2020 Oral Presentation Abstracts

O1. Synthetic versus Biologic Mesh for Complex Open Ventral Hernia Repair: A Pilot Randomized Controlled Trial (NCT03091790)

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Background: Synthetic mesh for uncomplicated ventral hernia repair (VHR) has been proven to decrease recurrence at a slight increased risk of wound complications. Because of concerns for postoperative infections and complications, many surgeons utilize biologic mesh for complex VHR (large hernias, contaminated fields, or patients with comorbid conditions). However, no randomized controlled trials (RCTs) have compared biologic and synthetic mesh in this setting.

Hypothesis: We hypothesize biologic mesh compared to synthetic mesh for complex open VHR is associated with fewer major complications at 1-year post-operative.

Methods: We performed a single-center, pilot RCT. All eligible patients undergoing elective complex, open VHR were randomized to receive biologic or synthetic mesh placed in the sublay position. Primary outcome was major complications -- a composite of mesh infection, recurrence or reoperation. Secondary outcomes included Clavien-Dindo complication grade, surgical site infections (SSI), seromas, hematomas, and readmissions. Outcomes were assessed using Fisher's exact test and Bayesian generalized linear models.

Results: Among 86 patients, 44 received biologic mesh and 42 synthetic mesh. Most cases were wound class 2-4 (68.6%), 64.0% of patients were obese, over 50% were ASA 3-4, and 73.3% had hernia width >4cm, of which 88.4% were incisional hernias. At a median follow-up of 11.2 months, between biologic and synthetic mesh there were no differences in major complications (20.5% vs 14.3%, p=0.573) or in secondary outcomes including SSI (15.9% vs 9.5%, p=0.522; Table). Bayesian analysis demonstrated that, when compared to synthetic mesh, biologic mesh had a 75% probability of increased risk of major complications at 1-year post-operative and a 78% probability of increased risk of SSI.

Conclusions: In elective complex open VHR, biologic mesh demonstrated no benefit compared to synthetic mesh in 1-year outcomes; however, long-term follow-up is needed and planned. Bayesian analysis suggests that biologic mesh has an increased probability of major complications and infectious complications. Results of this RCT caution against the use of biologic mesh in elective complex open VHR until larger multicenter trials are conducted.

O2. Mechanism of Bacteroides fragilis modulating lymphocytes in a clinically applicable 3D-Intestinal Organoid sepsis model

Isabella Heffernan; Alfred Ayala; Chun-Shiang Chung; Daithi Heffernan

Background: Sepsis induces lymphocyte dysfunction, microbiome disruption and intestinal destruction. Probiotics are rarely mechanistically directed. We previously demonstrated Bacteroides fragilis(B.frag) probiotics direct a restorative lymphocyte phenotype. In chronic inflammatory diseases, immunomodulation occurs via B.frag production of polysaccharide

A(PSA) interacting with TLR receptors. Mechanisms remain poorly understood in acute sepsis.

Hypothesis: Polysaccharide A will mediate B.frag immunomodulatory effects upon T-cells within an organoid model of sepsis.

Methods: LPS stimulation mimicked gram-neg infection. To test T-cell/probiotic interaction, T-cells were cultured with B.frag or Lactobacillus acidophilus(L.acid). Phenotyping included PD-1, BTLA and TLR-4 expression. Cytokines included IL-6, IL-4, IFN-γ as well as IL-33, an intestinal restorative cytokine. To assess PSA immunomodulatory effects, culturing was repeated using PSA knockout strain of B.frag(ΔPSA-Bf). To assess TLR-4 in T-cells, TLR-4-siRNA was transfected. Lgr5+ stem cell derived intestinal organoids were grown in a 3-dimensional matrix as a clinically translatable model. T-cells, microbes(B.frag, ΔPSA-Bf or L.acid)+/-LPS and organoids co-cultured. Histology assessed organoid injury. The microbicidal peptide α-defensin assessed organoid function.

Results: After stimulation with LPS, L.acid induced marked increase in IL-4(453 vs 57 pg/ml) and IL-6(2,153 vs 277 pg/ml) but only moderate increase in IL-33. B.frag largely suppressed IL-4 and IL-6, but increased restorative IL-33(57 vs 8 pg/ml;$p<0.01$) and IFN-g. Conversely, ΔPSA-Bf did not increase IL-33 or suppress IL-4 or IL-6. B.frag and L.acid increased TLR-4 and PD-1(84% vs 89% vs 20%;$p<0.01$) expression. A protective PD-1-high sub-population(17%) emerged in response to B.frag, but not to ΔPSA-Bf. Following TLR-4 siRNA transfection, T-cell responses to L.acid were unchanged. The protective effect of wild type B.frag was not observed. To create a clinically translatable model, intestinal organoids were grown. Following co-culture, LPS-stimulated T-cells influxed towards the organoids, and greatly increased with L.acid. Conversely, B.frag reduced immune cell influx. On histology, there was no overt organoid damage. α-defensin markedly increased in response to T-cell:L.acid but not T-cell:B.frag. This protective effect was not seen with ΔPSA-Bf, or following TLR-4-siRNA transfection.

Conclusions: The immuno-restorative mechanism of B.frag involves PSA-TLR interaction. Harvesting the unique properties of B.frag derived PSA will offer improved targeted probiotic-based sepsis recovery strategies.

O3. Administration of diclofenac causes clinically severe anastomotic leakage in the rat distal colon independent of diet

Melissa Arron; Melissa Arron; Stijn Bluiminck; Lindsay Alpert; Lindsay Alpert; Olga Zaborina; John Alverdy; John Alverdy; Harry van Goor

Background: Work from our lab has demonstrated that diclofenac (DCF), a common anti-inflammatory agent administered to patients in ERAS programs, can cause anastomotic leak in rats following proximal colon surgery, but not following distal colon surgery. Given the emerging role of the microbiota in anastomotic leak pathogenesis and related effects of diet and antibiotics, the aim of this study was to determine the combined effect of a Western type diet, antibiotics and DCF on anastomotic healing following distal colon resection in rats.

Hypothesis: The additive/synergistic effects of a Western diet, antibiotics and DCF will cause a clinically severe anastomotic leak in the distal colon of rats.

Methods: Harlan male rats (n=72) were randomly assigned to either a standard Chow diet (SD) or an obesogenic Western type diet containing 60% calories from fat (WD) for 6 weeks, and

further randomized to receive either parenteral DCF 3mg/kg per day starting on the day of surgery until postoperative day 3 or saline. Four groups of rats were thus generated; Group I = SD, Group II = SD+DCF, Group III = WD, Group IV = WD+DCF. All rats were then administered preoperative cefoxitin and subjected to distal colon resection with anastomosis and sacrificed on postoperative day 5 for direct anastomosis inspection for signs of leakage. To determine the direct effect of DCF on bacterial growth, in vitro bacterial growth curves for Gram-positive and Gram-negative bacteria were generated in the presence and absence of DCF.

Results: In both WD-fed and SD-fed rats, diclofenac caused severe clinical anastomotic leakage. Compared to non-DCF treated rats, DCF treatment increased leak rates independent of diet; 100% versus 0% in WD-fed rats ($p=0.0001$) and 88% versus 10% in SD-fed rats ($p<0.0001$). All noted leaks were severe with either large abscess formation or peritonitis. In vitro analysis of the effect of diclofenac on microbiota showed suppression of growth of Gram-positive and increased growth of Gram-negative bacteria. Lumen and tissue microbiota were collected and submitted for 16S rRNA sequencing and collagenase assays to determine microbial community structure, membership and function between groups. Histology of anastomotic tissues revealed acute inflammation in all groups, with no differences between groups.

Conclusions: Independent of diet, DCF causes a clinically severe disruption of anastomotic healing in the distal colon of rats. We speculate that the effect of DCF on the gut microbiota may contribute to this finding.

O4. Revisiting the Surgical Infection Society (SIS) Delphi: advancements and unanswered questions in surgical infections

Patrick Delaplain; Sebastian Schubl; Austin Dosch; Haytham Kaafarani; Austin R. Dosch; Philip Barie; Sebastian Schubl; Sebastian Schubl

Background: In 2004, the Scientific Studies Committee of the Surgical Infection Society (SSC-SIS) used a modified Delphi process to enlist SIS member-experts to identify 15 research priorities in the field of surgical infectious diseases, which was intended to serve as a research “road map”. However, our progress on these initiatives since their inception has not been evaluated.

Hypothesis: We examined the progress achieved with respect to the 15 research areas identified by the Delphi process at that time, hypothesizing that advances in knowledge would be achieved in most domains, if not all.

Methods: SIS members were surveyed to: 1) determine whether each question had been answered in a robust manner, 2) assess the amount of available evidence concerning each research initiative (1-3 scale), 3) delineate whether there is a current unmet need for continued research in each area. Randomized controlled trials (RCTs) regarding these initiatives were identified via literature search.

