Comparison of Treatment Outcomes for Vancomycin Alone Versus Combination Therapy in Severe *Clostridium Difficile* Infection

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**Background**: The recommended treatment for severe *Clostridium difficile* infection (CDI) is oral vancomycin 125 mg four times daily for 10-14 days.\(^1\)\(^2\) Combination therapy with metronidazole is only indicated in complicated cases with shock, ileus, or toxic megacolon.\(^3\)\(^4\) However, often many patients with severe infection are treated with combination therapy. To date, no comparison study has been published on the *in vivo* effect of combination therapy with vancomycin and metronidazole.\(^4\)

**Objective**: To evaluate differences in treatment outcomes for patients with severe CDI treated with oral vancomycin alone or with combination therapy.

**Methodology**: The charts of 78 patients with severe CDI receiving either oral vancomycin alone or combination therapy for at least 72 hours from 2006-2011 were retrospectively reviewed. The primary outcome assessed was time to clinical cure of CDI, defined as the first day of resolution of diarrhea for ≥48 hours without development of a complication. Other endpoints included cure rates, complication rates, and recurrence rates.

**Results and conclusions**: Seventy-eight patients were enrolled with 35 in the monotherapy group and 43 patients in the combination therapy group. Treatment with monotherapy or combination therapy resulted in clinical cure in 57.1% and 65.1% of patients, respectively (*P* = 0.49). Median time to clinical cure was 7.0 days for the monotherapy group and 8.0 days for the combination therapy group (*P* = 0.19). After adjustment, the hazard ratio of the time to clinical cure for combination therapy compared to monotherapy was 0.58 (95% CI 0.31-1.09, *P* = 0.10). There were no differences in recurrence or complication rates between groups. Our findings suggest that there is no difference in treatment outcomes between oral vancomycin alone and combination therapy with oral vancomycin and metronidazole for severe CDI.

**References:**

Management of Bone and Joint Infections (BJI) with Outpatient Parenteral Antimicrobial Therapy (OPAT) in a Veterans Population: Risk Factors and Outcomes

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Background: Outpatient parenteral antimicrobial therapy (OPAT) is often used for bone and joint infection (BJI). There are two OPAT delivery modality options: healthcare – administration or self – administration. Information related to OPAT outcomes and guidance for delivery modality selection is limited. The purpose of this study was to identify risk factors for OPAT failure with self – administration and assess outcomes in a Veteran population.

Objectives: (1) Identify risk factors that may contribute to OPAT failure; (2) Describe the OPAT failure & success rate at the Louis Stokes Cleveland Department of Veterans Affairs Medical Center (LSCDVAMC)

Methodology: A retrospective chart review was performed on patients enrolled in the LSCDVAMC OPAT registry from August 2009 – February 2012. Inclusion criteria were diagnosed/suspected BJI and self – administration of OPAT. Data was collected on demographics, past medical history, social support, diagnosis, antimicrobial therapy, microbiology, adverse events, and adherence. Outcomes used to define treatment failure were therapy completion, therapy extension, infection relapse, and readmission and/or surgery for the initial infection site within 60 days of therapy.

Results: Out of 492 registry patients, 73 (14.8%) met inclusion criteria. Treatment failure occurred in 47 (64.4%). Risk of failure was significantly increased with travel distance (OR 1.016 / mile; CI 1.000 – 1.033), osteomyelitis (OR 3.571; CI 1.158 – 11.018) and the presence of non-\textit{Staphylococcus aureus} isolates on surface culture (OR 3.643; CI 1.035 – 12.818). Risk of failure was significantly reduced with prosthetic joint infection (OR 0.148; CI 0.027 – 0.799) and methicillin susceptible \textit{S. aureus} alone on bone/fluid culture (OR 0.063; CI 0.005 – 0.785). More patients with diabetes, hematological/oncological disorder, psychiatric illness, morbid obesity, or smoking failed therapy. Overall, 17/19 patients who were non-compliant failed therapy. Of 13 adverse events, only 2 admissions and 1 therapy discontinuation was required.

Conclusions: Self-administered OPAT for BJI was well – tolerated; however post – therapy complications were common. Consideration of travel distance, diagnosis, organism, and compliance history may help identify high risk patients. Larger studies are needed to assess risk factors for failure and to establish if there is an association between delivery modality and outcome when such risk factors are present.

References:
Treatment of Diabetic Ketoacidosis (DKA): Insulin Nomogram vs. Prescriber-Specified Insulin Infusion

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Background: Diabetic ketoacidosis (DKA), a metabolic derangement associated with an absolute/relative insulin deficiency and an increase in counterregulatory hormones, is the most serious complication of diabetes mellitus. Insulin therapy is the standard of care in the treatment of DKA. According to the American Diabetes Association (ADA), the administration of regular insulin via a continuous intravenous infusion is preferred in DKA due to its short half-life and ease of titration. However, there has been no consensus on whether a prescriber-specified insulin infusion or a DKA insulin nomogram provides comparable efficacy and/or safety outcomes. Because of this, patients presenting to the Cleveland Clinic with DKA are either initiated on a DKA insulin nomogram or prescriber-specified insulin infusion depending on whether admitted to the General Internal Medicine (GIM) floor or Medical Intensive Care Unit (MICU), respectively.

Objective: To evaluate the efficacy and safety of a DKA insulin nomogram as compared to a prescriber-specified insulin infusion.

Methodology: A non-interventional, retrospective medical record review of adult DKA patients admitted to the Cleveland Clinic between January 1, 2008 to March 31, 2010. All adults (≥18 years old) with DKA (identified by ICD-9 codes) admitted to either the GIM or MICU and initiated on intravenous insulin will be included. Patients initiated on subcutaneous insulin therapy will be excluded. For the purposes of this study, DKA will be an initial serum glucose (>250 mg/dL) and anion gap (>12 mEq/L). The primary objective of the study is to evaluate the median time (in hours) to resolution of ketoacidosis between the DKA insulin nomogram vs. a prescriber-specified insulin infusion. Secondary endpoints include evaluating the median incidence of a blood glucose reduction rate greater than 75 mg/dL/hr, incidence of hypoglycemic episodes (blood glucose <70 mg/dL), median initial insulin infusion rate (Units/kg/hr), and median initial insulin bolus (Units/kg). Data describing patient demographics, blood glucose (point-of-care and laboratory drawn), anion gap, and prescribed insulin doses will be collected. An alpha of less than 0.05 will be considered statistically significant. A t-test will be used to evaluate continuous data and a chi-squared test will be used to evaluate categorical data.

Results and Conclusions: Eighty patients, 40 patients in each group, were evaluated in the study. Baseline characteristics such as initial blood glucose, anion gap, and pH were similar between groups. For the primary endpoint, the median time (hrs) to resolution of DKA was shorter 13.2 vs 17.6 in the GIM and MICU, respectively (p=0.002). For the secondary endpoints, there was no difference in median incidence of serum glucose reduction rate greater than 75 mg/dL/hr (2 vs 2; p=0.83) or median initial insulin bolus (0.086 vs 0.089; p=0.42); however, the median initial insulin infusion was higher (0.118 vs 0.091; p=0.001) in the GIM vs MICU, respectively.

References:
Characterization of Aminoglycoside Use in Critically Ill Patients at a Tertiary Care Hospital

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**Background:** Common drug information references describe both traditional dosing, 1 to 2 mg/kg of body weight given every eight hours, and extended interval dosing, 5 to 7 mg/kg given every 24 hours for the aminoglycosides (AG) tobramycin or gentamicin. Two large meta-analysis comparing these dosing strategies report conflicting results for both rate of nephrotoxicity and risk of treatment failure. The challenges associated with the use of AG in critically ill patients include difficulty attaining target drug peak levels and also a high risk of nephrotoxicity. At Mercy St. Vincent Medical Center (MSVMC), a 400+ bed teaching facility in Toledo, Ohio, AG are unrestricted for physician use with the option of a pharmacy dosing service.

**Objective:** The objective of this study is to describe the usage, efficacy, and toxicity of AG treatment in critically ill patients during a two year period at MSVMC.

**Methodology:** The primary endpoints of this IRB approved retrospective descriptive chart review study include the use of traditional, extended interval, or synergy dosing strategy, clinical resolution of suspected infection, and nephrotoxicity. Secondary endpoints include duration of antibiotic therapy, number of inappropriate therapeutic drug levels ordered, number of appropriate therapeutic drug levels ordered, number of cases without therapeutic drug level monitoring despite indication for monitoring, and number of cases with ratio of aminoglycoside peak level to bacterial MIC greater than 10 mcg/mL. A subgroup analysis based on physician service ordering medication and baseline creatinine clearance will be presented. AG orders were identified through electronic health record reporting of orders for intravenous amikacin, gentamicin, or tobramycin initiated while hospitalized critical care units.

**Results and conclusions:** A total of 154 cases of AG use met inclusion criteria. Analysis of 58 cases of treatment greater than 3 days resulted in a clinical cure rate of 55.2%. Two cases (4.5%) of nephrotoxicity were identified in 44 cases treated for greater than 3 days without a history of renal replacement therapy. Traditional, synergy, and extended interval dosing strategies were identified in 47%, 4%, and 1% of all cases respectively. The dosing strategy was undetermined in 12% of cases and 36% of cases utilized only a single dose. These results identify the predominant dosing strategy for AG at MSVMC is traditional, with a clinical cure rate of approximately 50% and low rate of nephrotoxicity. The results of this study identify opportunities for improving efficacy of AG within MSVMC.

**References:**

Background: Patients who present with massive or submassive pulmonary embolism (PE) may require immediate intervention using thrombolytic agents. Previous trials have indicated an increased rate of PE resolution and improved hemodynamics\(^1\) for patients receiving thrombolytics plus heparin versus heparin alone.\(^2\)\(^-\)\(^4\) In a recent study, alteplase 50 mg infused over 2 hours showed similar efficacy to the FDA-approved dose of 100 mg infused over 2 hours.\(^5\) Subgroup analyses maintained similar efficacy while total bleeding was significantly lower in the 50 mg group, especially in patients weighing less than 65 kg.

Objective: Determine if body weight influences the safety of a 2 hour infusion of alteplase 100 mg for the treatment of pulmonary embolism.

Methodology: A non-interventional, retrospective, case-control chart review to evaluate the effect of body weight on the incidence of bleeding within 72 hours of alteplase administration in patients who receive alteplase 100 mg for pulmonary embolism. Case patients included those experiencing bleeding while control patients were those who did not bleed. The influence of known risk factors for bleeding on the incidence of bleeding after alteplase for the treatment of pulmonary embolism was evaluated as a secondary objective. All patients at least 18 years of age who received alteplase 100 mg over 2 hours for a confirmed diagnosis of PE will were included. Exclusion criteria included administration of alteplase for indications other than PE or use of alternative dosing regimens. Data describing patient demographics, indication for alteplase, laboratory data, imaging data indicating bleeding, concomitant therapies including heparin, and risk factors for bleeding were collected.

Results and Conclusions: A total of 99 patients were screened. Of these, 37 were excluded yielding 62 patients for analysis. Among these patients, 28 (45.2%) experienced the study definition for bleeding with the majority of these resulting from either a requirement for blood transfusions or a drop in hemoglobin. Eleven patients within the bleeding group required a procedure due to bleeding with one patient experiencing intracranial hemorrhage. The majority of patients in the bleeding and nonbleeding groups, 82.1% and 94.1% respectively (p = 0.138), had evidence of right ventricle dysfunction on echocardiograph while 39.3% vs. 23.5% met criteria for massive PE (p = 0.180). Body weight was not different between groups with a median weight of 100.3 kg in the bleeding and 98.2 kg in the nonbleeding groups (p = 0.821). Known risk factors for bleeding were not different with the exception of noncompressible vascular punctures which occurred at a rate of 17.9% in the bleeding versus 2.9% in the nonbleeding groups. The bleeding group had significantly higher in-hospital mortality at 28.6% compared to 5.9% in the nonbleeding group (p = 0.033). In conclusion, alteplase resulted in higher rates of bleeding than expected and body weight was not different between groups. Higher in-hospital mortality occurred in bleeding patients.

References:
Assessing pharmacists’ confidence in counseling patients with mental illness

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Background: Pharmacist interaction with physicians has been shown to optimize the treatment of their patients by improving their adherence and attitudes toward antidepressant and antipsychotic medications used to treat psychiatric conditions.¹ Despite these results, only 21% of patients on these medications are being counseled.² It has been documented that antipsychotic medications as a therapeutic class is in the top five for medication spending in the United States in 2010.³ Although psychotropic medications are widely prescribed and dispensed, the number of hours devoted to psychiatric disorders in pharmacy school curricula throughout the United States average only 2.5 hours each to major depression and schizophrenia/psychosis. Other areas of mental illness covered are varied both in topic and time allotment.⁴ There are little data to show that pharmacists are confident and knowledgeable in counseling patients on psychotropic medications.

Objective: Assess the confidence and knowledge of practicing pharmacists in counseling of patients with mental illness on psychotropic medications.

Methodology: IRB approved online survey through surveymonkey.com. An email notification was sent to any pharmacist with an active license registered with the Ohio State Board of Pharmacy and an active email address. Consent was determined by completing a question of the survey. The survey collected demographic information and asked a variety of knowledge-based questions on schizophrenia, bipolar disorder, and depression. There were questions about perceived confidence on counseling on classes of medications and to individuals with a mental illness that was based on a 4-point Likert scale response. The primary outcome was to determine any possible predictive factors of confidence in counseling based on several characteristics of the practicing pharmacist.

Results and conclusions: The study included the first 640 participants to respond and 473 answered at least one knowledge-based question. Only 176 of this group were male (37.2%) with the mean of 15±12.85 years in practice. The majority of the participants had a primary practice site in the retail setting (43.3%). Confidence in counseling patients on schizophrenic medications along with counseling on bipolar medications showed a possible predictive association with scores on the knowledge-based questions (p=0.019 and p=0.003 respectively). Those confident in counseling patients on antidepressent were more likely to be in the retail setting (p=0.02). Finally, overall confidence in counseling a patient with any mental health illness was associated with a higher score on the schizophrenia knowledge-based questions only (p=0.048). Based on these results there may be an association with confidence and knowledge. Practice site, years in practice and highest level of education showed no overall predictive properties in counseling patients with any mental health illness.

References:
Antibiotic use for bacteria on urinalysis in patients presenting to the emergency department

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Background: Inappropriate antibiotic treatment can lead to bacterial resistance, adverse effects, and increased health care costs.1-5 Antibiotics for asymptomatic bacteriuria are not indicated in a majority of patients, yet many receive treatment.4,5

Objective: To determine the proportion of patients presenting to the emergency department (ED) with bacteria on urinalysis (UA) without major signs or symptoms consistent with a urinary tract infection (UTI) receiving antibiotic treatment for UTI.

Methodology: An IRB approved retrospective chart review of ED electronic records from January 1, 2005 to November 1, 2011 was conducted to identify patients ≥18 years with a chest pain diagnosis and a completed UA. Patients that were pregnant, immunocompromised, scheduled to undergo urologic procedures, unable to give a history upon presentation, had signs or symptoms of a UTI, or were receiving antibiotics at presentation were excluded. Data collected included demographics, the presence of certain comorbidities, and other positive UA findings. Patients without criteria for symptomatic UTI were divided into two groups: those treated for bacteria on UA and those not treated for bacteria on UA. For patients treated for bacteria on UA, urine culture results and antibiotic data were collected. The primary outcome was the proportion of patients with bacteria on UA without a symptomatic UTI that were treated with antibiotics. Secondary outcomes included the risk of receiving antibiotics for bacteriuria on UA in the presence of certain comorbidities or other positive UA findings, the percentage of completed urinary cultures in treated patients, the percentage of patients treated with specific antibiotics, the percentage of treated patients with an organism resistant to the chosen antibiotic, and the antibiotic chosen and the duration of treatment.

Results and conclusions: This study evaluated 1,367 patient charts and included 405 patients with bacteria on UA without documented signs or symptoms consistent with a UTI. Forty-four patients (11%) were treated with antibiotics for bacteria on UA while 361 patients (89%) were not treated. Excluding patients with "few" bacteria on UA, there were 185 patients, of which 35 (19%) were treated and 150 (81%) were not treated. There were 27 patients (77%) that had a urine culture completed, of which 17 (63%) were positive. Eleven of those urine cultures (65%) were susceptible to the antibiotic chosen. Age >75 (risk ratio (RR) 1.89, 95% confidence interval (CI) 1.05-3.40), presence of an indwelling urinary catheter (RR 4.92, 95% CI 3.04-8.00), a history of UTI (RR 5.26, 95% CI 3.36-8.25), and residence in a nursing home or extended care facility (RR 2.53, 95% CI 1.14-5.6) were risk factors associated with a higher risk of receiving antibiotic treatment. The presence of nitrates (RR 3.0, 95% CI 1.66-5.41), leukocyte esterases (RR 2.62, 95% CI 1.30-5.28), and white blood cells (RR 3.91, 95% CI 1.44-10.57) on UA were also associated with a higher risk of receiving antibiotic treatment. The presence of epithelial cells on UA was associated with a lower risk of receiving antibiotic treatment. This study determined that approximately 20% of chest pain patients were inappropriately treated for bacteria on UA. The risk of antibiotic treatment was increased with certain comorbidities and findings on UA.

References:
Effects of a Pharmacist-Initiation Outreach Program on Controller Medication use and Asthma Control in Non-Adherent Asthmatics

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**Background:** Short-acting-beta2-agonists (SABAs) are generally very effective at treating asthma attacks by relaxing bronchial smooth muscle. Overuse of SABAs is associated with increased risk of adverse effects and the development of tolerance leading to less effective responsiveness during an exacerbation. Appropriate use of controller medications such as inhaled corticosteroids (ICS) should decrease SABA utilization and improve asthma control in persistent asthmatics. Patients receiving intensive counseling on appropriate asthma treatment may be more likely to use an ICS appropriately. Pharmacists can play a key role in providing this educational intervention to patients.

**Objective:** To evaluate the clinical impact of a new program in which primary care clinical pharmacists (PCCPs) in an ambulatory care setting outreach to non-adherent patients with persistent asthma.

**Methodology:** This IRB-approved retrospective study included non-COPD patients aged five to sixty-four with a diagnosis of persistent asthma who received PCCP outreach triggered by an electronic refill authorization request for albuterol between September 12th, 2011 and January 31st, 2012. To qualify for outreach subsequent chart review had to indicate at least one of the following: overutilization of albuterol; lack of/non-adherence to an ICS; same-day/ER visit for asthma exacerbation in the past three months; or oral steroid prescription for asthma exacerbation filled in the past three months. To determine the effectiveness of this new outreach program, SABA and ICS utilization three months before and after PCCP outreach was evaluated by review of medication refill records. Improvement in asthma control was assessed by two methods: comparing quantity of oral steroid prescriptions utilized for acute asthma exacerbation three months before and after outreach and change in Asthma Control Test (ACT) scores between initial outreach and follow-up approximately one month later. Patient satisfaction was assessed using a five-point Likert scale survey which was mailed to all patients.

**Results and conclusions:** This study evaluated 266 patient charts, of which 109 patients received PCCP outreach. Between September 26th 2011 and December 31st 2011 eighty patients aged sixty-four years or younger received PCCP outreach. Within two weeks, 43% (34/80) of these patients filled an ICS. 30% of patients contacted (24/80) filled an ICS within 2 weeks who had not filled one in the last 90 days. The average ICS day supply per patient 90 days before and after outreach increased significantly from 14.8 days to 37.2 days (p<0.001). The number of albuterol canisters per patient 90 days before and after outreach also increased significantly from 1.48 canisters to 1.95 canisters (p<0.05). One month following PCCP outreach, the average ACT score increased significantly from 15.6981 to 19.4906 (p<0.0001). Additionally, when broken down into its individual components, each separate item on the ACT questionnaire increased significantly as well. When assessed as a dichotomous variable, the percentage of patients with controlled asthma (ACT score ≥20) increased significantly from 21.67% at time of initial outreach to 68.3% one month following PCCP outreach (p<0.0001).

**References:**

# Evaluation of the use of adjunct perphenazine in patients with SSRI-resistant PTSD

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## Background:

Selective serotonin reuptake inhibitors (SSRIs) are first line agents in treating post-traumatic stress disorder (PTSD). Augmentation of SSRIs with prazosin or atypical antipsychotics, like risperidone, olanzapine, and quetiapine is often tried in SSRI-resistant PTSD. A previous study conducted at the Louis Stokes Cleveland Veterans Affairs Medical Center (LSCVAMC) determined that a typical antipsychotic, perphenazine, is being used as adjunct treatment for patients with PTSD. Currently, antipsychotics lack an FDA approval for this indication. A recent study by Krystal and associates, evaluated adjunct risperidone for antidepressant-resistant symptoms of chronic military service-related PTSD and found it to be no more effective than placebo. The purpose of this study is to evaluate perphenazine use as adjunct treatment for SSRI-resistant PTSD in veterans at the LSCVAMC and provide guidance for future practice.

## Objective:

To evaluate the efficacy, defined by relapse rate, of adjunct perphenazine use in patients with SSRI-resistant PTSD.

