O01. Gut microbiota metabolites regulate host-pathogen interactions by altering pathogen virulence and host AhR signaling

Jason Xiao; Robert Keskey; Callie Winters; Callie Winters; Alexander Zaborin; Olga Zaborina; John Alverdy

Background: The determinants that confer survival following an LD50 dose of a given infectious inoculum remain unknown. In a previous model in which mice received intraperitoneal LD50 dose of Serratia marcescens, we demonstrated that survival depends on gut microbial production of tryptophan metabolites (i.e indole isoforms) with the capacity to activate a key receptor in macrophages, the aryl hydrocarbon receptor (AhR). Yet, whether gut-derived microbiota metabolites alter pathogen virulence and/or interfere with pathogens for AhR signaling has not been explored.

Hypothesis: We hypothesized that gut microbiota metabolites alter pathogen virulence and compete with pathogens for AhR signaling in host cells.

Methods: Serratia marcescens and Pseudomonas aeruginosa were tested in vitro for their response to gut microbial metabolites, including indoles and short-chain fatty acids (SCFAs). After exposure to metabolites, bacterial growth, biofilm formation, and virulence (using a small animal model of Galleria mellonella) were analyzed. The pathogen's ability to inhibit AhR was studied using a murine AhR reporter cell line in which AhR activation by indoles was previously established.

Results: Microbiota-derived metabolites impacted the growth and virulence of S. marcescens and P. aeruginosa in a concentration-dependent and metabolite-specific manner. SCFAs decreased S. marcescens growth by 27.0% (butyrate), 30.4% (acetate), and by 49.4% (propionate). Indoles reduced the growth and biofilm production of S. marcescens and P. aeruginosa strains by >15%. Specifically, 1mM indole-3-carboxyaldehyde (I3C) and tryptophol strongly inhibited S. marcescens growth (16% and 35%, respectively) and biofilm production (20% and 18%, respectively). Co-administering tryptophol, indole-3-lactic acid, or indole-3-acetic acid (I3A) reduced S. marcescens virulence as judged by delayed mortality in G. mellonella (n=10/group, p=0.0484). Similarly, co-administering SCFAs reduced S. marcescens virulence (n=10/group, p=0.0465). AhR signaling in response to indoles was suppressed by secretomes from S. marcescens (87.0%) and P. aeruginosa (65.8%), indicating a potential mechanism by which pathogens directly subvert host immunity.

Conclusions: Gut microbiota-derived metabolites of tryptophan alter pathogen virulence and compete for AhR signaling in host cells. The ability of gut microbiota to produce these metabolites may explain, in part, why some hosts survive while others do not when exposed to a given infectious inoculum.

O02. Interhospital Transfer is an Independent Risk Factor for Hospital-acquired Infection

Camden Gardner; Ilan Rubinfeld; Arielle Hodari Gupta; Jeffrey Johnson

Background: Regionalization of surgical care shifts patients with higher disease burdens and acuity to tertiary and quaternary centers. Further, transfer criteria are highly variable, and there is opportunity for harm in delay and miscommunication. Hospital-acquired infections (HAIs) are increasingly important quality measures with critical financial implications. We examined the role for interhospital transfer in our cases of HAI across a large multihospital system focusing on National Healthcare Safety Network (NHSN) labelled infections submitted to the CDC and found in the Center

for Medicare & Medicaid Services (CMS) value-based purchasing (VBP) program.

Hypothesis: Surgical patients transferred to a regional multihospital system have a higher risk of NHSN labelled HAIs.

Methods: The analysis cohort was filtered from a five-hospital health system administration registry containing inpatients admitted from 2014 to Fall of 2021. The study group included all adult surgical inpatients as defined by AHRQ. The dataset contained demographics, health characteristics, and variables reflecting disease severity, along with the NHSN defined HAIs of CLABSI, CAUTI, and C. difficile infection. Univariate statistical tests and multivariate logistic regression were performed to highlight the relationship between patient variables, including transfer status, and the occurrence of HAIs. The data was de-identified prior to analysis and deemed exempt from IRB review. Data was analyzed using R within R-Studio.

Results: The surgical cohort had a total of 31435 patients of which 1611 (5.1%) were transfers. The overall rate of HAIs was 1.8% (567) with 86 (0.3%) cases of CLABSI, 138 (0.4%) cases of CAUTI, and 359 (1.1%) cases of C. difficile infection. Across the three HAIs of interest the rate was higher in transfer patients compared to non-transfer patients at the univariate level (CLABSI: 1.1% vs. .02%, [OR: 4.94, p-value: <0.001]; CAUTI: 1.6% vs 0.4% [OR: 4.14, p-value: <0.001]; C. difficile: 2.5% vs 1.1% [OR: 2.42, p-value: <0.001]). Multivariate analysis found transfer patients had an increased rate of HAIs (OR: 1.42; p-value: 0.009).

Conclusions: There is an increased risk-adjusted rate of HAIs in transferred surgical patients as reflected in the NHSN metrics. This phenomenon places a burden on regional centers that accept high-risk surgical transfers, in part because of the downstream effects of the CMS VBP and HAC reduction programs.

O03. Neutrophil Extracellular Traps Induced by COVID-19 Plasma Persist Longitudinally: A Link to Endothelial Injury

Edward J. Kelly; Mary Oliver; Bonnie Carney; Lauren Moffatt; Jeffrey Shupp

Background: Neutrophil extracellular trap (NET) formation is a protective mechanism that neutrophils possess to respond to host infection or inflammation. However, dysregulation of NETosis has been implicated in many disease processes including cancer and autoimmune disease. Most recently, studies have focused on the role of NETosis in the pathogenesis of COVID-19 infection. While the exact mechanisms of their involvement remain largely unknown, this study aimed to elucidate the progression of NET formation over the time course of COVID-19 infection and their possible role in endothelial injury.

Hypothesis: NET formation induced by Covid-19 will persist over time and COVID-19 plasma will show increased Syndecan-1 levels when compared to controls.

Methods: Plasma samples were taken from COVID-19 patients at admission, day 3 and day 14 of hospitalization. Neutrophils were extracted from healthy donors and isolated using Ficoll separation. Neutrophils were treated with COVID-19 plasma for 3hrs. Myeloperoxidase (MPO) colorimetric activity assay kit was used as a marker to assess for NET formation. Spectrophotometry was used to obtain optical density measurements in order to quantify MPO. Syndecan-1 (SDC-1) ELISA was run using the same samples, as well as all patients with admission and day 1 plasma.

Results: Plasma samples from 16 different COVID-19 positive patients were used in this study. 58 yrs ± 13.8 was the average age of the patient population. 30-day mortality was 18.75 percent. There were no significant differences between individual patients and levels persisted throughout the time course. All patient plasma induced upregulation of MPO at all timepoints when compared to cell only controls. All patient samples had significantly higher MPO levels when compared to cells treated with healthy plasma. At admission, 60% of patients had SDC-1 levels significantly higher than controls ($p<0.05$, $n=10$) while day 1 samples showed 88% of patients with SDC-1 levels significantly higher than controls ($p<0.05$, $N=8$).

Conclusions: While neutrophils are thought of as part of the protective machinery of the innate immune system, their dysregulation can be detrimental to the host. Our study shows that COVID-19 plasma induces significant amounts of NET formation that persists over the time course of the disease. Furthermore, patients exhibit increased SDC-1 levels implicating endothelial injury in the pathogenesis of COVID-19 infection. Further characterization of this relationship could provide targets for future treatments.

O04. Non-operative management of Appendicitis: Variations in Racial and Social disparities across the United States

Carmen Fahlen; Chibueze Nwaiwu; Yao Liu; Carla Moreira; Andrew Stephen; Daithi Heffernan

Background: Racial and social biases affect the distribution of care, as well as willingness of operative intervention. However, very little data compares whether different states demonstrate a greater or lesser degree of inequity. Operative intervention is considered first line care for appendicitis. This study sought to identify whether the degree of racial or social biases differs across differing geographic regions in the United States with respect to non-operative management of appendicitis.

Hypothesis: The impact of Racial and Social disparities in the management of appendicitis will differ by geographic region.

Methods: A 17-year retrospective review of the National In-Patient Sample (NIS) dataset of patients with appendicitis. Data extracted included demographics including age, sex, and race Caucasian versus Non-Caucasian (Non-Cauc), insurance (private vs MediCare/MediCaid (MC) vs uninsured), income status, medical history and mortality. Patients were divided by operative(Op) versus non-operative (Non-Op) management. The US was divided into 9 geographic regions defined by HCUP. Multivariate logistic regression analysis was used to predict the effects of race or socioeconomic status upon Non-Op management within each region as well as between regions.