Results: We found that nearly every question (13/15) saw an increase in the perceived available data by experts, as well an increase in the number of RCTs addressing that topic. However, there were only six questions that experts felt had been sufficiently answered—primarily regarding antibiotic duration for certain conditions and glycemic control (Table 1). Re-

ranking these questions based on perceived importance of continued research resulted in a majority of the highly ranked questions (6/8) seeing a decrease, while the 7 lowest ranked questions saw an increase. For a majority of the questions that experts felt were not sufficiently answered (8/9), respondents felt that continued research into these areas was warranted.

Conclusions: Whereas 40% (6/15) of the research questions prioritized by the SCC-SIS in 2004 were answered to the satisfaction of member experts, there are many questions that remain unanswered despite an increase in available data. Revisiting these research priorities highlights advancements made in the field of surgical infections, but also helps identify the areas that would benefit from continued study. That a majority of questions remain unanswered underscores an opportunity for member-experts to collaborate on SSC-SIS-managed or -endorsed RCTs.

O5. Dietary fat and fermentable fiber composition mitigate the effects of antibiotics and surgical stress on the microbiota

Robert Keskey; Tiffany Toni; Renee Thewissen; Alexander Zaborin; Olga Zaborina; John Alverdy

Background: The intestinal microbiota play an essential role in regulating the immune response to stress and infection. Compositional and functional changes to the intestinal microbiota invariably effect the response to surgical injury and are highly dependent on both diet composition and antibiotic exposure. Both diet and antibiotics may have an unappreciated impact on postoperative complications. Prior studies have shown that exposure to a high-fiber/low-fat plant-based diet is protective against postoperative sepsis in a murine model of surgical stress. These findings underlie the importance of understanding the influence of preoperative diet on the intestinal microbiota.

Hypothesis: Supplementation of highly processed high-fat and low-fat diets with fermentable, plant-based fiber will improve microbiota resiliency to antibiotics and improve postoperative outcomes.

Methods: 6-week-old C57/B6 mice were placed on one of four different diets: high-fat, low-fiber diet (HFD, 45% kcal fat); high-fat, high-fiber diet (HFD+F); low-fat, low-fiber diet (LFD, 14% kcal fat); and low-fat, high-fiber diet (LFD+F) for 6 weeks. Weights were monitored and compared. After 6 weeks, the mice were placed on a 5-day antibiotic regimen of cefoxitin and clindamycin following which they were subjected to a 30% hepatectomy. Mice were monitored postoperatively and scored to screen for signs of postoperative sepsis; mice that developed a moribund status were immediately sacrificed. DNA was extracted from stool and cecal contents for 16S rRNA analysis to determine changes in microbiota composition. GC-mass spectrometry was performed to measure changes in SCFA associated with the diets.

Results: Overall, plant based fiber did not have an impact on weight gain as both HFD (45.9%±12.5%) and HFD+F (38.9±9.6%) gained significantly more weight than the LFD (10.5±5.8%) and LFD+F(15.6±4.4%). The addition of fiber significantly reduced the Firmicutes:Bacteroidetes ratio of the microbiota with a reduction in the relative abundance of Firmicutes in the LFD+F and HFD + F compared to the diets lacking fiber. Fiber resulted in an increase in cecal butyrate, propionate and acetate (Total short chain fatty acids, HFD vs HFD+F: 332±37 vs 1044±666 nmol/cecum, LFD vs LFD + F: 856±612 vs 1916±916

nmol/cecum). HFD+F had a significant reduction in antibiotic induced weight loss compared to HFD (HFD+F vs HFD: 10.6±3% vs 16.3±3.2%). LFD+F resulted in improved postoperative recovery with a 16% reduction in postoperative sepsis score.

Conclusions: Decreasing preoperative dietary fat and increasing fermentable fiber increases health promoting microbiota and stabilizes the microbiota in the face of antibiotic exposure and surgery.

~~O6. Are We Out of The Woods After Discharge? Nationwide Clostridium Difficile Infection Burden After Major Surgery~~

~~Arturo J. Rios-Diaz; Alicja Zalewski; Arturo J. Rios-Diaz; Jessica Cunning; David Metcalfe; Francesco Palazzo~~

~~**Background:** Clostridium difficile infection (CDI) is the principal cause of both community and hospital-acquired infection and a feared complication after surgery. We aimed to describe and quantify the national CDI burden within one year after major surgery.~~

~~**Hypothesis:** Readmissions for CDI will impose a considerable burden on patients and healthcare systems.~~

~~**Methods:** Patients undergoing 30 major surgical procedures discharged alive were identified using the 2010-2014 Nationwide Readmission Database. Those with incomplete follow-up were excluded. CDI rates were obtained for both the index admission and as the primary cause of readmission. Patient and hospital-level factors associated with CDI were ascertained using Cox regression. Generalized linear models were used to estimate the predicted mean difference in cumulative costs associated with CDI readmissions (CDI-R).~~

~~**Results:** There were 1,341,358 patients included in the study of which 5,844 (0.4%) developed CDI during the index hospitalization and 4,075 (0.3%) were readmitted within one year of surgery due to CDI. Of all CDI-R, 6.8% had developed CDI during the index admission, 29% occurred in a different hospital, 5.5% died during readmission, and 60.4% occurred within 30 days of discharge. CDI rates by procedure are shown in the Figure. Factors independently associated with one-year readmission due to CDI included Medicare/Medicaid insurance, illness severity, discharge to facility, anemia, rheumatoid arthritis, depression, liver disease, metastasis, renal failure, weight loss, prolonged length of stay, postoperative CDI, and postoperative complication (all $p<0.05$). CDI-R was associated with increased cumulative costs of $11,697 (95% CI $10,753-$12,642; $p<0.01$), and patients readmitted to a different hospital had an increase in cost by $7,865 ($365-$15,364; $p=0.04$) relative to those presenting to the same hospital. Estimated CDI-R cumulative costs totaled $114.4 million/year nationwide.~~

~~**Conclusions:** Almost 40% of CDI after major surgery occur after discharge. Of these, 40% are missed by the current 30-day readmission benchmark and a third present to a different hospital, which is associated with increased costs~~.

O7. Negative Pressure Wound Therapy With and Without Instillation in Necrotizing Soft Tissue Infections

Erin Andrade; Laurie Punch; Kelly Vallar

Background: Necrotizing soft tissue infections (NSTI) are rare but deadly infections that require early and often extensive surgical debridement. After debridement, patients are left with large, open wounds representing a significant source of morbidity. No guidelines currently exist for wound management in NSTI after wide debridement.

Hypothesis: Negative pressure wound therapy with instillation (NPWTi) results in higher wound closure rate compared to traditional negative pressure wound therapy (NPWT) or wet to dry dressings (no vac).

Methods: A prospectively maintained Acute and Critical Care Surgery database spanning 2008-2018 was queried for patients with a diagnosis of necrotizing fasciitis, Fourniers gangrene or gas gangrene. Data was collected on patient co-morbidities, operative management, and clinical outcomes. Patients were stratified by use of no vac, traditional NPWT, or NPWTi. Data were analyzed using ANOVA, chi-squared, and logistic regression.

Results: During the ten-year study period, 380 patients were treated for NSTI; 174 were managed with wet to dry dressings no vac, 158 with NPWT, and 48 with NPWTi. Patients were similar in terms of demographics, BMI, DM, and smoking rates. Intravenous drug use was significantly more frequent in NPWTi cases (24.39% vs 7.75% NPWT vs 5.07% no vac, p=0.001). Overall, 30-day complication rates were not significantly different, but mortality was significantly higher in the no vac group (14.37% vs 8.86% NPWT vs 2.08% NPWTi, p=0.033). In the no vac group, 82.2% of patients had an open wound at discharge compared to 52.5% of NPWT group and only 14.6% of the NPWTi group (p<0.001). On multivariate regression, NPWT was associated with closure rates five times higher than the no vac group (OR=5.37, 95%CI:2.63-10.94, p<0.0001), while the NPWTi was associated with closure rates 22 times higher (OR 22.17, 95%CI: 7.53-65.26, p<0.0001) than the no vac group after controlling for BMI, smoking status, number of operations, and involvement of an extremity.

Conclusions: Negative pressure wound therapy with instillation is associated with higher rates of wound closure without increasing surgical site infections in patients with NSTI compared to traditional NPWT or wet to dry dressings. While prospective studies are needed, this indicates the potential to improve patient quality of life through reduced pain and outpatient home health needs.

O8. Association Between Blood Transfusion and Infections in Trauma Patients: Further Evidence of a Dose-Dependent Effect

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Background: Early use of blood products for resuscitation after trauma has survival benefit. The PAMPer study demonstrated a survival benefit to patients who received plasma as part of the early resuscitation. The objective of our study was to examine the association between blood transfusion and infections in patients who participated in the PAMPer trial and were randomized to receive plasma vs. standard of care.

Hypothesis: Transfusion of packed red blood cells (PRBCs) will be associated with the development of nosocomial infections in a dose-dependent fashion.

Methods: We performed secondary analysis of patients who survived at least 3 days from prospectively-collected data from the multicenter PAMPer trial. Demographics, injury characteristics, and the number of units of PRBCs and other blood products transfused were obtained to evaluate outcomes. Two logistic regression models were performed to assess the association between nosocomial infection and 1) any transfusion of PRBCs and 2) quantity of PRBCs. Both models were adjusted for patient age, sex, and injury severity score (ISS).