## Methodology:

A case-matched, retrospective chart review will evaluate the relapse rate, defined as hospital admissions and psychiatric ER visits, of adjunct perphenazine versus adjunct risperidone for SSRI-resistant PTSD. Relapse is defined as a composite of one or more of the following: discontinuation due to lack of effect; psychiatric hospitalization with a discharge diagnosis ICD-9 code for PTSD; increase in symptoms; intentional self injury; new or increased suicidal ideation; homicidal ideation or violence. Secondary objectives will assess adherence and adverse effects. All patients with a prescription for perphenazine plus a SSRI for treatment of SSRI-resistant PTSD from October 2007 to May 2012 will be included. Patients will be excluded if they have a psychiatric indication for a typical antipsychotic (schizophrenia or bipolar), lack an adequate trial of perphenazine (at least 30 days on medication) or lack an adequate trial (dose and duration) of their previous SSRI as monotherapy (at least 30 days on medication). A power analysis was preformed to determine the target sample population of 28 patients for each group. Patients who meet the study criteria will be matched based on demographics (age, sex, and psychotherapy) to patients on an equivalent dose of risperidone plus SSRI for SSRI-resistant PTSD. Patients will be evaluated for the primary and secondary outcomes within 1 year of initiating perphenazine or risperidone. A t-test will be used to compare the relapse rate change between adjunct perphenazine and adjunct risperidone.

## Results and Conclusions:
To be determined.

## References:
Assessment of the Effects of Adherence Interventions on Laboratory Test Acquisition Rate

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Background: Research investigating the use of adherence interventions like phone calls and letters has been shown to increase patient attendance rate at scheduled appointment times but little research has been done to determine if these same interventions can increase attendance rate at unscheduled but required yearly laboratory testing. In an effort to increase adherence to laboratory draw attendance, the Kaiser Permanente Medication Management Clinic (MMC) instituted a range of adherence interventions: automated phone calls with a reminder message from the patient’s primary care physician (PCP IVR call), automated phone calls with a reminder message from the pharmacists at the MMC (Generic IVR call), letters, and digital messages through the KP.org secure online interface.

Objective: To evaluate the Kaiser Permanente MMC’s intervention strategy and determine which applied interventions increased adherence most.

Methodology: An IRB approved, non-interventional, retrospective chart review was performed on interventions for patients who annually require lab testing for their ACE-Inhibitors (ACE-I), angiotensin receptor blockers (ARBs), or diuretic medications. Primary endpoint was rate of their acquisition within 30 days of intervention. Secondary endpoint was cost per intervention. All patients at Kaiser Permanente who received an intervention from the MMC between September 2011 and December 2011 were included in this study. Data describing patient demographics, type of intervention, and labwork draw date were collected. Patients were stratified into two groups for analysis based on KP.org access due to concerns that patients with KP.org access would be a significantly different population. The Chi-squared test was used to analyze categorical data, the student’s t-test was used to analyze continuous data. The Bonferroni statistic was used to adjust for possible increase in type I error due to post-hoc testing, with statistical validity at p≤0.006.

Results and Conclusions: 1,343 patients received interventions and were analyzed. Populations were statistically different between the KP.org arm and Non-KP.org arm (average age [61.5 vs 67.1, p<0.0001]; Caucasian race [57.5% vs 38.9%, p<0.0001]). No differences in demographics were found between intervention groups in either arm. In the KP.org active arm, no significant difference was found between adherence in PCP IVR calls and Generic IVR calls (62.22% vs. 48.38%, p =0.096) and IVR calls and letters (48.92% vs.52.64%, p=0.971). Digital messages had statistically lower adherence compared to All IVR and Letters ( 36.84% vs 51.64%, p=0.003). In the Non-KP.org active arm, no significant difference was found in adherence between PCP IVR calls and Generic IVR calls (35.64% vs. 41.88%, p =0.248), however letters did improve adherence more than all IVR calls (50.86% vs. 40.75%, p=0.005). Because of the large difference in adherence rates between arms, analysis was done on combined data, which showed no significant difference between adherence in PCP IVR calls and Generic IVR calls (43.83% vs. 43.7%, p=0.999) and IVR calls and letters (43.78% vs.51.42%, p=0.011). Letter interventions cost an approximate $515 per 1000 interventions, with IVR calls costing $205 per 1000 interventions and digital messages costing $292 per 1000 interventions. Overall, IVR call interventions were more cost effective and offered a similar adherence rate compared to letters, while digital messages offered lower adherence rates.

References:
Evaluating the role of statins in the prevention of contrast-induced nephropathy

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Background: Contrast-induced nephropathy (CIN) is a well-known complication of using iodinated contrast media. Studies have evaluated a wide range of pharmacologic interventions to prevent CIN, including statins. Statins may have the ability to increase nitrous oxide production, provide beneficial effects on endothelial function, and scavenge free oxygen radicals. These pleiotropic effects may lend to their role in the prevention of CIN. Three recently published meta-analyses on the subject of statins for prevention of CIN have all come to a similar conclusion; that the role of statins is still unclear and further studies are needed. This study assesses whether statins prevent CIN in patients at our institution.

Objective: To evaluate the role of statins in the prevention of CIN.

Methodology: Electronic medical records of patients who underwent a cardiac catheterization and received contrast media at the University of Toledo Medical Center between January 2009 and August 2011 were retrospectively reviewed. The study was approved by the Institutional Review Board prior to commencement. Patient's baseline demographics, risk factors, specific statin used, nephrotoxic drugs and measures used to prevent CIN were obtained. Patients were included if they were over the age of 18, received contrast media at the time of catheterization, had a baseline serum creatinine concentration obtained within 24 hours prior to receiving contrast media, serum creatinine concentrations for at least 48 hours after exposure to the contrast media, and a record of outpatient prescription medications. Patients who have end-stage renal disease requiring dialysis were excluded from the study. Reason for catheterization, nephrology consult, lipid panel, type and volume of contrast media used, and comorbid conditions were also collected. The primary outcome, contrast-induced nephropathy, is defined as an increase in serum creatinine > 0.5 mg/dL or 25% from baseline within 48 hours following exposure to contrast media. This criteria for defining CIN has been used in multiple studies looking at statins for the prevention of CIN. Based on the definition, patients were classified as having CIN or not having CIN. Degree of renal dysfunction was also assessed according to the RIFLE criteria, specifically the GFR criteria that define the degree of renal dysfunction encountered by patients.

Results and Conclusions: The study evaluated 1080 patient electronic medical records with 200 patients meeting inclusion criteria. There were 95 patients who were on statin therapy and 105 patients who were not on statin therapy. The two groups differed significantly based on age and sex. There were significantly more patients in the statin group who had hyperlipidemia, hypertension and coronary artery disease. Patients in the statin group had significantly lower total cholesterol and LDL cholesterol compared to the patients not on statins. There was no statistical difference between the groups with respect to renal insufficiency, baseline serum creatinine, risk factors, and prophylaxis received. Sixteen patients in the statin group met criteria for CIN and 15 patients in the no statin therapy group met criteria for CIN (p = 0.47). Based on the RIFLE criteria, two patients in the statin group were classified as being at risk for renal injury, three were classified as having renal injury, and one as renal failure. In the no statin therapy group, one patient was at risk for renal injury and three had renal injury. The results of this retrospective analysis do not demonstrate that statins protect against contrast-induced nephropathy.

References:
Treatment and Outcomes of *Stenotrophomonas maltophilia* Bloodstream Infections (BSI)

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**Background:** *S. maltophilia* is an intrinsically multi-drug resistant nosocomial pathogen and a cause of BSI in critically ill and immunosuppressed patient populations. Historically, sulfamethoxazole-trimethoprim (SMX-TMP) has been the treatment of choice.\(^1\-^4\)

**Objective:** Evaluate the role of antimicrobial therapy (SMX-TMP vs. alternatives) on all-cause fourteen-day mortality.

**Methodology:** Retrospective chart review of patients with *S. maltophilia* BSI from 2001 to 2011. Patients with polymicrobial blood cultures were excluded. Survivors at fourteen days were compared to non-survivors. Logistic regression was performed to analyze for risk factors of fourteen-day mortality.

**Results and conclusions:** A total of 116 BSIs were included. Eighty-nine percent of patients received previous antimicrobials, 91% had central venous catheters, and 44% of patients were in an intensive care unit (ICU) at time of BSI. Malignancy (55%) was the most frequent comorbidity. Source of BSI was 79% line-related, 17% secondary and 4% was undetermined. Of 73 isolates tested, 90% were sensitive to SMX-TMP and 16% to ticarcillin/clavulanate (T/C). Sixty-five percent of patients were treated with appropriate antimicrobials, and of these, 88% received SMX-TMP. Alternative regimens consisted of T/C (N = 5), tigecycline (N = 13), and moxifloxacin (N = 2). Fourteen-day mortality was 18%. Amongst patients treated with an SMX-TMP containing regimen, fourteen-day mortality was similar to those treated with alternatives (14% vs. 11%, \(p = 1\)). There was a trend toward a longer median time to appropriate therapy amongst survivors (4 days, IQR 4.0-5.5) versus non-survivors (4 days, IQR 1.0-4.25, \(p = 0.054\)). Patients treated with tigecycline had a 30% fourteen-day mortality (\(p = 0.25\)) while both patients treated with moxifloxacin survived. Patients with SMX-TMP-resistant isolates had a fourteen-day mortality of 29% (\(p = 0.61\)). ICU admission (OR 41.36, 95%CI 3.40-502.74), neutropenia (OR 16.89, 95%CI 2.60-109.67), total Charlson Comorbitidy Index (OR 1.49, 95%CI 1.07-2.07), and total Pitt Bacteremia Score (OR 1.61, 95%CI 1.03-2.50) were found to be independent risk factors for mortality. Our findings suggest that treatment of *S. maltophilia* BSI with SMX-TMP containing regimens were comparable to alternative regimens in all-cause mortality at fourteen days.

**References:**

Antimicrobial usage following a three month hiatus from a pharmacist-driven antimicrobial stewardship program

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Background: A major health problem that has substantially impacted patient treatment and outcomes is the worldwide emergence of antimicrobial resistance. Antimicrobial stewardship programs have been utilized in order to optimize clinical outcomes while minimizing unintended consequences of antimicrobial use such as toxicity, selection of pathogenic organisms, and the emergence of resistance.

Objective: The goal of this study is to assess antibiotic usage at the University of Toledo Medical Center (UTMC) during a three month hiatus from a pharmacist-driven antimicrobial stewardship program.

Methodology: An institutional pharmacy report was generated in order to identify patients who received at least one of the specified antimicrobials and were screened to determine if they met inclusion criteria for chart review. A pre-data set was collected retrospectively (November 2010 – January 2011) and will represent the time antimicrobial stewardship was being performed by an infectious disease trained clinical pharmacist. A post-data set was collected retrospectively as well (November 2011 – January 2012) and will represent the period in which the stewardship position was vacant. Patients ≥ 18 years old, who have received either linezolid, micafungin, or imipenem/cilastatin for at least 72 hours will be included. In the pre data set patients will be included if the patient had an intervention made by the antimicrobial stewardship pharmacist. Data collected includes dose of antibiotic, duration of therapy, type of infection, microbiological results, de-escalation therapy and whether the patient was located in an intensive care unit at the start of therapy. The primary outcome will be the change in antibiotic usage over a three month period following the departure of an antimicrobial stewardship pharmacist. Secondary outcomes include the occurrence of C. difficile within the hospital and average duration of antimicrobial use following negative culture results.

