: Approved

Title: Evaluation of nurse-driven influenza vaccination protocol for appropriate patient screening, administration, and documentation at a tertiary hospital (25)

Purpose: The purpose of this study was to determine the appropriateness and efficacy of a nurse-driven vaccination protocol for influenza vaccination in a veteran population at the Phoenix Veterans Affairs Health Care System (PVAHCS).

Methods: This was a retrospective, observational study. Adult patients discharged between November 1, 2014 and December 31, 2014 were included in this study. Patients were excluded if the necessary data was not retrievable. Descriptive statistics were used to describe the demographics as well as the utilization of the immunization protocol and appropriate nursing screening and documentation of vaccination. Chi-square or Fisher’s exact tests were used for nominal data regarding the overall successful administration of the influenza vaccine. Alpha was set at 0.05. The primary objective of this study was to evaluate the efficacy of the nurse driven vaccination protocol to successfully provide influenza vaccination at discharge. The secondary objectives of this study were to evaluate the utilization of the vaccination protocol by the medical staff and to evaluate the efficacy of nurses in screening for appropriate vaccination and appropriate documentation of vaccine administration in the electronic medical record.

Results: Of the 1445 patients screened, 990 met the inclusion criteria and 490 were deemed eligible for vaccination and 500 were deemed ineligible for vaccination at discharge per guideline recommendations. The majority of patients
cluded were white males with an average age of approximately 66 years. Overall, influenza vaccine was appropriately administered in only 62 of the 490 (13%) eligible patients (p<0.001). The immunization protocol was ordered by the physician in 782 (79%) patients, and of these patients, 54 of the 389 (14%) patients who were deemed eligible for vaccination per guideline recommendations actually received the influenza vaccine. Additionally, in those patients in whom the immunization protocol was not ordered (n=208), 7 of the 101 (7%) patients who were deemed eligible for vaccination per guideline recommendation actually received influenza vaccine even without prompting from the physician. Of the patients who were appropriately screened and were vaccinated, 58 out of 62 (93%) of patients had their vaccinations appropriately documented by nursing in the electronic medical record.

**Conclusion:** Initiation of immunization protocol, assessment of influenza vaccination eligibility and administration of influenza vaccine to eligible patients are areas for improvement at the PVAHCS.

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**Category:** Acute Care

**IRB Status:** Approved

**Title:** Evaluation of albumin utilization in hospitalized adults

**Purpose:** The appropriate clinical indication for the use of albumin versus crystalloids has been a topic of extensive debate. Strong evidence to support one medication over the other is inconclusive in the majority of clinical indications. There are proposed theoretical advantages to the use of albumin, yet there is a lack of clear data demonstrating improved clinical outcomes with albumin use. The administration of albumin also has greater financial burden relative to crystalloid alternatives. The primary objective of this evaluation is to determine the utilization of albumin in a community hospital and to identify potential opportunities for improvement in its use.

**Methods:** This evaluation was a retrospective review of patients 18 years of age or older who received albumin between January 1, 2015 and March 31, 2015. The following demographic information was collected and evaluated: age, gender, admission weight, incidence of heart failure or liver disease, albumin formulation, schedule, indication, duration of therapy, total grams of albumin used, and prescriber specialty. Appropriateness of therapy was evaluated. Descriptive statistics will be used to describe the use of albumin.

**Results:** There were 140 patients evaluated with the majority of patients being male (59 percent) and a mean age of 63 years. Patients with heart failure and liver disease made up 10 percent and 11 percent of the patients, respectively. The most common indications for albumin were treatment of shock and diuresis. A total of 338 orders were prescribed with 5 percent of the orders deemed appropriate, 71 percent possibly appropriate, and 24 percent inappropriate. The inappropriate orders accounted for 3,350 grams (31 percent) of the total 10,958 grams prescribed. Scheduled orders accounted for 14 percent of orders while “1X Only” orders accounted for 78 percent of orders. Prescriber specialties with the most orders were intensivists (50 percent), nephrologists (14 percent), and cardiovascular surgeons (11 percent).

**Conclusions:** The majority of albumin use at Banner Desert Medical Center fell into the possibly appropriate category with a fair amount of inappropriate use. Physicians appropriately assessed the need for albumin therapy on a daily basis as most orders were not scheduled. Specialties that primarily prescribed albumin were identified for education of appropriateness of albumin therapy and fluid resuscitation. Overall, financial impact of albumin therapy was estimated at a savings of $10,000 during these three months.

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**Category:** Acute Care

**IRB Status:** Approved

**Title:** Prophylactic ondansetron administration with intravenous opiates in emergency department patients

**Purpose:** The primary purpose of this study is to determine if prophylactic ondansetron administered with intravenous (IV) opiates prevents nausea and vomiting secondary to opiate administration. Current literature suggests prophylactic promethazine, metoclopramide and prochlorperazine are not effective at preventing opiate-induced nausea or vomiting secondary to opiates. However, there is no data evaluating ondansetron's efficacy for preventing opiate-induced nausea and vomiting.

**Methods:** This prospective observational study was conducted in the emergency department at two academic medical institutions in the same healthcare system. Enrollment began November 21, 2015 and continued until January 21, 2016. Patients were eligible for enrollment if they were prescribed an IV opiate with or without IV ondansetron and had no baseline nausea. Patients were excluded if they received an opiate within 24 hours of enrollment, less than 18 years of age, or if they received an antiemetic other than ondansetron. Nausea was assessed using a verbal numerical rating scale (0-10). Patients’ level of
nausea was evaluated at baseline, 5 minutes, and 30 minutes after the IV opiate was administered. Patients were followed for up to 2 hours to assess emesis and rescue medication requirements. A subgroup analysis was performed comparing the different IV opiates to determine if nausea or vomiting was affected by which opiate was administered.