Results: 399 patients were included: age 46 (IQR 29-59), ISS 22 (IQR 12-29), 73% male, 87% white, 80% blunt mechanism, and 40 (10%) deaths. 93 (23%) developed in-hospital infections, including pneumonia (n=67), bloodstream infections (n=14), CAUTI (n=10), SSTI (n=8), Clostridium difficile colitis (n=7), empyema (n=6), and complicated intraabdominal infections (n=3). Nearly 80% (n=307) of patients received PRBCs; 12% received cryoprecipitate, 69% received plasma, and 27% received platelets. Patients who received any PRBCs had more than a two-fold increase in infections (OR 2.37, 95% CI 1.14-4.94, p=0.040). The number of PRBCs given was also associated with development of infection (OR 1.06 (1.02-1.10), p=0.001).

Conclusions: In this prospective dataset, trauma patients who received blood transfusion of at least one unit of PRBCs incurred a two-fold increased risk of nosocomial infection, and the risk of infection was dose-dependent.

O9. STING-dependent sensing of mtDNA initiated autophagy dysfunction drives sepsis-associated acute lung injury

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

Background: Sepsis can lead to severe multiple organ dysfunctions, in which lung injury is one of the most serious complications. ALI is commonly thought to be associated with the increased inflammatory response in the alveolar endothelial cells and immune cells. However, the mechanism of cell activation has not been clarified.

Hypothesis: Circulating mtDNA has a role in sepsis-associated acute lung injury (sALI) by activating the STING signaling pathway and inducing the autophagy disorder.

Methods: Blood samples and clinical data of patients with sALI were collected. Animal models, including CLP, LPS intra-peritoneal injection and mitochondrial DNA (mtDNA) i.p. were used to induce sALI in wide type and STING knockout mice. Autophagy flow evaluation, fluorescence co-localization and other methods were used to analyze the effects of STING activation on autophagy flux in vivo and in vitro.

Results: The increased levels of circulating mtDNA were correlated with the severity of the disease in sALI patients. STING activation was significantly increased in sALI patients. Consistently, the level of circulating mtDNA was increased in sepsis models. STING and NF-κB pathway were activated significantly in the lung of WT mice, which were improved in KO group. After mtDNA i.p, the degree of pulmonary injury and systemic inflammation were more severe in the control group than KO group. BMDM from WT or KO mice was stimulated with different

concentrations of mtDNA, in which proved that STING pathway could be significantly increased at the low concentration. The expression of autophagy-related proteins also increased during this period. The medium concentration of mtDNA could induce autophagy disorder in the WT group, which was not observed in KO group. Furthermore, STING activation can lead to autophagy degradation disorder rather than obstruct the autophagosomes and lysosomes fusion.

Conclusions: These results suggesting that the circulating mtDNA could activate the STING pathway and induce autophagy disorder in macrophages, leading to immune amplification, organ dysfunction, and aggravation of the disease. These results provide an in-depth direction for investigation of sepsis-related complications, and a target for improving the treatment efficiency and clinical prognosis of sepsis.

O10. Prevalence and Prognostic Value of Pseudomonas aeruginosa Isolated from Intra-abdominal Infections

Patrick Knight; Robert Sawyer

Background: Pseudomonas aeruginosa (PA) is isolated at variable rates from intra-abdominal infections (IAI). Not all recommended empiric regimens for IAI include anti-PA activity, for example: ceftriaxone and metronidazole.

Hypothesis: We hypothesized that within an adult population, PA is a relatively rare isolate and has no association with mortality, and, thus, empiric therapy with anti-PA activity is not warranted.

Methods: All IAI with positive cultures treated between 1997 and 2017 at a single institution were analyzed. This data set was divided into two cohorts, between those with cultures positive for PA and those without. Demographics and in-hospital mortality were compared by Student's t test and Chi-square analysis. Predictors of isolation of PA and in-hospital mortality were assessed using logistic regression (LR) analysis.

Results: In total, 2420 IAI's were identified, 104 (4.3%) with PA and 2316 (95.7%) without. Major demographic differences between patients with PA and those without included a higher rate of healthcare-associated infections (87/104, 83.7% versus 621/2316, 26.8%; $p = 0.02$), a higher rate of ICU-acquired infections (23/104, 22.1% versus 329/2316, 14.2%; $p = 0.04$) and a higher APACHE II score (17.7 ± 0.8 versus 14.5 ± 0.2; $p < 0.0001$). There was an increased rate of PA isolation with increasing APACHE II score (Table 1). Independent predictors of isolation of PA by LR included APACHE II score and days of hospitalization prior to diagnosis; Hosmer-Lemeshow test $p = 0.20$, ROC C statistic = 0.77. Crude, in-hospital mortality was similar between groups: PA 14/104 (13.5%) and 276/2316 (11.9%), $p = 0.79$. After controlling for age, sex, APACHE II, prior transfusion, immunosuppression status, solid organ transplant status, healthcare-association and days of hospitalization prior to diagnosis, the isolation of PA was not associated with mortality.

Conclusions: PA is infrequently isolated from adults with IAI and overall is not associated with mortality. With that being said, there may be a population that merits empiric anti-PA therapy: Those with APACHE II ≥ 20 and/or a significant length of hospitalization prior to diagnosis.

O11. Antibiotic Combinations & Acute Kidney Injury in ICU Patients with Septic Shock

Eva Urrechaga; Eva Urrechaga; Alessia Cioci; Alessia Cioci; Joshua Parreco; Daniel Yeh; Khaled Abdul Jawad; Khaled Abdul Jawad; Hang Zhang; Hang Zhang; Hang Zhang; Matthew Sussman ; Matthew Sussman ; Saskya Byerly; Saskya Byerly; Rodrigo Salas; Rishi Rattan; Nicholas Namias; Daniel Yeh

Background: Antibiotic-induced acute kidney injury (AKI) is a potential complication for critically ill septic patients managed with broad-spectrum regimens. Vancomycin (vanco) nephrotoxicity is well-documented, yet increased AKI risk with its concomitant use of other antimicrobials is controversial.

Hypothesis: We sought to compare the AKI risk associated with four commonly used broad-spectrum regimens and hypothesized that concomitant use was associated with AKI.

Methods: The e-ICU Collaborative Research Database was queried for adults admitted to the ICU with sepsis diagnosis. Patients receiving at least a dose of one of the following regimens were included: vanco/piperacillin-tazobactam ± metronidazole (VZ), vanco/meropenem ± metronidazole (VM), vanco/cefepime ± metronidazole (VCp), or vanco/ceftriaxone ± metronidazole (VCt). Demographic information was recorded. Outcomes of interest were AKI and dialysis. Univariate analysis was conducted to identify factors associated with AKI and dialysis, using Bonferroni correction. Multivariable logistic regression identified significant predictors of outcomes. Propensity score matching was inappropriate due to poor overlap.

Results: A total of 10,273 subjects were included: 6180 (60%) received VZ, 990 (10%) received VM, 1399 (14%) received VCp, and 1074 (11%) received VCt. Significant differences in baseline demographics were observed between groups, as well as significant differences in antibiotic usage across regions (Table). Higher utilization of VZ compared to other regimens was evident in the Midwest. After controlling for age, sex, race, and SOFA score, VCp and VCt were associated with higher odds of AKI compared to VZ (VCp OR 1.57 [1.34-1.84], VCt OR 1.63 [1.36-1.94]) while VM showed no difference compared to VZ. There was no difference in dialysis rates between groups after controlling for covariates.

Conclusions: To our knowledge this is the largest study investigating antibiotic-related AKI. Contrary to prior reports, the AKI rate was higher among VCp and VCt when compared to VZ; however, there was no difference in rate of dialysis between groups. Selection bias based on baseline demographics is likely. Significant variation in regional antibiotic regimen selection exists.

O12. From Triage to the Operating Room: The Impact of Delay in Intervention on the Outcome of Appendicitis

Khaled Abdul Jawad; Khaled Abdul Jawad; Khaled Abdul Jawad; Alessia Cioci; Khaled Abdul Jawad; Eva Urrechaga; Alessia Cioci; Eva Urrechaga; Hang Zhang; Hang Zhang; Saskya Byerly; Rishi Rattan; Saskya Byerly; Gerd Pust; Rishi Rattan; Gerd Pust; Nicholas Namias; Daniel Yeh; Nicholas Namias; Daniel Yeh

Background: Association between time-to-appendectomy (appy) and clinical outcomes is controversial with conflicting data regarding risk of perforation. Nearly all prior studies used

either administrative databases or were retrospective single center with a small sample size. We performed a post hoc analysis of a large, prospective multicenter study (Multicenter Study of the Treatment of Appendicitis in America: Acute, Perforated and Gangrenous, MUSTANG).

Hypothesis: We tested the null hypothesis of no association between in-hospital delay and increased rate of complicated appendicitis.