Results and conclusions: This study had 222 patient meet inclusion criteria. In the micafungin group during the active steward timeline there were 12 of 26 (46%) patients with an intervention and an average duration of therapy (DOT) of 6.96±3.6 days. The no steward timeline had 12 patients and an average DOT of 8.08±3.1 days. In the linezolid group during the active steward timeline there were 5 of 48 (10.4%) patients with an intervention and an average DOT of 7.79±4.5 days. The no steward timeline had 40 patients and an average DOT of 7.73±4.3 days. The imipenem/cilastatin group during the active steward timeline had interventions made on 12 of 45 (26.6%) patients with an average DOT of 7.2±4.1 days. The no steward timeline had 51 patients included and an average DOT of 6.4±2.4 days. The number of new cases of C. difficile during the two time periods increased from 11 during the stewardship timeline to 25 without an active steward.

References:
Evaluation of factors associated with achieving glycemic control in a pharmacist-managed diabetes clinic

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Background:  Pharmacist involvement in the management of diabetes has been associated with improved diabetes-related outcomes.1,2 Multiple studies have reported an average reduction in A1c of >1% in patients receiving diabetic management from a pharmacist.3,4 The specific interventions resulting in improved glycemic control have not been well-described in the literature.

Objective:  To identify factors that are associated with patients achieving goal A1c after 6 months in a pharmacist-managed diabetes clinic.

Methodology:  This study is a descriptive, retrospective chart review of patients enrolled in a pharmacist-managed diabetes clinic from July 2009 – July 2011.  Patients with a diagnosis of type 2 diabetes mellitus and a 6 month follow up A1c were included.  Patients with an A1c goal >7% or type 1 diabetes mellitus were excluded.  Data was collected for demographics, A1c measurements, diabetic medications and for each factor relating to baseline characteristics, referral, compliance or pharmacist intervention. The primary endpoint was the odds of each identified factor being associated with achievement of goal A1c after 6 months of enrollment in the diabetes clinic.  The factors were also evaluated within two subgroups of patients: those with a baseline A1c >7% reaching goal at 6 months and those with a baseline A1c >9% who achieved at least a 2% decrease in A1c in 6 months.

Results and conclusions:  Of the 112 patients enrolled into the clinic during the study period, 58 were included in the analysis.  In relation to the primary outcome, there was a positive association with reaching goal for patients who had <1 failure to show (FTS) to office visits in 6 months (OR 8.10, 95% CI 1.47-58.65), had cancelled or FTS to <50% of office visits (OR 10.0, 95% CI 1.87-30.88). This positive association was also seen within the subgroup of patients with baseline A1c >7%. There was a negative association with reaching goal for patients with documented social worker involvement (OR 0.22, 95% CI 0.04-0.99) and non-insulin or insulin dose increases at >50% of office visits (OR 0.10, 95% CI 0.01-0.55). This did not carry through to the subgroup analysis. There was no statistical significance found in the subgroup of patients with a baseline A1c >9% who achieved at least a 2% decrease in A1c for any factor. Overall, this analysis found that patients who had <1 FTS, had cancelled or FTS to <50% of office visits or who brought >75% logs to office visits were more likely to achieve goal A1c, while patients with a social worker or who had dose increases at >50% of office visits were less likely to reach goal A1c.

References:
Retrospective Evaluation of the Impact of an Antimicrobial Stewardship Program in a Teaching Hospital on Clinical and Economic Outcomes

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**Background:** As antimicrobial resistance continues to increase, national guidelines and recommendations have been published for the development of Antimicrobial Stewardship Programs. The primary goal of an Antimicrobial Stewardship Program (ASP) is to improve patient care and outcomes. Currently there are few publications that have studied the impact of an ASP on clinical patient outcomes. In an effort to provide optimal patient care and improve outcomes, Summa Health System (Akron City Hospital) initiated a prospective, comprehensive ASP in September 2010. The purpose of this study is to evaluate the impact of the ASP on clinical patient outcomes and cost of antimicrobials.

**Objective:** To evaluate the impact of Akron City Hospital’s ASP on clinical and economic outcomes.

**Methods:** A matched retrospective chart review was performed to compare the clinical outcomes and cost of antimicrobials in patients for whom an ASP recommendation was accepted (AC) versus not accepted (NAC). Baseline demographics total and ICU length of stay, mortality in-hospital and at 30 days, readmission, duration of antimicrobial (ATM) therapy and comparative cost of antimicrobial regimen were assessed.

**Results and conclusions:** A total of 100 patients, 50 with accepted recommendations and 50 with not accepted recommendations, were matched by type of recommendation, location (critical care vs. general medical unit), type of infection, and age for evaluation. Age, gender, comorbidities, type of recommendation and types of infection were similar between the groups. The hospital length of stay and duration of ATMs was not statistically different between groups (NAC- 15 days vs. AC- 17.2 days; p=0.262), (NAC- 4.52 days vs. AC- 4.18 days, p=0.583). Mortality out-patient at 30 days was significantly less in the AC group compared to the NAC group (1 pt vs. 8 pts, p=0.035) although the mortality in-hospital was similar between groups (3 pts vs. 1 pt, p=0.307). Overall mortality at 30 days was not significantly different between groups (AC 4 pts vs. NAC 9 pts, p=0.137). Patients in the AC group were more likely to have a decrease in cost of ATM regimens than patients in the NAC group ($35.95/day vs. $2.01/day, p<0.001). Clinical outcomes were comparable between patients for whom an ASP recommendation was accepted versus not accepted. There was a significant cost savings found in daily ATM regimens post-recommendation in patients with accepted recommendations.

**References:**

A Retrospective Evaluation of Pharmacist Managed Vancomycin Dosing and Monitoring

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Background: Vancomycin is one of the most highly used antibiotics and requires patient specific dosing and monitoring. Frequently vancomycin doses are determined incorrectly and monitoring is performed at inappropriate times leading to misinterpretation of vancomycin levels. A consensus review published by the American Society of Health – System Pharmacists, Infectious Diseases Society of America, and Society of Infectious Diseases Pharmacists recommends dosing vancomycin based on the patient’s actual body weight and frequency based on renal function. The recommendations also include appropriate monitoring of trough concentrations, which should be based on the individual patient, type of infection, and co-morbidities. Research has shown that pharmacist involvement with therapeutic drug monitoring has lead to more accurate dosing and monitoring. Dosing and monitoring guidelines have been developed at the Louis Stokes Cleveland Veterans Affairs Medical Center based on the above dosing recommendations. These guidelines are utilized by a newly implemented pharmacist managed vancomycin consult service.

Objective: To evaluate a newly implemented pharmacist managed vancomycin dosing and monitoring service

Methodology: A retrospective chart review was conducted to evaluate vancomycin therapy managed by pharmacy (post – consult group) compared to patients who received vancomycin prior to implementation of the pharmacy vancomycin consult service (pre – consult group). The primary endpoint was percent of appropriately collected vancomycin levels within the the goal range. Secondary endpoints included number of levels drawn, number of inappropriate levels, inappropriately held doses, dosage changes, critical trough values, and cost associated with excess levels. Inclusion criteria were patients ≥ 18 years of age, received ≥ 3 doses of vancomycin therapy, ≥ 1 trough level, and therapy initiated on the medicine wards. Patients were excluded if they were receiving hemodialysis, or had an infectious diseases consult or pharmacy note in the chart addressing vancomycin therapy (in the pre – consult group only). Patients in the pre – consult group received therapy from October 3, 2010 though February 28, 2011, and post – protocol group from October 3, 2011 through February 29, 2012. T-test was used to evaluate continuous data and chi-squared test was used to evaluate categorical data.

Results and Conclusions: All charts were reviewed for patients who received vancomycin on the medicine floor during the defined study dates. Of these patients, 95 patients in the pre – consult group and 93 patients in the post – consult group met inclusion and exclusion criteria. Baseline characteristics, length of stay, and duration of therapy were similar between groups. Initial dosing was more likely to be individualized for patients in the post – consult group (27% vs 90%, p < 0.0001). The percentage of appropriately collected troughs within range were significantly increased in the post – consult group (24% vs 44%, p = 0.01). In addition, there were significant decreases in the number of levels per patient (1.48 vs 1.16, p = 0.007), inappropriate levels (44% vs 5%, p < 0.0001), out of range values (76% vs 56%, p = 0.01), inappropriate dosage changes (31% vs 3%, p = 0.003) and inappropriately held levels (5% vs 0%, p = 0.025) in the post – consult group.

With pharmacist involvement, vancomycin doses and levels were more appropriate and patients were more likely to achieve levels within the desired trough range.

References:
The relationship between low vitamin D levels and depression

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Background: Low vitamin D levels are a widespread problem in the US\(^1\) with a prevalence reported to range from one third to one half of adults\(^2\). It has long been realized that vitamin D plays a role in the regulation of calcium and phosphate metabolism; however, vitamin D has recently been shown to be involved in other areas including cardiovascular disease, diabetes, and cancer. Receptors have also been found in the human brain\(^3\). Results from recent studies have led to the theory that vitamin D plays a part in cognitive function, neuronal development, and mental health.

Depression is a leading cause of disability. Not only is it a widespread issue, but high treatment failure rates lead to hospitalizations and readmissions. Although a few studies have shown an association between vitamin D levels and overall mood\(^3\), many of these only included special populations or excluded many patients at the greatest risk of depression. In addition, these studies have not looked at readmission rates in correlation to vitamin D levels.

Objective: To study the relationship between serum vitamin D levels and depression in hospitalized patients.

Methodology: A retrospective chart review to compare the rates of depression in adult patients with a documented vitamin D level between August 2010 and January 2011. Patients admitted to Akron City or St. Thomas hospitals with a documented vitamin D serum result were included. The primary endpoint of presence of depression was analyzed by factors including admission or transfer to a psychiatric unit for treatment for depression, and by the admission question "are you sad or depressed?". As vitamin D levels can fluctuate, the search for positive depression status will be confined to three months before through six weeks after the serum vitamin D result. Readmission rates were a secondary endpoint. Vitamin D status was analyzed as categorical data, defined as sufficient (≥30ng/ml), insufficient (29-20 ng/ml), and deficient (<20ng/ml).

Results and conclusions: A total of 398 charts were evaluated, with 334 patients meeting inclusion criteria. The majority of patients included in this study were caucasian (82%) females (64%) with an average age of 76 (range 20-98) and an average BMI of 28.1. With respect to the admission question, participants in the deficient and insufficient vitamin D groups screened positive for depression at a higher nonsignificant rate than those in the sufficient group (35.48%,40.54%, vs 29.41%, p=0.3177). When the groups are divided into those with sufficient levels vs those with less than sufficient levels, there was an 8% nonsignificant difference between groups with respect to the admission question (29.41% vs 37.9%, p=0.2095). Patients in the sufficient group had a consistently lower nonsignificant risk of readmission at 30, 90, and 120 days compared to those in the deficient group, but showed no difference compared to those in the insufficient group. The combined prevalence of insufficient and deficient vitamin D levels in patients included in the study was almost 80%, supporting the claim that low levels are a widespread problem. Although not statistically significant, these findings suggest a higher rate of depression in patients with lower vitamin D levels. Larger future studies will be needed to assess the affect of vitamin D levels on readmission rates.