**Results**

A total of 133 patients were enrolled with a mean age of 48 years and approximately 50% were female. Ninety percent of patients presented to the emergency department with a chief complaint of pain. Sixty-four patients received only an IV opiate and 69 patients received IV ondansetron with the IV opiate. Of the 133 patients 25 (18.7%) developed nausea secondary to opiate administration. One (0.75%) patient had an emetic event and 3 (2.3%) patients received a rescue antiemetic medication within 2 hours after an opiate was administered. There was no statistical difference in nausea between patients that were pretreated with ondansetron 5 minutes after the opiate injection. Paradoxically, patients that received ondansetron with an IV opiate were more likely (p=0.047) to be nauseous at 30 minutes. There was no statistical difference in emesis between treatment groups. Subgroup analysis found no difference of nausea or emesis between opiates administered (fentanyl, morphine or hydromorphone).

**Conclusion:** Our evaluation found ondansetron is not effective at preventing nausea or vomiting secondary to opiate exposure. Based on these findings and previous literature about other antiemetics, providers should preserve all antiemetics for patients complaining of nausea or actively vomiting.

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**Title:** Pharmacists’ experience with a medication safety committee’s structure, responsibilities, and roles

**Purpose:** The Institute of Medicine (IOM) released a report in 1999 quantifying the problem of medical errors in the United States. The Authors revealed in their report that medical errors kill 44,000 to 98,000 patients annually and two out of every hundred admissions experience a preventable adverse drug event. As the result of the call to action by IOM, hospitals are focusing their attention and establishing strategies to improve the safe use of medications. The objective of this study is to explore different models of medication safety committees in hospitals and the pharmacists’ experience with their contribution to such committees.

**Methods:** A national list of academic hospitals was created. Hospitals from this list were eligible for inclusion if they: fully met the standards of Leapfrog hospital rating for “steps to avoid harm”; had a medication safety committee (MSC); and if a pharmacist was assigned to this committee. The pharmacy representative to the MSC was contacted and invited to participate in the study. Phone interviews were conducted with participants using a standardized set of interview questions designed for this study. Participant interviews were recorded and then transcribed into a word-processing computer program. All data were recorded without participant identifiers to maintain confidentiality. The transcribed interviews were analyzed descriptively.

**Results:** Out of one hundred and thirty hospitals, only thirty hospitals fully met the standards of Leapfrog hospital rating for “steps to avoid harm”. Thirteen out of the thirty hospitals agreed to participate. Participants were located in nine different states. The most common position title of the interviewed person was the Medication Safety Pharmacist (9 of 13). The annual number of meetings for the MSC was either ten (3 of 13) or twelve (10 of 13). Most of the MSCs included a range of twenty to twenty-nine members (7 of 13). All of the MSCs except for one reported to one or more other committees. Twelve out of the thirteen participants stated that their MSC reports to the Pharmacy and Therapeutics (P&T) committee. The position title of the person who leads the committee was most commonly the Medication Safety Pharmacist. The participants were asked to describe the committee methods to relay their findings to physicians; the most common method was through reporting the findings to other committees that had physician leaders (11 of 13).

**Conclusion:** Based on the participants working in safety leading hospitals, a MSC would best be characterized as a committee that: 1) Meets ten to twelve times annually, 2) Includes 20-29 members, 3) Reports to at least one other committee, 4) Reports to the P&T committee, 5) Assigns the Medication Safety Pharmacist as the chair or leader of the committee. Future studies targeting a larger number of hospitals would be recommended to provide a better external validity.

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**Title:** Non-dihydropyridine calcium channel blocker use in stable heart failure

**Purpose:** The American College of Cardiology Foundation/American Heart Association guidelines recommend against using calcium channel blockers (CCB) in...
heart failure with a reduced ejection fraction (HFrEF) because there are no studies to illustrate any benefit in survival or functionality. The use of non-dihydropyridine CCB (non-DHP CCB) post myocardial infarction (MI) can be beneficial as evidenced by the results of the Multicenter Dilitiazem Trial (MDPIT) study. However, this benefit may be dependent upon the preservation of left ventricular (LV) function. No studies have been done looking at non-DHP CCB in patients with stable HF with a remote or no history of MI.

**Methods:** This study was a retrospective chart review utilizing the electronic medical record at the Southern Arizona VA Health Care System (SAVAHCS). It included veterans from the ages of 18 - 89 with a diagnosis of HFrEF on an optimal HF regimen of a beta blocker and ACE-I or ARB with or without a remote history of MI who received care at the SAVAHCS during a 72 month period. Within this population, the study looked at two groups, those on non-DHP CCB and those not on a non-DHP CCB. The primary outcome of this study was comparing rates of hospitalization for HF exacerbation over a 6 year period between the groups. The secondary outcome for this study was comparing cardiovascular events over the same 6 year period between the groups. Descriptive statistics was used to describe baseline characteristics. When the need for comparing differences between the two groups was necessary, chi square was used.

**Results:** A total of 143 patient charts were evaluated for the treatment group, of which all but 23 charts were excluded and a total of 200 patient charts were evaluated for the control group, of which all but 40 charts were excluded. There were 19 hospitalizations for HF exacerbation, 7 in the group with the presence of a non-DHP CCB and 11 in group with the absence of a non-DHP CCB. These findings were not statistically significant (p=0.38). There was one MI and no strokes in the group with a non-DHP CCB and no MIs and 2 strokes in the group without a non-DHP CCB. These findings were not statistically significant (p=0.936). There was a total of 16 deaths, 5 in the non-DHP CCB group and 11 in the group without a non-DHP CCB. These findings were also not statistically significant (p=0.681).