Methods: The Eastern Association for the Surgery of Trauma (EAST) MUSTANG database was queried and those with “acute appendicitis” diagnosed on computed tomography were included. “Upgrade” was defined as Gangrenous or Perforated finding at appy. Time intervals from Emergency Department (ED) triage to appy were recorded in 6-hour groups. Upgrade % for each group was presented and rates of a composite endpoint (30-day incidence of surgical site infection, abscess, wound complication, Clavien-Dindo complication, secondary intervention, ED visit, hospital readmission and mortality) were compared with Bonferroni correction to determine statistical significance (p=.05/9 =.005). Demographics for groups were compared.

Results: Of 3004 included subjects, 484(16%) experienced Upgrade at appy. Upgrade rates (%, 95% CI) were: Group 0-6h, 17%(14-19%); Group 6-11h, 15%(13-17%); Group 12-17h, 16%(13-19%); Group 18-23h, 17%(12-23%); Group 24-29h, 30%(20-43%); and Group 30h+, 24%(14-37%) (Figure). Of 484 subjects with Upgrade, 200(41%, 37-46%) had a worse composite outcome compared to 518(21%, 19-22%) of 2520 subjects with no Upgrade (p<.001). Upgrade group was older (49±17y vs 39±16y), had a higher CCI (1.6±1.9 vs 0.7±1.4) and was more likely to have positive smoking (20% vs 14%) and surgical history (30% vs 22%) (p<.001).

Conclusions: We reject the null hypothesis and propose that ≥24h delay from ED triage to appy is associated with increased rate of severity upgrade from simple to complicated appendicitis. Upgrade is correlated with older age, higher CCI and history of smoking and prior surgery and is associated with worse clinical outcomes. This confirms prior studies’ conclusions using a large, granular, prospective database. We recommend appy within 24h of ED triage.

O13. Long-term Outcomes of Infectious Complications in Geriatric Trauma Patients

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Background: The consequences of injury do not end with hospital discharge. Infectious complications are known to contribute to prolonged length of stay and in-hospital mortality after injury, but longer-term outcomes are not known. We used a novel data linkage strategy to assess the impact of infectious complications on long-term mortality for injured older adults.

Hypothesis: We hypothesized that trauma patients who developed infectious complications would be at higher risk for mortality during initial hospitalization and up to 12 months post-injury.

Methods: We identified injured patients age ≥ 65 admitted to Pennsylvania trauma centers, 2013-2014. We used the Pennsylvania Trauma Outcomes Study (PTOS), a robust, state-wide trauma registry. Patients were matched to their Medicare claims using trauma center, demographics, and injury characteristics. Infectious complications were pneumonia, urinary tract infection (UTI), wound/soft tissue infection, septicemia, sepsis, empyema, sinusitis and central nervous system infection. We compared in-hospital and 12-month mortality and 30- and 90-day

readmission rates between patients with infections and those with no complications. A previously validated multivariable logistic regression model incorporating physiology, injury characteristics, and patient characteristics identified predictors of mortality and readmission.

Results: Of 14,789 eligible PTOS patients, 10,361 (70%) were matched to Medicare records and 10,000 met inclusion criteria. Complications occurred in 988 patients (9.9%) and infections occurred in 405 (4.1%). UTI was most common (219, 2.2%) followed by pneumonia (173, 1.73%). Patient characteristics are in the table. Among patients with infections, 68 (16.8%) died in hospital and 108 (26.7%) died within 12 months compared to 445 (4.9%) and 1,386 (15.4%) of those with no complications. Infection was an independent predictor of inpatient mortality (OR 2.6, 95% CI 1.8, 3.6) and 12-month mortality (OR 2.3, 95% CI 1.8, 3.0). Overall, 16.1% were readmitted by 30 days and 19.3% were readmitted within 90 days. Infection was not a significant risk factor for readmission.

Conclusions: Injured patients who develop infections complications are at high risk for mortality within 12 months. Infection may serve as an indicator of high risk or as a causal factor in long-term mortality. Novel data linkages can extend our understanding of trauma outcomes beyond the registry and beyond the hospital stay.

O14. Staphylococcal TSST-1 Activates Skin Cells via CD40: Implications for Superantigen-Mediated Burn Wound Pathophysiology

Saira Nisar; Saira Nisar; Bonnie Carney; Lou'ay Hussein; Lou'ay Hussein; Lauren Moffatt; Jeffrey Shupp

Background: S. aureus infection after burn injury causes significant morbidity and mortality. It produces superantigen (sAg) virulence factors such as Toxic Shock Syndrome Toxin-1 (TSST-1) which may cause a cytokine storm by bypassing T-cell activation. Non-Thymocyte-mediated cellular activation is poorly understood. In studies using vaginal epithelial cells, activation through CD40 has been implicated as a putative mechanism for TSST-1 infection. CD40 is a costimulatory molecule present on a variety of epithelial cell types and is a receptor for TSST-1. Here we investigate the interaction between TSST-1 and CD40 on fibroblasts and keratinocytes using an in-vitro cell model using human fibroblasts and keratinocytes and an in vivo rat model.

Hypothesis: TSST-1 causes cytokine storm in burn wounds by binding to CD40.

Methods: Normal human fibroblasts and keratinocytes were grown and exposed to 100 µg/mL TSST-1 for 30 min, 2, 6, 12, 24 or 48 hours. RNA was purified using TRIzol reagent and qRT-PCR was performed for IL-6 and IL-8. Immunofluorescence was performed on unexposed fibroblasts and keratinocytes to stain for CD40. Additionally, 15% TBSA scald burns were created on male Sprague Dawley rats and burns were inoculated with TSST-1-producing MRSA on post-burn day 1. Burn, peri-burn, and normal skin biopsies were taken on days 4 to 14 and fixed in formalin. Samples were stained to co-localize TSST-1 and CD40.

Results: qRT-PCR analysis showed time-dependent increase in levels of IL-6 and IL-8. IL-6 levels in fibroblasts peaked at hour 12 with a 4-fold increase and in keratinycytes at hour 6 with a 2-fold increase, compared to unexposed controls. IL-8 levels in fibroblasts peaked at hour 12 with a 60-fold increase and in keratinocytes at hour 2 with a 4-fold increase, compared to controls. Keratinocytes stained positively for CD40, consistent with its known presence in other

epithelial cell types. Fibroblast staining for CD40 was negative. Thus, in response to TSST-1 exposure, levels of IL-6 and IL-8 increased in human fibroblasts and keratinocytes. Keratinocytes stained positive for CD40 suggesting it might be involved in TSST-1-induced cytokine production.

Conclusions: Superantigenic toxins likely contribute to wound pathophysiology by increasing local inflammation through binding to CD40 on resident nonimmune skin cells. Further co-localization work is ongoing and could possibly lead to the development of toxin modulating topical pharmacotherapies that block production of these inflammatory cytokines.

O15. Impact of antimicrobial prophylaxis duration on surgical site infection in ENT and OMF surgeries

Kristin Linder; John Wolf; David Blake; Casey Dempsey

Background: Existing evidence supports short-course postoperative antimicrobial prophylaxis (AP) <24 hours. However, AP beyond 24 hours is often utilized in patients undergoing ear, nose, throat (ENT) and oral and maxillofacial (OMF) surgical procedures due to lack of data in this specialty. The objective of this study is to determine the incidence of surgical site infection (SSI) among patients undergoing ENT or OMF procedures who received prolonged vs. short-course AP.

Hypothesis: The incidence of SSI among patients undergoing ENT and OMF procedures who received short course AP will be no different compared with patients who received prolonged AP.

Methods: This single-center retrospective study included patients that underwent an ENT or OMF procedure from June 1, 2017 through/including May 31, 2019. Patient demographics, AP history, index surgery details, and outcomes, including SSI rate within 30 days, length of stay (LOS), and 30-day readmission were compared for patients who received AP for <24 hours versus those who received prolonged AP. SSI definitions were consistent with the Centers for Disease Control/ National Healthcare Safety Network criteria for SSI, including: superficial incisional, deep incisional, and organ/space.

Results: Of the 250 patients that met inclusion criteria, 101 patients (40.4%) received AP for <24 hours. The 149 patients (59.6%) that received prolonged AP were more likely to undergo traumatic surgery (32.2% vs. 4.0%, P<0.001) and had longer median lengths of surgery (179 minutes, IQR 117-281 vs. 127, IQR 78-193). Patients who received prolonged AP were more likely to develop a SSI within 30 days of the index procedure (10.7% vs. 0, P = 0.001), had longer median LOS (1.33 days, IQR 0.42 – 3.00 vs. 0.29 days, IQR 0.17 – 1.04), and had higher readmission rates within 30 days (6.1% vs. 0, P = 0.012).

Conclusions: Short courses of AP were not associated with an increased risk of SSI compared to prolonged courses. In fact, patients who received prolonged courses of AP had higher rates of surgical site infection, longer lengths of stay, and higher 30-day readmission rates. As higher rates of traumatic surgery were observed in the prolonged AP group, it is possible this provoked longer utilization of AP and stimulated downstream differences in length of stay and readmission. Nonetheless, these findings align with guideline recommendations supporting shorter courses of AP in patients undergoing surgical procedures.