References:

Effect of Intravenous vs. Subcutaneous Phytonadione on Length of Stay in Patients in Need of Emergent Warfarin Reversal

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**Background:** Current Chest guidelines recommend intravenous phytonadione for the reversal of warfarin in the emergent setting. Compared to subcutaneous administration, delivery of phytonadione via the intravenous route works more rapidly than subcutaneous phytonadione\(^1\)\(^2\). In addition, higher doses of phytonadione are often required for rapid reversal when administered subcutaneously, possibly leading to extended resistance to subsequent anticoagulation upon restarting warfarin\(^3\).

**Objective:** To compare the length of stay in patients who were treated with intravenous or subcutaneous phytonadione for emergent warfarin reversal with bleeding.

**Methodology:** An IRB approved retrospective chart review evaluated hospitalized patients treated with intravenous versus subcutaneous phytonadione for emergent warfarin reversal within the University Hospitals Health System. All patients were 18 years or older and on warfarin therapy. The patient must have had an INR between 3 and 10 upon admission to the emergency department. The patient must have also been restarted on warfarin therapy upon hospital discharge. Exclusion criteria include: patients who received intramuscular or oral phytonadione, patients who received phytonadione by more than one route, patients who received FFP or any other blood products containing clotting factors, patients with active or severe liver disease, and patients who received other forms of anticoagulation. The primary endpoint was length of stay. Secondary endpoints were cumulative dose of phytonadione required to achieve an INR of \(\leq 1.5\), time taken to achieve an INR of \(\leq 1.5\), time from first phytonadione dose to restart of warfarin therapy, and the difference between initial and subsequent INRs measured at <12 hours, 12 to 24 hours, >24 to 36 hours, >36 to 48 hours.

**Results and conclusions:** This study evaluated 1182 patient charts to find 34 patients who met inclusion and exclusion criteria. Baseline characteristics were similar in both the intravenous and subcutaneous groups. Length of stay in the intravenous group was 143.5 hours compared to 166.3 hours in the subcutaneous group (p=0.84). INR reduction when comparing intravenous vs. subcutaneous was 5.3 vs. 0.7 at <12 hours (p=0.01) and 5.5 vs. 3.3 at 12 to 24 hours (p=0.002). No statistical significance was found comparing intravenous and subcutaneous initial and subsequent INRs at times >24 to 36 hours and >36 to 48 hours. Other secondary endpoints, including cumulative dose of phytonadione required to achieve an INR of \(\leq 1.5\), time taken to achieve INR of \(\leq 1.5\), and time from first phytonadione dose to restart of warfarin therapy were all not significantly different.

**References:**


Evaluation of Opioid Analgesic Usage in Postoperative Coronary Artery Bypass Graft Surgery Patients Pre and Post Implementation of Computerized Provider Order Entry

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Background: In the surgical setting, coronary artery bypass grafting (CABG) has become one of the most common cardiothoracic interventions today. Approximately two thirds of patients who have undergone CABG report moderate to severe pain following surgery. In many patients, postoperative pain following surgery remains one of the most feared events during their hospital stay. Appropriately treating postoperative pain in this patient population is of high priority to reduce further complications after surgical intervention. The institution implemented Computerized Provider Order Entry (CPOE) with pre-specified order sets for postoperative pain management in April 2011.

Objective: To evaluate opioid analgesic usage in postoperative CABG patients before and after the implementation of CPOE and compare reductions in overall pain between groups.

Methodology: A retrospective chart review was completed for patients who underwent coronary artery bypass graft surgery in the first and third quarter of 2011 in a 500-bed tertiary care medical facility. Patients must have undergone coronary artery bypass graft surgery and received opioid analgesic medications in the postoperative period. The data collection period for each patient began in the postoperative period after the close of surgery and continued for 72 hours. Patients were excluded if they were enrolled in other clinical trials within the institution or intubated for a period of 24 hours or greater after surgery. The primary endpoints for the study included overall reduction of pain after the administration of analgesics and a comparison of pain reduction before and after CPOE implementation. Gender, quarter 2011, medication selection, and appropriateness of selection were covariates selected for the primary endpoint analysis. Secondary endpoints included total amounts of analgesics administered and an evaluation of their appropriateness based on the post-operative order set.

Results and conclusions: The study evaluated a total of 55 patients who underwent CABG surgery with 25 patients meeting inclusion criteria in each the first and third quarter of 2011. A total of 417 appropriate analgesic administrations were documented with 395 being included in the final analysis. The majority of patients included in the study were men (64%) with an average age of 66 years. Median pre and post dose pain scores for the first and third quarter were 7.0 and 3.0, respectively. The highest average reduction of 4.1 in patient reported pain was observed when the appropriate analgesic and dose was administered, as recommended by the post-operative order set. A significant reduction in pain from the mean was observed in the third quarter 2011 (p = 0.0107). No statistical significance was found when the covariates were analyzed to determine an effect on the overall pain reduction (p = 0.3496). A greater overall pain reduction was found after CPOE implementation; however, the covariates analyzed had no effect on patient-reported pain reduction.

References:
Safety, Efficacy, and Cost of Pharmacodynamic Dose Optimization of Beta-Lactam Antibiotics

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Background: Beta-lactam antibiotics play a prominent role in current infectious disease therapy. However, increasing resistance among gram-negative pathogens and slow development of new antimicrobial agents has led to an emphasis on optimizing the use of current agents. Beta-lactam antibiotics exert time dependent antimicrobial properties, which are optimized when administered by extended infusion. Literature has shown outcome benefit of extended infusion of beta-lactams compared with intermittent infusion. In 2007, Summa Health System initiated extended infusion of piperacillin/tazobactam 3.375 g IV over 4 hours every 8 hours and doripenem 500 mg IV over 4 hours every 8 hours as the preferred method of administration in critically ill patients. Summa Health System then sought to investigate and define optimal use of antimicrobials effective against Pseudomonas aeruginosa. In 2010, isolates were collected from within the institution and analyzed through The Center of Anti-Infective Research and Development in Hartford, Connecticut. A pharmacodynamic dose optimization protocol (PDOP) was developed from this data, with the goal of optimizing the dosing of piperacillin/tazobactam, doripenem, and cefepime based on specific organism minimum inhibitory concentration. There are no outcomes data regarding this protocol.

Objective: To determine the efficacy, safety, and cost of the PDOP compared to an empiric non-optimized extended infusion protocol for piperacillin/tazobactam, cefepime, and doripenem.

Methodology: A retrospective cohort analysis of medical records was conducted on patients who received any study antibiotics between October 2009 and October 2011. Patients admitted prior to the start of the PDOP were assigned to the non-optimized group, while patients admitted after the initiation of the PDOP were assigned to the PDOP group.

Results and conclusions: 30 patients were included in the PDOP group and 15 patients in the non-optimized group. No statistically significant changes in outcomes were found between groups in terms of outcomes. De-escalation of the PDOP regimen does offer statistically significant cost reductions over the empiric PDOP regimen, and similar to the non-optimized group. In conclusion, The PDOP regimen does not appear to be any less safe or less effective when compared to the non-optimized extended infusion protocol. The dose de-escalation built into the PDOP regimen offers cost avoidance to the health system.

References:
Evaluation of clinical outcomes in patients who continued clozapine therapy despite moderate to severe leukopenia or neutropenia

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Background: Clozapine is the only antipsychotic medication approved for treatment-resistant schizophrenia and its superiority to other second generation antipsychotics, in terms of efficacy, has been well-established. The rare, but potentially fatal side effect of agranulocytosis has caused the use of clozapine to be regulated more than any other antipsychotic medication. All patients must be registered in the Clozapine National Registry and frequent monitoring of white blood cell (WBC) count and absolute neutrophil count (ANC) must be performed every 7-28 days depending on the current duration of treatment. According to the clozapine monitoring guidelines provided by the Clozapine National Registry, a WBC count less than 3000/mm$^3$ or ANC less than 1500/mm$^3$ requires interruption of clozapine therapy. However, some physicians and patients are reluctant to discontinue clozapine. There are limited published reports in which clozapine was continued and the neutropenia was managed by adding lithium or granulopoiesis stimulating factors (GSFs), changing concomitant medications which might also be implicated in neutropenia, or observing to see if the neutropenia is transient.

Objective: Compare clinical outcomes in patients who did and did not discontinue clozapine therapy as a result of a WBC count less than 3000/mm$^3$ or ANC less than 1500/mm$^3$.

Methodology: The VA's computerized patient record system will be used to retrospectively identify patients who, over a 17-year time period, have experienced a WBC count less than 3000/mm$^3$ or ANC less than 1500/mm$^3$ while actively taking clozapine for the treatment of schizophrenia or schizoaffective disorder. Patients who received clozapine for another diagnosis will be excluded. Patients will then be stratified into two groups; those who continued or discontinued clozapine therapy according to the national monitoring guidelines. Data collection will include clozapine dose, age, gender, baseline WBC count, baseline ANC, ethnicity/race, concomitant medications, and a diagnosis of benign ethnic neutropenia. Clinical outcomes will be obtained via chart review of electronic medical records for 30 days after the patient experienced the blood dyscrasia. Research has been approved by the hospital's institutional review board (IRB).

Results and conclusions: To be determined.

References:

Warfarin Discharge Counseling Pilot Evaluation

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Background: Warfarin is a high risk drug for adverse events and is associated with a ten-fold chance for bleeding during the first month of therapy. The National Quality Forum in response to National Patient Safety Goals (NPSG) regarding anticoagulation therapy has mandated an implementation of a formalized anticoagulation management program to reduce potential for patient harm with the use of anticoagulation therapy. The guidelines also recommend that patient/family education includes importance of follow-up in order to monitor patients.

Objective: To evaluate potential means to meet these goals the Cleveland Clinic Department of Pharmacy has implemented a warfarin discharge counseling pilot to determine quality assurance of patient education at discharge and continuity of care post-discharge.

Methodology: It is a descriptive concurrent study conducted on the cardiology step down unit. The primary objective was to determine the percentage of patients attending a post discharge follow-up appointment to monitor warfarin therapy using a phone follow-up survey. The secondary objective was to determine patient’s level of warfarin understanding after a counseling session by a pharmacist prior to discharge via a quality assurance survey. Patients 18 years or older discharged to home on warfarin therapy were included. Exclusion criteria included patients discharged to a nursing facility and those unable to speak and understand English. Also patients unable to be reached via a telephone were excluded from the primary outcome analysis. The timeframe for the pilot was November 1-December 9, 2011. Primary and secondary objectives were analyzed using descriptive statistics. Chi-square was used when appropriate. An alpha level <0.05 was deemed statistically significant.