Results: Over the 17 years 1,014,523 patients presented with appendicitis. The 68,938 patients (6.8%) managed were older (43.7 yrs vs 33.4 yrs; $p<0.001$) and more likely women (48.5% versus 44.8%;$p<0.001$). Patients with private insurance were less likely managed Non-Op compared to either MC patients (OR=0.59 (95%CI=0.58-0.61)) or uninsured patients (OR=0.88 (95%CI=0.86-0.90). Throughout the entire US, Non-Cauc patients were more likely managed Non-Op (OR1.29 (95%CI=1.27-1.35). Interestingly, there was significant discrepancy across geographic regions. The odds of Non-Cauc patients being managed Non-Op was highest in the East South-Central region (Kentucky, Tennessee, Mississippi and Alabama) (OR1.56 (95%CI=1.4-1.7) and lowest in the Pacific region (California, Washington, Alaska, Oregon and Hawaii) (OR1.15 (95%=1.14-1.19). Collectively, Non-Cauc patients in East South-Central, South Atlantic and Mid-Atlantic were significantly more likely to be managed Non-Op when compared to Pacific, Mountain, West South-Central and New

England ($p<0.001$). These geographic based racial differences persisted when accounting for insurance and income status.

Conclusions: We identified that Non-Caucasian patients and uninsured patients were less likely to undergo operative intervention for appendicitis. Racial and social biases are more pronounced in specific regions of the United States.

O05. Teasing pathologic from benign pneumatosis intestinalis

Julia Song; Biqi Zhang; David Mahvi; Mahsa Shariat; Manuel Castillo-Angeles; Tanujit Dey; Reza Askari

Background: Pneumatosis intestinalis (PI) is a rare radiographic finding that can range from benign to needing emergent surgery. Sufficiently powered studies are lacking and recommendations for surgical versus non-operative management remain unclear. We sought to identify key predictors of pathologic PI.

Hypothesis: Physical exam, laboratory, and radiographic findings can be used to distinguish pathologic from benign PI.

Methods: Patients ≥ 18 years old with radiographic evidence of PI were identified and retrospectively analyzed at two large academic medical centers (2010-2021). Patients were excluded if they pursued comfort-measures only or if there was concurrent radiographic evidence of a vaso-occlusive process. PI was defined as pathologic if ischemic and/or perforated bowel was found on exploratory laparotomy or if the patient died prior to planned surgery. Full, stepwise, and lasso regression models were compared to determine the best fit model for prediction.

Results: 334 patients with PI were identified. 91 (27%) underwent exploratory laparotomy, of which 59 (65%) had ischemic and/or perforated bowel. These latter patients as well as 10 other patients who died before exploratory laparotomy defined the pathologic PI cohort. The stepwise model was found to be the best fit for predicting pathologic PI (Table 1). Significant predictors were presence of portal venous gas (OR 2.23, 95% CI 1.03-4.83), multi-segment PI (OR 2.01, CI 0.97-4.19), vasopressor use (OR 4.56, CI 1.78-11.70), peritonitis (OR 11.46, CI 4.72-27.82), leukocyte count (OR 1.05, CI 1.01-1.10), and end organ injury (OR 1.75, CI 1.16-2.63), which were used to construct a nomogram for clinical use (Figure 1).

Conclusions: A nomogram score based on presence of portal venous gas, multi-segment PI, vasopressor use, peritonitis, leukocytosis, and end organ injury can help predict the probability of pathologic PI and therefore inform surgical decision-making.

O06. Geriatric Trauma patients admitted for a fall are more likely to have a Community Acquired UTI

Leonardo Diaz; Jose A Aldana; Melissa Canas; Ricardo Fonseca; Hussain Afzal; Kelly Marie Bochicchio; Jennifer Leonard; Grant Bochicchio

Background: Falls are the leading cause of injury in the United States and the primary etiology of accidental deaths in patients over 65 years old. Urinary Tract Infection (UTI) is the most common community-acquired infection in the elderly. Few studies have evaluated whether there is an

association between community-acquired UTI (CA-UTI) and falls in geriatric patients.

Hypothesis: We hypothesized that geriatric patients admitted for falls have a higher incidence of CA-UTI.

Methods: We queried our prospectively maintained trauma database spanning January 2019 to August 2021 or patients older than 65 years that were admitted to our level one trauma center. We stratified the patients by mechanisms of injury (fall vs non-fall) and then sub-stratified in CA-UTI vs NON CA-UTI. We determined this diagnosis by CDC guidelines (infection diagnosed within the first 72 hours of admission). Demographics and outcomes were analyzed using Student's t-test and Chi-square analysis in SPSS.

Results: From January 2019 to August 2021, 5257 trauma patients older than 65 years old were admitted. 3764 patients (72%) were admitted for falls and 1493 (28%) were admitted for other mechanisms. The majority of the fall patients were female (56.8%). Although ISS (8.9±1 vs 9.3 ±0.2 $p<0.001$), hospital length of stay (5.7±0.1 vs 5.8 ±0.3 $p<0.001$), and mortality (3.9% vs 6% $p<0.001$) were all significantly higher in the non-fall group, the majority of the CA-UTIs were diagnosed in fall patients (93.9% vs 6.1% $p<0.001$). Within the fall group, we found that patients with CA-UTI were significantly older (89.1±9.6 vs 74.7±11 $p<0.001$) and more likely to be female (79% vs 21% $p<0.001$). There was however no significant difference in outcome as measured by length of stay, and mortality when compared with the NON-CA UTI patients. When analyzed by logistic regression controlling for CA-UTI, age and ISS, we found that CA-UTI was 3 times more likely to be associated with a fall (OR 3.06, CI 1.103 – 8.655, 95% $p<0.035$).

Conclusions: Geriatric patients admitted after a fall had a significantly higher likelihood of having a UTI on admission when compared to non-fall patients. Based on these findings, we believe that strong consideration should be made for screening these patients in order to provide earlier treatment and avoid progression of the infection.

O07. Impact of Race on Outcomes and Management of Necrotizing Soft Tissue Infections

Brittany Fields; Elizabeth Fox; Zachary Bennett; Sierra Fleming

Background: Necrotizing Soft Tissue Infections (NSTI) represent major morbidity and mortality, with disproportionate effect on patients of various backgrounds. Given increased mortality among Black patients with NSTI1 we sought to identify factors affecting time to surgical debridement and subsequent survival.

Hypothesis: We hypothesized Black race would associate with longer time to surgical debridement and higher subsequent mortality.

Methods: Retrospective chart review between 9/1/2015 and 9/1/2020 for adult (≥18 years) patients coded with CPT/ICD-10 codes used for NSTI was performed, totaling 1,398 encounters. Of these, 121 qualified for inclusion. Patient demographics, comorbidities, presenting characteristics, and perioperative course were assessed. All but two patients identified as Black or White, therefore, data analysis was performed using 119/121 encounters. Analysis was performed using Chi-square test for categorical values and T test for continuous variables with a 0.01 threshold for statistical significance.

Results: Of 119 patients, 48.7% identified as female and 66.9% were ≥50 years. Most patients (68.1%) presented to the Emergency Department, and more Black patients (40.6%) were

initially admitted to a non-surgical service than their White counterparts (16.6%) (p <.01). There was no difference in presenting vitals. Of patients presenting to the ED, 41.2% underwent debridement within 24 hours. Mean time to surgery was 17.7 hours for Black patients and 5.3 hours for White patients (p <.01). Despite delay to surgery, there was no statistically significant difference in number of debridements or amputation between races. Overall mortality was 12.4%, and Black patients clinically demonstrated higher mortality (17.2%) than White patients (8.2%). Of all surviving patients, 60.5% discharged to home.

Conclusions: As early surgical debridement is definitive treatment for NSTI, factors contributing to non-surgical admissions and delay in surgery merit further investigation. Such factors include comorbidities that, if exacerbated or uncontrolled, may distract from adequate assessment of NSTI; ability to identify physical exam findings, such as erythema, on darker skin; and/or bias in addressing Black patients' complaints (e.g., pain). Limitations include its retrospective nature and our single institution sample. Most patients eligible for inclusion identified as Black or White, so expanding the study period would allow assessment of our more diverse patient population. As more data emerges regarding increasing survival, special consideration should be given to improving subsequent quality of life for these patients.

O08. "De-novo Belatacept therapy is associated with higher levels of BK viremia, lower rates of BK clearance and increased risk of CMV disease after kidney transplant."

Gregory Petrossian; Jorge Ortiz; Kathryn Addonizio; Alexander Hsiao; Lisa Teixeira; Naoru Koizumi;; Rosy James; Sunil Patel; David Conti; Robert Plews

Hypothesis: Belatacept-based maintenance immunosuppression after kidney transplantation will be associated with increased rates and severity of CMV and BK viremia.

Methods:
Patients who underwent kidney transplantation at one academic medical center between 2015 to 2021 were divided into two groups based on maintenance immunosuppression regimens: standard dose mycophenolate, rapamune, and tacrolimus vs. low-dose mycophenolate, low-dose tacrolimus, and bela (5.0 mg/kg monthly). All patients at risk for CMV disease (D+/R-) received antiviral prophylaxis with oral valganciclovir. Recipient and donor demographic information was compared between groups. The rate of CMV and BK infection was assessed by serum PCR testing and defined as above the limit for quantification (200 copies/mL). CMV disease was a clinical diagnosis of end-organ damage (pneumonitis, esophagitis, colitis, etc.) and positive CMV PCR testing. Both viruses were followed to determine the rate of infection, time to diagnosis, maximum titer, and time to clearance.