**Conclusions:** Even though it appears there is no difference between HF exacerbation, CV events or death regardless of the presence or absence of non-DHP CCB, this study sample size was not large enough to provide adequate power. Further studies with larger sample sizes is required to make further recommendations regarding the use of non-DHP CCB in patients with stable HF and no recent history of MI.

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**Title:** Appropriateness of vitamin K for warfarin reversal before and after initiation of a reversal of anticoagulation careset

**Purpose:** Vitamin K is a commonly used agent for the reversal of warfarin-associated coagulopathy in both the emergent and non-emergent settings. Dosing of vitamin K varies depending on physician preference and experience. Current guidelines provide vitamin K dosing strategies, although the optimal dose, route and timing of administration remains unclear. The aim of this study was to quantify and compare the dosing of vitamin K (and blood products?) at Banner University Medical Center – Phoenix (BUMCP) before and after the initiation of a reversal of anticoagulation computerized provider order entry (CPOE) careset.

**Methods:** Computerized decision support software identified patients given vitamin K utilizing the reversal of anticoagulation careset from May 2015 to October 2015. These patients were compared to a cohort analyzed pre-implementation of this careset from January 2014 to September 2014. Through manual review the additional inclusion criteria of patients ≥18 years old and warfarin coagulopathy reversal was determined. Patients were excluded if they received vitamin K for any alternative indications. The primary outcome was careset adherence rates. Secondary outcomes included vitamin K dose and route per careset, elevated INR correction goal met, procedural INR correction goal met, major bleeding INR correction goal met.

**Results:** We enrolled 119 and 120 patients in the pre and post-careset groups respectively. Average age was 69 (SD ±15), 59% male sex, median CHA2DS2VASc score 5 (IQR 3-7). Careset adherence increased in the post-careset group by 17%. Vitamin K dosing careset adherence increased by 9%. Major bleeding group reversal INR goal (<1.5) achievement decreased by 6%. Elevated INR group INR goal (therapeutic) achievement decreased by 10%. Procedural reversal group INR goal (<1.5) achievement increased by 4%.

**Conclusion:** Among patients requiring reversal of warfarin-associated coagulopathy with vitamin K, careset adherence rates were increased following implementation of a standardized reversal of anticoagulation careset.
Purpose: The use of vitamin K and blood products are commonly prescribed for warfarin coagulopathy, however the dosage and route of vitamin K, as well as the usage of blood products, varies dramatically due to clinician preference and experience. The primary objective of this study was to compare the rates of appropriate warfarin reversal before and after the initiation of a reversal of anticoagulation careset in a 388-bed acute care hospital. Appropriate reversal was based on interpretation of the American College of Chest Physicians (CHEST) guidelines for antithrombotic therapy and prevention of thrombosis.

Methods: The medical records of patients who received vitamin K for warfarin reversal at Banner Baywood Medical Center were reviewed retrospectively in two cohorts before (pre-careset) and after (post-careset) the initiation of a reversal of anticoagulation careset. Adult patients, aged 18 years and older, were reviewed in the pre-careset cohort from January 1, 2014 to December 1, 2014 and in the post-careset cohort from May 1, 2015 to December 1, 2015. Patients less than 18 years old or who received vitamin K for indications other than warfarin reversal were excluded. Included subjects were divided into groups based on indication for vitamin K administration which included procedural reversal, treatment of bleeding, or correction of an elevated international normalized ratio (INR) without bleeding. Secondary efficacy outcomes were evaluated.

Results: A total of 120 patients were included in the study, with 60 patients in the pre-careset cohort and 60 patients in the post-careset cohort. In regards to the primary outcome, appropriate reversal occurred in 28 of 60 (46.7%) in the pre-careset cohort and 40 of 60 (66.7%) in the post-careset cohort. An INR of less than or equal to 1.5 was achieved prior to procedure in 6 of 17 (35.3%) in the pre-careset cohort and in 15 of 21 (71.4%) in the post-careset cohort. Effective reversal in patients with major bleeding (INR less than or equal to 1.5) was achieved in 13 of 19 (68.4%) in the pre-careset cohort and in 13 of 14 (92.9%) in the post-careset cohort. INR correction for patients with an elevated INR without bleeding was achieved in 7 of 13 (53.8%) versus 1 of 13 (7.7%), in the pre-careset and post-careset cohorts, respectively. Final statistical analysis results are pending.

Conclusion: The implementation of a reversal of anticoagulation careset increased the rate of appropriate vitamin K use and appropriate warfarin reversal, based on current guidelines. The careset increased effectiveness of warfarin reversal prior to procedure and in patients with major bleeding. In patients with an elevated INR and no bleeding, proper correction was reduced.
baseline serum sodium were also found to take significantly longer to reach target (P=0.014), whereas baseline serum creatinine did not significantly affect time to target sodium (P=0.958). There was insufficient data to assess secondary objectives. Only 1 patient had an extra ventricular drain placed and 1 required a craniotomy. Eight patients developed hypokalemia during therapy. No patients developed acute kidney injury, pulmonary edema, congestive heart failure or metabolic acidosis requiring a change to sodium acetate.

**Conclusions:** Based on this study, only 60% of patients reached target Na within 24 hours on an every 6 hour dosing interval. This suggests 3 percent bolus dosing at the current schedule does not effectively elevate serum sodium to the target range. We postulate 60% of patients will reach target in 16 hours on an every 4 hour dosing schedule. A future evaluation comparing every 4 hour dosing to every 6 hour dosing may be warranted. Hypertonic saline was found to have an acceptable safety profile. However, vigilant monitoring and replacement of potassium may be warranted.

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**Title:** Evaluation of anti-methicillin-resistant Staphylococcus aureus therapy continuation and discontinuation based on MRSA nares testing in Veteran patients admitted with pneumonia

**Purpose:** Recent literature has found a 97% negative predictive value for a negative anti-methicillin-resistant Staphylococcus aureus (MRSA) nares test for ruling out pneumonia due to MRSA. The primary objective of this study was to measure the rate of appropriate discontinuation of MRSA antibiotic coverage for the treatment of pneumonia after the results of MRSA nares came back negative, as well as the appropriate continuation of anti-MRSA coverage when these results were positive.

**Methods:** This retrospective, chart based review measured the appropriate discontinuation of anti-MRSA coverage, defined within this study as discontinuation within 24 hours after results of negative MRSA nares were reported, as well as the appropriate continuation of anti-MRSA coverage when these results were positive in patients admitted with a primary or secondary diagnosis of pneumonia between 1/1/15 and 6/30/15. Secondary objectives were to measure the average time to discontinuation of anti-MRSA coverage after negative MRSA nares results were reported; the average rate of anti-MRSA therapy discontinuation within 24 hours, 48 hours, and 72 hours; discontinuation rates between the medical intensive care unit (MICU) and general medicine wards; and the results of blood, bronchoalveolar lavage, pleural fluid, and sputum cultures both when the MRSA nares were negative and when they were positive. ICD-9 codes, admission diagnosis, and discharge diagnosis were used to identify subjects with primary or secondary diagnosis of pneumonia. Data was extracted from the Computerized Patient Record System (CPRS). This study has been approved by the facility's Institutional Review Board.

**Results:** Out of 474 patients that were pre-screened as having received an anti-MRSA antibiotic, 29 were included. A total of 445 patients were excluded; 359 patients were not included because they did not have a primary or secondary diagnosis of pneumonia. Average time to discontinuation after negative nares results was 18.3 hours; 61.5% (16/26) were discontinued within 24 hours, 34.6% (9/26) were discontinued within 24 to 48 hours, and 3.8% (1/26) was discontinued more than 72 hours later. For patients in the MICU the rate of discontinuation within 24 hours was 67%, while only 60% were discontinued within 24 hours in the general medicine ward. The one order that was discontinued more than 72 hours after negative nares reporting was on the general medicine ward.

**Conclusion:** A majority of the orders for anti-MRSA therapy were discontinued within 24 hours after negative nares reporting, however the average was high at 18.3 +/- 16.25 hours in which a patient could potentially receive up to two more doses of unnecessary antibacterial therapy. The MICU team was quicker to discontinue after negative nares were reported, which was expected due to 24 hour coverage and higher risk of renal impairment which would make vancomycin less desirable.

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**Title:** Drug Related Issues in Lung Cancer Patients Who Have Received Oral Chemotherapy

**Purpose:** Oral chemotherapeutic agents continue to play role in cancer treatment. The lack of standards in prescribing and dispensing of oral chemotherapy raises serious concerns about the safe delivery of cancer treatment. Identification and prevention of medication errors is a key when working with oral agents. There is limited data to describe drug related issues associated with oral chemotherapy in lung cancer patients. The primary objective is to describe drug related issues of oral chemotherapy in lung cancer patients. Secondary objective is to characterize associated risk factors
in lung cancer patients who likely develop drug related issues from oral chemotherapy.

Methods: This study is a single institution, retrospective chart review. Data was collected from patients diagnosed with lung cancer who received treatment with an oral chemotherapeutic agent at The University of Arizona Cancer Center between November 1, 2013 to October 31, 2015. All patients who are ≥ 18 years old at the time of treatment initiation and received FDA approved oral chemotherapy for lung cancer including erlotinib, crizotinib, ceritinib, etoposide, afatinib, and temozolomide

Results: One hundred and one patients were screened and 44 patients met inclusion criteria for the study. Median age was 68 years (43-81), 36.4% were male, and 100% of patients were diagnosed with adenocarcinoma. Erlotinib was the most prescribed oral chemotherapy (72.7%). Common drug related issues identified in this study included adverse drug reaction (84.1%) - acneiform rash associated with erlotinib was the most frequent ADR reported in this study. Drug interactions (75%) - proton pump inhibitors were the common drug interaction found with erlotinib. Inappropriate indication (21.9%) - patients were receiving concomitant systemic chemotherapy with oral chemotherapy (erlotinib). Baseline laboratory and monitoring (15.9%) - the lack of baseline QTc or EKG prior to crizotinib or ceritinib initiated. Lastly, inappropriate dosing (9.1%) due to the unapproved dosing regimen. No statistically significant associated factors with drug related issues in lung cancer patients were identified in this study.

Conclusion: The most frequent issues identified in this study were adverse reactions and drug interactions. Pharmacists can play a vital role in minimizing these issues in patient receiving oral chemotherapy. By establishing trust and communication, providing support and education, developing effective treatment plans, and providing effective follow-up with patients pharmacists can contribute to improve treatment understanding and ultimately to prevent or reduce drug related adverse reactions and drug interactions.

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Title: Impact of time to antibiotic initiation on mortality in septic patients admitted through the emergency department at a community hospital system

Purpose: The Surviving Sepsis Campaign (SSC) guidelines recommend administering intravenous antibiotics within 1 hour of severe sepsis or septic shock recognition, as well as a “sepsis bundle” that requires broad-spectrum antibiotics to be given within 3 hours from emergency department (ED). Previous research has shown poor compliance with recommended antibiotic administration times. The objective of this study is to evaluate the association between antibiotic initiation time and sepsis-related mortality rates.