Results and Conclusions: There were a total of 79 warfarin consults over the 39 pilot days with 64 completed consults by a pharmacist. Out of the 64 counseled patients, 45 participated in the quality assurance survey and 41 permitted for post-discharge follow-up phone call. For patients who gave permission for follow-up phone call, 70.7% attended post-discharge follow-up appointment, 9.8% had an appointment scheduled for the future, 7.3% were aware of follow-up appointment but did not attend and 12.2% were unable to follow-up for other reasons. In regards to the quality assurance survey, 28.9% of patients agreed and 64.4% of patients strongly agreed that they had an overall understanding of their warfarin therapy after the counseling session with a pharmacist. In conclusion, pharmacists counseling patients on warfarin therapy ensures that patients are educated on their medications and receive follow-up instructions.

References:
Characterization of Adverse Metabolic Outcomes of Androgen Deprivation Therapy in Prostate Cancer Patients

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Background: Androgen deprivation therapy (ADT) is a management option for locally advanced to metastatic stages of prostate cancer, and can be accomplished medically through the use of gonadotropin-releasing hormone (GnRH) agonists. Recent studies have associated GnRH agonist therapy with increases in cholesterol, body fat, and triglycerides, while concomitantly decreasing insulin sensitivity. In October 2010, the FDA required manufacturers to include information in the GnRH agonist package inserts warning of increased risk of obesity, diabetes, and adverse cardiovascular outcomes (myocardial infarction, stroke, and sudden cardiac death). To this point, studies examining the relationship between GnRH agonists and adverse metabolic outcomes have produced conflicting results.

Objective: To describe the incidence of adverse metabolic events in patients receiving a GnRH agonist for prostate cancer at MetroHealth Medical Center, and to characterize metabolic parameters in those experiencing adverse outcomes.

Methodology: This IRB approved, retrospective chart review was conducted to characterize the incidence of adverse metabolic outcomes in prostate cancer patients from January 2001 through December 2010 who received GnRH agonist therapy at MetroHealth Medical Center. Patients were included if they were 18 years of age or older, had a biopsy-proven diagnosis of prostate cancer, and received leuprolide (GnRH agonist on MetroHealth formulary) for at least six months. Data collected on included patient demographics, therapy duration, and metabolic lab values (HbA1c, lipid panels, blood pressure, BMI). The primary outcomes of the study were the incidence of diabetes, myocardial infarction, and stroke while receiving leuprolide. Patients with a history of diabetes prior to initiation of leuprolide were excluded from the diabetes incidence endpoint, and patients were stratified by history of smoking, diabetes, and cardiovascular disease. The secondary outcome was characterizing the metabolic parameters in patients who experienced adverse metabolic outcomes while receiving leuprolide.

Results and Conclusions: A total of 146 patients met the inclusion criteria for the study. The median age in this group was 69 years old. The mean duration of therapy with leuprolide was 33.2 months. Out of the 119 evaluated patients who did not have a history of diabetes prior to treatment, 17 (14.3%) developed diabetes after initiation of leuprolide. Of 146 evaluated patients, 12 (8.2%) experienced a myocardial infarction, and 8 (5.5%) experienced a stroke after starting leuprolide treatment. A trend was seen towards a greater risk of stroke in African-Americans. In patients who experienced an adverse metabolic outcome, 93.1% had a BMI of 25 kg/m² or greater, 77.2% had an HDL of 40 mg/dL or less, 63.6% had TG of 150 mg/dL or greater, 92.3% had a blood pressure of 130/85 mm Hg or greater on two separate occasions, and 90% had a HbA1c of 6.5% or greater at some point during treatment. Based on these results, patients receiving GnRH agonist therapy for prostate cancer should undergo consistent monitoring of blood pressure, lipids, and blood glucose (according to accepted practice guidelines).

References:
Comparison of phenytoin and levetiracetam following benzodiazepine administration in the management of status epilepticus

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Background: Status epilepticus is a medical emergency which can result in neurologic injury after 30 minutes of seizure activity and is associated with significant morbidity and mortality. Benzodiazepines (BZD) have established efficacy as first-line therapy in status epilepticus, however, are only successful in 55-65% of patients. Patients who fail BZD therapy will require additional therapies, for which there is limited information regarding the appropriate selection of a second-line antiepileptic drug (AED). Evaluation of phenytoin and levetiracetam use in status epilepticus at the Cleveland Clinic will help identify appropriate second-line therapy.

Objective: Evaluate the role of phenytoin and levetiracetam following BZD administration in the management of status epilepticus.

Methodology: IRB-approved, non-interventional, retrospective chart review to compare the efficacy of phenytoin and levetiracetam following BZDs in the management of status epilepticus. Patients were included if they were diagnosed with status epilepticus between December 31, 2008 and October 1, 2011, ≥16 years of age, and had a definitive time of seizure onset who received a BZD followed by phenytoin or levetiracetam. Patients who were transferred from an outside facility for which information regarding initial management was unavailable were excluded. Data describing patient demographics, prior seizure history and therapy, presentation and treatment of status epilepticus, and patient outcomes were collected. The primary outcome was seizure cessation within 48 hours of 2nd-line AED initiation, occurring in 14 patients (66.7%) in then phenytoin group and 7 patients (63.6%) in the levetiracetam group (P=1.000). There was no difference in the time (hours) to seizure cessation between groups, with a median of 37.1 (8.4 – 58.5) in the phenytoin group and 38.0 (12.0 – 76.0) in the levetiracetam group (P=0.634). Functional status at hospital discharge was not significantly different between groups, with zero patients in the levetiracetam group and 5 patients (23.8%) in the phenytoin group considered to be independent at discharge (P=0.138). Overall survival was similar between groups with >90% of patients in both groups surviving at hospital discharge (P=1.000). There was no difference in time to seizure cessation following initiation of 2nd-line AED or patient outcomes between phenytoin and levetiracetam.

Results and Conclusions: This study evaluated 100 patients with 32 patients meeting inclusion criteria. Baseline characteristics were similar between groups with the majority of patients being male (17, 53.1%) with an average age of 61.0 ± 18.1 years in the phenytoin group and 62.4 ± 18.1 years in the levetiracetam group. There was no difference in seizure cessation within 48 hours of 2nd-line AED initiation, occurring in 14 patients (66.7%) in then phenytoin group and 7 patients (63.6%) in the levetiracetam group (P=1.000). There was no difference in the time (hours) to seizure cessation between groups, with a median of 37.1 (8.4 – 58.5) in the phenytoin group and 38.0 (12.0 – 76.0) in the levetiracetam group (P=0.634). Functional status at hospital discharge was not significantly different between groups, with zero patients in the levetiracetam group and 5 patients (23.8%) in the phenytoin group considered to be independent at discharge (P=0.138). Overall survival was similar between groups with >90% of patients in both groups surviving at hospital discharge (P=1.000). There was no difference in time to seizure cessation following initiation of 2nd-line AED or patient outcomes between phenytoin and levetiracetam.

References:
Vitamin D Therapy for Rosuvastatin-Induced Myalgia

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Background: Myositis and myalgia are common adverse effects associated with statins and are a major cause for discontinuation of therapy. Specifically for rosuvastatin, myalgia has been reported to occur in 3-13% of patients with the incidence increasing as the dose increases. The mechanism of statin induced muscle injury is not well understood. One hypothesis is that a deficiency in vitamin D levels leads to decreased nuclear vitamin D receptor gene transcription of proteins that prevent subsarcolemmal rupture and are needed for repair of the T-tubular system inside muscle cells.1

Research has shown that a strong association exists between low serum levels of vitamin D (25(OH)D) and myositis.2 Upon supplementation in vitamin D deficient patients, improvements can be seen in muscle strength and reduced falls.3 This is hypothesized to be due to a reduction in type II muscle fiber atrophy from deficiency in vitamin D.4

Objectives: (Primary) To assess the ability to tolerate rosuvastatin after adequate vitamin D replacement therapy in patients who had an ADR of myalgia with rosuvastatin and were vitamin D deficient.
(Secondary) Evaluate the number of patients able to reach LDL goals with rosuvastatin after adequate vitamin D replacement.

Methodology: This retrospective chart review was conducted on patients at Louis Stokes Cleveland VA Medical Center (LSCVAMC) who had a reaction of myalgia associated with rosuvastatin from January 1st, 2005 through August 1st, 2011. Patients must have received supplementation with ergocalciferol or cholecalciferol and achieved an increase in serum 25(OH)D level of greater than or equal to 10 ng/mL. To determine if myalgia occurred after vitamin D supplementation, patients must have been re-exposed to rosuvastatin. Patient charts were reviewed using the LSCVAMC Computer Patient Record System (CPRS) database. The sample size was calculated to be 14 patients assuming a power of 80%, alpha of 0.05, and an effect size of 0.87. Both the primary and secondary outcomes were assessed with chi square tests and logistic regression analysis using Microsoft Excel software.

Results and conclusions: Thirty patients were included in this study. Most patients were male (97%) and white (83%) with an average age of 66 yrs. Twenty-nine patients (97%) had a comorbidity of dislipidemia and eleven (37%) had a history of coronary artery disease or myocardial infarction. When evaluating the primary outcome of patients able to tolerate rosuvastatin after vitamin D supplementation, 21 out of 30 (70%) patients were successful. When compared to baseline this is statistically significant (p<0.001). Five (17%) patients were able to achieve their LDL goal. A logistic regression analysis was performed but found no statistically significant variables due to the small sample size. Vitamin D supplementation may increase the ability to tolerate rosuvastatin in patients previously experiencing myalgia associated with rosuvastatin. A randomized control trial is needed to limit confounding variables and further explore the association between vitamin D deficiency and statin induced myalgias.

References:
Physician perceptions of the current level of pharmacy practice in a community teaching hospital

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Background: Current pharmacy practice model initiatives are promoting an increased collaboration between pharmacists and physicians in order to provide safe, effective, efficient, and accountable care.1–3 Limited studies have been done to assess physicians’ expectations of pharmacist roles in collaborative practice.4,5

Objective: The objective of this study is to determine whether the current level of pharmacy practice at Akron General Medical Center (AGMC) meets our physicians’ expectations.

Methods: This study was a mixed-mode survey that was distributed to physicians for self-administration. All resident physicians and physicians with active medical staff privileges at Akron General Medical Center (AGMC) were included. Those physicians seeing an average of <2 patients/month or those physicians without an active email and mailing address were excluded. First contact was through email or a web-based survey. Second contact was through a mailed paper survey identical to the web-based survey. The primary outcome was to describe the difference between physicians’ experiences with and expectations of pharmacy services at AGMC. All items on the survey were answered based on a Likert scale. Secondary outcomes include demographic influence on primary outcome and physician assessment of the following: physician/pharmacist and patient/pharmacist affect on outcomes, pharmacist provided drug therapy management, and pharmacist accountability.