O16. Prolonged Antibiotics For Common Bile Duct Stones Are Associated With Worse Outcomes: Post-hoc Analysis of an EAST MCT

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Background: There is wide variation in perioperative antibiotic (abx) practices for choledocholithiasis (CDL) and gallstone pancreatitis (GSP).

Hypothesis: We sought to determine the effect of prolonged pre- and postoperative abx treatment on outcomes for CDL or GSP.

Methods: We performed a prospective observational study of patients who underwent same admission cholecystectomy for CDL and GSP between 2016 and 2019 at 12 U.S. centers. Patients with prior history of endoscopic retrograde cholangiopancreatography (ERCP) or diagnosis of cholangitis were excluded. Data on abx use and duration were collected. Prolonged treatment was defined as >24 hours of perioperative abx. Laboratory and patient variables, radiographic findings, and operative details were used to predict prolonged abx use using multivariable logistic regression. Outcomes including infectious and non-infectious complications were compared among patients receiving prophylactic (<24 hours) versus prolonged abx.

Results: There were 917 patients in the cohort; 46% (n=418) received standard abx prophylaxis (<24 h) and 54% (n=499) received prolonged therapy. Patients receiving prolonged abx were older (55.5 vs 46.1 y, p<.001), and more often tachycardic (14% vs 7%, p<.001) with leukocytosis (32% vs 14%, p<.001). The prolonged abx group underwent more open operations (10% vs 3%, p<.001). On regression, gangrenous gallbladder (OR 3.7, 95% CI 1.2-11.9, p=.03), WBC > 13 x 109/L(OR 2.7, 95% CI 1.7-4.2, p<.001), HR > 100 (OR 2.2, 95% CI 1.2-4.0, p=.01), and CDL [vs GSP] (OR 2.1, 95% CI 1.1-4.1, p=.03) significantly predicted prolonged abx use. Hospital length of stay was significantly longer (5 vs 3 d, p<.001) in the prolonged abx group, as were rates of non-home discharge (7% vs 2%, p<.001). Infectious complications were similar between groups (0.8% vs 1.9%, p=.14). Patients with acute kidney injury (AKI) received a longer duration of postoperative abx (5 vs 2 d, p=.003). After adjusting for age, gender, operative duration, and preoperative diagnosis, receiving >2 days of postoperative abx significantly predicted AKI (OR 9.0, 95% CI 1.0-80.5, p=.04. Postoperative abx for ≥5 days was associated with a 16-fold greater odds of AKI (95% CI 1.8-158.7, p=.01).

Conclusions: Prolonged perioperative abx use for CDL and GSP is associated with worse outcomes. Patients with CDL, gangrenous gallbladder, and systemic signs of inflammation are more likely to receive prolonged perioperative abx. Even after correcting for possible selection bias and confounders, we were unable to identify any benefits associated with prolonged perioperative abx.

O17. Concordance/Discordance between Radiologist and Surgeon for Appendicitis Category and the Effect on Clinical Outcomes

Khaled Abdul Jawad; Eva Urrechaga; Khaled Abdul Jawad; Eva Urrechaga; Eva Urrechaga; Alessia Cioci; Hang Zhang; Alessia Cioci; Saskya Byerly; Hang Zhang; Rishi Rattan; Gerd Pust; Nicholas Namias; Daniel Yeh

Background: The Association for the Surgery of Trauma (AAST) grading criteria uses

subscales for radiologists (Rad), surgeons (Surg) and pathologists (Path), though these groups may differ in assessment. We reviewed the Eastern Association for the Surgery of Trauma (EAST) Multicenter Study of the Treatment of Appendicitis in America: Acute, Perforated and Gangrenous (MUSTANG) database to determine rates of discordance and clinical consequences of inaccuracy.

Hypothesis: We hypothesize that surgeon assessment is concordant with pathologic diagnosis and that when discordant, patient outcomes were significantly worse.

Methods: A confusion matrix was constructed for pairs among Rad, Surg, and Path. Accuracy is reported using chronologically latest diagnosis as gold standard. “Concordance” (C) was achieved when both agreed on the diagnosis and “Discordance” (D) when they disagreed. A composite endpoint (“COMP” = 30-day incidence of surgical site infection, abscess, wound complication, Clavien-Dindo complication, secondary intervention, ED visit, hospital readmission, and mortality) was compared between C vs. D groups via $\chi 2$ test with Bonferroni correction to define statistical significance (p=.05/9 =.005).

Results: Surg/Rad diagnostic accuracy is displayed in the Figure. For each pair and diagnosis, subjects were categorized as C or D and compared for the incidence of COMP. Surg/Path: 16% vs. 26% (p=.006, NS by Bonferroni) for acute (A), 39% vs. 33% (p=.39) for gangrenous (G), and 48% vs. 37% (p=.035, NS by Bonferroni) for perforated (P). Rad/Path: incidence of COMP for C/D was 17% vs. 42% (p<.001) for A, 27% vs. 31% (p=.95) for G, and 56% vs. 48% (p=.48) for P. Rad/Surg: incidence of COMP for C/D was 17% vs. 40% (p<.001) for A, 36% vs. 26% (p=.43) for G, and 51% vs. 39% (p=.29) for P.

Conclusions: In appendicitis treated by appendectomy, surgeons are most accurate at diagnosing acute appendicitis and least accurate at gangrenous appendicitis. Radiologists were less accurate for all categories of appendicitis. Even when the surgeon was wrong, clinical outcomes were not significantly worse. However, when the radiologist was wrong about acute appendicitis, patients had significantly worse clinical outcomes.

O18. Missed Readmissions After Necrotizing Soft Tissue Infections: A National Analysis

Alessia Cioci; Eva Urrechaga; Alessia Cioci; Joshua Parreco; Shayan Khalafi; Matthew Sussman ; Rajan Ramdev; Daniel Yeh; Nicholas Namias; Rishi Rattan

Background: Necrotizing soft tissue infections (NSTI) are associated with significant morbidity and mortality. There are no national studies of readmission after NSTI. The purpose of this study was to identify readmission rates and associated risk factors.

Hypothesis: We hypothesized that a large proportion of patients are readmitted to different hospitals, and that risk factors for readmission to a different hospital are unique.

Methods: The Nationwide Readmissions Database (2010-2014) was queried to identify non-elective adult admissions for surgically-managed NSTI. Patients who died during initial admission or had incomplete records were excluded. Multivariate logistic regression identified independent risk factors for 30-day readmission to index or different hospital. Results were weighted for national estimates.

Results: There were 40,063 patients included. The 30-day readmission rate was 19%

(n=7406), of which 22% (n=1628) were to a different hospital. The most common reasons for readmission were infection (30%) and surgical complications (27%). Patients who received their initial care at a metropolitan teaching hospital and those with lengths of stay > 7 days had an increased risk of readmission to the index hospital (OR 1.18, 95% CI 1.01-1.26, OR 1.51, 95% CI 1.27-1.81, respectively), but not to different hospitals. Risk factors for readmission to a different hospital were unique and included initial treatment at either a public (OR 1.34, 95% CI 1.18-1.53) or for-profit hospital (OR 1.16, 95% CI 1.00-1.35), Medicare (OR 1.43, 95% CI 1.23-1.67), and leaving against medical advice (OR 3.73, 95% CI 2.62-5.39). Patients at risk for readmission to both the index and to different hospitals were those with Medicaid (OR 1.13, 95% CI 1.04-1.22, OR 1.20, 95% CI 1.03-1.40, respectively) and those discharged to an intermediate care/nursing facility (OR 1.28, 95% CI 1.18-1.39, OR 2.19, 95% CI 1.88-2.55, respectively). Women were more likely than men to be readmitted at both index (OR 1.14, 95% CI 1.08-1.22) and different hospitals (OR 1.13, 95% CI 1.03-1.27).

Conclusions: Nearly one in four 30-day readmissions after NSTI surgeryoccur at a different hospital and may be missed by current quality metrics, potentially affecting outcomes and benchmarking. Risk factors for readmission to a different hospital are unique suggesting prevention efforts based only on index readmissions may miss this important subgroup.

O19. Appendectomy vs. Non-operative Management of Appendicitis: A Post-Hoc Analysis of an EAST Multicenter Study

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Background: Recent high-profile European randomized controlled trials comparing appendectomy to non-operative management (NOM) selected only simple appendicitis.

Hypothesis: We sought to compare the two treatments in all types of appendicitis (simple, gangrenous, perforated).

Methods: In this post-hoc analysis of a prospective multicenter study, subjects were divided into surgical or NOM (antibiotics only or percutaneous drainage) cohorts. A composite endpoint was defined to include: surgical site infection, intra-abdominal abscess, wound complication, any Clavien-Dindo complication, secondary intervention, Emergency Department visit, readmission, and mortality up to 1-year. The propensity score model was fitted using logistic regression on appendectomy using: enrollment site, age, body mass index, symptom duration, co-morbidities, prior surgery, and Image AAST appendicitis severity grade. The resulting propensity scores in both surgical and NOM groups were found to be greatly skewed toward 1, making matching inappropriate. We then explored three additional models: (1) Marginal Structure Model (MSM) incorporating propensity scores as inverse weights when fitting a logistic regression model; (2) multivariable logistic regression (MLR) using propensity score as a predictor; and (3) MLR utilizing only baseline factors. We used this exploration to ensure consistency between methods.