Results:
246 no bela vs. 119 bela patients were identified. High-risk status for primary CMV disease (21.1% vs. 25.2%, p=.34) and rates of CMV viremia (11.4% vs. 15.1%, p=.31) were not significantly different between no bela and bela groups, respectively. Most infections occurred in patients at high-risk for primary CMV disease in no bela and bela groups, respectively (85.7% vs. 88.9%). However, bela patients experienced higher maximum PCR levels compared with no bela, respectively (median: 18,100 vs. 3,660), but did not reach statistical significance (p=.09). Bela treatment was associated with significantly higher rates of invasive CMV disease compared with no bela, respectively (27.8% vs. 3.6%, p<.001). Additionally, bela was associated with longer time to clearance of CMV viremia (mean days: 199 vs. 91, p=.04). There was no difference in the onset of CMV viremia between groups (mean days: 307 bela vs. 287 no bela, p=.70), likely due to CMV prophylaxis.

Bela treatment was also associated with significantly higher maximum quantified levels of >5,000 (bela 25.2% vs. no bela 14.6%, p=.02) and >10,000 (bela 21.8% vs. no bela 13%, p=.04). The time interval from transplantation to viremia was similar between groups (mean days: bela 167 vs. no bela 213, p=.30). Patients receiving bela were less likely to achieve clearance of BK viremia when compared with no bela (21.6% vs. 72.6%, respectively, p<.001). Acute rejection within 12 months of transplantation was similar between bela (2.6%) and no bela (2.3%).

Conclusion:
Our data shows that belatacept treatment is associated with a greater incidence and severity of BK viremia despite similar rates of acute rejection. Additionally, belatacept was associated with higher maximum BK titers and a lower likelihood of complete viral clearance. Belatacept was not associated with increased rates of CMV viremia but increased the risk of CMV disease. These findings are supportive that more immunosuppression with belatacept leads to more severe infections after kidney transplantation. Therefore, once anti-viral prophylaxis is completed, belatacept-treated patients may benefit from more vigilant post-operative monitoring and treatment.

O09. Burn Wound Microbiome Differences in the Setting of Xenografted vs. Autografted Wounds

Mary Oliver; John Keyloun; Jeremy Chen See; Robert Ball; Bonnie Carney; Lauren Nosanov; Melissa McLawhorn; Justin Wright; Regina Lamendella; Lauren Moffatt; Jeffrey Shupp

Background: As infection remains the leading cause of morbidity and mortality in burn patients, current burn care practice is focused on rapid wound closure and healing to mitigate this adverse effect. Autografting is standard burn wound care, and additionally, xenografts, human skin allografts, and biosynthetic dressings are other methods which provide promising skin substitute. Differences in xenograft versus autograft procedures (minimal excision vs. full excision) can contribute to variances in the microflora of the wound bed which may have local and systemic effects on healing.

Hypothesis: Microbiome characteristics of xenografted wounds will be more integrous with host microflora due to minimal excision of the wound bed.

Methods: 31 eligible patients were enrolled with thermal burns of TBSA ≤10%. Wounds were either autografted with meshed split thickness skin grafts or xenografted with porcine xenograft. Patients were assessed at 4 timepoints: pre-excision, post excision, dressing takedown, and follow up visit. Wound bed swabs, buccal swabs, blood, biopsies and images were taken at each time point. %reepithelization measurements were calculated, and swabs were used for 16srRNA sequencing.

Results: Overall %reepithelization was higher in autografted wounds at follow up (92.3% vs. 76.9%, p=0.03). Considering Faith's phylogenic diversity metric, xenografted buccal swabs and wound bed swabs showed higher diversity than autografted swabs (p=0.048 and p=0.0002, respectively). In the wound bed swabs, the dressing take down and follow up time points were drivers of overall xenograft diversity (p=0.035 and p=0.012, respectively). Moreover, linear discriminant analysis effect size (LEfSe) plot showed significant enrichment of 7 taxa in buccal swabs from xenografted wounds as compared to 4 in the autografted. Of note, Streptococcus, and Granulicatella were among enriched xenograft taxa. In the wound bed both xenograft and autograft presented 4 enriched taxa; including Staphylococcus and Burkholderia in xenograft and Enterobacter and Serratia in autograft.

Conclusions: Xenograft swabs exhibited taxa that are resident microbes of the microbiome whereas autografted taxa trended to be representative of pathogenic microbes. The integrity of xenograft

diversity remains consistent throughout healing to the follow up timepoint. Further analyses into microflora shifts in oral and wound microbiome in autografted wounds versus other grafting solutions will help inform clinicians of proper interventions in the care of burn patients.

O10. The Distressed Community Index is not associated with mortality in critically ill patients with sepsis

Chloe Williams; Jon Wisler; Megan Ireland; Anahita Jalilvand

Background: Over 1,000,000 people are affected by sepsis annually, with many requiring ICU admission. The impact of socioeconomic factors on outcomes following sepsis is unclear. The distressed communities index (DCI) is a composite score based on unemployment, education level, poverty rate, median income, business growth, and housing vacancies, which attempts to quantify socioeconomic well-being by zip code. Therefore, the primary objective of this study was to evaluate the association between DCI and mortality in patients admitted to the surgical ICU (SICU) with sepsis.

Hypothesis: Community distress is predictive of worse outcomes in patients with sepsis.

Methods: We conducted a retrospective analysis of institutional data for patients diagnosed with sepsis or septic shock (SOFA2) admitted to the SICU. High or “distressed” communities were defined as a DCI in the top quartile of our cohort (n=331), while low or non-distressed DCIs were below the median (n=661). Baseline demographic and clinical characteristics were compared based on this stratification. Primary outcomes included in-hospital and 90-day mortality, incidence of respiratory or renal failure, and discharge disposition. Multivariate regression analyses were performed to identify independent variables associated with outcomes. A $p < 0.05$ was considered statistically significant.

Results: Overall 90-day mortality was 28.6% (n=284). The low DCI cohort was older (61.214.9 vs. 57.216.9 years), more likely to be Non-Hispanic White (90% vs. 76%), more likely to be transferred, and less likely to have significant liver disease or COPD. Initial SOFA scores were comparable (5 (4-8) vs 6 (4-8), p=0.75), as were rates of vasopressor use (38% vs 36%, p=0.54). Incidence of respiratory and renal failure, and discharge disposition were equivalent between groups. Low DCI patients had comparable in-house (24% vs 23%) and 90-day mortality (28% vs 30.2%). After regression analyses, DCI was not a significant predictor of mortality in this cohort.

Conclusions: Socioeconomic status has been consistently championed for inclusion when constructing risk models, evaluating resource utilization, comparing hospitals, and determining patient management. Using a robust index of community distress, we did not find an association between DCI severity and sepsis mortality, despite contrasting evidence in other disease processes. While the absence of DCI-related associations observed herein merits further investigation, this suggests that bundled care in sepsis management may mitigate healthcare disparities.

O11. Incisional microenvironments and reduction in SSIs in patients treated with a local doxycycline-eluting formulation

Noam Emanuel; Goldi Kozloski; Anthony Senagore

Background: Despite significant advances in infection control guidelines and practices, surgical site infections (SSIs) remain a substantial cause of morbidity, prolonged hospitalization, and mortality among patients undergoing both elective and emergent surgeries. Patients undergoing colorectal

surgery are at increased risk for SSIs. D-PLEX100 is a novel, drug-eluting polymer-lipid matrix that supplies a high, local concentration of doxycycline for approximately four weeks with minimal systemic drug exposure.

Hypothesis: The objective of this analysis was to evaluate SSI reduction and identify the causative pathogens found within the postoperative soft tissue infection to determine variations in the surgical wound microenvironment following administration of D-PLEX100.

Methods: Patients undergoing elective colorectal surgery were randomized 1:1 to D-PLEX100 plus Standard of Care (SOC) or SOC alone (ClinicalTrials.gov identifier NCT03633123). All patients received prophylactic IV antibiotics 30-60 minutes prior to surgery. Patients randomized to the investigational arm received D-PLEX100 at the time of closure based on the length of surgical incision (5-10 cm = 5g D-PLEX100 (5g D-PLEX100 contains 54.6 mg doxycycline), 11-20 cm = 10g D-PLEX100, >20cm = 15g D-PLEX100). The SSI rate within 30 days post-index surgery was evaluated. Pre- and post-treatment bacterial colonization analysis was assessed by rectal swab, and organisms were identified and isolated from adjudicated incisional SSIs. Systemic doxycycline plasma concentrations were assessed at various post-operative time points.