Results: The survey was sent to 466 physicians and 114(24.4%) usable surveys were included in the data analysis. Results from the primary outcome analyzing the overall difference between physicians’ experience with and expectations of pharmacy services indicate a significant difference between the groups using the Mann-Whitney U test (mean 2.86 vs. 3.25, p<0.0001). Of physicians answering, 99.1% (107/108) and 98.1% (102/104) agree or strongly agree that their interactions with AGMC pharmacists and patient interactions with pharmacists, respectively, result in better patient outcomes. The physicians surveyed agree or strongly agree that drug therapy management should be provided for each hospitalized patient (72.8%, 75/103) and that AGMC pharmacists hold themselves accountable for patients’ medication related outcomes (72.9%, 70/96).

Conclusions: This study demonstrates that the current level of pharmacy practice at Akron General Medical Center does not meet the expectations of our physicians. The study also appears to reveal a trend that as physician exposure to AGMC pharmacy services increases, so do both the experiences with and expectations of those services. This, in addition to the overwhelming agreement that pharmacist interactions result in better patient outcomes, leads the authors to the conclusion that the pharmacy practice model at Akron General has exposed our physicians to the services that can be provided by the pharmacy and those physicians expect more of those services. We feel that this proves that we have a successful pharmacy practice model at Akron General Medical Center and there is a need to develop more ways to make Akron General pharmacists available to provide these services to physicians and patients.

References:
The effect of selegiline therapy on the onset of dementia in patients with Parkinson’s disease

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Background: Dementia is a common non-motor complication in patients with Parkinson’s disease (PD) with few therapeutic options. The use of selegiline therapy in PD is primarily as monotherapy in early stages or to reduce on-off fluctuations in later stages. Literature evaluating the potential neuroprotective benefits of selegiline in patients with PD is limited and focuses on motor complications. Recent studies have shown a potential benefit of selegiline therapy in the treatment of Alzheimer’s dementia. To date, amantadine is the only medication to be evaluated as potentially neuroprotective with regards to the onset of PD dementia. The progressive neurodegenerative nature of PD has driven therapeutic approaches to neuroprotective therapies which may prevent or slow disease progression. Although literature suggests the possible neuroprotective benefits of available medications on motor complications, evidence is inconclusive to currently recommend these therapies for use in slowing the progression of motor and non-motor complications in PD.

Objective: To determine the effect of selegiline therapy on the onset of dementia in patients with Parkinson’s disease

Methodology: IRB approved, observational, retrospective chart review to evaluate differences in time from PD diagnosis to the diagnosis of dementia between patients treated with selegiline (experimental group) vs. those that have not (control group). All patients with a diagnosis of PD as documented in the computerized patient records system between 2000 and 2005 with at least 5 years of follow-up since diagnosis of PD will be considered for inclusion. Exclusion criteria includes a change in the diagnosis of PD, a diagnosis of dementia prior to selegiline therapy or prior to the diagnosis of PD, concomitant diagnosis of HIV, concomitant diagnosis or significant history of schizophrenia, schizoaffective disorder, or bipolar disorder, a PD diagnosis prior to the age of 50, a diagnosis of dementia and PD in the same year, or documented treatment with rasagiline or amantadine. The data to be collected will include patient demographics, date of diagnosis of PD and dementia, patient’s age at these time points, and medications the patient has received in the treatment of Parkinson’s disease. If the patient has received selegiline therapy, in addition to the above mentioned, the date selegiline therapy was started and discontinued, and reason for discontinuation will be documented.

Results and conclusions: A total of 1319 patients with Parkinson’s disease were identified, of these 234 patients were included, 201 patients in the control group and 34 patients in the selegiline group. Most patients included were caucasian males. Mean age at diagnosis of PD was 69.88±7.61 and 66.18±7.22 in the control and selegiline groups respectively (p = 0.0089). A total of 129 (54.9%) patients developed dementia, 111 (55.2%) in the control group and 18 (52.9%) in the selegiline group. The mean time to dementia onset for controls was 117.5 months and 161.4 months in the selegiline group (p = 0.0001). There was no statistically significant affect by age at PD onset, sex, or race on time to dementia onset. No statistically significant difference was found on the probability of dementia development between the two groups. In this study, a statistically significant longer time to onset of dementia was found in patients receiving selegiline therapy versus control patients that did not receive selegiline therapy.

References:
Comparison of length of stay in two treatment severity criteria for *Clostridium difficile* infections

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**Background:** The 2010 Infectious Diseases Society of America (IDSA) *Clostridium difficile* infection (CDI) treatment guidelines stratify disease severity based on expert opinion. These guidelines cite a study by Zar et al. as their main resource providing evidence of superiority with vancomycin in severe disease. However, not all components of the Zar criteria were incorporated into the IDSA stratification of disease severity.

**Objective:** To determine which criteria for stratifying CDI severity is a better predictor of health care utilization.

**Methodology:** This IRB-approved descriptive retrospective chart review examined patients admitted to Akron General between 2005 through 2011. Adults ≥18 years of age with an ICD-9 code (008.45) for CDI and a positive diagnostic test were included. Patients were excluded if they received >4 doses of either metronidazole or vancomycin and then switched to a different agent, received combination metronidazole and vancomycin therapy, or were prescribed nitazoxanide, fidaxomicin, rifaximin, or other medication used for CDI. The primary outcome was the difference in length of stay (LOS) between the IDSA criteria group compared to the Zar criteria group in patients treated with metronidazole. Secondary outcomes were the difference in length of stay between the IDSA criteria group compared to the Zar criteria group in patients treated with vancomycin, readmission rates based on treatment received, the proportion of patients readmitted with CDI in each group, calculated economic impact of additional LOS, and the percentage of patients that were prescribed appropriate therapy for CDI, as defined the Zar criteria versus the 2010 IDSA guidelines criteria. Subgroup analysis was performed for the primary outcome, excluding patients in intensive care units.

**Results and conclusions:** This study reviewed 412 patient charts with 206 patients meeting inclusion criteria. The average age of included patients was 70.6±16.5, 60.2% were females, and 84.4% were caucasian. Patients treated with metronidazole who were stratified as mild in the IDSA criteria had a LOS of 4.7 days, while those that were severe in the IDSA group had a LOS of 4.0 days (p=0.41). Patients treated with metronidazole who were stratified as mild in the Zar criteria had a LOS of 4.4 days, while those that were severe in the Zar group had a LOS of 4.1 days (p=0.74). The absolute difference between these groups was not significant (p=0.90). Patients treated with vancomycin who were stratified as mild in the IDSA criteria had a LOS of 4.2 days, while those that were severe in the IDSA group had a LOS of 5.9 days (p=0.20). Patients treated with vancomycin who were stratified as mild in the Zar criteria had a LOS of 5.1 days, while those that were severe in the Zar group had a LOS of 8.0 days (p=0.21). The absolute difference between these groups was not significant (p=0.39). Overall, there were 9 readmissions within 28 days, 6 of which were treated with metronidazole. LOS for patients in non-critical floors were similar. Those patient treated with metronidole had a LOS of 4.1 days and cost $5812, while those treated with vancomycin had a LOS of 5.9 days and cost $8314, though this data does not support metronidazole being a more cost-efficient option because this study did not look at clinical cure rates. Appropriate therapy was prescribed to <60% of patients overall. There were 21 total deaths, 16 of which were in those treated with metronidazole. When stratified by criteria, there was a trend towards a higher rate of deaths for those patient considered severe who were undertreated with metronidazole, but those differences were not significant. In conclusion, there were no statistical differences between the criteria groups.

**References:**


3. Lentino JR, Bilgrami M, Salaheen Q, Pachucki CT. Are the Guidelines for *C. difficile* Diarrhea Appropriate for Patients Judged to Have Severe Illness? Edward Hines JR. VA Hospital, Hines, IL. 2011 ICAAC Conference, Chicago, IL
Effect of a Urinary Tract Infection Stewardship Program in an Emergency Department

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Background: Urinary tract infections (UTIs) are one of the leading causes of emergency department (ED) visits in the United States. The ED at MetroHealth Medical Center (MHMC) averages 100,000 visits annually and approximately 250 UTI related diagnoses monthly in females 18-65 years. On December 30, 2010, MHMC implemented an electronic UTI order set in the ED to increase adherence to the Infectious Diseases Society of America (IDSA) 2010 practice guidelines for antimicrobial treatment of acute uncomplicated cystitis and pyelonephritis in women. Adherence to the IDSA guidelines increased from 41% to 71% after order set implementation, however 30-50% of UTI cases diagnosed by ED providers were either found to have an alternative diagnosis or not meet study criteria. A retrospective study demonstrated an antimicrobial stewardship program in the ED significantly improved antimicrobial use and overall patient care. The primary objectives of this study are (1) to determine if UTI stewardship audit and feedback will improve the appropriateness of treatment for uncomplicated UTIs and (2) to reduce the inappropriate treatment of abnormal urinalyses in asymptomatic patients in the ED. The secondary objective is to assess the compliance rate to the previous ED UTI order set, based on the IDSA guideline on the treatment of acute uncomplicated cystitis and pyelonephritis in women.

Objective: The primary objectives of this study are (1) to determine if UTI stewardship audit and feedback will improve the appropriateness of treatment for uncomplicated UTIs and (2) to reduce the inappropriate treatment of abnormal urinalyses in asymptomatic patients in the ED. The secondary objective is to assess the compliance rate to the previous ED UTI order set, based on the IDSA guideline on the treatment of acute uncomplicated cystitis and pyelonephritis in women.

Methodology: Study population included female aged 18–65 years who were seen in the ED at MHMC with UTI related diagnoses. The UTI stewardship audit and feedback regarding the management of patients diagnosed with UTIs occurred over an 8 week time period. Appropriateness of UTI diagnosis and treatment were determined as well as urine culture ordering in pyelonephritis cases. Post treatment feedback was sent to ED providers via staff messages in the electronic medical chart (EPIC®). A single educational session was conducted for ED providers. A power point presentation was available to all providers unable to attend the session in person. Post stewardship data was collected 8 weeks after the audit and feedback (100 cases). Data collection included demographic information, laboratory test results, past medical history, documented signs and symptoms, prescribed antibiotic therapy, and adverse events.

Results and conclusions: Between 11/16/2011- 1/19/2012, 219 female 18-65 years old who were seen in the ED with UTI related diagnoses were screeend for the UTI stewardship audit and feedback part of the study. Of those 219 patients, 143 patients met the study criteria. Fifty one cases required feedback and 14 cases required feedback more than once. Feedback was sent a total of 67 times to the ED providers during this time period. The majority of the feedback sent was related to diagnoses that did not meet study criteria (n=33, 49%), followed by inappropriate medication choice (n=16, 24%), inappropriate treatment duration (n=11, 16%), and absence of urine culture with pyelonephritis diagnosis (n=7, 11%). Twenty cases required feedback related to diagnoses because of no documented urinary symptoms, 12 cases were due to predominant vaginal symptoms, and 1 case was due to cystitis diagnosis when patient’s symptoms were consistent with pyelonephritis. Majority of feedback about medication choice was due to ciprofloxacin use for cystitis (n=11) and 1 was due to nitrofurantoin use for pyelonephritis. Feedback was sent regarding untreated sexually transmitted infections (STIs) 4 times. Feedback was given 11 times for inappropriate treatment duration including 9 cases of cystitis treated too long (median duration: 7 days), and 2 cases of pyelonephritis treated too short (median duration: 5 days). Post stewardship data analysis is in progress.