Results: A total 3591 subjects were included before matching: 3262 surgical and 329 NOM (Table). Across 28 sites, the rate of NOM ranged from 0-48%. There were 317 pairs identified in Surgical/NOM groups based on propensity score matching. Based on our three approaches we obtained the following results for the composite endpoint: MSM (OR 0.66 [0.62-0.7], p<.001), MLR with propensity as a predictor (OR 0.33 [0.24-0.45], p<.001), and without propensity as a

predictor (OR 0.36 [0.27-0.49], p<.001). All three models were consistent in both size and direction of association.

Conclusions: In contemporary American practice, surgical appendectomy for simple and complicated appendicitis is associated with lower odds of developing treatment-related complications in the first year after illness compared to non-operative management. Randomized controlled trials are required to confirm these findings.

O20. Diagnosing Necrotizing Soft Tissue Infections (NSTIs): Revisiting the Utility of the LRINEC Score

Manuel Castillo-Angeles ; Ramsis Ramsis; Barbara Okafor; Mahsa Shariat; Alfredo Cordova; Stephanie Nitzschke; Reza Askari

Background: Early diagnosis of NSTIs is paramount for better patient outcomes. The Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) score, as originally described by Wong, was developed to aid in the diagnosis of NSTIs. The purpose of this study was to revisit the predictive value of the LRINEC score and to assess its utility for immunocompromised patients.

Hypothesis: We hypothesize that the LRINEC score will have a high predictive value for the general NSTI population, but a lower predictive value for the immunocompromised patients.

Methods: A retrospective cohort study of NSTI patients admitted to two academic institutions from January 1995 to June 2019 was conducted. Operative and pathology reports were reviewed to confirm all cases. The control group included patients with infections not meeting the criteria for NSTIs, such as cellulitis or abscess. Immunocompromised status was defined by corticosteroid use, active malignancy, receipt of chemotherapy or radiation therapy, diagnosis of human immunodeficiency virus or AIDS, or prior solid organ or bone marrow transplantation with receipt of chronic immunosuppression. Diagnostic accuracy of the LRINEC score was measured by sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV). A subgroup analysis was performed to determine the utility of the score in immunocompromised patients.

Results: 241 NSTI patients with complete laboratory data were included. Median age was 59 (IQR47–67), 134 (55.6%) were male, 45 (18.7%) patients were categorized as immunocompromised. There were no significant differences in demographics between the NSTI and control groups. For the overall cohort, using a cutoff score of 6, the LRINEC score had a sensitivity of 0.48 (95% confidence interval [CI] 0.41-0.54) and a specificity of 0.71 (CI 0.62-0.79). The PPV was 0.69(CI 0.63-0.73) and the NPV was 0.38(CI 0.34 to 0.42). After subgroup analysis, results were similar for the immunocompromised NSTI patients: PPV was 0.68 (CI 0.54-0.82), and NPV was 0.50 (CI 0.40-0.57).

Conclusions: Overall, the LRINEC score revealed a low predictive value in our NSTI cohort and in the subset of immunocompromised NSTI patients. The utility of LRINEC in the diagnosis of NSTI needs to be used with caution and may be less useful that originally described.

O21. Clostridium Difficile Infection is a Risk Factor for Long-term Mortality in an Emergency General Surgery Population

SAMUEL ROSS; Caroline Reinke; Kyle Cunningham; Timothy Hetherington; Huaping Wang; Marc Kowalkowski; Susan Evans; Addison May

Background: Clostridium difficile infection (CDI) has become a nosocomial epidemic and can predispose to severe complications. Emergency general surgery (EGS) patients are additionally at high risk of complications, however little is known about the long-term risk associated with CDI in this population.

Hypothesis: We hypothesized that EGS patients with C. difficile would have higher long-term mortality than those without.

Methods: Our regional integrated health system billing data was used to construct an EGS Registry from 2013-2015 using AAST defined EGS ICD-9 codes. Inpatient and observation admissions with emergent or urgent admission status were included and compared by CDI status. 1-year mortality was the primary outcome, with secondary outcomes being inpatient, 30- and 90 day, and 3-year mortality. Univariate analysis was used to evaluate factors associated with mortality and multivariable analysis controlled for age group, BMI, gender, operative management, hospital trauma-tier, and Charlson Comorbidty Index (CCI).

Results: We identified 81,625 EGS patient encounters, 9,904 (12.1%) were operative. There were 2,645 (3.2%) encounters with CDI, 67 (0.08%) with megacolon. CDI patients were older, had lower BMI, and higher CCI (P<0.0001). Patients with CDI were less likely to require an operative intervention (4.1% vs 12.4%; <0.0001) but were more likely to require an open operation when one was performed (73.4% vs 29.8%; p<0.0001). Patients with CDI were not more likely to be transferred to or received in transfer from another facility. Patient unadjusted and adjusted mortality is reported in the Table. Inpatient mortality was significantly higher in the CDI group, which continued at 30- and 90- days 1-and 3- years. On multivariate analysis, CDI had an increased independent odds of mortality at all time points.

Conclusions: CDI is associated with an increased risk of short and long-term mortality, perhaps indicating its correlation with other risk factors such as institutionalization, disability, and frailty. Strategies to reduce the risk of C. difficile transmission and increase post-discharge support should be pursued to optimize patient outcomes and mitigate this increased risk.

O22. Comparison of end colostomy versus primary anastomosis after emergent colectomy for sigmoid volvulus

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

Background: Patients with sigmoid volvulus that require emergent colectomy can undergo several different procedures, namely colectomy with primary anastomosis (PA), colectomy with end colostomy (EC) and colectomy with primary anastomosis and diverting ostomy (DO). The purpose of this study is to examine the short-term outcomes of patients undergoing different emergent procedures for sigmoid volvulus.

Hypothesis: EC is associated with fewer complications compared to PA.

Methods: Using the 2011-2017 American College of Surgeons' National Surgical Quality Improvement Program (ACS-NSQIP), patients with sigmoid volvulus (ICD-9 560.2, ICD-10 K56.2) who underwent emergent surgery and either PA, EC or DO were identified. Univariate

and multivariate logistic regression was utilized to compare 30-day mortality, morbidity and readmission rates for the different procedures. Variables with a p-value <0.2 by univariate analysis were included in multivariate analysis.

Results: Overall, 2,326 patients were identified (66.6 ± 16.9 y, 1,309 [56.3%] females), of which 1,673 (71.9%) underwent PA, 604 (26%) underwent EC and 49 (2.1%) underwent DO. Patients undergoing PA were younger, had lower American Society of Anesthesiologists (ASA) scores and were less sick. On multivariate analysis, EC had a lower risk for organ/space SSIs (EC vs. PA: 3.5% vs. 5%, aOR 0.51, 95% CI: 0.28-0.94, p=0.031) and superficial SSIs (EC vs. PA: 4.6% vs. 6.8%, aOR 0.44, 95% CI: 0.24-0.81, p=0.009) compared to PA (Table 2). EC was associated with a non-significant lower risk of mortality compared to PA (aOR 0.84, 95% CI: 0.48-1.46, p=0.534).

Conclusions: Most patients undergoing emergent surgery for sigmoid volvulus have primary anastomosis without diversion. However, colectomy with end colostomy is associated with a lower risk for superficial and organ/space SSIs compared to colectomy with primary anastomosis and no diversion and should be considered in higher risk patients.

O23. Prior Antibiotic Exposure and Outcomes After Elective Colorectal Surgery

Christopher Guidry; Christopher Guidry; Andrew Medvecz; Raeanna Adams; Bradley Dennis; Shannon Eastham; Oscar Guillamondegui; Oliver Gunter; Allan Peetz; Callie Thompson; Stephen Gondek; Timothy Nunez; Robert Sawyer; Addison May; Mayur Patel

Background: In a single-center study, antibiotic exposure 90 days prior to elective non-colorectal surgery has been linked to higher rates of complications, infections, and lengths of stay. This study examines the effects of recent antibiotic exposure prior to elective colorectal surgery across a national sample.

Hypothesis: In this multicenter cohort of colorectal surgery patients, we hypothesized that recent antibiotic exposure would be associated with poor outcomes.

Methods: Using the Veterans Affairs Surgical Quality Improvement Program (VASQIP) and outpatient VA pharmacy data, we included adult patients undergoing elective colorectal surgery from 2013–2017, who were exposed to antibiotics 90 days prior to surgery. Exclusion criteria consisted of immunosuppression within 1 year of surgery, inpatient admissions within 90 days of surgery, intra-operative dirty/infected wounds, and/or SIRS, sepsis, or septic shock. Prior outpatient antibiotic exposures were sub-classified as therapeutic (>1d of exposure) and/or prophylactic (<=1d of exposure). Demographics, comorbidities, and procedure type were recorded. Primary outcomes were VASQIP-defined complication rates and infection rates. Multivariable logistic regression was used to evaluate primary outcomes. The threshold for significance was p<0.01.

Results: Of 8,286 patients meeting eligibility criteria, 3,871 (46.7%) were exposed to outpatient antibiotics prior to surgery. Of 9,151 prescriptions, 3,450 (37.7%) were prophylactic. On multivariate analysis, recent antibiotic exposure was independently associated with lower complication rates (OR: 0.64, 99% CI: 0.55-0.74) and lower infection rates (OR: 0.51, 99% CI: 0.42-0.61). For patients who received antibiotics, increasing time between exposure and operation was independently associated with slightly increased infection rates (OR: 1.004, 99% CI: 1.00-1.01). However, prophylactic exposures were not associated with outcomes.

Conclusions: In general, antibiotic exposures prior to elective colorectal surgery appear to decrease post-surgical complication infection rates. Longer periods of time between exposure and surgery may be associated with increased infection rates, although with limited clinical significance. More work is needed to evaluate the effects of recent antibiotics on post-surgical complications.

O24. To Culture or Not to Culture: Does Microbiology Affect Mortality After Intra-abdominal Infection?

Laura Stearns; Robert Sawyer

Background: Intra-abdominal infections (IAI) require both antibiotic therapy and source control for adequate treatment. Culture obtained at timing of source control can help to direct antimicrobial therapy.

Hypothesis: We hypothesize that the availability of cultures for the management of IAI will be associated with a lower mortality.

Methods: All IAI treated between 1997 and 2017 at a single institution were stratified by whether or not cultures were obtained during operation or drainage procedure. Demographics and in-hospital mortality were compared by Student's t test and Chi-Square analysis, predictors of mortality by logistic regression (LR) analysis.

Results: A total of 2963 IAIs were treated, 1062 (35.8%) without culture and 1901 (64.2%) with cultures. The patients without culture obtained had a significantly lower average APACHE II score (11.0 ± 0.2) compared to the culture group (13.4 ± 0.2) ($p < 0.0001$). The no culture group also had a significantly lower percentage of healthcare associated infections compared to the culture group (51.4% versus 70.4%, $p < 0.0001$). Crude in-hospital mortality is presented in Table 1. By LR, independent predictors of mortality included age, APACHE II score, and history of prior cellular transfusion during hospitalization, but not the availability of cultures ($p = 0.26$), Hosmer-Lemeshow test $p = 0.330$, ROC C statistic = 0.86. Similar results were found when LR was used to analyze only community-acquired infections, only healthcare-associated infections, and only patients with an APACHE II score ≥ 15. The no culture group had a significantly lower duration of antimicrobial therapy than the culture group (10.2 ± 0.3 days versus 13.9 ± 0.3 days, $p < 0.0001$).

Conclusions: In this study, we found no evidence that obtaining cultures improved survival following the treatment of IAI. These findings suggest that the practice of culturing IAI should be abandoned and further highlight the importance of source control for determining outcomes.

O25. The steroid antagonist, RU486, upregulates a hyperactive human glucocorticoid receptor isoform

Melissa Grigsby; Debora Lim; Melissa Grigsby; Tajia Green; Kiho Cho; David Greenhalgh

Background: The variable response to burn may be related to variations in their human glucocorticoid receptor (hGR) profiles. We previously identified two hyperactive hGR isoforms whose activity differed when treated with steroids.

Hypothesis: We hypothesize that some hGR isoforms may have a unique response to a well-described antagonist of hGR, RU486.

Methods: With IRB approval, blood samples were collected on admission, then biweekly and during episodes of sepsis, from hospitalized patients who sustained at least 20% total body surface area burn injury. The buffy coat was collected and screened for hGR variants. The previously identified hyperactive G1376T single nucleotide polymorphism (SNP) isoform was cloned into an expression vector, and its activity was tested in a reporter assay after treatment with saline, steroids, and/or the antagonist RU486. In addition, hGRα and the G1376T isoform were co-transfected (hGRα/G1376T) to test their combined activity.

Results: The G1376T SNP isoform of the hGR had increased activity when treated with RU486 (Figure). This represents activity five times greater than hGRα treated with saline or RU486 and G1376T treated with saline. When treated with both RU486 and hydrocortisone, G1376T activity was repressed (near that of RU486 treatment alone) in comparison to its activity with hydrocortisone, which is almost 80 times greater than hGRα treated with hydrocortisone. To further explore this result, we used three different RU486 concentrations in our assay, and the pattern remained the same regardless of the concentration. Methylprednisolone and dexamethasone were also used for the G1376T reporter assay, and the overall pattern again remained similar; however, there appeared to be different dose-response relationships for each steroid. Finally, when hGRα was co-transfected with G1376T to simulate isoform interaction, the activity mirrored that of the hGRα profile.

Conclusions: We have identified a variant of hGR that is hyperactive in the presence of steroids, but perhaps more interestingly, also exhibits a hyperactive response, albeit blunted, to RU486 in the absence of steroids. The unique interactions of G1376T with both steroids and RU486 may help us better understand why clinical treatments aimed at stimulating or inhibiting the HPA axis have variable results in different patients.

O26. Short Courses of Antibiotics are Safe in Necrotizing Soft Tissue Infections

Maria Valadez; Neil Patel; Darin Saltzman; Ashkan Moazzez; Brant Putnam; Christian DeVirgilio; Dennis Kim

Background: Necrotizing soft tissue infections (NSTI) carry high morbidity and mortality. While early aggressive surgical debridement of NSTI is well accepted, the optimal duration of antibiotic therapy is unclear.

Hypothesis: We hypothesized that there is no difference in outcomes in patients treated with a short course (less than or equal to 7 days) versus prolonged course (greater than 7 days) of antibiotics following adequate source control for NSTI.

Methods: This was a retrospective chart review of adult patients presenting with NSTI between December 2014 and December 2018 at two academic medical centers. The diagnosis of NSTI was based on documented intraoperative confirmation of NSTI. The primary outcome of the study was in-hospital mortality. Secondary outcomes included clostridium difficile infection, amputation, 30-day readmission, and 30-day return to the emergency department. Continuous and categorical variables were analyzed using Student's t-test and Chi-square respectively. Additionally, non-parametric statistical tests were used to analyze other variables.

Results: A total of 142 patients aged 24 to 96 were included in our analysis. There were no differences between groups regarding age, gender, or comorbidities.

Conclusions: Provided adequate surgical debridement, similar outcomes in mortality and other selected complications suggest that antibiotic courses of seven days or less are equally safe compared to longer courses in the treatment of NSTI.

O27. Age More Than 40 and Appendiceal Diameter More Than 10mm Predict Malignancy in Appendicitis: A Multicenter Study

Leon Naar; Peter Kim; Saskya Byerly; Peter Kim; Georgia Vasileiou; Saskya Byerly; Hang Zhang; Georgia Vasileiou; Hang Zhang; D. Yeh, MD; Haytham Kaafarani; D. Yeh, MD

Background: The incidence of underlying malignancy in appendicitis ranges between 0.5 and 1.7%. We sought to identify the subset of appendicitis patients who are at a particularly increased risk of appendiceal malignancy.

Hypothesis: Based on results from previous retrospective, single-institution studies, we hypothesized that there may be pre-operative factors, like age, that may suggest an increased risk for cancer in the appendix when considering non-operative therapy for appendicitis.

Methods: Using the Eastern Association for the Surgery of Trauma Multicenter Study of the Treatment of Appendicitis in America: Acute, Perforated, and Gangrenous (EAST MUSTANG) database, we included all patients from 28 centers undergoing immediate, delayed, or interval appendectomy between 2017 and 2018. Univariate then multivariable analyses were performed to compare patients with and without malignancy on final pathology and to identify independent demographic, clinical, laboratory and/or radiological predictors of malignancy. Akaike information criteria (AIC) for regression models were used to evaluate goodness of fit.

Results: A total of 3,293 patients were included. The median age was 38 [27-53] years, 46.5% were females, and most underwent a laparoscopic appendectomy (92.7%). On pathology, 48 (1.5%) had an underlying malignancy [adenocarcinoma (60.4%), neuroendocrine (37.5%) and lymphoma (2.1%)]. Patients with malignancy were older (56 [34.5-67] vs. 37 [27-52] years, p<.001), had longer duration of symptoms (36-41 vs. 18-23 hours, p=.026) prior to presentation, and were more likely to have a phlegmon on imaging (6.3% vs. 1.3%, p=.025). Multivariable analyses showed that an enlarged appendiceal diameter was independently associated with malignancy (OR=1.06, 95%CI=1.01-1.12; p=.008). The incidence of malignancy in patients older than 40 with an appendiceal diameter >10mm on computed tomography was 2.95% compared to 0.97% in patients ≤40 years old with an appendiceal diameter ≤10mm (Figure 1). The corresponding risk ratio for that population was 3.03 (95%CI:1.24-7.42, p=.015).

Conclusions: The combination of age>40 and an appendiceal diameter >10 mm is associated with a greater than 3-fold increased risk of malignancy in patients presenting with appendicitis. Such findings are important for patient counseling and perhaps suggest that those patients, when managed non-operatively, should undergo routine colonoscopy and an interval appendectomy.