Results: There was a 64% relative risk reduction in SSI rate in the D-PLEX100 plus SOC group (N=7/88 [7.9%]) vs SOC alone (N=20/91 [21.9%]); $p<0.05$. Causative organisms from SSI wounds were similar between study arms. There was no significant difference in colonization with multi-drug resistant organisms (MDROs) between groups based on rectal swabs. The maximum systemic doxycycline exposure (mean Cmax) was 183.04 ng/ml for patients treated with 15g D-PLEX100 (maximum dose), significantly lower than the 5,100ng/ml found after a standard 200mg oral dose.

Conclusions: These data demonstrated that the addition of D-PLEX100 to the SSI SOC prophylaxis regimen in elective colorectal surgery provided a 64% reduction in SSIs and importantly this was achieved without affecting the incidence of postoperative colonization by MDROs. As such, D-PLEX100 may be a promising addition to established colorectal SSI bundles for reducing SSIs without the risks associated with systemic antibiotic exposure.

O12. Factors Associated with Pelvic Infection after PrePeritoneal Pelvic Packing for Unstable Pelvic Fractures

Husayn Ladhani; Caitlyn McCall; Chelsea Horwood; Nicole Werner; Ryan Lawless; Barry Platnick; Ernest Moore; Eric Campion; Daniel VanDerPloeg; Fredric Pieracci; Clay Cothren Burlew

Background: At our institution patients with unstable pelvic fractures and hemodynamic instability are taken to the OR for preperitoneal pelvic packing (PPP) and external fixation of the pelvis. Pelvic infection (PI) can occur after PPP but there is little data in the literature. The objective of this study is to evaluate factors associated with PI after PPP.

Hypothesis: Open fractures and repacking are associated with PI after PPP.

Methods: Consecutive patients who underwent PPP with hospital LOS > 2 days were analyzed. Demographics, duration of PPP, operative timing for pelvic fractures, and outcomes were compared between patients with and without PI. Mann Whitney U and Chi-Square tests were used for continuous and categorical variables, respectively. Patients were divided into groups of four years and significant outcomes were plotted over time.

Results: Over a period of 16 years, 199 consecutive patients with PPP and LOS > 2 days were included; median age was 46 years (IQR 28-58), median ISS was 43 (37-57), and 18% had open fractures. Median SBP was 70mmHg with median BD of -10mmol/L. Median duration of PPP was 2 days (1-2) and 11% of patients underwent repacking. The incidence of PI was 11% (21 patients); 3 patients required hardware removal. Overall mortality was 10%. There was no difference in age, gender, mechanism of injury, fracture classification, and initial labs between patients with and without PI (all $p>0.05$). More patients in the PI group had an open fracture (33% vs 15%, $p=0.036$). Median transfusion, both pre-PPP and in 24-hours after PPP, were similar between the two groups (all $p>0.05$), but more patients in the PI group underwent repacking (48% vs 7%, $p<0.001$). Patients with PI had a longer hospital LOS (38 vs 22 days, $p<0.001$), longer ICU LOS (19 vs 13 days, $p=0.006$), and more ventilator days (16 vs 10 days, $p=0.039$), without a difference in mortality ($p>0.05$). Over the course of 16 years, the rates of PI, repacking, and mortality after PPP decreased at our institution (see Figure).

Conclusions: In our experience the overall rate of PI after PPP is 11%, and open fracture and repacking after PPP are associated with an increased risk of PI. The rate of PI at our institution decreased over time, likely associated with a decrease in the rate of repacking.

O13. A comparison of basolateral versus apical out enteroids as a model for necrotizing enterocolitis

Heather Liebe; Camille Schlegel; Alena Golubkova; Tyler Leiva; Xue Cai; Catherine Hunter

Background: Necrotizing enterocolitis (NEC) is a devastating disease of premature babies. Although there have been many animal models of NEC, the utility of these systems is limited by species-specific differences. The development of human enteroids has allowed our group to cultivate a tissue engineered human NEC model. Access to the luminal surface in the enteroid is challenging, to circumvent this we have developed an apical out (AO) model. There are benefits unique to both models: AO enteroids are more physiologically relevant while the basolateral out (BO) enteroids allow for faster culturing.

Hypothesis: AO and BO human enteroids will provide a relevant model of NEC with AO enteroids providing a more physiologically precise model.

Methods: Following IRB approval (#11610-11611) and parental consent, four human neonatal surgical intestinal samples were collected. Intestinal stem cells were harvested, crypt isolation performed and enteroids were generated. These were grown for 5-7 days in basement membrane matrix to induce a BO conformation. Enteroids were transformed to an AO conformation using our standard protocol. AO and BO enteroids were untreated or treated for 24 hours with 100ug/mL of LPS +/- hypoxic conditions (1% oxygen, 5% carbon dioxide, 94% nitrogen). AO vs BO architecture was confirmed via immunofluorescent staining of the apical protein zonula occludens-1 and basolateral protein beta-catenin. Quantitative PCR assessed gene expression. Western blot (WB) assayed tight junction proteins and enzyme-linked immunosorbent assay evaluated TNF-alpha. Uptake of Lucifer Yellow (LY) allowed comparison of permeability between AO and BO enteroids in the treatment groups.

Results: LY assay showed significantly increased intestinal permeability in treated AO and BO enteroids compared to controls ($p=0.01$, $p<0.0001$). Gene expression of the tight junction protein occludin was decreased in treated AO and BO enteroids ($p=0.004$, $p=0.02$). Both models had decreased claudin-4 gene expression in treated groups ($p=0.02$). BO enteroids had decreased gene

expression of claudin-3 (p=0.007 vs 0.05) while AO enteroids had decreased claudin-1 (p=0.006 vs 0.22). WB confirmed decreased occludin in AO and BO enteroids (p=0.02). Gene and protein expression of the inflammatory marker, TNF-alpha was significantly increased in both groups ($p<0.05$).

Conclusions: Treated AO and BO human enteroids demonstrate similar pro-inflammatory markers and increased permeability expected in NEC. AO enteroids are beneficial in that they provide direct access to the luminal surface while BO enteroids allow for shorter culturing times.

O14. Academic Medical Centers Had Higher Rates of Postoperative Healthcare-associated Infections During the COVID-19 Pandemic

Brett Tracy; Carrie Valdez; Brandon Crowley; Sirivan Seng; Asanthi Ratnasekera; Bishwajit Bhattacharya; Rick O'Connor; Victoria Sharp; Rondi Gelbard

Background: We sought to examine healthcare-associated infections (HAIs) among patients who underwent an appendectomy during the COVID-19 pandemic at academic medical centers (AMCs) and non-AMCs.

Hypothesis: We hypothesized that AMCs would be associated with higher rates of HAI compared to non-AMCs.

Methods: We performed a prospective, observational, multicenter study of patients aged ≥ 18 years who underwent appendectomy for acute appendicitis before, during, and after the end of pandemic operative restrictions for the first COVID-19 peak. Patients were grouped according to hospital type (AMC vs non-AMC) and then classified as pre-pandemic (Pre-CoV: October 2019-January 2020), during the first 2020 pandemic peak (CoV: April 2020 through local end of pandemic restrictions), and Post-CoV (4 month period following the end of each site's pandemic restrictions). Our primary outcome was the incidence ofpost-operative HAIs, which we compared between hospital types during each period. HAIs included surgical site infections, central-line–associated bloodstream infections, catheter-associated urinary tract infections, ventilator-associated events, and Clostridioides difficile infections.

Results: There were 1003 patients: 30.5% (n=306) were treated at non-AMCs and 69.5% (n=697) at AMCs. For the entire cohort, 40 patents (3.9%) experienced an HAI. More HAIs occurred at AMCs (4.9% vs 2%, p=0.03), which remained significant after stratifying by study period (3.6% Pre-CoV vs 7.7% CoV vs 3.7% Post-CoV, p=0.02). On multivariable regression controlling for age, white blood cell count, frailty, immunocompromised status, and the intraoperative detection of a gangrenous/perforated appendix, AMCs were an independent risk factor for HAIs (aOR 8.6, 95% CI 1.6-158.5, p<.01) during the CoV period. However, during the pre- and post-CoV periods, AMCs were not a significant risk factor for HAIs.

Conclusions: Among patients who underwent an appendectomy, HAIs were significantly higher at AMCs, particularly during the initial 2020 pandemic peak. These findings highlight the need for AMCs to be increasingly vigilant about infection control and prevention efforts as COVID-19 pandemic surges occur.

O15. Emergency General Surgery in the Immunosuppressed Patient: Do Outcomes Differ?

Manuel Castillo-Angeles; Barbara Okafor; Christine Wu; Stephanie Nitzschke; Reza Askari

Background: Emergency General Surgery (EGS) patients are at increased risk of morbidity and mortality. Little is known about the impact of these high-risk procedures on immunosuppressed patients. The purpose of this study was to determine if outcomes differ for immunosuppressed patients undergoing EGS procedures.

Hypothesis: We hypothesize that immunosuppressed patients undergoing EGS will have worse outcomes when compared with immunocompetent patients.

Methods: This was a retrospective analysis of the American College of Surgeons National Surgical Quality Improvement Project (ACS-NSQIP) database (2005-2014). All inpatients that underwent one of 7 EGS procedures shown to represent 80% of EGS volume, complications, and mortality nationally were included. Immunosupression was defined as regular administration of oral or parenteral corticosteroids or immunosuppressant medications within 30 days to the operative procedure. The primary outcomes were overall mortality, overall morbidity, major morbidity, and infectious complications (organ/space surgical site infection, urinary tract infection, pneumonia, sepsis, septic shock). Multivariate logistic regression was used to determine the association between immunosuppression and main outcomes.

Results: We included a total of 222,519 EGS admissions, of which 6,919 (3.1%) were immunosuppressed patients. Mean age was 46 years and 51.4% were female. Overall mortality was 3.6% for the entire cohort and 15.8% within the immunosuppressed group. After adjusting for clinical and demographic variables, immunosuppressed EGS patients had higher rates of overall mortality (Odds Ratio [OR] 1.42, 95% Confidence Interval [CI] 1.25 - 1.60), higher overall morbidity (OR 1.41, 95% CI 1.28 - 1.54), major morbidity (OR 1.36, 95% CI 1.23 - 1.49), and infectious complications (OR 1.28, 95% CI 1.13 - 1.44) when compared with patients without immunosuppresion.

Conclusions: Overall, immunosuppression was significantly associated with worse mortality and morbidity, particularly infectious complications, in patients undergoing EGS procedures. These results showed the added risk of this chronic condition, and its need for additional planning from preoperative evaluation to postoperative management, to maximize benefits in these EGS subpopulation.

O16. Towards Proactive Surgical Infection Management: Development and External Validation of an AI-based Prediction Tool

Siri van der Meijden; Anna van Boekel; Mark G. J. de Boer; Rob G. H. H. Nelissen; Sebastian Bredie; Bart F. Geerts; Sesmu M.S. Arbous; Harry Van Goor

Background: Late detection of postoperative infections results in poor outcomes for patients and added costs. To enhance early detection of surgical infections, we developed an Artificial Intelligence (AI) prediction model for clinical use.

Hypothesis: Postoperative infections can be accurately predicted using AI prediction models.

Methods: We retrospectively developed and validated an AI model (XGBoost) on surgical procedures in adults performed between 2011/1/1 - 2021/10/5 at the Leiden University Medical Center (LUMC). Model development and validation was performed on respectively 70% and 30% of the LUMC dataset using available electronic health record (EHR) data. We aimed to predict the risk of any treated bacterial infection within 30 days at the end of surgery. As not all infections can be found

in the data due to under registration, we broadened the definition used for identifying infections to: non-prophylactic antibiotics, interventions related to infections and elevated CRP. External validation of the LUMC trained model was performed on a temporal LUMC dataset (2021/10/8 - 2021/11/8) and a general surgical dataset from The Radboud University Medical Center (Radboud UMC).

Results: The model predicted postoperative infection with high performance using the LUMC EHR and temporal validation datasets, but did not show equal performance on the Radboud UMC dataset (Table 1). Both datasets differed in infection rates and infection related antibiotic treatments.

Conclusions: We were able to predict postoperative infection with high internal and external temporal (prospective in time) predictive performance in one hospital. However, the same model did not perform as well in a comparable academic hospital. This finding emphasizes the need for AI models to be retrained on external data due to differences in patient populations, coding in EHR, local guidelines, human factors, procedure types and data collection. Next step is to investigate whether retraining of the AI model improves performance. The latter is needed before studying its impact in multi-center clinical trials.

O17. Activated Collagen Powder Significantly Reduces Surgical Site Infections In Patients Undergoing Elective Surgery

Samir Awad; Ryan Nowrouzi; Elaine Vo; William Lightle

Background: Surgical site infections(SSI) are the most common hospital acquired infection (HAI) accounting for 20% with increase in morbidity, mortality and cost. Activated collagen(AC) has been shown to promote wound healing in surgical incisions, preventing wound dehiscence with a decrease in surgical site infections(SSI). In vitro, AC has been shown to significantly retard gram positive bacterial growth with a zone of inhibition(ZOI) comparable to vancomycin (ZOI=8 mm) and also mildly retards various gram negative bacteria growth.

Hypothesis: Our objective was to evaluate the impact of AC (CellerateRX, Sanara Med Tech) on SSI rate in patients undergoing elective surgery. We hypothesized that AC would decrease SSIs in patients undergoing elective surgery.

Methods: A retrospective review of a prospective data base of patients undergoing elective surgery at a tertiary academic hospital was performed from 1-1-2018 to 12-1-2021. Age, gender, comorbidities and demographics were collected. Surgical specialties included general, surgical oncology, orthopedic, vascular, neurosurgery, cardiothoracic, plastic and gynecology. All patients underwent preoperative decontamination with Chlorhexidine wipes day prior and on day of surgery; all had surgery site appropriate prophylactic antibiotics prior to incision; and all had chloraprep or duraprep as the skin prep. In the AC group, AC was applied prior to skin closure. Cases were stratified for clean and clean contaminated (CC). Patients in the AC group were compared to case matched 1:3 Non-AC patients. SSI rates were calculated for each group. Student's ttest was used to compare continuous data. Chi square analysis was used to compare SSI rates between groups using $p<0.05$ as significant.

Results: A total of 5335 cases were performed, 76%(4068) clean, 24%(1287) CC. Overall, the mean age was 61+/-1 years, mean BMI was 31.1+/-0.65. 87% were male, 53% were white, 31% with DM, 21% with COPD and 13% with CKD. The AC and Non-AC groups were well matched with no significant differences in age, gender, comorbidities, demographics, BMI, surgical specialty. Overall AC was used in 23% (Total=1489;Clean=1089;CC=400) of cases. There was a significant decrease

in overall SSI rate with use of AC(AC SSI= .63,Non-AC SSI= 1.52,p=.008). There was a significant decrease in SSI rate in clean cases(AC SSI=.30,Non-AC SSI=.97,p=.026) and a trend towards decreased SSI rate in CC cases(AC SSI=3.36,Non-AC SSI=1.54,p=.058).

Conclusions: The use of AC in patients undergoing elective surgery resulted in a significant 59% reduction in SSI rate. This was most pronounced in the clean cases with a 69% decrease SSI rate. AC can be safely used in elective cases to promote wound healing of incisions and decrease SSI rates.

O18. Burn Wound Location Influences the Composition of Buccal and Wound Bed Swab Microbiomes

Edward J. Kelly; Mary Oliver; Bonnie Carney; John Keyloun; Robert Ball; Melissa McLawhorn; Justin Wright; Regina Lamendella; Lauren Moffatt; Jeffrey Shupp

Background: Burn wound infections are a common complication affecting burn patients and a significant source of morbidity and mortality. Patients are at risk from many different species known to colonize wound infections. There is limited information regarding the differences in microbial diversity based on burn location. This study aimed to identify the specific microbiome in different burn wound locations.

Hypothesis: Different burn wound locations will exhibit unique microbiomes.

Methods: Thirty-one patients with minor (<10% TBSA) and uncomplicated thermal burns anticipated to require a single excision and grafting operation were enrolled. Blood draws, wound biopsies, culture swabs and saliva for oral microbiome (16S rRNA) analysis were collected before and after wound excision, at first dressing takedown, and at first follow-up visit. Data were analyzed using Faith's Phylogenetic Diversity Metric (Alpha diversity), Permutational multivariate analysis of variance (Beta diversity) and Linear discriminant analysis effect size (LEfSe; Taxa abundance).

Results: Seven burn wound locations (abdomen, arm, back, chest, foot, hand, leg) were categorized. Buccal swab alpha diversity when all swabs were taken together showed abdomen had lower diversity than arm and back (Kruskal-Wallis, p=0.050 and 0.033). All WB swabs analyzed together showed alpha diversity of arm had higher diversity than leg (Kruskal-Wallis, p=0.048). Buccal swab beta diversity showed differences among back and foot p=.002, abdomen and leg p=.003, abdomen and back p=.005, back and hand p=.005, abdomen and arm p=.01, back and leg p=.014, foot and leg p=.043, arm and back p=.045, and abdomen and hand p=.048. WB swab beta diversity showed differences between arm and hand p= .001, arm and leg p=.001, back and leg p=.002, and back and hand p=.007. LEfSe plots showed enrichment of greater than 15 taxa among the different burn locations. Buccal swabs from abdominal wounds showed enrichment of Staphylococcus, Roseomonas and Proteus, back wounds with Prevotellaand Streptococcus, and chest wounds with Enterobacteriaceae and Serratia (LDA ≥ 4, p≤ 0.05). These findings are consistent with wound swabs from the abdomen, back, and chest.

Conclusions: Oral and wound microbiomes display unique characteristics based on burn location. Furthermore, when compared to each other, oral and wound swabs from similar burn locations show consistent bacterial profiles. Increasingly targeted therapies are paramount given the continued emergence of antibiotic resistance.