References:
Evaluation of Time to Care and Outcomes in Heart Failure Patients Enrolled in Telehealth

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Background: Management of heart failure (HF) exacerbations are time dependent to prevent emergency department (ED) visits or hospital admissions. The average cost for a HF exacerbation hospital admission is $6,000 to $12,000. A meta analysis of twenty-one original studies performed by Polisena and colleagues demonstrated that patients followed by telemonitoring had a lower mean number of ED visits per patient per year compared to usual care. At the Louis Stokes Cleveland VA Medical Center (LSCVAMC), nurse managers monitor patients’ vitals daily through a Health Buddy machine™. The software program assigns the uploaded vitals a color code (green, yellow, or red) with red being the most alarming and requiring same day attention from nursing. If there is a red alert and the patient requires further evaluation, a note is placed in the computerized patient record system (CPRS) and the provider is alerted. Nurses rely on the provider to make interventions, as there are no treatment protocols in place. Torres and colleagues found that the average response time within the VA for providers to acknowledge an alert was 18-43 days. The provider has several other responsibilities in addition to alert management and response time is essential to prevent worsening of HF symptoms.

Objective: To determine the length of time for provider’s to respond to alerts, what types of interventions are being made, and the patient outcomes based on the interventions.

Methodology: IRB and R&D committees approved this study. The computerized patient record system (CPRS) identified 200 patient notes meeting the inclusion criteria: active with Cleveland VA system for at least 3 months prior to red alert, enrolled in Telehealth for HF management, one red alert that occurred between 09/1/10 to 2/28/11, and a progress note titled “Care Coordination Home Telehealth (CCHT) Subsequent Evaluation Note” or “CCHT Subsequent Evaluation Note Follow-up” specific for HF. Baseline data collection will include: demographic data, time period for provider to acknowledge alerts, type of intervention made, and patient's outcome

Results and conclusions: Two hundred CCHT red alerts were processed for 29 individual patients enrolled with a single dialogue for heart failure, who met inclusion criteria. One hundred and forty-two red alerts did NOT have a “CCHT Subsequent Evaluation and/or Subsequent Evaluation Follow-up” progress note in CPRS within 72 hours of the red alert. The provider was added as an additional co-signer on 26 of the 58 CCHT notes entered into CPRS. The mean time for providers to respond to alerts was 30 hours. Fourteen CCHT notes required provider follow up and 11 interventions were made,. The provider further proceeded to make 5 follow up recommendations. Three patients had 5 VA ED visits and 4 patients had 5 VA hospitalizations. Five times there was mention of NON-VA hospitalization or ED visit during the study period. The conclusion from this study is that, with consistent follow up and monitoring by CCHT nurses, even if a formal CCHT note was not entered, the rate of ED or hospitalizations for HF was low. Providers responded to CCHT alerts in a timely manner with appropriate patient follow up.

References:
Pharmacy Practice Model Initiative (PPMI) Implementation in a Community Hospital Setting: A Pilot Study

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Background
The pharmacy profession is evolving from a dispensing oriented model to a patient-centered care model, as a result of the initiative from the American Society of Health-System Pharmacists (ASHP) practice model summit1. The Pharmacy Practice Model Initiative (PPMI) is a framework for advancing the health and well-being of patients in hospitals and health systems by developing and disseminating optimal pharmacy services based on the effective use of pharmacists as direct patient care providers1. Successful implementation of the PPMI is well documented in academic health care systems, however Hillcrest hospital is a community based non-teaching medical center1-4. The recent implementation of Computerized Physician Order Entry (CPOE) allowed us to evaluate our current order entry and dispensing model to evolve into a nursing unit based order verification model with a focus on patient counseling. To facilitate our PPMI, the staff pharmacists will embark upon a didactic educational program over the next two years. We hypothesize staff pharmacists will demonstrate increased clinical knowledge through didactic education provided by the clinical pharmacy staff.

Objective:
To increase educational acumen of the pharmacist staff through didactic education from the clinical pharmacy staff.

Methodology:
This IRB approved, single center, prospective, paired study was performed to test the change in staff pharmacists’ knowledge after didactic education. The primary endpoint was the change in overall staff pharmacist test scores assessed before and after clinical didactic education. The secondary endpoints included change in test scores based on topic-related subgroups of AMI, CHF, SCIP, and pneumonia. All changes in test scores were analyzed by a student paired t-test. Pharmacist demographics were analyzed descriptively.

Results and conclusions:
Overall test score significantly improved by 15.14% (49.86% vs. 65%, SD 10%; p < 0.001). The only significant increase in topic-related subgroups was pneumonia (39.44% vs. 76.67%, SD 16.8%; p < 0.001). Exam scores for AMI, CHF, and SCIP did not significantly differ between the pre-test and post-test assessments; however, exam scores for each of these topics improved greater than 5% (range 5.56 – 37.23%). Didactic education significantly increased pharmacist clinical knowledge in the study curriculum.

References:
The Use of Metoclopramide for the Treatment of Neonatal Reflux

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Background: Gastroesophageal reflux (GER) is a familiar problem in preterm and term infants. Apnea and bradycardia episodes associated with GER are also common in the neonatal patient population. One way to identify and quantify the clinical significance of GER is to document apnea, bradycardia and desaturation episodes; then, consider treatment based on the frequency of these events. Metoclopramide is amongst the treatment options for this condition. However, the 2009 Pediatric Gastroesophageal Reflux Clinical Practice Guidelines stated there is insufficient evidence to justify the routine use metoclopramide for the treatment of GER. This study will investigate the change in frequency of apnea, bradycardia and desaturation episodes after initiation of metoclopramide therapy in the neonatal intensive care unit.

Objective: To evaluate the clinical utility of metoclopramide for the treatment of neonatal reflux.

Methodology: An IRB-approved, non-interventional medical record review of 90 patients admitted to the neonatal intensive care unit at the Cleveland Clinic Main Campus who received at least 72 hours of metoclopramide therapy was performed. The number of apnea, bradycardia and desaturation episodes 5 days before treatment was compared to the number of episodes during the 5 days after 72 hours of treatment with metoclopramide. Exclusion criteria included patients who received metoclopramide therapy for less than 72 hours, were immediate post-operatively prescribed metoclopramide, and/or presented with confirmed bowel obstruction, GI hemorrhage, necrotizing enterocolitis, or a history of seizures or dystonic reactions. Data describing patient demographics, GER medications, number and type of episode, and presence or absence of enteral feeds were collected. An alpha of less than 0.05 was considered statistically significant. A Wilcoxon signed rank test and linear regression model were used to evaluate the data as appropriate.

Results and conclusions: In this study, 116 patient charts were evaluated and 90 patients met inclusion criteria. The average gestational age was 30.5±4.5 weeks and the average birth weight was 1605.7±879.6 grams. The median number of total episodes during the 5 days prior to treatment was 8.5 (range 0-66) episodes. About 6.7% of the patients received concomitant proton pump inhibitors, 80% received histamine receptor antagonists and half of the patients received caffeine. Majority of the patients (83.3%) were receiving enteral feeds at initiation of therapy. The median number of total episodes during the 5 days after treatment was 7 (range 0-65) episodes, which was not a significant difference (p=0.216) from number of pretreatment episodes. A subgroup analysis looking at patients with <2 episodes during the 5 days prior to treatment (n=25) found there was a significant increase in median number of total episodes during the 5 days after 72 hours of therapy (p=0.008); as well as a significant increase in desaturation episodes specifically (p=0.012). For patients with ≥2 episodes prior to treatment (n=65), the subgroup analysis showed there was a significant reduction in median number of total episodes (p=0.022) after 72 hours of therapy. In patients with ≥2 episodes prior to treatment, a linear regression model demonstrated that the number of total episodes prior to initiation of therapy was the only significant characteristic associated with the primary outcome (p<0.05). Metoclopramide reduced the number of total reflux episodes in patients experiencing at least 2 episodes prior to initiation of therapy. The use of a proton pump inhibitor, histamine receptor antagonist or caffeine was not associated with a reduction in reflux episodes.

References:
Background: It is estimated that up to 60% of patients have at least one medication discrepancy on admission with approximately 43% having the potential to be harmful.\(^1\) It has also been shown that approximately 6% of patients admitted to the hospital will have an inadvertent drug discontinuation of serious nature.\(^2\) Additionally, 60% of postdischarge adverse drug events (ADEs) that occur can be prevented or ameliorated and studies have shown that pharmacy involvement at discharge may reduce ADEs after discharge, hospital readmissions, and return visits to the ED.\(^3\) Currently there is no formal pharmacy involvement in medical reconciliation or discharge education in adult patients with solid tumors. The combination of recorded and reported medication use may increase the accuracy of the medication reconciliation process. Implementation of the pharmacy department in medication reconciliation and discharge counseling may also improve patient safety, satisfaction, and understanding of medications. This project will evaluate the feasibility of implementing a medication reconciliation and discharge counseling program for adult solid tumor patients.

Objective: To develop the process by which the department of pharmacy may implement a medication reconciliation and discharge counseling program for adult solid tumor patients

Methodology: IRB exempt, concurrent, observational study to evaluate the time required to complete medication reconciliation and discharge counseling. Secondary objectives include evaluating the number of medication discrepancies resolved, quality assurance survey, and Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) scores. Patients were included if they were admitted to the Cleveland Clinic Adult Solid Tumor Service between December 14, 2011 and January 17, 2012, ≥18 years of age and discharged to home.

Results and Conclusions: There were 130 admissions in the adult solid tumor service during the study period and a total of 107 patients were included in the analysis. Medication reconciliation data was collected for 93 patients and data for discharge counseling was collected in 38 patients. The median age for all patients included was 61 (21-90) and 57% of the patients were male. The most common malignancies included lymphoma, lung cancer, breast cancer, esophageal cancer, and multiple myeloma. The median time to complete medication reconciliation at admission was 16-20 minutes (5-45) and the median time to complete discharge counseling was 21-25 minutes (11-60). There were 47 medication discrepancies resolved at admission, and approximately 40% of patients had ≥ 1 medication discrepancy resolved at admission. There were 25 medication discrepancies resolved at discharge, and an estimated 34% of patients had ≥ 1 medication discrepancy resolved at discharge. Additionally, a vast majority of the patients at discharge had strong positive feedback based on the quality assurance survey. More than 95% of patients felt they understood the purpose of their medications, potential side effects, and administration of their medications. Implementation of pharmacy services in medication reconciliation and discharge counseling in an adult solid tumor patient population resulted in resolution of medication discrepancies at admission and discharge, patient understanding of medications, and positive feedback.

References: