Learning Objective(s)– This activity is designed for Physicians, Pharmacists and Nurses. Upon completion of this course, participants will be able to
1. Describe the appropriate diagnostic measures for the diagnosis of Surgical Site Infection
2. Apply the correct treatment paradigm for the treatment of appendicitis
3. Summarize results on the latest research relevant to the diagnosis and treatment of surgical infections
4. Illustrate the correct use of antimicrobials for empiric treatment of sepsis in surgical patients
5. Examine elements of Quality in Surgery
6. Explain the best technique for bowel prep
7. Recognize the current controversies in the diagnosis and treatment of surgical infections
8. Evaluate the use of antimicrobials for a set course in the treatment of surgical infections
9. Discuss recent developments in the study of cellular and molecular mechanisms in the pathogenesis of surgical infections

CONTINUING MEDICAL EDUCATION CREDIT INFORMATION

Accreditation
This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint providership of the American College of Surgeons and the Surgical Infection Society. The American College of Surgeons is accredited by the ACCME to provide continuing medical education for physicians.

AMA PRA Category 1 Credits™
The American College of Surgeons designates this live activity for a maximum of 21.75 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

Of the AMA PRA Category 1 Credits™ listed above, a maximum of 18.50 credits meet the requirements for Self-Assessment.

Disclosure Information
In compliance with the ACCME Accreditation Criteria, the American College of Surgeons, as the accredited provider of this activity, must ensure that anyone in a position to control the content of the educational activity has disclosed all relevant financial relationships with any commercial interest. All reported conflicts are managed by a designated official to ensure a bias-free presentation. Please see the insert to this program for the complete disclosure list.

Marketing & Exhibitor Support
The Surgical Infection Society wishes to recognize and thank the following companies for their marketing support:

Platinum:
- Pfizer
- Allergan
- Merck

Gold:
- CareFusion–BD
- IntrMax
- Applied Medical
- Acelity

Sponsors:
- 3M
- Thermo Fisher
- 3M

Marketing & