

## 2020 Mini Oral Abstract Book

### M1. Identifying Risk Factors for Pneumonia and Sepsis in Patients Undergoing Rib Fixation for Isolated Rib Fractures

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**Background:** There are few population-level studies of rib fixation for traumatic injury. The purpose of this study was to compare outcomes in patients with and without rib fixation for isolated rib fractures.

**Hypothesis:** We hypothesized that patients who underwent rib fixation would have a decreased risk of readmission due to pneumonia or sepsis compared to those who did not.

**Methods:** The 2010-2014 Nationwide Readmissions Database was queried for all nonelective admissions with rib fractures. Patients with other orthopedic injuries were excluded. The outcomes of interest were readmission within one year, readmission for pneumonia, and readmission for sepsis. Univariable comparisons were made with chi squared test. Multivariable logistic regression was performed controlling for: number of rib fractures, flail chest, injury severity, comorbidities, and rib fixation. Survey weights were used for national estimates.

**Results:** There were 140,913 patients identified with isolated rib fractures. The overall rate of readmission within one year was 23% (n=31,995). The rate of readmission for pneumonia was 5% (n=6,819) and the rate for sepsis was 3% (n=3,873). After controlling for confounding factors through logistic regression, patients undergoing rib fixation were at decreased risk for readmission (OR 0.79, 95% CI 0.70-0.90, p<.01). Rib fixation was also associated with a decreased risk for readmission for pneumonia (OR 0.77, 95% CI 0.59-1.00, p<.01) and readmission for sepsis (OR 0.68, 95% CI 0.48-0.96, p<.01).

**Conclusions:** This study represents one of the first population level comparisons of patients undergoing rib fixation for isolated rib fractures. After controlling for severity of injury and comorbidities, rib fixation was associated with decreased rates of readmission for pneumonia and sepsis.

### M2. Early Tracheostomy Decreases Ventilator Associated Pneumonia in Geriatric Trauma Patients with Rib Fractures

Christina X Zhang; Christina X Zhang; Ricardo Fonseca; Melissa Canas; Rohit Rasane; Jose A Aldana; Javier Rincon; Esha Ghosh; Qiao Zhang; Kelly Marie Bochicchio; Jennifer Leonard; Grant Bochicchio

**Background:** Trauma patients with rib fractures are at high risk of developing respiratory failure resulting in prolonged mechanical intubation and tracheostomy placement. Previous studies in trauma patients have found an association between early tracheostomy (ET) insertion and improved clinical outcomes. To our knowledge, there is an absence of data that has evaluated the impact of early tracheostomy in critically injured geriatric trauma patients who present with respiratory failure combined with rib fractures.

**Hypothesis:** We hypothesized that early tracheostomy insertion is associated with decreased

ventilator associated pneumonia (VAP) in geriatric trauma patients with rib fractures.

**Methods:** All patients (age  $\geq 55$ ) admitted with one or more rib fractures to our level I trauma center from 2010 to 2018 with an Abbreviated Injury Score  $\leq 2$  for other regions undergoing tracheostomy placement were included in the study. Demographics, comorbidities, injury related variables, culture data, and clinical outcomes were abstracted. Patients were stratified into two cohorts: ET ( $\leq 7$  days of ventilation) vs. late tracheostomy (LT) ( $> 7$  days of ventilation). The primary outcome of our study was VAP. The secondary outcomes were all-cause mortality, hospital length of stay (LOS), ICU LOS, and ventilator days. Student's t-test was used for continuous variables and  $\chi^2$  test was used for categorical variables.

**Results:** A total of 97 geriatric patients with traumatic rib fractures required intubation. Of these, 15 patients (15%) had tracheostomy placement. 6 (40%) patients had ET and 9 (60%) patients had LT. Patients who had ET were significantly older (71.5 vs. 61.8 years,  $p=0.04$ ). There were no other significant differences found between the groups in regards to demographics, comorbidities, Injury Severity Score (ISS), or rib fracture characteristics. Patients who had LT placement had a significantly higher incidence of VAP (88.9% vs. 33.3%,  $p=0.03$ ) and longer ventilator days (22.8 vs. 10.4,  $p=0.04$ ) when compared to the ET group. The most common causative organisms of VAP in the ET cohort were *E. coli* and *S. aureus* and in the LT group was *P. aeruginosa*. No significant differences were found in mortality, hospital LOS, or ICU LOS.

**Conclusions:** Early tracheostomy is associated with significantly lower ventilator days and a 2.5 fold decreased risk of developing VAP. In addition, delayed tracheostomy is associated with a greater number of resistant gram negative pathogens. Clinicians should strongly consider tracheostomy within 7 days of intubation in this high risk population. Future prospective trials with larger cohorts are warranted.

### **M3. Time to Decortication for Empyema Not Associated with Increased Mortality: A National Inpatient Sample Analysis**

Katelynn Bachman; Stephanie G. Worrell; Philip Linden; Christopher Towe

**Background:** Empyema is a rare condition with significant mortality. A study of The Society of Thoracic Surgeons database suggested that delayed intervention was associated with increased risk of mortality. These data were from highly specialized centers, and it is unclear if this finding is generalizable to other settings.

**Hypothesis:** We hypothesized that in a representative national sample, longer times between hospital admission and surgical decortication would be associated with increased mortality.

**Methods:** We used the 2016 National Inpatient Sample (NIS) to identify patients with a diagnosis of empyema without fistula. Patients with bilateral decortications, younger than 18, elective admission, and whose decortication occurred greater than 8 days after admission were excluded. The outcome of interest was in-hospital mortality. We analyzed the association of day of decortication and in-hospital mortality using a two-tailed t-test. Multivariable regression was also performed to remove possible confounding of other medical comorbidities.

**Results:** 1,837 patients with empyema underwent decortication in the 2016 NIS. 54 patients died (2.9%). Day of decortication was not associated with death (3.6 days died vs 6.5 days alive,  $p=0.814$ ). Several comorbidities including age, congestive heart failure, peripheral

vascular disease, complicated hypertension, and renal failure were associated with death. A multivariable logistic regression demonstrated no association of day of decortication and death. (Table 1)

**Conclusions:** This analysis of the NIS does not demonstrate an association of hospital day of decortication and death. The optimal timing of decortication is unclear. Until further data can be used to demonstrate the optimal timing of decortication, the decision to operate should be based on clinical factors.

#### **M4. Randomized Trial of Fibrinolytic Therapy vs Video Assisted Thorascopic Surgical Decortication for Parapneumonic Effusion**

Kiara Leasia; Hunter Moore; Sarah Roark; Ernest Moore; Fredric Pieracci

**Background:** Treatment of parapneumonic infection is not standardized and may incite poor patient outcomes. Complicated effusions that are not amenable to chest tube drainage alone require additional treatment with either fibrinolytic therapy (FT) or video-assisted thorascopic surgical (VATS) decortication. There are currently no prospective data to inform selection of one therapy over the other.

**Hypothesis:** We hypothesize that VATS decortication, as compared to FT, improves outcomes of patients with complicated parapneumonic effusions.

**Methods:** Prospective randomized clinical trial of hospitalized patients identified to have complicated parapneumonic effusions with radiographic imaging. Enrollment occurred after effusion resulted with a pH <7.3 and was unresolved radiographically after 24 hours of drainage. FT consisted of 72 hours of twice daily intrapleural installation of alteplase and doranase. VATS was performed by the on-call acute care surgeon. Summary of data collected was demographic information, disease and treatment characteristics, and daily patient parameters. The primary outcome was hospital LOS. Power analysis determined sample size of 24. Data was assessed for normality; 1-way ANOVA test and chi-square test were used for analysis. Statistical significance was determined at a  $p < 0.05$ .

**Results:** Sixty-five patients were screened, 55 were excluded, and 10 subjects were enrolled. Five were randomized to the FT group and 5 to early VATS decortication. Mean demographics that were similar between the two (FT vs VATS) groups: age (44 vs 45.6 years old), male sex (3 vs 4), and BMI (32.44 vs 28.10). Outcomes are summarized in the Table. Intrapleural tPA did not increase fibrinolytic activity compared to surgery and pleural fluid had increased fibrinolysis resistance in the surgical group. The primary outcome of hospital LOS was similar between groups, as were all of the secondary outcomes.

**Conclusions:** Our initial experience with this RCT suggests that FT and VATS are equivalent for the management of complicated parapneumonic effusion. We plan to complete enrollment to target sample size.

#### **M5. Thoracic Drainage and Decortication in Trauma is Associated with Worse Outcomes and Exacerbated by Splenectomy**

Brett Tracy; Onkar Khullar; Rob Todd; Jason Sciarretta

**Background:** We have noticed an increase in infectious pulmonary complications in trauma patients leading to operative thoracic intervention (OTI), particularly in patients who previously underwent a trauma splenectomy.

**Hypothesis:** We hypothesize that splenectomy is a risk factor for OTI and that OTI is associated with infectious complications.

**Methods:** We performed a retrospective review of all trauma patients in our fall 2016 through spring 2019 TQIP registry. We stratified patients into no thoracic intervention versus OTI using ICD codes (drainage and/or decortication). We abstracted demographics, index trauma operations, and complications, then compared them between groups. Next, we adjusted for trauma splenectomy and evaluated the same variables using Cochran-Mantel-Haenszel (CMH) tests. On multivariable logistic regression, we examined predictors of OTI at 7 and 14 days following admission. Modeling accuracy was determined using receiver operator curves (ROC).

**Results:** There were 8,463 patients in the cohort; 0.34% (n=29) patients underwent OTI. OTI patients were younger (years: 29 vs 39, p=.02); however, had similar injury severity score [ISS] (19.2 vs 17.7, p=.32), Glasgow coma scale [GCS] (6 vs 6, p=.86), and modified frailty index [mFI] (0.09 vs 0.08, p=0.57). More patients with OTI underwent trauma thoracotomies (6.9% vs 1.4%, p=.01) and splenectomies (6.9% vs 1.4%, p=.01). After adjusting for mechanism, sex, age, ISS, thoracotomy, ventilator duration, mFI, and GCS, only splenectomy was predictive of OTI at 7-days (OR 7.4, 95% CI 1.3-42.6, p=.03); ROC 0.83. At 14-days, this same model demonstrated splenectomy as an independent risk factor for OTI (OR 8.6, 95% CI 1.2-61.8, p=.03); ROC 0.9. OTI was associated with greater rates of ARDS (10.3% vs 2.1%, p=.03), UTI (20.7% vs 1.9%, p<.0001), organ space SSI (13.8% vs 0.6%, p<.0001), pneumonia (13.8% vs 1.7%, p=.002) severe sepsis (13.8% vs 1.6%, p=.002), unplanned ICU admission (13.8% vs 4.0%, p=.04), unplanned intubations (17.2% vs 2.8%, p=.002), and unplanned returns to the operating room (10.3% vs 2.5%, p=.04). All aforementioned complication rates remained statistically significant on CMH testing when stratifying for splenectomy.

**Conclusions:** OTI is associated with infectious sequelae, especially when accounting for previous splenectomy. Furthermore, undergoing a splenectomy accurately predicted OTI at both 7 and 14 days. Future studies should explore whether splenectomy immediately impairs immunity, which leads to these infectious outcomes.

## **M6. Does Drains Placement in Surgically Managed Patients with Perforated Peptic Ulcers Prevent Intra-Abdominal Abscess?**

Jose A Aldana; Rohit Rasane; Christina X Zhang; Javier Rincon; Ricardo Fonseca; Melissa Canas; James McMullen; Adrian Coleoglou Centeno; Esha Ghosh; Kelly Marie Bochicchio; Obeid Ilahi; Grant Bochicchio

**Background:** The annual incidence of perforated peptic ulcers (PPU) in the USA is as high as 14 cases per 100,000 individuals. Operative drain placement continues to be a major source of debate between surgeons, as there is a lack of data and therefore consensus on whether placing drains after PPU repair prevents postoperative intrabdominal abscess (IAA). We hypothesized that the insertion of drains in surgically managed PPU patients decreases the incidence of IAA and thus better outcomes.

**Hypothesis:** We hypothesized that the insertion of drains in surgically managed PPU patients

decreases the incidence of IAA and thus better outcomes.

**Methods:** A prospectively maintained acute and critical care surgery database spanning 2008-2018 was queried for patients with PUD. Patients older than 18 with a diagnosis of PPU who underwent surgical repair were included. Patients managed nonsurgically were excluded. The cohort was divided into two groups: patients managed with drain insertion during surgery and those without a drain placed. Demographics, cultures, and outcomes were abstracted and compared using chi-squared and student's t-test.

**Results:** A total of 109 patients had PPU and underwent surgical management. Of these, 52(47%) had drains placed during surgery. Open surgery was the most frequent approach 91% followed by laparoscopic 4.5%, and laparoscopic converted 4.5%; 63(58%) patients had a duodenal ulcer, 44(40%) a gastric ulcer, and 2(2%) gastric and duodenal ulcers. There is no significant difference in age ( $55\pm 2.12$  vs  $57\pm 2.53$ ,  $p=0.66$ ), BMI ( $28\pm 1.42$  vs  $27\pm 0.89$ ,  $p=0.56$ ), and Charlson comorbidity index ( $4.09\pm 0.40$  vs  $3.85\pm 0.40$ ,  $p=0.68$ ) between two groups. Also, patients with and without drains placed had no difference in length of stay (LOS) ( $14.53\pm 13.45$  vs  $11.92\pm 12.50$ ,  $p=0.29$ ), ICU LOS ( $6.99\pm 1.61$  vs  $4.33\pm 1.18$ ,  $p=0.18$ ), antibiotic days ( $4.46\pm 0.37$  vs  $4.94\pm 0.34$ ,  $p=0.33$ ), IAA formation (11.53% vs 14.03%,  $p=0.69$ ) or mortality (3.85% vs 5.25%,  $p=0.72$ ). Among patients with IAA (12.84%,  $n=14$ ), cultures were positive in 67% of PPU with drain placement and 75% without drain placement ( $p=0.73$ ). The most common bacteria in IAA cultures was MRSA in patients with drains and Streptococcus anginosus in patients without drains.

**Conclusions:** The insertion of intraoperative drains was not associated with a decreased risk of developing an IAA in PPU patients. However, drain insertion was associated with a greater number of multidrug-resistant organisms. Clinicians should reconsider the use of drains in PPU patients. Further research is warranted, level of contamination, and other factors may play a role in the clinicians' decision to place drains.

## **M7. Epidemiology of Acute Gallbladder Disease: A 7-Year, Population-based Temporal Analysis of Morbidity and Mortality**

Victor R. Vakayil; Nicholas Ingraham; Adam Sheka; Samit Roy; Jeffrey Chipman; Christopher Tignanelli

**Background:** Acute cholecystitis accounts for 5-10% of cases of abdominal pain worldwide. Advances in care have led to changes in both the management and outcomes following acute gallbladder disease. Using a national database, we evaluate the temporal changes in surgical care, morbidity and mortality following acute cholecystitis in the United States.

**Hypothesis:** We hypothesize that overall morbidity and mortality following acute cholecystitis are decreasing temporally, along with a decrease in the rate of open cholecystectomies.

**Methods:** We utilized Healthcare Cost and Utilization Project's State Inpatient Databases to include all patients with a diagnosis of acute cholecystitis from 12 states across the United States using ICD codes from 2008 to 2014. We abstracted patient and hospital demographics, clinical comorbidities, mortality, and complications.

**Results:** We identified a total of 1,357,303 (1.6%) cases of acute cholecystitis out of a total 80,736,256 hospitalizations. 60.5% of patients were female with a median age of 58 years (42-

73). 50.8% of patients had a Charlson comorbidity index of 0 and 28.9% had a Charlson index of  $\geq 2$ . 54.5% of patients were managed operatively with a cholecystectomy during admission. 7.7% of patients had an open cholecystectomy and this rate decreased temporally from 8.4% in 2008 to 6.6 in 2014. Similarly, the rate of common bile duct explorations decreased in a temporal fashion from 1.1% in 2008 to 0.5 in 2014. The overall rates of rates of pneumonia (1.6%), venous thromboembolism (1.2%), hemorrhage (1.0%) and myocardial infarction (1.5%) were stable throughout the period of study. Overall rates of surgical site infection decreased temporally from 1.1 % in 2008 to 0.7% in 2014. In-hospital mortality rate was 2.4% and remain stable throughout the study period.

**Conclusions:** Postoperative morbidity and in-hospital mortality following acute cholecystectomy remain low. The overall rates of surgical site infection decreased temporally along with a concomitant decrease in the rates of open cholecystectomy.

## **M8. Risk of Mortality in Patients Infected With Clostridium Difficile Colitis and Underwent Colectomy**

Nasim Ahmed; Yen-Hong Kuo; Robyn Guinto; Jordan Purewal

**Background:** The incidence of Clostridium difficile (C-diff) infection has been on the rise in recent years. In some circumstances, C. diff. can advance to a fulminant infection that requires surgical intervention. The mortality associated with fulminant infection can be as high as 57%. In such cases, the timely colectomy reduced mortality by almost 25%. Even in the setting of timely and proper management, fulminant infection carries considerable mortality. The purpose of the study was to identify potential risk factors of mortality in patients who underwent colectomy for fulminant C. diff. colitis.

**Hypothesis:** patients who presented with multiorgan failure will be higher risk for mortality

**Methods:** Patient information was extracted using the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) data from 2012 to 2016. All adult patients who underwent colectomy for C. diff colitis were included in the study. Patient demographics, comorbidities, and organ failures prior to colectomy were compared between patients who survived and who died. Multiple logistic regression model was developed by backward deletion methods for risk assessment. All p values are two sided and values  $<0.05$  were considered statistically significant.

**Results:** A total 184 out of 525 (35%) patients who qualified for the inclusion of the study, died. There were significant differences found between the groups who survived and who died, specifically in age, respiratory failure requiring mechanical ventilation (vent-dependent), the presence of shock prior to colectomy, comorbidities including chronic pulmonary obstructive disease, renal failure on dialysis, bleeding disorder and ASA classification, were all statistically significant ( all p values were  $<0.05$ ). The final model of logistic regression revealed advanced age  $\geq 75$ , vent dependency and presence of shock prior to surgery, history of steroid use and ascites were highly significant for 30 days mortality. The median [IQR] time of death was 5.5 days [2-14],  $p < 0.001$ .

**Conclusions:** About 1/3rd of patients who underwent surgery due to C-diff infection died. Older age, circulatory and respiratory collapse, and some comorbid conditions were highly associated

with mortality.

### **M9. The Role of Preoperative Bowel Preparation in Colectomy with Ostomy Creation: Analysis of the NSQIP Database.**

Richard Kalu; Amalia Stefanou; Ilan Rubinfeld; Amy Tang

**Background:** Use of preoperative bowel preparation in colorectal resection remains controversial and has not been examined solely in patients requiring colostomy or ileostomy creation. This national database study assessed the impact of different preoperative bowel preparations on short-term postoperative outcomes in colectomy patients with stoma.

**Hypothesis:** Preoperative bowel preparation confers no difference in short-term postoperative outcomes in colectomy patients with stoma creation.

**Methods:** Using the National Surgical Quality Improvement Program colectomy-targeted database from 2002 to 2017, we identified 21,731 patients who underwent colectomy with ostomy creation. Multivariate logistic regression models were used to compare impact of different bowel preparations on short-term outcomes.

**Results:** Of 21,731 patients, 14,677 (67.5%) had no bowel preparation (NP), 3,047 (14.0%) received mechanical bowel preparation (MP), 926 (4.3%) oral antibiotics preparation (AP), and 3,081 (14.2%) combined mechanical and oral antibiotic preparation (MAP). The most common indications for surgery included acute diverticulitis (26.1%) and colon cancer (18.6%). Patients with MAP were significantly younger, mostly male, had lower body mass index, lower rates of preoperative sepsis, and lower rates of contaminated and dirty/infected operative wounds. The AP and MAP groups had a lower incidence of surgical site infections (superficial/deep/organ space). The MP and MAP groups had lower rates of *Clostridium difficile* colitis, wound disruption, and reoperation. The MAP regimen was associated with a lower overall complication rate.

**Conclusions:** The use of preoperative mechanical bowel preparation and oral antibiotics appears to be beneficial in improving short-term outcomes and reducing overall complication rate in elective colectomy with ostomy creation.

### **M10. Trends and outcomes of inpatient management of acute appendicitis, 2008-2014**

Adam Sheka; Adam Sheka; Nicholas Ingraham; Victor R. Vakayil; Samit Roy; Michael Usher; Christopher Tignanelli

**Background:** Acute appendicitis is the most common cause for emergent surgery worldwide. However, appendicitis treatment is evolving, with non-operative management gaining a greater role. We used a national database to better understand contemporary trends in the epidemiology and inpatient management of acute appendicitis in adults.

**Hypothesis:** Trends in appendicitis management will change over time, with increased rates of non-operative management and increased length of stay.

**Methods:** Data from 2008-2014 from 12 states contributing to the Healthcare Cost and Utilization Project's state inpatient databases were used. Patients with acute appendicitis were

identified using ICD-9-CM codes 540.0, 540.1, 540.9, 541, and 542. Patient, hospital, and treatment data were extracted to estimate trends.

**Results:** From 80,736,256 total hospitalizations, we identified 497,464 (0.6%) patients with acute appendicitis. Patients were 48.9% female with a median age of 41 years (IQR 28-56). Perforated appendicitis was present in 12.4% of patients. A non-operative management strategy was used for 13% of patients and increased over time, from 7.6% in 2009 to 16.1% in 2014. Percutaneous drain placement occurred in 2.0% of patients and was more common in patients with perforated appendicitis (11.0% vs 0.7% of non-perforated patients). Of patients who underwent operative management, 75.0% had laparoscopic appendectomy and 25.0% had open surgery. Of patients who underwent surgery, 3.5% had intestinal resection beyond appendectomy. Compared to patients with non-perforated appendicitis, patients with perforated appendicitis were less likely to undergo surgery (74.9% vs 88.7%) but were more likely to have open surgery (45.3% vs 22.8%) or colectomy (9.0% vs 2.2%). Length of stay was longer for patients who underwent non-operative management ( $5.0 \pm 7.1$  vs  $3.2 \pm 4.5$  days) and patients who had perforated appendicitis ( $6.5 \pm 6.7$  vs  $3.0 \pm 4.5$  days). Surgical site infection occurred in 1.2% of patients and was stable over time. In-hospital mortality occurred in 0.14% of patients and was more common in patients with perforated appendicitis (0.27%).

**Conclusions:** When patients require inpatient management for appendicitis, up to a quarter undergo open surgery and 3.5% undergo partial colectomy. Non-operative management strategies for appendicitis appear to be increasing over time, and patients managed non-operatively have an increased length of stay.

### **M11. Outcome of Patients Managed with Rapid Source Control Laparotomy (RSCL) versus Primary Fascial Closure (PFC)**

Rachael Seddighzadeh; Ayolola Onayemi; John Davis; Jason Sciarretta; Yen Hong Kuo; Nasim Ahmed

**Background:** Damage control laparotomy (DCL) has been widely accepted for use in patients with intra-abdominal trauma who have hypothermia, coagulopathy, and acidosis. These patients are managed with temporary abdominal coverage and intensive correction of their metabolic disorders. DCL use has evolved in the acute care setting to include surgical patients with acute diverticulitis without clear evidence to support such practice.

**Hypothesis:** Rapid source control laparotomy (RSCL), where the contaminating lesion is resected and the abdomen left open with a temporary covering, is not as beneficial as performing the same procedure followed by primary fascial closure (PFC).

**Methods:** All patients with acute diverticulitis in septic shock were studied using data from the 2014-2016 National Surgical Quality Improvement Program (NSQIP) database. These patients were then sorted by surgical intervention into two groups: RSCL versus PFC. Patients from each group were cross matched according to demographics and comorbid conditions. The data was analyzed comparing operative time, 30-day mortality, complications, discharge destination and length of stay between the groups.

**Results:** Of the 104 patients who qualified for the study, 55 underwent PFC and 49 underwent RSCL. Cross matching resulted in 49 patients in each group. Demographic and comorbidity characteristics of the two groups were not statistically different with the exception of the primary



operative procedure. In the RSCL group 40.8% of patients had a colectomy with primary anastomosis as compared to 2.0% in the PFC group. By comparison 71.4% patients in the PFC group had end colostomies as compared to only 38.8% in RSCL. This difference was statistically significant ( $p=0.004$ ). Post-match analysis revealed no statistically significant difference in median [IQR] OR times between the two groups (RSCL=104[61,142] versus PFC=109 [90,138] minutes,  $p=0.401$ ). However, the 30-day mortality rate (PFC=6, RSCL=20,  $p=0.006$ ), rates of failure to wean from a respirator in less than 48 hours (PFC=21, RSCL=40,  $p=0.001$ ), postoperative bleeding requiring transfusions (PFC =3, RSCL=13,  $p=0.016$ ), discharge destination (home>rehabilitation facility,  $p=0.048$ ) and rates of renal failure (PFC=2, RSCL=10,  $p=0.043$ ) of the RSCL group were significantly higher.

**Conclusions:** This data suggests that RSCL is not beneficial in patients in septic shock with acute diverticulitis. A significant number of patients in the RSCL group had primary anastomoses which likely contributed to the poor outcomes in the RSCL group.

### **M12. Procalcitonin level is more indicative of trauma severity than infection in the acute recovery phase**

Matthew Sussman; Emily Ryon; Eva Urrechaga; Alessia Cioci; Rajan Ramdev; Tyler Herrington; Khaled Abdul Jawad; Gerd Pust; D. Yeh, MD; Nicholas Namias; Edward Lineen; Kenneth Proctor

**Background:** Procalcitonin (PCT) is used to assist in the diagnosis of acute infection and to help define the duration of antimicrobial therapy. However, its role in trauma patients remains unclear.

**Hypothesis:** We hypothesized that PCT is a reliable biomarker that can aid in the detection of systemic infections in the acute post-traumatic state.

**Methods:** Over a 6-month period, PCT levels were serially collected from trauma ICU patients for up to 2 weeks. A subset of 43 patients who had serial data for  $\geq 4$  consecutive days starting at admission was stratified into cohorts based on initial PCT level (above or below the median) or based on  $\pm$  blood, bronchoalveolar lavage, urine or wound culture. Variables are expressed as mean  $\pm$  SD if parametric or median [IQR] if not.

**Results:** The study population was  $44 \pm 18$  yrs old and 64% male. 66% of subjects sustained blunt traumatic injuries, had an average ISS score of  $25 \pm 12$ , and an in-hospital mortality of 7% with a median survivor ICU length of stay of 29 [28] days. High PCT subjects were younger (37 vs. 51 yrs,  $p=.011$ ), had longer duration of ventilation (13 vs. 6 d,  $p=.034$ ), and had higher ISS (33 vs. 19,  $p<.001$ ). They were also more likely to receive RBC transfusion within 24 h of ICU admission (67% vs. 32%,  $p=.022$ ), but the ICU infection rate was similar (57% vs. 54%,  $p=.864$ ). When stratified by presence of infection, there was no difference in average PCT change during the first week (D7.6 vs. D 13.6,  $p=.507$ ).

**Conclusions:** In the acute post-traumatic setting, elevated PCT is associated more severe injury and longer duration of ventilation, though not with higher rates of infection in the first 2 weeks of ICU stay. Additional research is required to elaborate the role (if any) of PCT in critically injured patients.

### **M13. Risk of Mortality after Infection in Trauma Patients: Are Current Frailty Indices Meaningful?**

Laura Brown; Husayn Ladhani; Jeffrey Claridge; Vanessa Ho

**Background:** For older trauma patients, frailty is an indicator of poor resilience and inability to recover. Trauma patients who get an infection must recover from two “hits”: the trauma and the subsequent infection. The most commonly utilized frailty indices, the 5-item modified frailty index (mFI-5) and the 11-item modified frailty index (mFI-11), are derived from standard registry variables. It is unknown whether these indices accurately identify patients who are unable to recover from infection after trauma, or whether other factors not currently included in these indices, such as fall mechanism, would be more informative.

**Hypothesis:** The mFI-11 and mFI-5 will be associated with inpatient mortality after infection in trauma patients.

**Methods:** We utilized the Trauma Quality Improvement Program public use dataset for 2016. We included all patients over the age of 50 who developed infections (severe sepsis, pneumonia, surgical site, and others). The mFI-11 and mFI-5 were calculated from data on functional dependence and comorbidities. Sequential logistic regressions were performed to assess the association between inpatient mortality and the mFI components. A logistic regression model was created using other non-frailty measures of age, fall mechanism, and injury severity score (ISS).

**Results:** 4,116 patients were identified: median age 67 (IQR 58-78), median ISS 20 (13-27), 767 (19%) died. Median mFI-5 score was 1 (0-2), and median mFI-11 score was 1 (0-2). Regression models are shown in Table 1. Both mFI-5 and mFI-11 were associated with inpatient mortality. When individual components of each index were considered, only COPD and CHF were associated with higher odds of mortality, whereas psychiatric disease was associated with lower odds of mortality. When further adjusted for age, fall, and ISS, all three were associated with mortality.

**Conclusions:** Both mFI-5 and mFI-11 identify trauma patients at higher risk for mortality after developing an infection, but not all components of these indices contribute to identifying our most vulnerable patients. In trauma, a fall mechanism may be a better indicator of poor resilience and frailty than the established multicomponent frailty indices.

### **M14. Traumatic Brain Injury with Facial Fractures, an Added Risk for Ventilator Associated Pneumonia.**

Rohit Rasane; Jose A Aldana; Javier Rincon; Christina X Zhang; James McMullen; Melissa Canas; Ricardo Fonseca; Esha Ghosh; Kelly Marie Bochicchio; Obeid Ilahi; Grant Bochicchio

**Background:** Ventilator associated pneumonia (VAP) is associated with significant morbidity and mortality in critically injured trauma patients. Although, there is a positive correlation between the presence of facial fractures and the severity of brain injury, there is a paucity of data that has evaluated whether the combination of injuries are associated with a higher incidence of VAP.

**Hypothesis:** We hypothesize that the combination of facial fractures and TBI is associated with

a higher incidence of VAP compared to facial fractures and TBI alone.

**Methods:** Prospective data were collected on 4966 critically injured trauma patients admitted to our surgical ICU from 2010 to 2016 who were diagnosed with either facial fractures or traumatic brain injury. Patients were stratified into 3 cohorts: TBI alone, FF alone or both. The clinical diagnosis of VAP was confirmed with bronchoalveolar lavage. Outcome was evaluated by hospital and ICU length of stay, ventilator free days and mortality. Univariate analysis was conducted using student's t-test and chi square analysis. Multivariate analysis was conducted and adjusted for age, gender and ISS.

**Results:** Of the 4966 patients who with either TBI, FF or both, 255 patients met our inclusion criteria. The majority (76%) were male and Caucasian (58%). 49 (19.22%) of these patients developed VAP. Patients with the combination of TBI and FF had a significantly greater ISS ( $25.1 \pm 11.5$  vs  $18.1 \pm 7.9$  vs  $11.8 \pm 9.6$ ,  $p=0.0001$ ), hospital days ( $17.3 \pm 17.3$  vs  $13.2 \pm 11.9$  vs  $11.5 \pm 10.8$ ,  $p=0.016$ ), ICU days ( $10.1 \pm 9.2$  vs  $9.4 \pm 10.2$  vs  $6.2 \pm 7.8$ ,  $p=0.006$ ), ventilator days ( $6.9 \pm 7.4$  vs  $6.1 \pm 7.5$  vs  $4.0 \pm 5.8$ ,  $p=0.010$ ) and Ventilator free days ( $3.4 \pm 4.5$  vs  $3.3 \pm 4.3$  vs  $2.2 \pm 2.9$ ,  $p=0.045$ ) as compared to TBI and FF only cohorts. They also had a higher incidence of ventilator associated pneumonia (VAP) (28.8% vs 17.7% vs 14.0%,  $p=0.041$ ) and mortality (27.4% vs 26.4% vs 6.1%,  $p=0.0001$ ) compared to TBI and FF alone cohorts. Regression models showed that the combination injury patients stayed almost 3 days longer on the ventilator and also had a nearly a 3-fold increased risk for VAP (OR 2.83, CI 0.047 to 0.261,  $p=0.005$ ).

**Conclusions:** Patients with both TBI and FF had significantly greater ventilator days and a three-fold greater risk for developing of VAP as compared to patients with TBI or FF only injuries. Clinicians should aim at earlier diagnosis and treatment of VAP in patients who are admitted to the ICU with both TBI with FF.

### **M15. Short term vs. Long term Empiric Antibiotic treatment for open facial fractures. Is there a difference in Outcome?**

Melissa Canas; Christina X Zhang; Ricardo Fonseca; Jose A Aldana; James McMullen; Javier Rincon; Rohit Rasane; Esha Ghosh; Kelly Marie Bochicchio; Grant Bochicchio

**Background:** There continues to be significant debate regarding the antibiotic management for trauma patients with open facial fractures. This debate is most notable in regard to the use and duration of empiric treatment.

**Hypothesis:** We hypothesized that longer antibiotic courses of empiric antibiotics are associated with improved clinical outcome in trauma patients with open facial fractures

**Methods:** Our prospectively maintained Trauma Registry was queried from 2005 to 2018 for patients diagnosed with open facial fractures. Demographics, fracture types, antibiotic treatments, and outcomes were abstracted. Patients with AIS scores  $>2$  in other anatomical regions were excluded. Patients were stratified into two groups: short-term antibiotic treatment ( $\leq 7$  days) and those receiving long-term antibiotic treatment ( $>7$  days). These short-term and long-term groups were subsequently analyzed by Chi-Square and continuous variables by the Student t-test using STATA

**Results:** 84 patients were identified as having open facial fractures. 57 patients (66.9%)

received short-term antibiotic treatment and 27 (32.1%) received long-term treatment. A total of 4 of the 84 patients (4.8%) were diagnosed with facial abscesses directly related to the facial fracture. All 4 of these infections were diagnosed in patients who received short-term empiric antibiotics in the initial admission and 3 out of these patients (75%) were readmitted due to infectious complications and 2 (50%) went back to the OR. Despite no significant differences in demographics or ISS between the two groups, patients receiving long-term antibiotic therapy were more likely to be admitted to the ICU (88.9% vs. 26.3%,  $p < 0.001$ ), had increased ICU days ( $12.7 \pm 9.4$  days vs.  $3.0 \pm 1.7$  days;  $p < 0.001$ ) and were more likely to go to the OR (85.2% vs. 63.1%;  $p = 0.049$ ) during their initial admission

**Conclusions:** Open facial fractures pose a complex clinical challenge, as there is currently insufficient evidence to evaluate the efficacy of short-term vs. long-term antibiotic treatment. While our data demonstrate that failure in early aggressive empiric therapy may lead to infectious related readmissions, longer antibiotic courses were associated with greater resource utilization. Prospective trials with larger cohorts are required to further assess the proper empiric management of these complex traumatic injuries.

### **M16. Surgeons Are Unreliable Predicting Organ Space Surgical Site Infection Risk for Trauma Laparotomy: A Prospective Study**

Gabrielle Hatton; Luciano Posada; Kayla Isbell; Hannah Ortiz; Shuyan Wei; Charles Wade; John Harvin; Lillian Kao

**Background:** Management of organ space surgical site infections (OS-SSIs) should be founded upon accurate and consistent risk stratification. The Bayesian Organ/Space Score (BOSS) is a validated risk calculator utilizing factors available upon abdominal closure to predict OS-SSI. However, management is currently guided by surgeon estimates alone. It is unknown if surgeon risk estimates are consistent and correlate with BOSS.

**Hypothesis:** Individual surgeon OS-SSI risk estimates disagree with both BOSS and the estimates of other surgeons.

**Methods:** A prospective, observational study of surgeons performing trauma laparotomy on adult ( $\geq 16$  years) patients was performed 6/2019-9/2019. Patients who died  $< 48$ h or had an index laparotomy  $> 24$ h after arrival were excluded. Surgeons who performed an index trauma laparotomy estimated the patient's OS-SSI risk within 24 hours. Clinical data were collected by chart review and BOSS risks were generated. Risk quartiles were assigned by BOSS distribution. Univariate and reliability analyses were performed.

**Results:** For 47 index laparotomies, 75 estimations were obtained. Most patients were young (median age 28, IQR 20-39), male (71%), and suffered penetrating trauma (56%). According to surgeon estimate, the median risk of OS-SSI, was 6% (IQR 5-25%). According to BOSS, the median OS-SSI risk was 7% (IQR 5-21%,  $p = 0.82$ ). After assigning risk quartiles, surgeons over-estimated and under-estimated OS-SSI risk 26 (35%) and 21 (28%) times, respectively. (Figure) Only 28 (37%) surgeon estimates agreed with BOSS. Intraclass correlation between surgeons and BOSS was moderate (0.71). Only 33% of surgeons assessing risk on the same patient agreed by quartile and intraclass correlation was poor (0.28). Two patients (4%) developed an OS-SSI, both of which were in the highest, BOSS risk quartile. The three surgeon estimates for the two patients who developed OS-SSI were in the 2nd, 3rd, and 4th quartiles.

**Conclusions:** Despite similar group risk estimates between surgeons and BOSS, surgeons were inaccurate and inconsistent estimating OS-SSI risk. Management based on evidence-based risk stratification, such as the BOSS calculator, may standardize care and improve patient outcomes.

### **M17. Reduction of unplanned (surgical infection related) ICU admissions with introduction of continuous vital sign monitoring**

Yassin Eddahchouri; Yassin Eddahchouri; Yassin Eddahchouri; Roel Peelen; Mats Koeneman; Roel Peelen; Mats Koeneman; Sebastian Bredie; Harry van Goor; Harry van Goor; Sebastian Bredie

**Background:** Main reason for clinical deterioration at the surgical ward is a postoperative infection. For early detection of clinical deterioration periodic vital sign monitoring with early warning score calculation has been widely adopted. Previous studies yielded conflicting results regarding effects on patient outcomes mainly due to the low predictive value of discontinuous vital sign data. Continuous monitoring (CM) has been promoted to improve prediction of deterioration. In 2018 we introduced CM with automated MEWS calculation and registration in the EHR at a gastro-intestinal (oncological) surgical ward and general internal medicine ward, and prospectively studied denominators of deterioration e.g. rapid response team (RRT) calls, unplanned ICU admissions (uICU), deaths, and ward and hospital stay. Comparison was done with periodic monitoring before CM introduction.

**Hypothesis:** CM results in fewer RRT calls, unplanned ICU admissions and deaths, and shortens ward and hospital stay.

**Methods:** We performed a before (2017, 1 year before CM;PRE) and after (2018, 1 year during CM;POST) study in all patients who occupied 60 beds at the 2 wards. Differences in uICU admissions, RRT calls and deaths, ward and hospital stay were assessed. For control on selection bias and to exclude trends in hospital admissions we analyzed uICU admissions and RRT calls for 15 other wards with periodic measurements (PRE and POST) and for the same surgical and internal medicine wards the year before the PRE period (2016).

**Results:** A total of 2,023 (PRE) and 1,873 patients (POST) had occupied these 60 beds and were included. POST uICU admissions were 34% less compared to PRE uICU admissions (44 vs 29 per 1000 admission weeks,  $p=.013$ ). About 60% of gastro-intestinal surgical uICU admissions were related to infections. RRT calls decreased ( $p=.011$ ) from 65 (PRE) to 46 (POST). Decreases were comparable for both wards. Similar decreases in uICU were observed for patients at these beds when compared to the year 2016. uICU admissions did not decrease at the 15 other wards. Mortality was comparable for both periods, ward (4.2 vs 4.2 days) and hospital stay (5.2 and 5.2 days) did not differ.

**Conclusions:** Implementation of CM led to a significant reduction in uICU admissions and fewer RRT calls. This may indicate earlier recognition of clinical deterioration such as due to postoperative infection. Next steps are new protocol development based on CM derived early warning scoring and implementation of CM driven predictive analytics for postoperative infection.

### **M18. Predicting Sepsis Within Four Hours of Admission to a Surgical Intensive Care Unit**

Andrew Young; Andrew Young; Elinore Kaufman; Madhu Subramanian; Dane Scantling; Patrick Reilly; Carrie Sims

**Background:** Sepsis remains a leading cause of morbidity and mortality in the intensive care unit. Early intervention in sepsis can improve outcomes. Many studies report on prediction models with the aim to make the model more generalizable, but few utilize hospital and care-team specific data

**Hypothesis:** We hypothesized that a machine learning algorithm using electronic health record (EHR) data available within the first 4 hours after SICU admission could accurately predict development of sepsis.

**Methods:** All patients admitted to the surgical intensive care unit (SICU) at an academic tertiary referral center between January 2010 and January 2017 were included. Patients with an admission diagnosis of sepsis were excluded. Sixty-six variables were identified as being readily available (present within 4 hours of admission >80% of the time). The data was then divided into a training (80%) and a test (20%) set. A Gini index was calculated from a random forest (RF) algorithm to shrink the variable list to 29 variables. Algorithms for prediction included logistic regression (LR), decision tree classifier (DT), RF classifier, and extreme gradient boost (XGB). Area under the curve (AUC) was calculated for each algorithm for a sepsis diagnosis.

**Results:** 14,693 patients who were initially admitted to the ICU without sepsis met inclusion criteria. The mean age was 58.6 years  $\pm$  18.7 years with 40.6% female. Service representation included Trauma (25%), GI Surgery (10%), Neurosurgery (9.3%), Vascular surgery (8%), Urology (4.7%), Transplant (4.5%), and 40% from other services. 4.5% developed sepsis during their hospital stay who were not admitted with the diagnosis of sepsis. The top five variables identified in descending order of importance: age, creatinine, day of the week admitted, hour of the day admitted, and partial thromboplastin time. The AUC for predicting sepsis within four hours of admission to the SICU for LR, DT, RF and XGB was 0.65, 0.53, 0.75, 0.74, respectively.

**Conclusions:** The RF algorithm provided very good accuracy in predicting sepsis within the first hours of admission to the SICU. This model can be deployed immediately within the EHR to identify at risk patients requiring early, aggressive intervention.

### **M19. Is Bloodstream Infection and Epiphenomenon in Surgical Patients?**

Joslyn Jose; Robert Sawyer

**Background:** Bloodstream infection (BSI) is not uncommon in the ICU setting, often regarded as an unfortunate byproduct of patients' critically ill status along with translocation from nosocomial or community-acquired infections. ICU personnel are well-versed in bacteremia and the dangers it poses, but it seems that rather than being another part of the milieu of critical illness in surgical ICU patients, BSI may be an important predictor of mortality.

**Hypothesis:** Outcome of diseases treated with source control (intraabdominal infections) may not be affected by BSI or lack thereof. BSI may be an independent predictor of mortality in diseases where source control cannot be obtained (pneumonia, urinary tract infection)

**Methods:** Data on all infections treated between 1997 and 2017 in a single Surgical-Trauma

Intensive Care Unit (ICU) were prospectively collected. Patients were categorized by primary site of infection and presence or absence of associated BSI (same organisms grown from primary site and blood). Demographic and outcome variables were compared using Student's t-test or Chi-square analysis. Logistic regression analysis was used to determine independent predictors of death, including the following variables: Age, sex, trauma vs. non-trauma, APACHE II score, days from admission to infection treatment, and presence or absence of BSI. Due to multiple comparisons,  $p < 0.01$  was considered significant (Bonferroni's correction).

**Results:** Over 6,000 patients were studied during this 20 year period, and BSI was associated with increased mortality in patients with concurrent (detected within 72 hours) infections of the abdomen, lung, urine, and other primary site infections, as demonstrated in the attached table. Regression analysis demonstrated that even after correcting for the above variables, BSI was associated with increased mortality (OR = 1.51, 95% CI = 1.21-1.89). Hosmer-Lemeshow test = 0.26, ROC C statistic = 0.78.

**Conclusions:** This study is not intended to make a statement on correlation vs. causation of BSI with regards to mortality. However, it does demonstrate a statistically significant association that cannot be overlooked. BSI was an independent predictor of mortality, despite patients receiving a longer duration of therapy, and regardless of whether it was present in diseases with possible source control (intraabdominal infections). Thus, surgeons need to be aware that BSI can be a significant harbinger of mortality, and may consider obtaining blood cultures promptly if a significant primary site infection is detected; this may lead to earlier initiation of treatment and improved outcomes.

## **M20. Emergency General Surgery Patients with Gram Negative Bacteremia Associated Venous Thromboembolism Have Worse Outcome**

Javier Rincon; Javier Rincon; Rohit Rasane; Rohit Rasane; Jose A Aldana; James McMullen; Christina X Zhang; Ricardo Fonseca; Melissa Canas; Esha Ghosh; Kelly Marie Bochicchio; Mark Hoofnagle; Obeid Ilahi; Grant Bochicchio

**Background:** Acute infections have been reported to be associated with venous thromboembolism (VTE) [deep vein thrombosis (DVT) and pulmonary embolism (PE)]. Bacteremia is associated with increased morbidity and mortality in emergency general surgery (EGS) patients. However, to our knowledge, the impact on outcome between gram negative bacteremia (GNB) vs gram positive bacteremia (GPB) associated with VTE in EGS patients has not been previously reported.

**Hypothesis:** We hypothesized that EGS patients with GNB and associated VTE have worse outcomes than those with GPB.

**Methods:** A prospectively collected EGS institutional database from 2005 through 2018 was queried for patients diagnosed with VTE using ICD 9 and 10 codes. Demographics, diagnostic imaging, microbiology, and outcomes were extracted. Only patients with positive blood cultures (BC) with the clinical diagnosis of bacteremia prior to the diagnosis of VTE were included in the study. Based on the cultures and gram stain, we defined 2 cohorts: GNB with VTE and GPB with VTE. Student's T-test was used for continuous variables. Chi-square test was used for categorical variables.

**Results:** A total of 318 EGS patients were diagnosed with VTE. Of these 75 (23.6%) patients

were diagnosed with bacteremia prior to their VTE diagnosis, 14 (18.7 %) were positive (GNB= 6, 42.9 % vs GPB= 8, 57.1%). Males were more likely to have GPB with VTE (87.5% vs 33.3%,  $p= 0.036$ ). Patients with GNB with VTE were found to be significantly older ( $64.3 \pm 9.7$  vs  $49.9 \pm 14.3$ ,  $p=0.054$ ), and had significantly greater ICU days compared to GPB with VTE cohort ( $17.1 \pm 10.8$  vs  $2.9 \pm 3.9$ ,  $p=0.004$ ). The most common isolated organism in the GNB cohort was Klebsiella (42.8%) and in the GPB group was Methicillin resistant Staph. aureus (40%). There were no significant differences seen in the Charlson's comorbidity index ( $6.0 \pm 1.9$  vs  $4.13 \pm 3.4$ ,  $p=0.249$ ) and hospital days ( $25.3 \pm 13.7$  vs  $22.8 \pm 17.8$ ,  $p= 0.786$ ). GNB patients had a mortality of 33.3 % as compared to 0 %, in the GPB patients.

**Conclusions:** Patients who were diagnosed with VTE after a gram negative bacteremia had more than five-fold longer ICU length of stay compared to those with gram positive bacteremia followed by a VTE as well as a 33% mortality. We recommend periodic screening for VTE in patients in EGS patients who are at high risk and the aggressive management of gram-negative bacteremia.

## **M21. Early vs. Delayed Foley Catheter Removal after Pelvic Surgery: Effect on UTI and Hospital LOS**

Laurie Hung; Cigdem Benlice; Scott Steele; Michael Valente; Stefan Holubar; I. Emre Gorgun

**Background:** FC catheters (FC) are routinely used during and after pelvic surgery. There is currently no standard practice for when FC are removed after pelvic surgery and delayed removal may increase the risk for urinary tract infection (UTI). This study aimed to evaluate FC removal practice after pelvic surgery at our institution, and to assess the effect of FC duration on UTI and hospital length of stay (LOS).

**Hypothesis:** We hypothesized that early FC removal was associated with a decreased rate of UTI and shorter LOS, with minimal increase in urinary retention (UR).

**Methods:** Patients who underwent pelvic surgery from January 2012 to December 2017 ( $n=1,569$ ) in the Department of Colorectal Surgery at our institution were included in our retrospective study. Patient demographics, clinical data, and post-operative outcomes were collected. Our primary endpoint was UTI (by urinalysis and urine culture), and secondary endpoints were need for straight or re-catheterization and LOS. Patients were divided into early (post-operative day 1 & 2) and late (post-operative day 3 or later) FC removal groups, as well as high risk (urological history [UH] and/or diabetes) and low risk (no UH/diabetes) groups that were further sub grouped into early and late groups.

**Results:** The late FC removal group ( $n=721$ ) was more likely to have rectal cancer ( $p=0.001$ ), preoperative radiation ( $p<0.001$ ), ureteral stents ( $p<0.001$ ), abdominoperineal resection ( $p<0.001$ ), longer surgery times ( $p<0.001$ ) and longer LOS ( $p<0.001$ ) than the early group ( $n=848$ ). The UTI adjusted multivariable logistic regression model (model) showed no significant association between FC removal group and UTI. The UR ( $n=253$ ) model showed no significant association between FC removal group and UR. When the data were analyzed by specific FC removal day, the model showed that each one-day delay in FC removal significantly increased the odds of UTI by 10% [OR 1.10, 95% CI 1.03 - 1.17] and decreased the odds of having UR by 12% [OR 0.88, 95% CI 0.80 - 0.97]. When the data were analyzed by risk groups, the late FC removal subgroup of the high risk group showed a significantly higher odd of UTI [OR 3.85, 95% CI 1.23-12.03].



**Conclusions:** This study demonstrated that early FC removal after pelvic surgery is associated with decreased rates of UTI and LOS, and increased UR. These findings should be implemented as part of a quality project in order to study these observed effects prospectively, with a long-term goal of improving quality of patient care.

## **M22. Does Anti-Fungal Therapy in Fungal Necrotizing Soft Tissue Infection Improve Outcomes?**

Ricardo Fonseca; Ricardo Fonseca; Melissa Canas; Christina X Zhang; Jose A Aldana; Javier Rincon; Rohit Rasane; James McMullen; Esha Ghosh; Kelly Marie Bochicchio; Grant Bochicchio

**Background:** The elevated mortality rate associated with Fungal Necrotizing Soft Tissue Infections (FNSTIs) has been recently recognized. To our knowledge, there have been few studies evaluating the benefits of anti-fungal therapy in this population.

**Hypothesis:** We hypothesized that the use of anti-fungal therapy improves clinical outcomes in patients with FNSTIs.

**Methods:** Patients with Necrotizing Soft Tissue Infections (NSTI) were identified from a prospectively maintained Acute and Critical Care Surgery (ACCS) database from 2008-2018. Patients were initially categorized by intra-operative cultures into FNSTIs and Non-FNSTIs. The FNSTI cohort was further subdivided into two groups based on anti-fungal usage. Patients who received anti-fungal therapy prior to culture collection were excluded. Microbiologic data, demographics, Charlson Comorbidity Index (CCI), infection site, number of surgical procedures, anti-fungal regimen, and clinical outcomes were compared using Pearson's chi-squared test ( $\chi^2$ ), Fisher's Exact Test, and Student's t-test.

**Results:** A total of 368 patients were diagnosed with NSTI [FNSTIs= 26 (7.1%), Non-FNSTIs= 342 (92.9%)]. Patients with FNSTI had a significantly higher mortality rate (19.2% vs 8.2%) and a longer Hospital Length of Stay (LOS) than Non-FNSTIs (21.1 vs 14.2;  $p= 0.004$ ). The 26 patients with positive cultures for FNSTIs were more likely to be female (61.5%;  $p= 0.034$ ). The most commonly identified fungal pathogen was *Candida Albicans* (46.2%). Anti-fungal therapy was used in 14 of the 26 patients (53.8%) and Fluconazole was the most common (64%) antifungal used. No significant differences were found in regards to outcomes including ICU and hospital days as well as mortality.

**Conclusions:** The presence of a positive fungal soft tissue culture in NSTIs had over 3-fold increase in mortality. Yet, contrary to our hypothesis, the use of anti-fungal therapy did not decrease the mortality or improve other clinical outcomes in patients with FNSTIs. The use of empiric anti-fungal regimens in FNSTIs should be carefully evaluated. A further prospective randomized study is warranted to confirm this finding.

## **M23. Clustering of Positive Fungal Cultures in Burn Patients**

Alison Monahan; Alison Monahan; Arek Wiktor; Michelle Barron; Arek Wiktor; Heather Carmichael ; Patrick Duffy; Anne Wagner; Arek Wiktor

**Background:** Burn patients are at risk for opportunistic fungal infections due to open wound

surfaces, impaired immune systems, and broad-spectrum antibiotics. Extraneous factors such as air supply contamination and local construction events may introduce mold spores into the hospital environment. The specific aim of this study was to examine fungal infections in burn patients in conjunction with various demographic, clinical, and environmental factors.

**Hypothesis:** Percentage burn correlates to fungal infection.

**Methods:** We conducted a retrospective review of all patients admitted to our ABA-verified burn center from 2015-present who developed positive fungal cultures (PFC) during their inpatient stay. Non-burn patients were excluded. Demographic data, length of stay (LOS), percent total body surface area (%TBSA) injury, fungal culture data, systemic anti-fungal agents, surgical interventions, and mortality were recorded. Infection control records were examined for clustering outbreaks of PFC.

**Results:** 2164 total patients were screened, 19 patients met inclusion criteria with a median age of 43 years [IQR 31-56], a median TBSA of 54% [IQR 6-69], and a median hospital LOS of 79 days [IQR 32-112]. Seventeen distinct fungal species were cultured from a total of 118 positive cultures (see graph). Patients had a median of three [IQR 1-6] PFC and were treated with a median of four [IQR 1-6] antifungal medications, for a median period of 26.5 days [range 0-374]. Median number of operations were 10 [range 1-49]. Three patients underwent an amputation (16%) for fungal control, and four patients died (21%). % TBSA burned was correlated with # of PFC ( $p < 0.001$ ). A 20% increase in TBSA was associated with approximately one more PFC per patient. LOS was not significantly correlated with # of PFC ( $p = 0.19$ ). PFC events showed clustering around three separate hospital construction events, which included two operating room (OR) construction projects and an addition of a loading dock next to burn unit (see graph).

**Conclusions:** Burn fungal infections are rare occurrences and appear to be associated with extent of burns. Moreover, fungal clustering in burn units may be associated with construction events. Infection control measures should be heightened during those periods.

#### **M24. Patterns of Use and Factors Associated with Sustained Prescription Opioid Use After Necrotizing Soft Tissue Infections**

Manuel Castillo-Angeles ; Stephanie Nitzschke; Tracey Koehlmoos ; Zara Cooper; Ali Salim; Reza Askari

**Background:** Prolonged opioid use is a major concern when treating pain after surgical procedures. It has been shown that approximately 1.7% of patients are still using opioids at one year after Emergency General Surgery. However, this sustained opioid use has not been studied within the NSTI population. The objective of the current study was to determine the patterns of use and factors associated with sustained opioid use in patients with NSTI at discharge.

**Hypothesis:** We hypothesize that the proportion of patients with NSTI persistently using opioids at one year after discharge will be higher than that reported for EGS.

**Methods:** The 2007-2015 TRICARE insurance database was queried for patients 18-64 years, with a diagnosis of NSTI (identified through ICD-9 diagnosis codes). Basic demographic data, clinical characteristics, as well as medical comorbidities were obtained. The opioid prescriptions present at discharge, three months, six months and one year were also obtained. A risk-

adjusted Cox Proportional-Hazard model was used to identify predictors of opioid discontinuation to highlight the likelihood of sustained opioid use.

**Results:** We identified 2,890 patients with diagnosis of NTSI. Among the 1,083 patients that received an opioid prescription at discharge, 30% filled  $\geq 1$  opioid prescription after discharge, 10.5% continued opioid use at 3 months, 6.6% at 6 months, and 4.1% at 1 year. After risk-adjusted analysis, older age (45-64 vs. 18-24 years [Ref.], HR: 0.55,  $p < 0.01$ ), married status (HR: 0.88,  $p = 0.03$ ), previous diagnosis of anxiety (HR: 0.56,  $p = 0.03$ ), pre-existing comorbidities (defined by Charlson Comorbidity Index  $\geq 1$ , HR: 0.42,  $p < 0.01$ ) and length of stay (HR: 0.97,  $p = 0.001$ ) were associated with decreased likelihood of opioid discontinuation or higher likelihood of sustained opioid use at one year. Being retired (HR: 1.35,  $p < 0.01$ ) and being in the Midwest region (HR: 1.47,  $p < 0.01$ ) were associated with higher likelihood of opioid discontinuation, or a lower likelihood of sustained opioid use. Gender, race, and prior diagnosis of depression were not significant predictors of sustained opioid use.

**Conclusions:** Even though less than 5% of NSTI patients continued to use opioids for more than 1 year after discharge, this was higher than the reported rate after EGS. Further research needs to focus on developing strategies and guidelines to adequately prescribe and discontinue opioids in the NSTI population.

## **M25. Use of Broad-Spectrum Antibiotics and Sepsis-3 Criteria in Burns**

Luis Enrique Meza; Sarah Rehou; Shahriar Shahrokhi

**Background:** Sepsis is diagnostic challenge in critically ill patients; especially so in the burn population because the signs and symptoms of sepsis are pervasive after injury. The Sepsis-3 criteria identify organ dysfunction as an acute change in SOFA score  $\geq 2$  points consequent to infection. The objective of this study was to evaluate if Sepsis-3 criteria were fulfilled when broad-spectrum antimicrobial therapy was started in a burn cohort.

**Hypothesis:** We hypothesized that the initiation of antimicrobial therapy without indication has led to an increase in morbidity and mortality in burn patients.

**Methods:** We included all adult ( $\geq 18$  years) patients with an acute burn admitted to our burn centre within 2 days of injury between 2016 and 2019. Only patients that received meropenem or piperacillin/tazobactam during their acute hospitalization period were included. Patients were stratified based on the Sepsis-3 definition using evidence of infection and evaluation of organ failure in the 48-hour period prior to administration of antibiotics.

**Results:** We studied 70 patients, with 24 patients in the control group and 46 patients in the Sepsis-3 group. Demographics were similar among the control and Sepsis-3 groups: mean age was  $44 \pm 18$  versus  $48 \pm 18$  years ( $p = 0.372$ ); but injury severity was significantly different: median percent TBSA burn 18% vs. 32% ( $p = 0.003$ ) and proportion of inhalation injury 13% vs. 50% ( $p = 0.002$ ). Length of stay (LOS) was significantly longer in the Sepsis-3 group, control group median 23 days vs. median 43 days ( $p < 0.001$ ). However, LOS/TBSA was not significantly different in the control group compared to the Sepsis-3 group: median 1.6 vs. 1.4 days per percent TBSA burn ( $p = 0.777$ ). Mortality was similar among the groups: 13% vs. 20% ( $p = 0.526$ ). The proportion of patients diagnosed by a physician with sepsis was also similar with 21% in the control group vs. 33% in the Sepsis-3 group ( $p = 0.406$ ).

**Conclusions:** Though the Sepsis-3 group had greater injury severity, mortality and LOS in-hospital, when normalized to TBSA, was similar. Patients were diagnosed by the physician with sepsis in less than a third of patients. This raises the question of why broad-spectrum antibiotics were started. Potentially, patients were treated based on clinical suspicion of sepsis instead of delaying treatment until diagnosis was confirmed. Benefits of early antibiotic administration must be considered in conjunction with antimicrobial stewardship.

## **M26. MORTALITY OF NECROTIZING FASCIITIS - EFFECTS OF PATIENT, INSURANCE AND HOSPITAL FACTORS**

Allison Berndtson; Allison Berndtson; Laura Godat; Laura Godat; Jessica Weaver; Amy Liepert; Amy Liepert; Sara Higginson; Sara Higginson; Leslie Kobayashi; Jeanne Lee; Jeanne Lee; Todd Costantini; Leslie Kobayashi; Jay Doucet; Todd Costantini; Jay Doucet

**Background:** Necrotizing soft-tissue infections (NSTI) are rare, life-threatening infections characterized by rapid spread and necrosis of fascial planes and surrounding tissue. The most important determinant of mortality is time to surgical débridement. Multiple factors may influence access to and delay in obtaining emergency general surgery (EGS) consultation for NSTI and therefore increase mortality.

**Hypothesis:** We hypothesized that patient, hospital and insurance factors are associated with increased NSTI mortality.

**Methods:** A retrospective analysis of the US 2016 Nationwide Inpatient Sample was done, analyzing patients admitted with an International Classification of Diseases version 10 code for necrotizing fasciitis (NF) and a code for an excisional procedure for skin, subcutaneous tissue or muscle. Patient data (age, sex, comorbidities, estimated costs, zip income quartile, insurance status) and hospital data (region, rural, urban, teaching and volume of NSTI admissions) were collected. Analyses were performed to identify independent predictors of hospital mortality using logistic regression. Estimated median costs were compared by quantile regression.

**Results:** There were 2740 unweighted NSTI admissions representing 13700 weighted cases. 1466 were male (53.5%) with a median age of 53.4 years (I.Q.R. 44-63), admitted to 1274 hospitals, including rural (146, 11.5%), urban non-teaching (366, 28.7%) or urban teaching hospitals (792, 59.8%). 54% of hospitals admitted < 3 NSTI cases/year. Overall, 197 (7.2%) patients died. There were 439 patients transferred; these patients had higher unadjusted mortality (10.0% vs. 6.7%,  $P=0.012$ ). Adjusted median costs were significantly higher in teaching hospitals (+\$2690.57, 95% CI: 1276-4104;  $P<0.001$ ). Regression analysis is shown at Table 1.

**Conclusions:** There is decreased NSTI survival for MEDICAID patients. Transfers and geographic factors also influence outcome. Time to surgery in hospital may influence survival. Adjusted costs are higher in teaching hospitals indicating the burden NSTI management places on these facilities. EGS registries may determine additional factors affecting survival after NSTI.

## **M27. Organ dysfunction resolution by Day 14 strongly predicts long-term survival in necrotizing soft tissue infection**

Addison May; Wayne Dankner; Scott Brakenridge; David Wilfret; Valery Walker; Kate Andrade;

John White; Wayne Dankner

**Background:** A recent publication validated a composite endpoint including resolution of organ dysfunction assessed by a modified sequential organ failure assessment (mSOFA $\leq$ 1) to define clinical efficacy in patients with NSTI, demonstrated that resolution of organ dysfunction at Day 14 post-initial debridement predicted lower 28-day mortality (Bulger EM, et al. J Trauma Acute Care Surg. 2017;83(4):622-627). The use of mSOFA to predict long-term outcomes has not been fully evaluated.

**Hypothesis:**

**Methods:** A retrospective claims analysis utilizing the Optum Research Database (ORD) was performed. Diagnosis of NSTI was identified by ICD-9 and/or ICD-10 codes from April 2014 through March 2017. Inclusion criteria included age  $\geq$ 18 yrs, continuous enrollment with medical/pharmacy benefits for 3 months prior to NSTI admission, CPT code for a NSTI-related surgical procedure, hospitalization for at least 5 days and survival past 14 days. Clinical and laboratory data were abstracted during inpatient stay to facilitate calculation of the mSOFA (bilirubin not included) score proximate to Day 14 or at hospital discharge if earlier than Day 14. Deaths were identified from the ORD and National Death Index.

**Results:** 259 NSTI cases met inclusion: 180 pts (69.5%) had a Day 14 mSOFA  $\leq$  1 and 79 pts (30.5%) had a Day 14 mSOFA  $\geq$  2. Mean age was 59.5  $\pm$ 12.7 yrs, 60.6% were males, 54.1% Caucasian, 19.3% Black and 13.5% Hispanic. By medical history, 53.7% had diabetes and 22.8% had chronic kidney disease, while 28.2% were reported to have septic shock and 49.8% had acute kidney injury in the first 14 days of their hospitalization. Long-term outcome and resource utilization are shown below.

**Conclusions:** In a geographically diverse population of patients with NSTI, resolution of organ dysfunction (mSOFA score  $\leq$ 1) was strongly predictive of long-term survival and significantly associated with improved healthcare resource outcomes including less time in an ICU or hospital and opportunity to be discharged to home.

**M28. Initial experience with a standardized wound management pathway for long spinal constructs: The Peyote Protocol**

Kyle Mueller; Kyle Mueller; Matthew Jacobs; Mattew D'Antuono; Mattew D'Antuono; Edward Aulisi; Nathan Nair

**Background:** No standard closure technique exists following posterior spine surgery requiring a long construct. With a high surgical site infection rate with this population, reduction strategies often require a multifaceted approach. Standardization and implementation of prevention protocols has led to SSI reductions in other areas of medicine.

**Hypothesis:** The aim of the current investigation was to report our initial experience with the use of a standard closure protocol for patients undergoing long spinal constructs. By standardizing a pathway for high-risk incisions we hope to see a reduction in the rate of surgical site infections.

**Methods:** A prospective study of patients undergoing posterior spine surgery of ( $\geq$  3 levels) at a single-center was performed. A standard protocol was used for all patients. All patients were

closed with interrupted O-Vicryl fascial sutures, 2-O deep dermal Vicryl sutures and interrupted 2-O vertical mattress Prolene sutures with intervening staples for the skin. Prophylactic closed-incisional negative pressure therapy (ciNPT) was applied to all incisions for seven days. Staples were removed at two weeks and sutures at three weeks, both in the ambulatory setting. Deep and superficial surgical site infection rates (SSIR) along with underlying pathology were recorded.

**Results:** 89 patients underwent the standard closure protocol. Pathology types included degenerative/deformity (57/89, 64.0%), neoplastic (14/89, 15.7%), infection (12/89, 13.5%), and traumatic (6/89, 6.7%). The average age was 64.3 years (45-78). The average body mass index (BMI) and hemoglobin A1C were 32.2 and 7.0, respectively. Overall superficial and deep SSIR were 6.7% (6/89) and 3.4% (3/89), respectively. Deep SSIR was almost fourfold less than institutional historical rates (3.4% v. 13%). Deep SSIR for pathology types were 8.3% (infection), 1.8% (degenerative/deformity), and 0% (neoplastic and trauma).

**Conclusions:** Closure technique and incision management pathways can be used to minimize complications for high-risk spine patients. A standard protocol that couples inpatient prophylactic ciNPT with outpatient sequential staple/suture removal minimizes the rate of deep surgical site infections by optimizing tension free closure.

## **M29. Is Intraoperative Hypothermia Associated with Increased Risk of Surgical Site Infection?**

Kyle Pribyl; Victor R. Vakayil; Kyle Pribyl; John Butterfield; Kate Geschwind; James Glover; Catherine Statz; Robert Bulander; James Harmon

**Background:** Intraoperative hypothermia is associated with an increased likelihood of surgical site infections (SSI); however, current evidence is inconclusive and data supporting this association is limited. We evaluated the association between intraoperative hypothermia and postoperative SSI after colon surgery.

**Hypothesis:** We hypothesized that an increased rate of intraoperative hypothermia would increase the rate of postoperative SSI.

**Methods:** We performed a retrospective, single-center review of adult patients undergoing colectomy from January 2018 through September 2019. We evaluated patients' baseline demographics, clinical characteristics, and perioperative variables. Temperature data was recorded continuously and intraoperative hypothermia was defined as a temperature  $<36^{\circ}\text{C}$  ( $96.8^{\circ}\text{F}$ ). Our primary outcome was 30-day postoperative rate of SSI. We calculated the duration of hypothermia as a proportion of total operative time. We performed univariate analysis and constructed a multivariate logistic regression model to evaluate the independent effect of hypothermia on risk of developing subsequent SSIs.

**Results:** 526 patients were included in our analysis. The patients average age was  $58 \pm 15$  years, BMI was  $29 \pm 8$  kg/m<sup>2</sup>, and 55.3% (n=291) were female. 12.4% (n=65) of patients had a history of smoking and 14.3% (n=75) were diabetic. 68.4% (n=349) of patients had an ASA score  $\geq 3$ . Patients were hypothermic for an average of  $50\% \pm 32\%$  of the total operative time. On multivariate analysis, the percentage of intraoperative hypothermia was not associated with an increased risk of SSI (OR: 1.6, 95% CI: 0.6-4.5, P=0.399). Age (OR: 0.97, 95% CI: 0.95-0.99, P=0.035) and intraoperative time (OR: 1.003, 95% CI: 1.001-1.005, P=0.031) were

independently associated with an increased rate of post-op SSIs.

**Conclusions:** In the current era of perioperative care, which includes the timely administration of prophylactic antibiotics, improved glycemic control, and other procedural optimizations; the effect of the current levels of intraoperative hypothermia on SSI's rates was not detectable in this population.

### **M30. Socioeconomic well-being predicts mortality in necrotizing soft tissue infection**

Michael Villarreal; Kathryn Schubauer; Anghela Paredes; Robert Tamer; Scott Strassels; Heena Santry; Jon Wisler

**Background:** Necrotizing soft tissue infections (NSTI) are life-threatening bacterial infections requiring prompt recognition and intervention. Socioeconomic status is a major determinant of both quality of life and health care-related outcomes. The distressed communities index (DCI) is a comprehensive ranking of socioeconomic well-being based on zip code. The effects of socioeconomic factors on outcomes after debridement for NSTI are poorly understood. The role of DCI in predicting mortality in NSTI remains unknown.

**Hypothesis:** We hypothesize a higher DCI score correlates with increased likelihood for mortality after surgical debridement in NSTI.

**Methods:** A retrospective analysis of institutional data was performed for patients diagnosed with NSTI requiring surgical intervention (2011-2016). The DCI accounts for unemployment, education level, poverty rate, median income, business growth, and housing vacancies, with scores ranging from 0 (no distress) to 100 (severe distress). DCI scores were matched based on patient zip code. Stratification of DCI scores was performed using quintiles. Propensity score matching and multivariable regression analyses were performed to determine the relationship between DCI and mortality from NSTI.

**Results:** 432 patients met inclusion criteria. Overall mortality was 22% of the cohort. Patients who died were more likely to be male (55%), older in age (median 60, IQR [55,67]), have a BMI  $\geq 30$  (58%), have a Charlson score of  $\geq 5$  (42%), and have a DCI score within the distressed quintile (42%). After applying 1:1 propensity score matching, controlling for age, gender, race, BMI, and Charlson index, a distressed DCI score demonstrated a higher likelihood for mortality from NSTI (OR 3.47, 95% CI 1.07-11.32) compared to the most prosperous communities ( $p=0.04$ ). The distressed community indices for comfortable (OR 3.63, 95% CI 0.95-13.92), mid-tier (OR 0.85, 95% CI 0.20-3.65), and at risk (OR 1.24, 95% CI 0.41-3.73) communities were not found to demonstrate significance ( $p>0.05$ ).

**Conclusions:** A DCI score classifying a community as distressed is predictive of mortality in patients undergoing debridement for NSTI. This finding is likely due to a combination of individual means and community-level resources. Socioeconomic status should be considered when determining pre-operative and post-operative patient management, evaluating resource utilization, and building risk models. The DCI-related association observed in this study warrants further investigation as the identification of modifiable risk factors may help mitigate the increased risk of mortality.

### **M31. Using Perioperative Jackets: Does it Decrease Surgical Site Infections?**

Kyle Pribyl; Kyle Pribyl; Victor R. Vakayil; Jessica Flanke; Catherine Statz; John Butterfield; James Harmon; James Glover; James Glover; Catherine Statz; Robert Bulander; James Harmon

**Background:** Desquamation and airborne particulates are associated with increased surgical site infections (SSI). National organizations such as the Association of Perioperative Registered Nurses advocate using perioperative jackets in an effort to reduce SSI; there is a lack of evidence demonstrating a reduction in SSI rates.

**Hypothesis:** We hypothesize that a perioperative jacket policy would reduce overall postoperative SSI rates and additionally reduce the rates of SSI's secondary to skin-borne pathogens.

**Methods:** We performed a single-center, retrospective cohort study comparing SSI rates 3-years before and 3-years after instituting a perioperative jacket policy. There was a 3-month run-in period to ensure policy institution and compliance. We included adult patients who underwent any operative procedure >15 minutes with an assigned National Healthcare Safety Network (NHSN) code. SSIs were determined by a surgical infection surveillance nurse using the NHSN guidelines. Our primary outcome was overall SSI rates and our secondary outcome was the rate of wounds that cultured skin-borne pathogens. We performed a univariate analysis to identify factors associated with increased risk of postoperative SSIs. Multivariate models were constructed to evaluate the independent effect of perioperative jacket use on subsequent SSI risk.

**Results:** 43,861 patients met our inclusion criteria; 22,293 patients pre-policy implementation and 21,568 post-implementation. 60.8% (N = 26,647) were female with an average age of 52.7 ± 16.5 years. Overall, SSI rates were 4.3% (N = 1,878). On univariate analysis, males, higher ASA scores, emergency surgery, higher wound classification and increased operative time were associated with an increased risk of developing SSIs. Post-implementation SSI rates (4.4%, N = 957) were comparable to pre-implementation SSI rates (4.1%, N = 921; P > 0.05). On multivariate analysis after adjusting for potential confounders the institution of a perioperative jacket policy did not reduce overall postoperative SSI rates (OR: 0.9, 95% CI: 0.8-1.1, P = 0.158); however, the jacket policy significantly reduced the odds of developing SSI's secondary to skin-borne pathogens (OR: 0.8, 95% CI 0.7- 0.9, P = 0.023).

**Conclusions:** The use of perioperative jackets significantly reduced the rates of SSI's that cultured skin-borne pathogens; however, overall SSI rates remained unchanged. Well designed clinical trials are needed to better elucidate the causal association between air-borne particulates and subsequent SSI.

### **M32. The Impact of Elder-friendly Care on Infection and Delirium following Acute Care Surgery**

Diane Catalano; Diane Catalano; Diane Catalano; Jayna Holroyd-Leduc; Shelly Jun; Diana Rucker; Rachel Khadaroo

**Background:** Post-operative infections are common and universally expensive complications in surgical patients. Older adults, in particular, are especially vulnerable to postoperative complications, and may be at a higher risk for developing subsequent neurological complications due to infection. The aim of this analysis was to: (1) examine the association



between postoperative infection and delirium among older patients recovering from emergency abdominal surgery; and (2) explore the impact of Elder-friendly Approaches to the Surgical Environment (EASE) interventions on postoperative infection and delirium complications.

**Hypothesis:** We hypothesize that elder-friendly interventions will decrease post-operative infectious complications and delirium in older patients having emergency surgery.

**Methods:** We conducted a prospective before-and-after study at a tertiary care hospital. Older patients,  $\geq 65$  years old, who preoperatively required assistance with less than 3 activities of daily living and were admitted for acute care surgery were eligible. We excluded patients who were transferred from other medical services, underwent elective or trauma surgery cases. In this analysis, we report on patients who received: (i) standard care; or (ii) EASE interventions. Surgical complications were determined using the Clavian-Dindo Classification. Associations were explored with the Chi-square test (two-sided;  $p < 0.05$ ). All analyses were performed using STATA 14.0.

**Results:** A total of 293 patients (mean age=75.6 years, 49% female;  $n=153$  control) were recruited at the EASE intervention site. Postoperatively, 9.2% of these patients developed a surgical-site infection (SSI) and 19.5% delirium. There was an association, nearing statistical significance, between SSI and delirium complications (OR 1.9; 95% CI 0.90-3.9,  $p=0.06$ ). Moreover, the EASE intervention, which was a multi-faceted quality improvement initiative that integrated a geriatrician to the surgical team and early mobilization practices, was significantly associated with a decrease in organ/space surgical site infection ( $p=0.04$ ) and delirium ( $p=0.006$ ).

**Conclusions:** Older patients having acute care surgery are highly vulnerable to postoperative complications, and subsequent functional decline or death. Post-operative infections in particular pose a serious threat to older patients who may develop major neurological sequela, such as delirium. Targeted elder-friendly approaches to recovery may reduce postoperative complications among older patients and mitigate its downstream effects.

### **M33. Pediatric Surgical Coverage is Associated with Increased Costs in the Operative Management of Uncomplicated Appendicitis**

Nicholas Bandy; Ismail El Moudden; Rebecca Britt; Jiangtao Luo; Nicholas Bandy

**Background:** Optimal management of acute, uncomplicated appendicitis in the pediatric population is controversial, however the current standard of care remains appendectomy. It remains unclear if this population benefits from management by Pediatric Surgeons (PS) rather than General Surgeons (GS).

**Hypothesis:** We hypothesize that PS coverage offers no advantage of GS in the operative management of uncomplicated appendicitis.

**Methods:** Virginia Health Information (VHI) administrative database was retrospectively analyzed for cases of pediatric (ages 5-18), uncomplicated appendicitis that were managed operatively. Length of stay, total charges, operative charges and radiology charges were compared between patients cared for by Pediatric and General Surgeons. Patients were further stratified into three age groups (5-8, 8-13 and 14-18 years) for outcome comparisons.

**Results:** A total of 793 patients aged 5-18 were identified in the VHI database by ICD-10 codes between 2015 and 2019. A majority (70%) of the patients received care from PS hospitals. Total charges (\$32,165.49 vs \$44,330,  $p < 0.01$ ), OR charges (\$10,445.92 vs \$13,500.37,  $p < 0.01$ ), radiology charges (\$486.27 vs \$954.72,  $p < 0.01$ ) and Length of stay (2.38 vs 2.83 days,  $p = 0.05$ ) were significantly lower in the GS group. The costs remained significantly lower across all groups for GS except for radiology charges which were equivalent in the 5-8 year old group. When comparing specific age groups, length of stay was no longer significantly different.

**Conclusions:** Based upon this administrative database, operative management of uncomplicated appendicitis in the pediatric population can more efficiently be completed by general surgeons. It remains unclear exactly which patients benefit most from transfer to specialty PS hospitals. Our data suggest routine operative management of uncomplicated appendicitis does not require Pediatric Surgical coverage.

### **M34. Gender Disparities in the Operative Management of Complicated Diverticulitis**

Laura Godat; Allison Berndtson; Amy Liepert; Jay Doucet; Todd Costantini

**Background:** Effective treatment for complicated diverticulitis requires prompt infectious source control to limit morbidity and mortality. Treatment paradigms for complicated diverticulitis include antibiotics, percutaneous drainage or operative intervention for colon resection including the potential need for colostomy placement. While disparities in care for diverticulitis related to race and insurance status have been identified, the effect of gender on surgical care for complicated diverticulitis is unknown.

**Hypothesis:** We hypothesized that gender disparities would exist in the operative management of patients with complicated diverticulitis

**Methods:** Admissions from the emergency department for complicated diverticulitis; defined as ICD-9 codes for diverticulitis with peritonitis or abscess, were identified in the National Inpatient Sample Database from 2012 – 2015 Q3. Patients age 18 and over were included. Demographic data, Charlson Comorbidity Index (CCI) and mortality were obtained. ICD-9 codes were used to identify operative interventions including open or laparoscopic colectomy, ostomy, or percutaneous abscess drainage.

**Results:** There were 21,821 patients identified with complicated diverticulitis. 50.4% of patients were male and 49.6% of patients were female. The mean age of males was  $53.0 \pm SD 13.8$  while the mean age of females was  $61.7 \pm SD 13.7$  ( $p < 0.001$ ). Female patients with complicated diverticulitis were less likely than males to undergo operative intervention as age increased (see figure), with the largest disparity in operative intervention between genders occurring for patients age  $\geq 60$ . There was no difference in percutaneous drainage procedures related to gender. Compared to males, females  $\geq 60$  were less likely to have a CCI  $> 3$  suggesting they had fewer medical comorbidities. Females with complicated diverticulitis had increased in-patient mortality compared to males (3.2% vs. 1.8%,  $p < 0.001$ ).

**Conclusions:** Gender disparities exist in the surgical care of patients with complicated diverticulitis. Females were less likely to undergo operative intervention for complicated diverticulitis as age increased compared to males which was associated with increased mortality. Determining factors that lead to disparities in surgical care for female patients with

diverticulitis may improve outcomes.

### **M35. Association of Patient Frailty With Surgical Site Infections After Intestinal Surgery for Crohn's Disease**

Wenbin Gong; Kun Guo; Jianan Ren

**Background:** Frailty, a state of physiologic reserve and vulnerability to poor resolution of homeostasis after external stressors, is a consequence of age-related and disease-related deficits in multiple organ systems. It has been verified that frailty is associated with higher risk of postoperative morbidity during a variety of surgical procedures, but the association of frailty with postoperative outcomes, particularly for surgical site infections (SSI) in patients with Crohn's Disease (CD) undergoing intestinal resections is unclear. Further information on this association is able to allow surgeons to provide surgical risk consultation appropriately for these patients, and intervene in time and effectively before surgery in order to improve health status and surgical outcomes.

**Hypothesis:** Frailty is associated with poor postoperative outcomes, particularly SSI, in CD patients who require intestinal surgery.

**Methods:** To determine the association between frailty and postoperative outcomes of CD patients who require intestinal surgery, the CD patients who underwent intestinal surgery between January 2014 and January 2019 in our medical center were retrospectively investigated. The association of frailty with SSI (including anastomotic leakage, intra-abdominal abscess, entero-cutaneous fistula and wound infection), noninfectious complications (including postoperative ileus, bleeding, pleural effusion and others) and length of stay were analyzed.

**Results:** Of the 195 patients enrolled, 34 (17.4%) had SSI, including 5 (2.6%) anastomotic leakage, 11 (5.6%) intra-abdominal abscess, 2 (1.0%) entero-cutaneous fistula and 16 (8.2%) wound infection. High modified frailty index (mFI) score was associated with statistically increased odds ratio of 3.02 (95%CI, 1.69-4.20; P=0.014) for SSI compared with low mFI. An elevated mFI was also related to an increased incidence of postoperative ileus (OR, 1.82; 95%CI, 1.53-2.06; P <0.001). However, mFI scores were not predictive of bleeding (OR, 1.24; 95%CI, 0.73-1.82; P =0.48) or length of stay (OR, 1.05; 95%CI, 1.01-1.20; P =0.08).

**Conclusions:** Frailty was associated with increased odds of SSI in CD patients who underwent intestinal surgery. Surgeons should consider frailty when counseling and intervene preoperatively in time in order to improve postoperative outcomes for these patients.

### **M36. Ventral Hernia Repair in Immunocompromised Patients**

Mahsa Shariat; Joshua Jolissaint; Bryan Dieffenbach; Thomas Tsai; Ali Tavakkoli; Reza Askari

**Background:** Although ventral hernia repair (VHR) is one of the most common surgical procedures, complications and recurrence rates are a matter of great concerns. Given the vulnerability of immunocompromised patients to different types of infections and impaired wound healing, we aimed to assess immunosuppression as a predictor of recurrence in VHR.

**Hypothesis:** We hypothesized that immunocompromised status is a predictor of recurrence after VHR.

**Methods:** Patients who underwent VHR at our institution and were captured in the ACS National Surgical Quality Improvement Program (ACS-NSQIP) database between 2002 and 2015 were identified. Immunosuppression was defined as any steroid use or chemotherapy treatment prior to surgery. Unadjusted five-year cumulative incidence for VHR was performed based on immunosuppression status. Cox proportional hazards regression models were used to analyze the effect of immunosuppression on recurrence while controlling for confounding factors.

**Results:** Of total 630 patients included in the study, 27 were immunocompromised with a mean age of 54.6 ( $\pm 2.5$ ). Immunocompromised patients were more likely to have dirty wound class (7.4% vs. 0.7%  $p=0.004$ ), concurrent COPD (88.9% vs. 2.8%  $p=0.016$ ) and deep incisional SSI (3.7% vs. 0.3%  $p=0.013$ ). Recurrence rate was 22.2% in immunosuppressed patients with no significant difference between the two groups. No significant differences were observed in post-operative surgical site occurrence (SSO), superficial incisional SSI, organ space SSI and wound disruption. After adjusting for covariates, immunosuppression was not an independent predictor of recurrence after VHR (HR=0.83, CI 95%: 0.35-1.95;  $P=0.67$ ).

**Conclusions:** Although immunocompromised patients are more likely to have dirty wound class and deep incisional surgical site infection, immunocompromised status is not associated with a higher rate of recurrence after VHR.

### **M37. Predictors of Pathologic Non-Occlusive Mesenteric Ischemia**

Mahsa Shariat; Barbara Okafor; Manuel Castillo-Angeles ; Christina Liu; Reza Askari; Christina Liu

**Background:** Non-occlusive mesenteric ischemia (NOMI) is a subtype of mesenteric ischemia without occlusion of mesenteric arteries. NOMI accounts for 20-30% of acute mesenteric ischemia. Little is known about predictors of pathologic NOMI.

**Hypothesis:** In this study we aimed to assess clinical characteristic of benign and pathologic cases of NOMI, to better differentiate cases that need immediate surgical treatment.

**Methods:** This was a retrospective study of all NOMI patients admitted from 2013-2017 to two academic hospitals. Operative and CT scan of all the patients with pneumatosis intestinalis were reviewed to confirm the diagnosis. Patients with stenosis of SMA or severe atherosclerosis of abdominal aorta were excluded from the study. Patients were divided into benign and pathologic subtype. Pathologic pneumatosis was determined if the patient died due to underlying pneumatosis or had necrotic bowel on exploratory laparotomy.

**Results:** Overall 195 patients met our inclusion criteria. 56.4% of the patients were male and the mean age was 60.1 (SD 15.7). The overall mortality rate was 29.2%. Of all the patients included in the study 23.6% were considered pathologic. 24.6% of the patients were receiving tube feeds and 47.2% of the patients had concurrent malignancies. When comparing the two subgroups, patients in the pathologic group were older (65 vs 58.6  $p=0.01$ ) and were more likely to have peritonitis (23.2% vs 9.5%  $p=0.01$ ) and abdominal distention (72.7% vs 48.2%  $p=0.004$ ) on physical examination. Patients with pathologic NOMI were more likely to develop AKI, hepatic failure, sepsis and multiorgan failure, during their admission (all  $p<0.05$ ). Pathologic status was also correlated with higher levels of lactate (2.9 vs 2.1  $p=0.011$ ) and creatinine (1.9

vs 1.3 p=0.08) and lower levels of CO<sub>2</sub> (22 vs 24.1 p=0.009). Receiving steroids and immunosuppressant were significantly higher in benign cases (32% vs 17.3% p= 0.04).

**Conclusions:** Pathologic NOMI is more likely to present with distention, peritonitis, higher levels of lactate and creatinine and lower levels of CO<sub>2</sub>. Interestingly, tube feeds were not associated with pathologic NOMI.

### **M38. Outcomes of patients undergoing enterocutaneous fistula repair**

Mathias A Christensen; APOSTOLOS GAITANIDIS; Mathias A Christensen; APOSTOLOS GAITANIDIS; Kerry Breen; Mathias A Christensen; Kerry Breen; Jason Fawley; Jason Fawley

**Background:** Enterocutaneous fistulas (ECFs) constitute a major surgical challenge and treatment options involve a multidisciplinary approach. Over the years, definitive surgical treatment of ECFs continues to be associated with significant morbidity. The purpose of this study was to utilize a nationwide database to identify and define the morbidity associated with current treatment strategies in the surgical management of ECFs.

**Hypothesis:** We hypothesize that patients undergoing surgical repair of ECF have higher morbidity and readmission rates than expected

**Methods:** The 2007-2017 American College of Surgeon National Surgical Quality Improvement datasets (ACS-NSQIP) were used to assess the burden of readmission and complication rates after surgical repair of ECFs. Outcomes of morbidity and mortality were compared to the predicted morbidity and mortality.

**Results:** Overall, 2,603 patients undergoing ECF-repair were identified. Mean age was 56.5 (standard deviation (SD) 14.7). Patients were generally comorbid (74.0% were in ASA class III or higher). Based on NSQIP risk calculator, the expected morbidity rate was 26 ± 11.5% and the expected mortality rate was 2 ± 5%. The observed in-hospital mortality was 2%. However, the observed morbidity rate was 48.3%. Of the observed morbidity, 77.7% was due to post-operative infectious complications (superficial surgical site infections (SSI), deep SSI, organ/space SSI, wound disruption, pneumonia, urinary tract infection (UTI) sepsis or septic shock). The most common infectious complication was organ/space SSI (9.3%). 30-day readmission rate was 16.3%, the 30-day reoperation rate was 7.6% and mean length of stay was 16.5 days (SD 28.9).

**Conclusions:** The management of patients with ECFs is complex and associated with significant morbidity. Our data demonstrate half of patients undergoing surgical management of ECFs developed in-hospital complications and one in six was readmitted within 30 days of discharge. Further research efforts are needed to identify optimal treatment strategies to improve outcomes of patients undergoing ECF repair.

### **M39. Current Practice of Acute appendicitis Diagnosis and mAnagement in China**

Qinjie Liu; Qinjie Liu; Jie Wu; Xiuwen Wu; Jianan Ren; Xiuwen Wu

**Background:** Appendectomy is one of the most frequent surgical procedures for acute appendicitis. Consequently, there has been an increasing number of RCTs investigate the differences of prognosis between the non-operative management (NOM) and surgical treatment.

Herein, we analysed the distributions of the disease and outcomes of two kinds of treatments from the national study in China.

**Hypothesis:** The aim of this study was to describe and analyze the current status of diagnosis and management of acute appendicitis in China

**Methods:** An online record system was used to retrospectively collect data from 52 medical centers in mainland China. Consecutive acute appendicitis patients who were treated in the hospital in 2017 were included and followed for at least one year. Propensity score matching (PSM) was used to exclude the potential confounders and analyze the difference in outcomes between the non-operative management (NOM) and surgical groups.

**Results:** A total of 10,187 patients were enrolled, of whom 5,517 (54.2%) were men; the median age of all subjects was 38 years. A total of 2,056 (20.2%) cases received NOM. The one-year recurrence rate of appendicitis in NOM is 19.3% (102/530). Among the recurrence patients who were followed up, 72.5% of them received surgical treatment without an increase in complications. In PSM analysed, we found that NOM group had the lower complications rate (2.0% vs. 4.2%,  $P = 0.001$ ) and acceptable success rate (96.8% vs. 100.0%,  $P < 0.001$ ) compared with operative group. However, in complicated acute appendicitis population, the in-hospital complications rate of NOM was higher (10.8% vs. 5.8%,  $P = 0.048$ ) and success rate was lower (95.4% vs. 100.0%,  $P < 0.001$ ) than operative group. The recurrence rate was lower in non-complicated acute appendicitis patients than in the complicated acute appendicitis (17.3% vs. 30.8%,  $P = 0.010$ ). In operative group, there is no difference of success rate and SSI rate between the antimicrobial prophylaxis and non-antimicrobial prophylaxis for non-complicated patients (99.9% vs. 99.9%,  $P = 0.201$ ; 1.3% vs. 1.0%,  $P = 0.289$ , respectively). However, for complicated patients, the success rate was lower (99.3% vs. 100.0%,  $P = 0.031$ ) and SSI rate was higher (5.3% vs. 2.5%,  $P = 0.004$ ) in non-antimicrobial prophylaxis than in antimicrobial prophylaxis.

**Conclusions:** Appendectomy is still the most effective treatment for acute appendicitis at present. However, NOM is an alternative treatment for non-complicated acute appendicitis with the lower complications rate and considerable success rate and recurrence rate.

#### **M40. Community versus Hospital acquired Infections in Rwandan Acute Care Surgery Patients**

Christophe Mpirimbanyi; Christophe Mpirimbanyi; Thierry Cyuzuzo; Jean Bosco Katabogama; Vital Muvunyi; Christian Urimubabo; Jennifer Rickard

**Background:** There is a growing rate of antimicrobial resistance (AMR) globally, with high rates noted in low and middle income countries. This is particularly challenging because there are limited antibiotic options available in these settings. The aim of this study was to compare community (CAI) and hospital acquired infections (HAI) and determines the rate of extended spectrum beta-lactamase (ESBL) production in acute care surgery patients at a tertiary referral hospital in Rwanda.

**Hypothesis:**

**Methods:** This was a prospective, observational study of all acute care surgery patients with suspected infection. Specimens were collected depending on potential source of infection:

wound, urine, sputum or blood. Culture and sensitivity testing were done at the hospital laboratory using Kirby Bauer disc diffusion method. CAI was defined as those sampled within 48 hours of hospital admission and HAI were sampled more than 48 hours after hospital admission. We reported results as frequencies and percentages. Using Chi squared analysis; we compared factors associated with CAI versus HAI.

**Results:** Over a 9 month time period, we collected 158 samples from 139 patients. The most common diagnoses were soft tissue infection (n=28, 20%), abscess (n=21, 15%), and appendicitis (n=19, 14%). Most (n=107, 68%) specimens were collected from surgical wounds. Overall, 94 (59%) specimens collected were CAI and 64 (41%) were HAI. Of 157 samples, 103 (66%) were positive for culture growth, with no difference between CAI or HAI (60% vs 73%, P value=0.087). The most common organisms isolated were Escherichia coli (n=42, 42%), Staphylococcus aureus (n=20, 20%), and Klebsiella species (n=14, 14%). Of 40 E. coli isolates tested, 17 (43%) were resistant to ceftriaxone, with higher rates of resistance seen in HAI versus CAI isolates (75% vs 29%, p=0.006). Of 13 Klebsiella isolates, 9 (69%) were resistant to ceftriaxone, with no difference between HAI and CAI isolates (83% vs 57%, p=0.308). All S. aureus isolates were sensitive to vancomycin. Of 62 specimens tested for ESBL, 27 (44%) were ESBL producers. ESBL positive specimens were more common in the HAI isolates compared with CAI isolates (64% vs 30%, respectively, p value=0.008).

**Conclusions:** Rates of cephalosporin resistance and ESBL production are relatively high in Rwandan surgical patients with higher rates noted in HAI compared with CAIs. Infection prevention practices and antibiotic stewardship are critical to reduce infection rates with resistant organisms in a low resource setting.

#### **M41. Adapting Assessment Tools for Use in Lower Level Facilities in Low- and Middle-Income Countries**

Chandler Hinson; Joseph Solomkin; Angie Sway; Steven Senglab; Anthony Wanyoro; Amos Oburu

**Background:** There are many existing tools developed by large organizations such as the WHO and CDC. These tools are generally created with little input from professionals working in lower-income regions. Publications have highlighted the disproportionate burden of SSI in LMIC and the limited data on surgical conditions and practices in these regions. There is a need for quality improvement in SSI/IPC/patient safety in LMIC facilities. A starting point would be to adapt available tools for use in resource-limited facilities. Our goal was to assess IPC capacity of facilities by analyzing HAI surveillance; hospital workload, workforce, and infrastructure; and surgical operative practices.

**Hypothesis:** Can a tool be adapted to collect high-quality information on IPC and surgical practices from low-resource facilities in LMICs?

**Methods:** We created an adapted survey using components from the WHO's Guideline on Core Components for IPC and Essential Surgical Care Situational Analysis Tool that addressed 1) program support; 2) surveillance; 3) infrastructure; and 4) environment. Purposive sampling was used to identify 23 health facilities across 7 counties in Kenya. We chose to use cesarean section as a bellwether procedure because it is a high-volume procedure in LMIC. Permission to conduct the survey was solicited from facility leadership prior to the beginning of the survey, which was conducted by two surveyors.

**Results:** All facilities had an IPC program and 22/23 reported that their program was supported by facility leadership and a professional IPC team. However, only 10 facilities reported a specific IPC budget. 16 had adequate lab support. 12 conducted HAI surveillance and 11/12 monitored SSI. Most had reliable water (22) and power (21), but only 15 reported functioning hand hygiene stations. 15 allowed bed-sharing and 6 placed beds in areas other than patient rooms. Over 75% of facilities did not follow the WHO recommended pre-operative practices on bathing, hair removal, and skin preparation. Almost all (96%) of facilities administered systematic antibiotic prophylaxis (Abx), but none provided only pre-op Abx and the reported timing of administration ran contrary to established recommendations. 78.2% provided both pre- and post-op Abx, and 17.4% facilities provided only post-op Abx.

**Conclusions:** This survey was a time and resource efficient way of collecting the data needed to understand the variables associated with surgery, SSI, and IPC in lower-level facilities. Clear targets for surgical practice improvement were identified, and the workforce and infrastructure data will be used to design effective and sustainable solutions.

#### **M42. Epidemiology and outcomes of Fournier's gangrene: a population-based analysis between 2008-2014**

Samit Roy; Nicholas Ingraham; Victor R. Vakayil; Adam Sheka; Michael Usher; Christopher Tignanelli; Christopher Tignanelli

**Background:** There are few large epidemiologic studies reporting the incidence, complications, and outcomes related to Fournier's gangrene. We used a national database to investigate contemporary trends in the epidemiology of Fournier's gangrene.

**Hypothesis:** We hypothesize that there have been important temporal changes in the diagnosis, comorbidity burden, and clinical factors of patients diagnosed with Fournier's gangrene between 2008 and 2014.

**Methods:** Data from the Healthcare Cost and Utilization Project's state inpatient databases was utilized from 2008 – 2014 from 12 states. Patients with a diagnosis of Fournier's gangrene (ICD-9 CM 608.83) were included and patient, hospital, and treatment data were used to provide descriptive information as well as estimate incidence, trends, and mortality rates.

**Results:** We identified a total of 10,844 (0.01%) cases of Fournier's gangrene out of a total 80,736,256 hospitalizations. The majority of patients identified were male (98.4%) and identified as white (64.3%). Mean age was 54.8 years (SD: 17.5). Median Charlson comorbidity index was 1 (IQR: 0-3). Mean length of stay was 12.8 days (SD: 15.5) and did not vary significantly over time ( $p=0.5$ ). Debridement occurred in a total of 6,987 patients (64.4%). The rate of debridement increased during the study period 57.8% - 63.8% ( $p<0.001$ ). The rates of renal failure (26.8%,  $p<0.001$ ), sepsis (26.3%,  $p=0.01$ ), and pulmonary failure (17.2%,  $p=0.002$ ) complications also increased over time. Acute hemorrhage and surgical site infections were seen in 4.6% ( $p=0.13$ ) and 3.2% ( $p=0.31$ ) of cases respectively and neither of these changed significantly over time. Overall in-hospital mortality was 5.4% and was stable over time ( $p=0.5$ ).

**Conclusions:** Fournier's gangrene is a rare but serious infection. While mortality has remained unchanged complications related to Fournier's gangrene have increased over time.



### **M43. Impact of Splenic Embolization Technique on Post-embolization Complications: A single Institutional Review**

Colleen Donahue; Frank Disilvio; Michael Rosenblatt; Chaitan Narsule; Bedabrata Sarkar

**Background:** Splenic embolization has proven to be a successful treatment for nonoperative management of splenic injuries and is now considered the standard of care in a hemodynamically stable patient. However, embolization carries risks including rebleeding, pseudocyst formation, and more commonly, abscess formation. Although splenic embolization is increasing in frequency, the technique, including location and materials utilized, has not yet been standardized. At our institution, it is at the discretion of the interventional radiologists which technique to use while embolizing the splenic vessels.

**Hypothesis:** Our institution saw an increase in the number of readmissions for infections after splenic embolization. We found that all patients readmitted with infectious complications had been embolized with gelfoam. We hypothesized that use of gelfoam lead to increased infections.

**Methods:** We retrospectively reviewed the Lahey Hospital and Medical Center Trauma Database for splenic injuries from 2016 to present, including patients who underwent splenic embolization during their initial admission. Patients who proceeded immediately to splenectomy were excluded. The mechanism, injury grade, number transfusions, and embolization technique were included in the analysis. Our primary outcome was postembolization complications including abscess requiring percutaneous drainage, pleural effusion requiring thoracentesis, and readmission.

**Results:** 21 patients underwent embolization for splenic injuries from 2016 until present at our institution. The study population was predominantly male and 95% where blunt traumatic injuries. Splenic injury grade ranged from grade II (9.5%), III (33.3%), IV (47.6%) and V (9.5%). Patients were embolized with either coils alone (9, 42.9%), gel foam alone (6, 28.6%) and gel foam and coils (6, 28.6%). There were nine patients who underwent embolization with coils alone, and had no readmissions, splenic abscesses or pleural effusions requiring intervention. None of those patients progressed to splenectomy for either rebleeding or infection. There were 12 patients who underwent embolization with gel foam either in combination with coils or alone. Out of these patients there were 7 readmissions (58%), 4 patients with pleural effusions requiring thoracentesis (33.3%) and 7 patients with splenic abscess requiring percutaneous drainage (33.3%). Three patients (33.3%) required splenectomy for infectious complications. There were no splenectomies for rebleeding.

**Conclusions:** While splenic embolization for traumatic splenic injury in the hemodynamically stable patient has become the standard of care, the use of gel foam in our institution leads to increased rates of readmission, splenic abscesses, and splenectomy compared to patients embolized with coils alone.

### **M44. Fluids and Scopes and Scalpels, Oh My! An 8-Year Retrospective Analysis of Patients with Pancreatitis**

Nicholas Ingraham; Nicholas Ingraham; Adam Sheka; Adam Sheka; Victor R. Vakayil; Samit Roy; Michael Usher; Jeffrey Chipman; Christopher Tignanelli

**Background:** Pancreatitis accounts for over 2.5 billion dollars of healthcare costs and remains the most common gastrointestinal (GI) admission. Limited contemporary studies have assessed temporal trends of incidence, complications, management, and outcomes for acute pancreatitis in hospitalized patients at the national level.

**Hypothesis:** Trends in management, incidence, outcomes, and admission specialty for pancreatitis will change over time.

**Methods:** We used one of the largest hospital-based databases available in the U.S., Healthcare Cost and Utilization Project's State Inpatient Database, from 12 states between 2008 and 2015. We included patients with a diagnosis of acute pancreatitis (ICD-9 CM 577.0). Patient- and hospital-level data were used to estimate incidence, trends, and mortality rates.

**Results:** From 80,736,256 hospitalizations, 929,914 (1.15 %) cases of acute pancreatitis were identified. The median age was 53 years (IQR 41-67) and 50.8% were male. 45.9% of patients had a Charlson comorbidity index of zero while 29.1% had an index  $\geq 2$ . Overall in-hospital mortality occurred in 2.5% of patients and has declined from 3.2 to 2.4%. Length of stay was unchanged, median 4 days (IQR 2-7). Surgical and endoscopic interventions occurred most in 2011 (peak incidence of 16.1% and 9.5%, respectively) and have been declining since. Most complications were either stable (pulmonary failure [6.9%], pneumonia [2.3%], venous thromboembolism [1.0%]) or decreasing (GI bleed [2.2%], surgical site infections [0.7%], myocardial infarction [1.4%]) throughout the study period; however, acute renal failure (13.9%) was found to be increasing. Most patients were admitted to internal medicine (46.6%) followed by family medicine (13.9%) and surgical (6.3%) teams based on the admitting provider's specialty. Family medicine admissions decreased over time while internal medicine increased. Secondary providers were most commonly surgical (21.4%) or gastroenterology (18.9%) providers.

**Conclusions:** The incidence of pancreatitis is increasing while mortality continues to decline. This brings new challenges, including necrotizing pancreatitis and other long term sequelae. Pancreatitis management crosses multiple disciplines, especially among complex cases. Understanding trends in outcomes and management along with provider/hospital/regional variation can better identify areas for future research and collaboration in managing these patients.

## **M45. Alcoholism and Infection Risk in the Intensive Care Unit**

Kristin Colling

**Background:** Alcohol is the most frequently abused drug in US, and alcohol dependence and cirrhosis are common diagnoses in intensive care unit (ICU) patients. Alcoholism is associated with increased infection risk and worse outcomes.

**Hypothesis:**

**Methods:** A retrospective chart review of ICU patients admitted between March 2018-March 2019 at a tertiary referral hospital serving a large rural population was performed. Patients with diagnoses of alcoholism, alcohol dependence and alcoholic cirrhosis were included. Patients were excluded if they did not require ICU care (no intubation, organ failure, ICU medications) in order to include only those patients requiring intensive care, not merely monitoring. Patient

demographics, hospital course, infection type, culture results and mortality were collected and evaluated using SPSS version 26.