O28. Automated detection of Mesh infection and explantation after hernia surgery: a longitudinal Study in a National Cohort

Radwan Dipp Ramos; Radwan Dipp Ramos; Radwan Dipp Ramos; Kalpana Gupta; William O'Brien; William O'Brien; Kalpana Gupta; Kalpana Gupta; Kamal Itani; Kamal Itani

Background: Mesh infection following hernia repair is rare yet catastrophic. Timely diagnosis is crucial to proper management.

Hypothesis: We hypothesize that mesh infection can be detected beyond the traditional 90 days of infection surveillance by a validated SSI infection algorithm.

Methods: Longitudinal study of patients undergoing ventral, umbilical, or inguinal hernia repair during 2008-2015. Primary endpoint was mesh explantation due to infection within 5 years. We modified a validated SSI algorithm to capture mesh infection using administrative data. Scores ranged from 0 to 4 based on occurrence of a diagnosis code, imaging procedure, antibiotic use, or positive culture. We calculated the interval between index surgery and onset of mesh infection and explantation. Participants with selected CPT codes indicating removal of mesh or foreign body were selected for medical record review.

Results: The study population was 96,440 hernia repairs, of which 79.7% were inguinal, 11.6% umbilical, and 8.7% ventral. Mean (SD) age was 62.0 (12.1). A CPT code indicative of mesh explantation was found in 604 (0.6%). In manual chart review of those patients, 324 (53.6%) had hernia mesh explantation due to infection. The remaining cases were mesh removal for other reasons (e.g. pain), or removal of implants or foreign bodies unrelated to the hernia. The positive predictive values of the scoring algorithm to predict a true mesh infection were 26.4%, 50.4%, 89.4%, 83.0%, and 100.0%, for scores of 0 through 4, respectively. The incidence of confirmed mesh explantation due to infection was highest among ventral hernia repairs (180/8390; 2.14%), followed by umbilical hernias (71/11187; 0.63%) and then inguinal hernias (73/76862; 0.09%). The median (IQR) number of days for onset of mesh infection was 45.7 (18.2-246.0). Median days interval between index surgery and explantation was 260.5 (65.8-747). A culture was available in 197 mesh infected cases. A single organism was cultured in 127 (64.5%), the majority of which were staphylococcus aureus (63.8%). Methicillin resistant staphylococcus aureus (MRSA) occurred as a single organism in 21 out of the 127 cases (16.5%).

Conclusions: Our SSI scoring algorithm lead to robust identification of mesh infection and augments traditional surveillance methods beyond 90 days. Explantation denotes failure of other treatment modalities and is a late event. Given the morbidity associated with mesh infection, early identification using the SSI scoring algorithm can improve timely management.

O29. Revisiting the Role of Appendectomy in Perforated Appendicitis

Megan White; Adrian Coleoglou Centeno; Adrian Coleoglou Centeno; Steven Wolf; Seth Bellister

Background: Perforated appendicitis complicates up to 20% of all cases of acute appendicitis in the United States annually. Non-operative management continues to gain acceptance in the treatment of perforated appendicitis, challenging the use of appendectomy in these patients.

Hypothesis: We hypothesize that patients undergoing appendectomy for perforated appendicitis have shorter length of stay (LOS), fewer CT scans, and decreased readmission rates. We further posit that multidrug resistant organisms (MDRO) are a cause of prolonged

LOS.

Methods: Adult cases of perforated appendicitis from 2009-2018 were identified. Demographics and hospital outcomes including LOS, readmission rates, number of CT scans and culture data were obtained. Cases of perforated appendicitis were diagnosed using either preoperative CT scan or intraoperative findings. Patients who underwent appendectomy versus those who underwent non-operative management were compared using chi-square and Mann-Whitney U test for categorical and continuous variables respectively.

Results: Two hundred and fifty eight cases of acute appendicitis were identified and of those 120 had perforated appendicitis. 75 patients underwent appendectomy (OR) and 45 patients were managed non-operatively with either percutaneous drain (PD) or antibiotics only (AO). There was no significant difference in demographics. Patients in the OR group had a similar LOS as those in the PD group (8 days (IQR = 6-10) vs, 8 days (IQR = 8-12), p = 0.46), but significantly longer LOS than those in the AO group (8d (IQR = 6-10) vs, 6.5d (IQR = 5-7.25), p < 0.009). Readmission rates were similar among the three groups [OR: 18.9% vs PD: 23.8%, p = 0.62 RR=1.26 (95% CI 0.51-3.09)], [OR: 18.9% vs AO: 20.8% p = 0.84 RR=0.91 (95% CI0.37-2.26)], [PD: 23.8% vs AO: 20.8%, p=0.81 RR=0.86 (95% CI 0.29-2.61)]. Number of CT scans performed during admission was also similar among the groups (OR: 1.7 ± 0.8 vs PD: 1.4 ± 0.9, p = 0.16, OR: 1.7 ± 0.8 vs AO: 1.5 ± 0.8 p = 0.18, PD: 1.4 ± 0.9 vs AO: 1.5 ± 0.8 p = 0.44). In patients in the top decile of LOS, MDROs were identified in only 1 culture specimen overall. Pansensitive E. coli was the most common organism identified overall (57.1%).

Conclusions: In cases of perforated appendicitis, appendectomy remains a safe option when compared with PD or AO. The available culture data demonstrated that the perforated appendix contains many different organisms, both gram positive and gram negative. MDROs are rarely isolated from the perforated appendix. Further research is needed to optimize the perioperative antibiotic practices based on our current local taxonomy.

O30. Can big data and machine learning predict infectious complications in trauma patients while they are still in the ED?

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Background: The American College of Surgeons Committee on Trauma has devised a uniform set of trauma registry data called the National Trauma Data Standard™. This data set is used by TQIP (Trauma Quality Improvement Program) and has introduced enhanced big data for trauma research. Supervised machine learning (SML) techniques are emerging tools which can unlock information and create predictions from large data sets.

Hypothesis: We will be able to 1) predict infectious complications (IC) in trauma patients using initial emergency room data, and 2) demonstrate the predictability and usability of (SML) techniques.

Methods: Patients from the 2016 TQIP data set who were admitted for ≥ 3 days were analyzed. IC included surgical site infections, osteomyelitis, septic shock, VAP, CAUTI, and CLABSI. A bivariate analysis was used to rank data fields associated with IC by p-value. Fields were divided into two sets based on timing of availability to clinicians. The first set included EMS, trauma center, and ED data fields (ThroughED). These variables would be known to the

surgeon at the point of care. The second set included outcome information and coded data (AfterDischarge). This information would not be known to the treating surgeon. SML models and an ensemble of best models were created and compared to each other and between data sets. An identical boosting algorithm was utilized for all models to account for the overall low percentage of IC. Gain charts and confusion matrices compared model predictions.

Results: 230,781 patients met inclusion criteria. 7,540 (3.3%) patients acquired an IC. The highest ranked data fields from bivariate analysis in the ThroughED set included Glascow coma scale (GCS), body region injured, mechanism of injury, ED vital signs, transportation mode, and ED disposition. The highest ranked variables for the AfterDischarge set included length of stay, ICU stay, injury severity score, highest GCS, and hospital discharge disposition.

Conclusions: Using big data and SML, IC can be predicted from data obtained in the emergency room, with small improvement when using data from entire hospital stay. Choice of "best" model can be tailored to fit the clinical preference for screening sensitivity and specificity. Probabilities and confidence values obtained from point of care SML models may aid the surgeon when diagnosing infections and become tools used by surgeons to assist with care.

O31. Prophylactic Closed-Incisional Negative Pressure Therapy in Spine Surgery: A Multicenter, Observational Study

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Background: Surgical site infections increase healthcare cost and result in diminished quality in spine surgery. Closed-incisional negative pressure therapy (ciNPT) stabilizes the surgical closure and prevents shear and motion around the incision. This has been used to facilitate healing of challenging wounds; however, its prophylactic use in spine surgery is not well studied.

Hypothesis: The objective of the current investigation was to compare the application of prophylactic closed-incisional negative pressure therapy dressing with standard surgical dressings for the development of surgical site infections in a heterogeneous spine population. Our hypothesis is the the use of a prophylactic ciNPT will result in a reduction in surgical site infections compared with a standard sterile dressing.

Methods: We performed a prospective, multi-center, observational study in which we prophylactically placed either a ciNPT or standard sterile dressing over the closed incision at the time of surgery in matched cohorts. Durotomy was considered a contraindication. Baseline patient characteristics and wound complications up to 60 days following surgery were recorded.

Results: 212 patients were included in the study. 104 patients received ciNPT and 108 received standard dressing. There were statistically more patients with a higher BMI (32.4 vs. 28.9, p=0.001), diabetic (44 vs. 24, p<0.001) and >3 levels (90 vs. 50, p<0.001) in the ciNPT group compared with standard surgical dressing. The overall SSIR was 13.9% (39/281). The SSIR in the ciNPT was less than with standard surgical dressing (5.8% vs 18.6%, p=0.005).

Conclusions: Prophylactic closed incisional negative pressure therapy results in a significant reduction in surgical site infections following spine surgery. This investigation supports the need for further study in select high risk groups, such as spinal oncology and deformity.