Methods: A retrospective chart review was conducted on patients admitted through 3 adult emergency departments after January 1, 2014 and discharged prior to June 30, 2015. Patients were included in the evaluation if they were identified with severe sepsis or septic shock via ICD9 coding, had a reported time to antibiotic administration, and a documented mortality status. Exclusion criteria included patients less than 18 years of age, immunocompromised patients, and pregnant patients. For the purpose of this study, the diagnosis time was defined as ED triage time. Data collected included demographics (gender and age at admission), intensive care unit (ICU) admission, length of stay, baseline vitals, severe sepsis or septic shock diagnosis, antibiotic administration times, and mortality status. Charts were randomly selected up to a total of 200 patients meeting the inclusion criteria. The primary outcome was mortality (defined as in-hospital mortality or discharged to hospice) in patients receiving antibiotics at different time intervals (i.e. <1h, 1-2h, 2-3h, 3-4h, 4-5h, 5-6h, and >6h). The secondary outcome was to evaluate time to completion of the empiric antibiotic regimen as a predictor of mortality. Multivariable logistic regression models controlling for patient age and diagnosis were performed for both study endpoints.

Results: A total of 430 patients were screened and 200 patients met the inclusion criteria during the study period. A diagnosis of severe sepsis was found in 44.5% of patients and 55.5% of patients had a diagnosis of septic shock. Overall mortality was 32.5%. Median time to first antimicrobial administration was 1.5 hours, with 92% of patients receiving antibiotics within 3 hours of ED triage. About 28% of patients’ antibiotic infusion timespan was greater than 3 hours due to a combination of empiric antibiotic agents or delayed administration of additional antibiotics. Using the multivariable logistic regression model, the odds ratio (OR) for mortality was 0.818 (95% confidence interval [CI], 0.604-1.108; P = 0.306) for elapsed time from triage to first antibiotic, and 1.139 (95% CI, 0.888-1.460; P = 0.306) for empiric antibiotic regimen infusion timespan. There was no statistically significant increase in mortality due to delay in antibiotic administration from less than 1 hour to more than 6 hours. A trend towards increased mortality with empiric antibiotic regimen infusion times greater than 60 minutes was observed but was not statistically significant.

Conclusion: There was not a significant mortality benefit of earlier antibiotic administration in severe sepsis and septic shock patients in this evaluation. In addition, no significant mortality benefit was detected with shorter empiric antibiotic regimen infusion timespan. Further investigation in currently recommended timing metrics as measures of quality of care may be needed. Larger studies may be needed to observe a
possible correlation of various empiric antibiotic infusion timespans on mortality.

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Title: Implementing an appointment-based medication synchronization program in a grocery store community pharmacy

Purpose: The objective of this study was to implement and evaluate the impact of an appointment-based medication synchronization (ABMS) program and identify reasons why eligible patients may decline medication synchronization.

Methods: The project was conducted between January and June of 2016 in pharmacies located in Albertsons Companies Southwest Division (Arizona, Nevada, New Mexico, Texas, and Utah). Initially, the objective of the project was to create an ABMS program. The central focus of the project changed in March of 2016, when a medication therapy management software platform was offered by Albertsons Companies, OutcomesMTM, introduced a Targeted Intervention Program (TIP) entitled “needs medication synchronization.” There was interest in better understanding why some eligible patients were declining this service. Claims for this OutcomesMTM TIP can be submitted as “medication synchronized,” “patient refused” or “unable to reach patient.” Pharmacists who offered the program to patients and submitted claims as “patient refused” were asked to document the patients’ reasons for refusal from among eight alternatives that had been compiled during patient interviews earlier in the project.

Results: Preliminary data analysis includes 221 completed medication synchronization attempt claims for pharmacies in the Southwest Division. A total of 148 (67.0%) of these claims indicated “medications synchronized,” while 60 (27.1%) indicated “patient refused.” An additional 13 (5.90%) indicated the pharmacist was “unable to reach patient.” Among claims indicating the patient refused synchronization, 40 included one or more reasons for refusal. The most common reasons that patients provided for declining medication synchronization included not wanting to pay copays for all prescriptions at once (n=8, 20%); preferring to order medications when the patient feels he or she needs them (n=9; 23%); and patients are using more than one pharmacy for their medications (n=10; 25%).

Conclusion: The reasons why eligible patients decline medication synchronization in a grocery store community pharmacy may not be the same as those for other community pharmacies. In a grocery store pharmacy where patients often shop several times per month, convenience-related benefits of medication synchronization may not be as strong of a motivator when compared to patients in other community pharmacies. Differences in the benefits that patients perceive from medication synchronization programs should be considered when implementing such programs in a grocery store pharmacy.

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Title: Optimization of induction chemotherapy in AML: a retrospective comparison of 7+3 versus 4+3.

Purpose: The purpose of this study is to characterize the impact of using intermediate-dose cytarabine (1.5 gm/m2/day) for four days in combination with idarubicin (12 mg/m2/day) for three days versus standard-dose cytarabine (100 mg/m2/day) for seven days in combination with idarubicin (12 mg/m2/day) for three days.

Methods: This is a single-center retrospective study of adult patients who received induction chemotherapy for acute myeloid leukemia. Patients who received induction therapy for acute myeloid leukemia during the study timeframe were identified via pharmacy records. In addition to demographic data, efficacy outcome data was collected for remission rates and relapse within six months of initial therapy. Safety data was collected regarding adverse events potentially related to chemotherapy including infection, dermatologic toxicity, and ocular toxicity.

Results: Thirty-three patients were identified for inclusion in this study, eighteen having received 7+3 and 15 having received 4+3. Demographics between the two groups were balanced with the exception of age and time to initial bone marrow analysis. There was not a difference between the two groups in regards to residual disease on initial bone marrow, however there was a statistically-significant increase in six month relapse rates in the 4+3 group (20%) when compared to the 7+3 group (0%, p = 0.047). Safety outcomes were not different between the two groups.