**Results:** 321 patients with alcoholism were admitted to the ICU in the study period (8.5% of all ICU admissions). 55 patients were excluded as they did not require ICU care, leaving 266 patients in the cohort. The most common admitting diagnoses were GI bleed (21%), trauma (14%), acute withdrawal (12%), sepsis (10%) and suicide/overdose (8%). Infection occurred in 39% of patients. Septic shock was present in 56% of infections and was associated with an increased risk of 30-day mortality (32% versus 3% without septic shock,  $p < 0.001$ ). Patient factors related to infection are depicted in table 1. Infection diagnosis was pneumonia in 71%, urinary tract infection in 13%, skin and soft tissue infections in 13%, bacteremia in 10%, intraabdominal infection in 7% and *C. difficile* in 6%. Cultures were obtained in 65 of the 74 cases of pneumonia, most common being *H. influenzae* and *S. pneumoniae*. Patients with pneumonia had increased risk of 30-day mortality (15% versus 7%,  $p = 0.05$ ). All patients  $n=266$  Infection  $n=104$  No Infection  $n=162$  P value Age; years 53 55 52 0.04 Sex (Male) 180 (68%) 73 (70%) 107 (66%) NS Rural 83 (31%) 43 (52%) 40 (25%) 0.004 ICU Length of Stay; days (SD) 4.2 (4.2) 2.9 (2.5) 6.3 (5.3)  $<0.001$  Hospital Length of Stay; days (SD) 10.5 (12.2) 7.6 (7.2) 15.2 (16.3)  $<0.001$  Cirrhosis 128 (48%) 57 (55%) 71 (44%) 0.05 Thrombocytopenia 112 (42%) 54 (52%) 58 (36%) 0.009 30-Day Mortality 25 (9%) 19 (18%) 6 (4%)  $<0.001$

**Conclusions:** Alcoholism and cirrhosis are commonly found in ICU patients. Infection was a common finding in alcoholic ICU patients, and was associated with increased mortality, as well as increased ICU and hospital stay. Infection risk was associated with age, rural patients, cirrhosis and thrombocytopenia.

#### **M46. Chemical Dependency Evaluation During ICU Admission is Associated with Decreased 1 year Mortality**

Kristin Colling

**Background:** Alcoholism is a common problem in the intensive care unit (ICU). These patients are at risk for worse outcomes. The acuity of the situation may allow physician-led counselling and chemical dependency (CD) counselling to motivate patient behavioral change.

**Hypothesis:** Patients with alcoholism have high mortality and morbidity. CD counselling will decrease readmissions and mortality.

**Methods:** A retrospective review of ICU patients admitted to a tertiary referral hospital serving a large rural population was performed from March 2018-March 2019. Diagnoses of alcoholism, alcohol dependence and alcoholic cirrhosis were included. Patients were excluded if they did not require ICU care (no intubation, organ failure, ICU medications in the first 24 hours of ICU admission) to include only those patients requiring intensive care, or if they were no longer drinking. Patient demographics, hospital course, CD evaluation, CD at discharge, and mortality were collected and evaluated using SPSS version 26.

**Results:** 321 of patients with alcoholism were admitted to the ICU, accounting for 8.5% of ICU admissions. 55 patients were excluded as they did not require ICU care, and 36 patients were no longer drinking, leaving 230 patients in the cohort. The most common admitting diagnoses were GI bleed (19%), trauma (16%), withdrawal (14%), suicide/overdose (10%) and sepsis (8%). 72% of patients had a CD consult and only 36% were discharged with CD treatment. Of

patients offered CD treatment, 49% accepted treatment at discharge. Readmissions were common (55%). Readmission rate was not affected by CD evaluation (53% vs 55%). 3-day mortality was 9%, and 1-year mortality was 22%. Variables significantly associated with mortality risk are listed in table 1, reported as odds ratio (OR) with 95% Confidence Interval (95%CI) for univariate analysis and adjusted OR with 95%CI for multivariate analysis using logistic regression. Number of Patients n=230 OR 1 Year Mortality (95%CI) Adjusted OR 1 Year Mortality (95%CI) Cirrhosis 94 5.7 (2.8-11.3) 5.9 (2.5-14.1) Rural 68 2.0 (1.1-3.8) 2.7 (1.2-6.3) Chronic Respiratory Disease 45 3.1 (1.5-6.2) 2.6 (1.0-6.7) Procedure During Admission 86 1.9 (1.0-3.5) 1.4 (0.6-3.2) Morbidity during Admission 181 3.0 (1.1-8.0) 2.7 (0.8-9.5) Thrombotic event 18 3.1 (1.2-8.4) 1.9 (0.6-6.1) ARDS 16 5.3 (1.9-15.0) 2.8 (0.7-10.7) CD Consult 166 0.2 (0.1-0.4) 0.3 (0.1-0.7) CD at Discharge 82 0.3 (0.1-0.6) 0.6 (0.2-1.6)

**Conclusions:** Alcoholic patients admitted to the ICU have high risk of mortality. This study demonstrates when CD counselling occurs, 50% will accept CD treatment at discharge and is associated with significantly decreased risk of 1-year mortality.

#### **M47. Gender disparity in medical comorbidity distribution that affect trauma related infectious outcomes**

Amelia Gurley; Andrew Stephen; Daithi Heffernan

**Background:** Trauma remains a leading cause of death and long-term disability across all ages. Considerable discrepancies have been noted between sexes with respect to trauma outcomes, especially among patients with trauma related critical illness. Women tend to suffer higher rates of complications including infectious complications following admission for traumatic injuries. Medical co-morbidities are known to be significant drivers of these complications. However, there is very little data addressing sex discrepancies among prevalence of pre-trauma medical comorbidities.

**Hypothesis:** Among trauma patients, a significant sex-based disparity will exist with respect to medical co-morbidities that are known to affect trauma related outcomes.

**Methods:** This is a 3 year retrospective chart review of admitted adult blunt trauma patients. Patients were divided by sex (male:female) and by age – young 18-35; middle 36-64; and geriatric  $\geq 65$  years old. Charts were also reviewed for mechanism of trauma, injury severity, hospital course, and outcomes. Medical comorbidities, extracted from the charts, were only those medical comorbidities known to exist prior to the trauma. The number and specific type of comorbidities also assessed. Chi-squared analysis was used for categorical data, and Student's t-test or Mann-Whitney U was used for continuous data. Significance was set at  $p < 0.05$ .

**Results:** Overall, 10,985 patients were admitted, 4,672 (42.5%) were women. Women were older ( $67.5 \pm 0.3$  vs  $52.5 \pm 0.3$ ;  $p < 0.001$ ). Within age groups, there was no significant differences with respect to mechanisms of injury. Motor vehicle collisions were the predominated among both young women and young men. Fall from standing predominated among geriatric patients. Overall women were more likely to have any comorbidity upon presentation (82% vs 72%;  $p < 0.001$ ). However, among geriatric patients, elderly women had fewer average pre-trauma comorbidities ( $2.6 \pm 0.02$  vs  $2.8 \pm 0.03$ ;  $p < 0.03$ ). With respect to specific diseases women were significantly less likely to be diagnosed with diabetes (19.1% vs 24.2%;  $p < 0.001$ ) or COPD (12.8% vs 10.7%;  $p = 0.04$ ), or with steroid use. Geriatric women were more likely to have been diagnosed with dementia (19.1% vs 13.1%;  $p < 0.001$ ), considered

functionally dependent (31.3% vs 21.5%; $p<0.001$ ) or carry a DNR status upon presentation (17.6% vs 14.7%; $p=0.008$ )

**Conclusions:** Sex related disparities exist with respect to comorbidities that are known to affect infectious trauma outcomes including diabetes and COPD. A lack of a diagnosis may not always imply the lack of disease, but may reflect limited access to care. An unrecognized sex-bias may exist with respect to disease screening.

#### **M48. Innovation in Preoperative Skin Preparation: A Novel Approach Utilizing a Dual Antimicrobial Film Drape**

Katherine Evely; Katherine Evely; Alyssa Hrycyshyn; Alyssa Hrycyshyn; Jordan Payette; Val DiTizio

**Background:** Surgical site infections (SSIs) are a challenging and costly health care issue. Preoperative skin antisepsis, in the form of chlorhexidine-based wipes and washes, are often used prior to surgery to reduce endogenous flora, a common cause of SSIs. However, current methodologies have been associated with poor compliance, which has likely contributed to conflicting reports on effectiveness and resultant recommendations. The burden caused by surgical site infections is significant, such that research and innovation on preoperative antiseptic prophylaxis has been identified as a priority.

**Hypothesis:** We present a novel approach to preoperatively preparing and protecting the surgical site, an innovation that provides continuous exposure to an effective, non-irritating concentration of antimicrobials, while isolating the surgical site from exogenous microbes. MediClear™ PreOp is an antimicrobial film drape which incorporates chlorhexidine diacetate and silver sulphate in a silicone adhesive.

**Methods:** A series of in vitro and in vivo experiments were performed to assess the antimicrobial efficacy of the dual antimicrobial silicone technology.

**Results:** The product provides a physical barrier to external contamination including fluids, bacteria, and yeast, and the surface in contact with the skin is an antimicrobial silicone technology proven to be efficacious against microorganisms commonly associated with SSIs. The antimicrobial silicone adheres intimately within the microcontours of the skin and in vitro testing demonstrates that CHX and Ag provide a rapid bactericidal and fungicidal effect against microorganisms including Staphylococcus aureus (MRSA), Staphylococcus epidermidis, Enterococcus faecalis (VRE), Klebsiella pneumoniae, Pseudomonas aeruginosa, Enterobacter cloacae, Candida albicans, and Candida tropicalis, achieving on average a 3-log (99.9%) reduction at 10 minutes and a 4-log (99.99%) reduction at 30 minutes. Rapid antibacterial action makes this advanced silicone technology appropriate for emergency operations, and application could address concerns associated with poor compliance and lack of standardization. In vivo testing confirms the products ability to suppress bacterial regrowth over the entire surface area for an extended duration and confirms the antimicrobial silicone is atraumatic.

**Conclusions:** This product addresses preoperative exposure to potentially pathogenic endogenous and exogenous microbes, representing a paradigm shift which can positively impact the effectiveness, efficiency and compliance of preoperative skin cleansing protocols, while offering a novel infection prevention solution in the age of antimicrobial stewardship.

## **M49. Mortality and Discharge disposition: Characterizing the burden of NSTI in the United States**

Adara McCarty; Jon Wisler; Robert Tamer; Zoe Krebs; Kathryn Schubauer; Courtney DiDonato; Michael Villarreal; Anghela Paredes; Heena Santry; Wendelyn Oslock; Scott Strassels

**Background:** Necrotizing soft tissue infections (NSTIs) are rare and life threatening diseases, characterized by inflammation and necrosis of the tissues within the soft tissue and muscles. The term encompasses a group of diseases, including necrotizing fasciitis, gas gangrene, cutaneous gangrene, and Fournier gangrene. While this disease is highly morbid, the overall burden of these diseases on patients, both during and after the initial hospitalization, is not well understood.

**Hypothesis:** The NIS dataset can be used to show that there are specific risk factors that will lead to more complicated outcomes.

**Methods:** Retrospective data was obtained from the 2012-2016 National Inpatient Sample dataset. Included in analysis were those  $\geq 18$  years of age with a primary diagnosis of a Necrotizing soft tissue infection (Gas gangrene, Necrotizing fasciitis, Cutaneous gangrene, or Fournier's gangrene). Risk factors were examined. Continuous variables were assessed using central tendency, t-tests, and Wilcoxon rank-sum tests. Categorical variables were assessed using chi-squared and Fisher's Exact tests. Statistical significance was defined as  $p < 0.05$

**Results:** 1,030 patient records were reviewed. 828 (33.0%) patients required emergency surgery for their NSTI diagnosis. The overall mortality was 20%. Several underlying comorbidities were associated with higher rates of mortality including cancer (OR 3.50,  $p=0.0004$ ), liver disease (OR 2.97,  $p=0.0096$ ), and kidney disease (OR 2.15,  $p<0.0001$ ). Kidney disease was also associated with a higher likelihood of discharge to a skilled nursing facility or rehab ( $p<0.0001$ ). Overall, patients discharged to skilled nursing facilities or rehab had higher rates of underlying comorbidities compared to patients that were discharged home (3 or more comorbid illness 84.3% vs. 68.6%,  $p<0.0001$ ).

**Conclusions:** Using the National Inpatient Sample dataset we identified several medical comorbidities that are associated with increased rates of in-hospital mortality. Patients with underlying cancers had the highest odds of increased mortality. The effect on outcomes of the potentially immunosuppressive cancer treatments in these patients is unknown. These data suggest that patients with underlying illnesses, cancer, kidney disease, or liver disease have higher mortalities, and are more likely to be discharged to skilled nursing facilities or rehab. It is unclear why these illnesses were associated with these worse outcomes. These data suggest that these particular comorbid illnesses may have special prognostic implications, although further analysis is necessary to identify the causative factors.

## **M50. A Retrospective Single-Center Case-Matched Review of Robotic Colorectal Surgery at a Safety-Net Hospital**

Naila Dhanani; Oscar A. Olavarria; Tien Ko; Stefanos Millas; Erik Askenasy; Mike Liang; Julie Holihan

**Background:** The use of robotic platforms has rapidly expanded and this has been partially driven by robotic colon resections. In theory, the robotic platform offers advantages of improved

ability to complete procedures using a minimally invasive approach, faster recovery, and potentially improved clinical outcomes.

**Hypothesis:** We hypothesized when compared to laparoscopic and open, robotic colorectal surgeries would have fewer post-operative Clavien-Dindo complications.

**Methods:** We performed a retrospective review of robotic colorectal surgeries performed in 2019 at a single center, safety-net hospital. All cases were performed by high-volume experts in colorectal surgery. Robotic cases were matched on a 1:3 ratio to laparoscopic and open cases. The primary outcome was Clavien-Dindo complications at 90-days post-operative. Secondary outcomes included operative duration, length of stay, conversion to open for robotic and laparoscopic cases, inadvertent enterotomy, surgical site infection (SSI), surgical site occurrence (SSO), re-operation, and readmission. Outcomes were assessed using Fisher's exact test and ANOVA test.

**Results:** A total of 12 patients who underwent robotic colorectal surgery were included in this study and matched to 36 laparoscopic and 36 open cases. There were more Clavien-Dindo grade 1-2 complications in the robotic group, but fewer grade 3-5, although none were statistically significant. The robotic group had a significantly longer mean operative duration. There were no conversions to open in the robotic group while 17% of laparoscopic cases converted to open. Length of stay was one day shorter in the robotic group, yet this was counterbalanced with more readmissions. While robotic and laparoscopic surgery were associated with fewer SSIs, robotic surgery experienced more wound complications than laparoscopic, on par with open procedures.

**Conclusions:** When compared to both laparoscopic and open colorectal surgeries, robotic surgery does not confer any clear clinical benefit or harm. Robotic surgery increases operative duration but potentially decreases the conversion rate to open when compared to laparoscopic cases. A larger study is needed to define the role of robotic colorectal surgery.