O19. Evaluation of nasal methicillin-resistant Staphylococcus aureus screening for intraabdominal infections

Gabrielle Gibson; Emily Owen; John Mazuski; Jessica Kramer

Background: Intra-abdominal infections (IAIs) are associated with significant morbidity and mortality in the ICU. Early diagnosis, adequate source control, and appropriate antimicrobial therapy are the cornerstones of treatment. Most IAIs are caused by gram-negative organisms, while methicillin-resistant Staphylococcus aureus (MRSA) is an uncommon organism in IAIs. Despite MRSA being a rare organism in IAIs, if isolated it does confer an increased risk of mortality. Guideline recommendations suggest only adding anti-MRSA antibiotics when certain risk factors are present, however, anti-MRSA agents are frequently utilized for empiric treatment of IAIs. Therefore, it would be useful if nasal MRSA screening could be used to help limit exposure of anti-MRSA agents. This study aimed to evaluate the performance of nasal MRSA screening to predict MRSA IAIs in critically ill adult patients.

Hypothesis: Nasal MRSA screening identifies patients with intra-abdominal infection who will have positive cultures for MRSA

Methods: This was a retrospective, cohort study at single center that took place between June 2018 and December 2020. Adult patients admitted to an ICU with a diagnosis code for an IAI and had an intra-abdominal culture were eligible for inclusion. Patients were excluded if they died within 96 hours of admission. The primary outcome was to determine the performance of the MRSA nasal swab by assessing sensitivity, specificity, positive and negative predictive values.

Results: There were 79 patients that had a MRSA nasal swab that was positive (NS+) and 57 patients that had a negative MRSA nasal swab (NS-). Patients in the NS+ group were older (59 years vs 53 years; p=0.019) and had higher APACHE II scores (13 vs 10; p=0.01) compared to the NS- group. Nine patients (11.4%) in the NS+ group had IAI cultures positive for MRSA compared to 38 patients (66.7%) in the NS- group (p<0.001). MRSA nasal swab screening demonstrated a sensitivity of 19% (95% CI: 9%-33%) and specificity of 21.35% (95% CI: 13.4%-31.3%).The positive predictive value of the nasal swab predicting an IAI with positive MRSA culture was 11.4% (95% CI: 6.6%-19%), while the negative predictive value was 33.3% (95% CI: 24.7%-43.3%). The ICU length of stay was similar between groups (6.8 days in NS+ group vs 5.7 days in the NS- group; p=0.584), however, patients in the NS+ group spent more time in the hospital (15 days vs 11 days; p=0.026). There was no difference between groups in in-hospital mortality.

Conclusions: A negative MRSA nasal swab was not useful in excluding MRSA as a causative organism in IAIs.

O20. Is there a community microbial community? A comparison of pathogens between 2 hospital SICUs in a single city

Robert Sawyer; Mikayla Moody

Background: Nosocomial and healthcare-associated infections drive increased healthcare costs and negatively affect patient outcomes. The human microbiome has been heavily explored in recent years with incomplete data regarding hospital-specific and community-specific microbial communities. Although bacterial species differ between intensive care units in the same hospital, it is unclear if they differ between similar units in similar hospitals in the same community.

Hypothesis: Our hypothesis is that pathogens in surgical intensive care units are distinct between hospitals, even in the same community.

Methods: From 2017-2021, data were prospectively collected from the SICUs of two 500 bed hospitals located 3 miles apart in the same city (Hospital A and Hospital B). Infections defined using CDC criteria were recorded for trauma and general surgery patients, as well as patient demographics, APACHE II score, and causative organism. Means were then compared using the Student t-test, and proportions were compared with Chi-square or Fisher's exact test.

Results: Results: Overall, Escherichia coliwas the most commonly isolated pathogen in Hospital A, while Staphylococcus aureuswas most commonly isolated at hospital B (Table, * = $p \leq 0.05$ between hospitals). Enterococci were more common in Hospital A, and Haemophilus influenzae and Enterobacterspp. were more common in Hospital B. After stratification between trauma and non-trauma patients, however, these differences disappeared, with the exception of more overall Gram-positive organisms and fewer Gram-negative organisms among Hospital A trauma patients compared to Hospital B. There were no differences in rates of isolation of either fungi or resistant bacteria between hospitals. APACHE II scores were also similar when stratified by diagnosis.

Conclusions: Conclusion: At a species level, admission diagnosis appears to be a greater determinant of pathogen isolation than hospital when comparing similar intensive care units, but a larger body of data is needed to flesh out a distinct microbial map of the organisms occupying a certain geographic region. Further areas for investigation include comparison between hospital units, specific anatomic sites, and ICU versus floor patients.

O21. Readmissions in Patients with Necrotizing Soft Tissue Infections: Continuity of Care Matters

Clara Kit Nam Lai; Christopher Towe; Nimitt Patel; Laura Brown; Jeffrey Claridge; Vanessa Ho

Background: Necrotizing soft tissue infections (NSTI) are lethal and rapidly progressive infections, typically treated with extensive surgical debridement, and can carry a mortality up to 34%. For patients who survive the index hospitalization, risk factors associated with readmission and delayed mortality are unknown.

Hypothesis: We hypothesized that readmission to the same hospital where the index admission occurred would be associated with better clinical outcomes compared to readmission to a different hospital.

Methods: We utilized patients from the 2017 Nationwide Readmissions Database (NRD) with an index admission for NSTI by ICD-10 code in the first 9 months of the year. We identified patient demographic factors, and Elixhauser comorbidities using ICD-10 codes. Index hospitalization mortality and discharge destination were extracted. We identified all-cause 90-day readmissions, whether readmission occurred at the same or different hospital, and identified time from discharge to first readmission. We calculated 90-day readmission rate and utilized survey-weighted logistic regression to identify factors associated with 90-day readmission and death at the first readmission; factors examined included age, sex, initial discharge destination, same-hospital readmission, and payer; regressions were adjusted for hospital rural/urban location and comorbidities.

Results: We identified 29,401 patients who were admitted with NSTI in the first 9 months of 2017;

2,350 died at the initial hospitalization. Of the 27,051 patients remaining, 8,021 (29.7%) were readmitted within 90 days, and 382 (4.8%) died at readmission. The median time to readmission was 25 days (IQR 10-48), and 27.8% (n=2,229) occurred at a different hospital. Factors associated with readmission via survey-weighted logistic regression included younger age, and discharge to SNF or against medical advice. Factors associated with death at readmission included older age, index discharge to short term hospital or SNF, or readmission occurring at a different hospital from the index admission. (Table)

Conclusions: Nearly half of readmissions for patients who were admitted for NSTI occurred after 30 days, and more than one-quarter were admitted to different hospitals. Continuity of care is important for these complex patients, as readmission to the index hospitalization was associated with a decreased odds of death at readmission.

O22. A Systematic Review of Preoperative Oral Health Intervention in Abdominal Surgery Patients

Chelsea Guy-Frank; James Klugh; Naila Dhanani; Jonah Stulberg; Charles Wade; Lillian Kao

Background: Poor oral health is an underrecognized risk factor for postoperative complications. Previous studies have demonstrated reduced postoperative complications with bundle care that includes oral hygiene. A systematic review was conducted to examine the effects of preoperative oral health on postoperative infectious outcomes in abdominal surgery patients.

Hypothesis: Preoperative oral health intervention is associated with a reduction in postoperative infectious complications in abdominal surgery patients.

Methods: A literature search was conducted of MEDLINE, Embase and Cochrane from inception to October 2021. Randomized control trials (RCT) and observational studies (ObS), which assessed adult patients undergoing abdominal surgery and receiving preoperative oral/dental care were included. Risk of bias was assessed with CASP and quality of evidence was evaluated with GRADE.

Results: Eleven studies met inclusion criteria: 1 RCT and 10 ObS, the majority were from Japan. Outcomes included pneumonia (PNA), surgical site infections (SSI) and postoperative infectious complications. Preoperative oral management (POM) with dental care reduced PNA, SSI, and infectious complications; and >2 visits, with initial visit >2 weeks preoperatively, was associated with a dose response reduction of infections. Additionally, severe periodontal disease/plaque score was associated with increased risk of infectious outcomes.

Conclusions: Perioperative oral hygiene was associated with reduced infectious complications after abdominal surgeries. Although the quality of evidence was low, perioperative oral hygiene is a low-cost intervention that warrants investigation in further prospective studies.

O23. Abdominal sepsis and the open abdomen in the geriatric patient: to operate or not to operate?

Jefferson A. Proaño-Zamudio; Dias Argandykov; Anthony Gebran; Charudutt N. Paranjape; Stephanie J. Maroney; April Mendoza; Haytham Kaafarani; Peter Fagenholz; David King; George Velmahos; John Hwabejire

Background: Elderly patients are presenting more commonly with emergency surgical conditions. The open abdomen technique is widely used in patients with abdominal emergencies who need rapid

control of intrabdominal contamination. However, specific predictors of mortality in this population are understudied.