Conclusions – These data suggest that the regimens outlined may be comparable in terms of efficacy and safety. The difference between the two groups in regards to six month relapse may warrant further investigation within a larger patient population.
Title: Is more always better? A retrospective chart review comparing combination therapy and monotherapy in the treatment of neonatal abstinence syndrome

Purpose: With no current published guidelines addressing the treatment of neonatal abstinence syndrome, multiple studies have been conducted comparing various pharmacotherapy options as monotherapy to determine the most effective treatment options. Although these studies resulted in conflicting outcomes, currently there are no studies comparing combination therapy versus monotherapy in the treatment of neonatal abstinence syndrome. The primary objective of this study was to examine the differences in time to decrease neonatal abstinence scores, duration of therapy, and duration of hospital stay between combination therapy and monotherapy in treating withdrawing neonates.

Methods: A retrospective chart review was done to compare the differences between monotherapy with morphine or clonidine and combination pharmacotherapy utilizing a clonidine and morphine regimen or phenobarbital and morphine regimen prescribed for withdrawing neonates. Patients were identified by running a computer based report listing all neonates who had a positive urine or meconium drug-screen for opioids during admission to St. Joseph’s Hospital and Medical Center nursery intensive care unit from May 2013 to October 2015. Once identified, data collected included patient demographics, Finnegan scores, therapy, length of therapy, and length of stay. A two-tailed sample t-test was performed to measure the differences in patient demographics as well as averages of length of stay, duration of therapy, time to reach two consecutive Finnegan scores less than eight, and time to first decrease in therapy with an alpha of 0.05 using IBM SPSS Statistics 24.

Results: No statistically significant differences were noted in the baseline characteristics of the two groups indicating no patient pharmacokinetic parameters that may affect the severity of withdrawal; however, there was a statistically significant difference in initial Finnegan scores, indicating the combination therapy group started therapy with a higher average Finnegan score (8.4 vs. 10.2; p=0.04). The average length of hospital stay for neonates was lower in the monotherapy group (15.5 days vs. 22.14 days; p=0.033) when compared to the combination therapy group in addition to duration of treatment within the hospital (8.05 days vs. 17.7 days; p=0.003). In accordance with Finnegan scoring operations, an average time to reach neonatal abstinence syndrome scores less than eight for two consecutive scores was drastically shorter with the monotherapy group (3.65 days vs. 11.65 days; p=0.001). The statistically significant differences in hospital length of stay, duration of treatment, and average time to reach a neonatal abstinence syndrome score less than eight consecutively favored monotherapy over combination therapy.

Conclusion: This study found that there may be a benefit to utilizing monotherapy as opposed to combination therapy in shortening length of treatment and hospital stay while also achieving lower neonatal abstinence syndrome scores quicker. Though no conclusion can be made in regards to superiority of different single pharmacotherapy options, employing monotherapy may potentially result in more desirable outcomes when initiating treatment.

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Title: Cardiovascular outcomes related to testosterone supplementation in a male veteran population (CORTS Study)

Purpose: In March of 2015, the United States Food and Drug Administration required a label change on all testosterone products to clearly indicate the potential risk of myocardial infarction (MI) and stroke. Previous studies have conflicting evidence for whether or not this risk is truly present. The purpose of this study is to evaluate composite cardiovascular (CV)-related outcomes including MI, stroke, and venous thromboembolisms (VTE) in men who have received testosterone replacement therapy (TRT) compared to men who have not received TRT. Secondary outcomes included a comparison of all-cause mortality between the two groups along with subgroup analyses to determine trends.

Methods: This retrospective chart review was conducted at a Veterans Affairs (VA) medical center and included males 18 to 89 years old who used TRT for at least three months between May 1, 2000 to May 1, 2010. Subjects were excluded if they had a history of breast or prostate cancer, or if they received TRT from outside this VA medical center. Included subjects were compared to a control group of men not using TRT who have not received TRT. The first prescription for TRT served as the starting point of follow-up period for tracking the CV outcomes and death in the treatment group, and the length of follow-up time was matched for the control group. Student’s t-test was performed for continuous data and Chi-
square analysis was used for categorical data, with an alpha of 0.05. Secondary outcomes for sub-analyses of different age cohorts, testosterone dosage forms and doses, and duration of use were analyzed with logistic regression.

**Results:** A total of 250 charts were obtained for review with 50 subjects excluded from the study. Of the 200 men included, 100 subjects were utilizing TRT, while the matched 100 subjects were not. The two groups did not differ statistically by present age, hypertension, atrial fibrillation, or history of: tobacco use, MI, UA, VTE, stroke/TIA, CAD, or dyslipidemia. They did differ on diabetes mellitus, with more in the untreated group (52%) than in the treated group (32%, P = 0.0041). The primary outcome of composite CV events was greater in the group using TRT (35%) compared to the untreated group (28%), however this was not statistically significant. The secondary outcome of all-cause mortality was significantly higher among men on TRT (27%) compared with the untreated group (15%, P = 0.037). There was significant association between death and type of testosterone treatment (P = 0.0260), where patients who received the intramuscular (IM) TRT were 3 times more likely to die than patients who did not receive TRT (odds ratio [OR] = 3.08, 95% confidence interval [CI] 1.41-6.73). The other subgroup analyses found no significant difference.

**Conclusion:** There was no difference in composite CV events between the TRT group and control group. Males utilizing TRT for at least 3 consecutive months experienced higher all-cause mortality than untreated men. Subjects utilizing the IM form of TRT were 3 times more likely to die than the untreated group.

**References:**

**Title:** Prospective evaluation of clinical cure rates for uncomplicated cystitis in the emergency department using oral cephalosporin

**Purpose:** According to Infectious Diseases Society of America (IDSA), beta-lactams are not recommended as the first line treatment for uncomplicated cystitis. However, oral cephalosporins are commonly prescribed at the Emergency Department (ED) for such indication due to local susceptibility pattern or patient's poor renal function. This study evaluates the current empiric antibiotic treatment of uncomplicated cystitis in the ED of a large, academic medical center in order to determine the clinical effectiveness of oral cephalosporins.

**Methods:** This is a prospective, observational study that identifies patients in the ED with subsequent positive urine cultures. Seven and thirty days after the initial ED visit, telephone surveys are conducted to determine if 'clinical cure' (resolution of symptoms) was achieved; along with assessing if the patient experienced any adverse effects or encountered barriers to obtaining therapy.

**Results:** Seven day and thirty day phone calls are completed for 102 patients. The percentage of patients in this study prescribed cephalaxin and ciprofloxacin is 31.4% (n=32) and 43.1% (n = 44) respectively. The 7 day and 30 day clinical cure rates for patients who receive cephalaxin versus ciprofloxacin is 62.5% and 72.7%; and 65.6% and 88.6% respectively.

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**Title:** Effectiveness and safety of hepatitis C treatment with direct-acting antivirals (DAAs) in a veteran population

**Purpose:** Chronic hepatitis C infection can contribute to severe complications such as liver decompensation, cirrhosis, or hepatocellular carcinoma. The previous standard of care, peg interferon and ribavirin, has been replaced by direct acting antivirals. This discovery represents an immense improvement in hepatitis C therapy. Thus, the VA health care system will benefit from research comparing hepatitis C outcomes in the veteran population to landmark clinical trials as well as potential drug-drug interactions. This retrospective, observational study reviewed Veterans with hepatitis C genotypes 1-6 receiving direct-acting antivirals from the Phoenix VA between October 1, 2014 and September 8, 2015.

**Methods:** Data was extracted from the Computerized Patient Record System. The assessed group included Veterans who are 18 years of age or older diagnosed with chronic hepatitis C receiving direct acting antivirals at the Phoenix VA between October 1, 2014 and September 8, 2015. Veterans were excluded from the study if they transferred hepatitis C care from a non-VA provider to the Phoenix VA or transferred hepatitis C care to a provider outside of the Phoenix VA, received long term direct acting antivirals pending liver transplant, or if SVR_{12} (sustained viral response at 12 weeks) was after the September 8, 2015. The primary outcome was the effectiveness of direct acting antivirals defined as the percent of Veterans with hepatitis C viral infection who achieved SVR_{12} compared to the SVR_{12} outcomes found in landmark trials. Secondary outcome evaluated the impact of histamine (H_{2}) antagonists and proton pump inhibitors on SVR_{12} in Veterans treated with ledipasvir plus sofosbuvir.

**Results:** Research-in-Progress

**Conclusion:** Research-in-Progress
Title: Hidden antimicrobials in surgical patients: Usage and documentation of antimicrobial content of bone cement

Purpose: The use of antimicrobials in bone cement to prevent or treat infections during orthopedic procedures has become common practice since its introduction and remains a challenge for many clinicians. Antibiotic-loaded bone cement (ALBC) represents the current gold standard for local antibiotic delivery as most major orthopedic procedures present a moderate risk of serious infection from the surgical process. The purpose of this study was to evaluate the type of antimicrobial and dose used during the procedures and to determine the incidence of adverse drug effects, including acute kidney injury.

Methods: We conducted a retrospective chart review on patients who had bone cement implanted containing antimicrobial agents in a surgical operation in an academic medical center. The University of Arizona Institutional Review Board approved this study. The inclusion criteria included patients admitted to a tertiary care academic medical center for an orthopedic procedure resulting in the placement of antibiotic loaded bone cement between November 2013 and May 2015. Any patients under the age of 18 were excluded. We evaluated the dose and type of antibiotic used per 40 g of cement, the type of cement utilized in the procedure, the documentation of antibiotics used per surgery, pharmacy, or other consult services notes, and the incidence of adverse drug effects including acute kidney injury. Acute kidney injury was defined as a greater than 25% increase in creatinine or an increase of equal to or greater than 0.3 mg/dL from preoperative baseline. In order to further investigate the incidence of acute kidney injury, we performed subgroup analysis in patients receiving vancomycin, gentamicin, and tobramycin and determined the incidence of acute kidney injury with each antibiotic as well as when used in combination.

Results: Data collection and analysis are ongoing.

Conclusion: Pending data analysis.
Methods: The study design is a descriptive, non-experimental study to collect quantitative data via a self-administered survey. The survey will be sent out to pharmacists in a grocery chain-based pharmacy setting via secure company email explaining the study and its purpose. The survey takes five to ten minutes to complete. There will be a reminder email sent out one week after the original message to encourage further participation. The survey is administered through Qualtrics, which facilitates anonymous data collection. There will not be any identifying information collected. Survey responses will be anonymous; however, there will be one question on demographic data to allow assessment of how long the participant has been practicing as a licensed pharmacist. Survey questions will be close-ended, Likert scale structure. Sampling will be non-probability based through quota sampling; thus surveys will be collected until 100 responses are received or by the specified date of completion, whichever is sooner. The survey will close after two weeks, and then, analysis of survey results will occur. During data analysis, there will be use of descriptive statistics for Likert scale questions.

Results: In progress

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Title: Impact of a diabetes shared medical appointment in patients with poorly controlled type 2 diabetes mellitus

Purpose: To investigate the sustained clinical differences observed in patients who were previously enrolled in the diabetes shared medical appointment clinic (DM SMA) at the Phoenix VA Health Care System once discharged back to standard care. This report will focus mainly on the cardiovascular outcomes. The primary aim is to compare quality measures after clinic enrollment such as the Healthcare Effectiveness Data and Information Set (HEDIS) and clinical endpoints set by the American Diabetes Association (ADA) and the American College of Cardiology/American Heart Association (ACC/AHA).

Methods: A retrospective chart review evaluating objectives since the time of discharge from the DM SMA clinic and subsequent yearly serial increments through September 2015. The primary objectives were to assess the change in A1c for DM outcomes and change in blood pressure (BP) for cardiovascular outcomes from the time of DM SMA discharge through September 2015. Secondary objectives for diabetes are: percent of patients meeting goal A1c less than 9 percent, A1c less than 7 percent, and number of DM related emergency room visits or hospitalizations. Secondary objectives for cardiovascular outcomes are: percent of patients meeting the previous ADA blood pressure goal less than 130/80 mmHg and updated ADA BP goal less than 140/90 mmHg, percent of patients meeting the HEDIS measure for low density lipoprotein (LDL) cholesterol of less than 100 mg/dL, and percentage meeting the 2013 ACC/AHA goals of moderate to high intensity statin therapy. Veterans were eligible for the follow up study if they completed at least 3 of 4 DM SMA sessions. Eligible participants were contacted via telephone to obtain verbal consent for study continuation. Veterans were excluded if verbal consent was not obtained or did not have at least 1 post discharge A1c measure.

Results: There were 95 patients that completed the DM SMA clinic who were eligible for inclusion and of those, 71 provided verbal consent. Baseline characteristics were consistent with a Veteran population; males (97 percent), mean age 60.8 years and of white ethnicity (61.1 percent). At the time of DM SMA discharge, the mean BP was 135/79 mmHg and a mean LDL of 79.7 mg/dL. For the primary outcome, change in systolic BP was not significant; 95 percent CI (-0.53 to 3.1), p=0.61. There was a significant reduction in diastolic BP by 3.3mmHg; 95 percent CI (-5.9 to -0.7), p=0.01. For the secondary outcomes, the percent change in patients
meeting BP goal <130/80 mmHg was not significant; 95 percent CI (-0.111 to 0.13), p=0.81 or percent change in patients meeting BP goal <140/90 mmHg was not significant; 95 percent CI (-0.19 to 0.10). There was no significant change in patients meeting an LDL goal less than 100 mg/dL; 95 percent CI (-0.005 to 0.237), p=0.06. Lastly, there was no significant change in the percent of patients on moderate or high intensity statin therapy; 95 percent CI (-0.18 to 0.04), p=0.19.

Conclusions: All cardiovascular risk reductions achieved from those who completed the DM SMA clinic were sustained from the time of discharge through September 2015. There was a downward trend in systolic BP and a significant reduction in diastolic BP overtime as well. The change in systolic BP may not have reached statistical significance due to the small sample size, reducing the power of the study to detect a difference. The results of this study suggests that once patients return back to their normal care, patients are able to utilize what they have learned to maintain their cardiovascular risk reduction goals.

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Title: Vitamin D deficiency in patients of an integrated mental health clinic

Purpose: Vitamin D deficiency is a prevalent problem, affecting about one billion people worldwide. Low 25-hydroxy-vitamin D (25(OH)D) levels have been linked to osteoporosis, psychiatric and neurological disorders, metabolic-related conditions, and many other medical conditions. Patients with mental illness are at higher risk for chronic diseases such as diabetes and cardiovascular disease, so optimizing their 25(OH)D levels is desirable to improve both physical and psychiatric conditions. The purpose of this study was to evaluate the management of vitamin D deficiency in patients of an integrated mental health/primary care clinic.

Methods: A retrospective electronic medical record review was conducted including patients at least 18 years old who were not pregnant, did not have end-stage renal disease, and who completed the Wellness Program at Assurance Health and Wellness Center (AHWC) between 9/1/2014 and 10/31/2015. Vitamin D deficiency is defined as 25(OH)D level < 30 ng/mL. The primary endpoint was the number and proportion of patients who achieved 25(OH)D levels 30 ng/mL or greater after starting vitamin D supplementation. Secondary endpoints included the number/proportion of patients with two or more 25(OH)D levels, number and proportion of patients started on vitamin D supplementation with a repeat level, time between levels, number and proportion of patients with vitamin D prescriptions initiated by an AHWC provider, and dosing regimens of vitamin D. Descriptive statistics were used to analyze these endpoints. This study was IRB-approved as a retrospective review by the authors’ affiliated university.

Results: Sixty-eight patients (53 percent female) were included in the study, with mean age of 49 (standard deviation 13) and body mass index of 31.7 kg/m2 (standard deviation 8.5 kg/m2). Fifty-three patients had medical comorbid conditions, the most common being hyperlipidemia (47 percent), hypertension (44 percent), arthritis (19 percent), and diabetes (18 percent). Sixty-three patients had at least one psychiatric condition, the most common being depression (44 percent), generalized/unspecified anxiety (34 percent), and post-traumatic stress disorder (21 percent). Eighty-eight percent of patients (N=60) had an initial 25(OH)D level, of which 66 percent (N=40) had levels less than 30 ng/mL. Of the patients identified as vitamin D-deficient, 60 percent (N=24) had vitamin D supplementation initiated. Overall, 31 patients had a vitamin D prescription initiated by an AHWC provider. Of these patients, 11 (35 percent) had a repeat 25(OH)D level drawn after a mean of 163 days (range 35-357). Only 4 of these 11 patients achieved a 25(OH)D level of 30 ng/mL or greater. The most commonly prescribed vitamin D dosing regimens included vitamin D3 2000 international units (IU) daily (52 percent of all prescriptions) and vitamin D3 5000 IU daily (32 percent).

Conclusion: Initial vitamin D deficiency screening is performed for nearly all patients at AHWC, but treatment with vitamin D and monitoring of 25(OH)D levels varied substantially. Appropriate monitoring of 25(OH)D levels after initiation of vitamin D supplementation appears to be the most considerable barrier. These results will be used to help improve current practice of treating vitamin D deficiency.