Hypothesis:

Methods: The 2013-2017 ACS-NSQIP database was queried for emergent laparotomies performed in geriatric patients with pre-operative sepsis or septic shock in whom closure of the fascia was delayed. Patients with acute mesenteric ischemia were excluded. The primary outcome was 30-day mortality. Univariable analysis was performed, followed by multivariable logistic regression. Mortality was computed for combinations of the five predictors with the highest odds-ratios (OR).

Results: A total of 1519 patients were identified. Median age was 73 years and 53.3% were females. 30-day mortality was 47.9%. Compared to survivors, non-survivors were older (median age (IQR) 75.9 (69.5-80.0) vs. 72.0 (78.0-78.0), $p < 0.001$), had a higher incidence of chronic obstructive pulmonary disease (COPD) (22.1% vs 16.3 %, $p = 0.004$), congestive heart failure (CHF) (10.9% vs 4.6%, $p < 0.001$), dependence on dialysis (12.4% vs. 4.3%, $p < 0.001$), dependence on mechanical ventilation (37.7% vs 17.3%, $p < 0.001$), and pre-operative septic shock (71.4% vs 49.3%, $p < 0.001$). In the multivariable analysis, the most important predictors were: American Society of Anesthesiologists (ASA) status 5 (OR = 4.10, 95%CI, 1.69 – 9.94 p =0.002), dialysis dependence (OR = 2.53, 95%CI 1.59 – 4.02, $p < 0.001$), CHF (OR = 2.34, 95%CI 1.49 –3.67, $p < 0.001$), disseminated cancer (OR = 2.12, 95%CI 1.29 –3.47, $p = 0.003$) and pre-operative thrombocytopenia (OR = 1.94, 95%CI 1.24 – 3.04, $p = 0.004$). Mortality for combinations of these predictors was computed (Figure 1); five combinations resulted in 100% mortality. The absence of all these risk factors results in a survival rate of 64.2%.

Conclusions: In elderly patients, abdominal sepsis or septic shock requiring open abdomen for surgical management is a highly lethal condition. The presence of several combinations of pre-operative comorbidities is uniformly lethal, and should preclude surgical management.

O24. Bacteremia in Trauma: A Contemporary Analysis of Blood Culture Results and Outcomes in 158,884 Patients

Samir Fakhry; Kimberly MacLeod; Jennifer Morse; Jeneva Garland; Nina Wilson; Laura McLean; Dorraine Watts

Background: Bacteremia is a potentially lethal complication. Little contemporary research exists describing its incidence and associated outcomes in trauma patients.

Hypothesis: The purpose of this descriptive study was to characterize incidence, risk factors and outcomes of Bacteremia in a large multi-institutional sample.

Methods: Trauma activation/consultation, age>18, admitted 2017-20 to trauma centers in a hospital system were selected. Blood culture (BC) results reported by the laboratory were obtained from a system EMR repository. POS was defined as 2 BCs drawn within 2 hours of each other both growing the same organism. NEG was defined as above but with no growth, only 1 BC with growth, or growth of 2 different organisms. POS and NEG patients were compared to NO BC on univariate measures. Logistic regression examined the relationship of BC results to outcomes, adjusting for age, sex, ISS and comorbidity count.

Results: Of 158,884 trauma patients at 45 centers, 17,166 (10.8%) had a BC drawn and 1,214 were

POS (7.1%). Compared to NO BC patients, POS patients were more likely to be male (70.4% vs. 57.8, p<0.001), with more comorbidities (2.1 vs. 1.6, p<0.001) and higher median ISS (14 vs 9, p<0.001). They also had higher ICU use rates (82.5% vs. 40.3, p<0.001), ventilation (61.6% vs. 9.5, p<0.001) and mortality (17.2% vs. 2.6, p<0.001). POS patients were 3.8 times as likely to die (aOR 3.8 [3.2-4.5], p<0.001) and exponentially more likely to have septic shock/severe sepsis (aOR 114.9 [95.1-138.9], p<0.001). In POS patients, the most commonly reported isolates were S. epidermidis (14%), non-MRSA S. aureus (12%), and E. coli (6%). Organisms associated with the highest mortality rates were K. pneumoniae (27.1%), E. coli (28.4%) and E. faecalis (30.0%).

Conclusions: This multicenter study shows that Bacteremia in adult trauma patients is relatively uncommon (<1%) but associated with increased hospital resource use and very poor outcomes. Increased age, co-morbidities and ISS were associated with worse outcomes. Bacteremia, or even suspicion thereof, identifies a population at exceedingly high risk and justifies aggressive empiric intervention to maximize survival.

O25. Prevalence of cultures, sensitivity testing and antibiotic use among SSI studies: a query of the top surgical journals

Kaylie Machutta; Jason Xiao; Callie Winters; Jordan Perrott; Swathikan Chidambaram; James Kinross; Ryan Morgan; Tanvi Subramanian; Adam Cifu; John Alverdy

Background: Studies addressing surgical site infections (SSIs) published in surgical journals rarely if ever report culture results, antibiotic sensitivities and the antibiotics used for prophylaxis. As such, recommendations in the absence of this information are limited in their application to evidence-based practice. The aim of this study is to quantify the degree to which these 3 key features are absent among 4 of the most highly ranked non-specialty surgical journals over the last 5 years of publication.

Hypothesis: We hypothesized that SSI-related publications from the top four non-specialty surgical journals routinely omit the following information: 1. How an SSI is defined, 2. the presence of bacterial cultures, 3. reporting of antibiotic sensitivity data, and 4. identification of the antibiotic chosen for prophylaxis.

Methods: A systematic review evaluating surgical site infections from four highly cited non-specialty surgical journals, Annals of Surgery, the British Journal of Surgery, JAMA Surgery and the Journal of the American College of Surgeons was conducted for articles published between 2016-2021. We focused our extraction on data regarding SSI characteristics, SSI definition, interventions, use and reporting of bacterial cultures, reporting of antibiotic prophylaxis, recommendations made, and use of sensitivity and resistance testing.

Results: Of the 71 studies included, 32 diagnosed SSIs based on criteria developed by the Centers for Disease Control alone while 5 provided no definition of SSI. Of the 21 articles recommending increasing antibiotic usage, only one study performed antibiotic sensitivity testing to guide antibiotic choice. Of the total 71 studies reviewed, only 1 reported all of the key features considered to be necessary for SSI antibiotic decision making; 46 reported none of the key features. Figure. Among 71 included publications, 1% (n=1) included all three criteria (1. culture results, 2. antibiotic sensitivity, 3. antibiotics used for prophylaxis). 7% (n=5) included any combination of two criteria, 27% (n=19) included only one criterion, and 65% (n=46) included none.

Conclusions: Among the most highly read non-specialty surgical journals examining SSIs, bacterial cultures, antibiotic sensitivity data, and the antibiotics used for prophylaxis are routinely not reported.

Given that today, as many as 50% of all SSIs are estimated to be resistant to the antibiotics chosen for prophylaxis, absence of this key information presents a major limitation to reduce SSIs beyond empirical measures.

O26. Prolonged Therapy Is Not Associated with Delayed Identification of Recurrent Intra-Abdominal Infection

Andrew Dulek; Jacob O'Dell; Christopher Guidry

Background: The STOP-IT Trial identified an association between prolonged antibiotic therapy and delayed identification of recurrent intra-abdominal infection. However, this association has not been observed in other studies. The purpose of this study was to evaluate the association between recurrent intra-abdominal infections and the duration of antibiotics.

Hypothesis: We hypothesized that longer durations of antimicrobial therapy would be associated with delayed identification of recurrent infection.

Methods: Adult patients from 2016 to 2020 who underwent a source control procedure for a colon-related complicated intra-abdominal infection were identified. Patients not meeting the inclusion criteria were excluded. Demographics, comorbidities, post-operative antibiotic duration, and presence of secondary intra-abdominal infection were recorded. The primary outcome was the time to identification of secondary intra-abdominal infection. Delayed identification of recurrent infection was defined as 10 or more days following source control procedure. Statistical analysis using chi-square, fisher's exact and Wilcoxon rank sum were used where appropriate.

Results: 76 of the patients identified met inclusion criteria, and 17 (22.4%) of those patients had a recurrent intra-abdominal infection. Patients with recurrent infections were slightly younger (64 vs 60 years; p= 0.01) and had lower rates pre-operative anticoagulation (50.8% vs. 17.6%; p=0.02). There were no significant differences in the initial length of antibiotic therapy following source control between the recurrent infection and non-recurrent groups. There was a significant difference in total days of antibiotic use between the two groups, with the recurrent infection group averaging 10 more days of antibiotic use than the non-recurrence group ($p<0.0001$). In those patients with a recurrence, there were no differences in median days to identification (9 vs 11.5 days; p= 0.29) or the rate of those with delayed identification of recurrent infection for patients who recieved short versus long course antibiotic regimens (44.4% vs 75%; p=0.33).

Conclusions: Similar to the STOP-IT trial we failed to identify an association between the duration of post-operative antibiotics and recurrent infection. However, we further failed to identify an association between the prolonged post-operative courses and the timing of identification of the recurrent infection. Further evaluation is needed to determine if prolonged therapy delays the identification of recurrent infection.

O27. Cross-Border Antibiotic Resistance Patterns in Burn Patients

Chance Dunbar; Jarrett Santorelli; William Marshall; Laura Godat; Kevin Box; Jeanne Lee; Eli Strait; Todd Costantini; Alan Smith; Jay Doucet; Allison Berndtson

Background: Antimicrobial resistance (AMR) is a growing problem worldwide, with differences in regional resistance patterns partially driven by local variance in antibiotic stewardship. Resistant

gram-negative organisms are increasingly prevalent in Latin America and account for a higher percentage of infections than in the United States (USA) or Canada. Trauma patients transferring from Mexico (MEX) for treatment have been shown to have more AMR than those injured in the USA, raising concern for transfer of AMR across the border.

Hypothesis: Patients transferred to a USA burn center after burn injury in Mexico have a higher incidence of infections due to antibiotic-resistant organisms.

Methods: The registry of an ABA verified burn center was queried for all admissions for burn injury Jan 2015 - Dec 2019. Patients were excluded if they had a hospital length of stay (LOS) of <7 days. Patients were divided into two groups based upon injury location: inside the USA or in MEX. Cultures and sensitivities were reviewed to remove duplicate results and for confirmation of clinical infection. All non-wound infections were analyzed.

Results: A total of 69 MEX and 833 USA patients were included. Patients had a similar mean age (40.7 years MEX vs. 42.1 years USA) and sex distribution (69.6% male MEX vs 64.3% USA). MEX patients had a larger mean %TBSA burn (17.2% vs. 8.3%), primarily flame burns (49.3% vs. USA 38.9% flame and 36.1% scald) and longer hospital LOS (26.6 vs. 19.2 days). MEX patients were more likely to have any infection (20.3% vs. 11.4%), urinary infections (7.3% vs. 3.4%), and respiratory infections (15.9% vs. 7.4%), while bloodstream infections were similar. MEX patients had more gram-positive infections (38.9% vs. 32.0%) as well as more resistant infections (38.9% of all organisms grown vs. 19.5%, p=0.027).

Conclusions: AMR is more common in burn patients injured in MEX and transported across the border than in those injured in the USA, despite geographic proximity. Patients from high AMR areas including MEX may require alternative empiric antibiotic regimens when presenting with infection. Global initiatives to improve antibiotic stewardship are critical.

O28. Skin Closure after Laparotomy: A National Survey of Surgeon Risk Assessment and Management

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Background: Emergent trauma laparotomies (TL) are high risk for postoperative complications. Wound management, though considered universally important, is varied in clinical practice. We evaluated surgeon decision making of skin management strategies and risk assessments for superficial-surgical site infection (S-SSI) after TL.

Hypothesis: We hypothesize that most surgeons will close the skin on low-risk patients and there will be more variation in management as S-SSI risk increases.

Methods: An anonymous survey was distributed to the Surgical Infection Society (SIS) of 8 fictional TL scenarios with a wide range of S-SSI risk. Risk was calculator-generated, based off an intraoperative, point-of-care Bayesian risk calculator. Surgeon participants were randomized by Qualtrics Software to 4 scenarios. Data was analyzed for trends in surgeon generated infection risk estimation and wound management based on groupings of S-SSI risk: low, medium, high.

Results: Twenty-nine surgeons started the survey, with 22 completing >95%. Sixty-four percent were male; 45% were 41-50 years old; 95% are practicing as attendings, and 90% work in an academic

setting. Eighty-one percent identified as trauma surgeons, and 85% had >5 years of experience. In the risk calculator generated groups, the percentage of surgeons who would close the skin decreased with increasing S-SSI risk: low: 79% closed skin, moderate: 62% closed skin, high: 52% closed skin. Surgeon estimated S-SSI risk varied, with ~50% agreeing with the risk-calculated S-SSI groupings.

Conclusions: The early findings of this study indicate that estimates of S-SSI risk vary between surgeons and with those of a single-center derived point-of-care risk calculator. The percentage of surgeons who would close the skin decreased based on both calculator-informed and surgeon-derived estimates of S-SSI risk. Having a standardized estimator of S-SSI risk may help to guide surgeon decision-making.

O29. Open Mandible and Maxillary Fractures Associated with Higher Risk of Infection in Victims of Violence

Melissa Canas; Ricardo Fonseca; Leonardo Diaz; Jose A Aldana; Hussain Afzal; Jennifer Leonard; Kelly Marie Bochicchio; Grant Bochicchio

Background: Interpersonal violence is a common mechanism of injury in trauma patients. Fractures of the jawbones are commonly the result of these violent altercations. They represent a complex challenge due to possible compromise of the airway, and infection-related complications due to potential involvement of the oral cavity.

Hypothesis: We hypothesized that open mandible and maxillary fractures in victims of violence (VOV) are associated with a higher rate of infection as compared to non-VOV patients with open facial fractures.

Methods: We queried our prospectively maintained Trauma Registry from 2005 to 2020 for patients admitted to our Level one trauma center with the diagnosis of open mandible and maxillary fractures. We abstracted demographics, fracture location, cultures, infectious complications (abscesses, wound infections, and osteomyelitis), and antibiotic treatments. Standard antibiotic prophylaxis during the study period included Clindamycin, Ampicillin-Sulbactam, or Cefazolin. We excluded patients with AIS scores >2 in other anatomical regions. We stratified patients into two groups: VOV (penetrating and blunt assault) and non-VOV (falls, MVC/MCC, pedestrian struck). We subsequently analyzed these two groups with Chi-Square and Student t-test using SPSS.

Results: We identified 316 patients with open mandible and maxillary fractures. 198 patients (62.7%) were identified as being VOV, and 118 (37.3%) patients were non-VOV. 234 (74.1%) of these patients were diagnosed with open mandible fractures, 25 (7.9%) had open maxillary fractures and 57 (18%) had both. All of these fractures were isolated or associated with other facial fractures. 19/316 (6.0%) patients were diagnosed with infection related to the fracture (63.2% abscesses, 31.6% wound infections, and 26.3% osteomyelitis). Although ISS was higher in non-VOV patients (5.8 ±2.6 vs 4.9 ±1.8, p 0.013), 17/19 infections (89.5%, $p<0.013$) were in the VOV cohort.

Conclusions: Open fractures of the mandible and maxilla as a result of VOV (blunt or penetrating mechanism of injury) are associated with a greater risk of infection as compared to non-VOV mechanisms of injury. These violent mechanisms of injury should alert the clinician of this greater risk and potentially institute more aggressive methods of infection prevention. Further research is needed to prevent this high risk of infection.

O30. Use of Antibiograms and Changes in Bacterial Resistance Patterns in a Burn Population

Josephine D'Abbondanza; Natalia Ziolkowski; Sarah Rehou; Shahriar Shahrokhi

Background: Infection is a leading cause of death in burn patients. With an increase in resistance patterns, management of these infections has become progressively difficult. Antibiograms, a summary of susceptibilities to bacteria in a given institution or area, are often used to guide empiric treatment of infections. However, inappropriate prescribing and use of empiric antimicrobials may greatly impact the incidence of resistance. Currently, we do not know the patterns of antibiotic use since the introduction of institutional antibiograms or associated changes in antibiotic resistance. The objective of this study is to describe trends in antibiotic susceptibilities in burn patients in Canada pre- (PrA) and post-introduction (PoA) of antibiograms.

Hypothesis: We hypothesize that the use of empiric broad-spectrum antibiotics, such as piperacillin-tazobactam, meropenem, and vancomycin, may result in increased use of antibiotics and higher incidence of multi-drug resistant infections.

Methods: We performed a retrospective review of patients admitted to an ABA-verified Burn Centre 2 years pre- (2013-2014) and post-introduction (2016-2017) of institutional antibiograms and started on broad-spectrum antibiotics (meropenem, piperacillin-tazobactam, and/or vancomycin).

Results: A total of 864 patients were admitted during the study period (n=420 PrA and n=444 PoA). Average age, % total body surface area (%TBSA), and length of stay were similar between cohorts. Administration of empiric meropenem increased (43.2% vs. 56.8%) and piperacillin-tazobactam decreased (60.6% vs. 39.4%), which was significant (p=0.002). The use of vancomycin was unchanged. There was a significant decrease in the overall use of empiric antibiotics (p=0.002) since the inception of antibiograms, with a significant improvement in culture and sensitivity (C&S) testing within 5 days of starting empiric antibiotics (p=0.002). There was no significant difference in use of targeted antibiotics pre- or post-antibiogram introduction.

Conclusions: Our study demonstrates that since the inception of antibiograms, there has been a significant decrease in overall use of empiric antibiotics and improvement in acquiring C&S within 5 days. However, these antibiotics were not always targeted to the appropriate organism and therefore may contribute to multi-drug resistant organisms in a burn population.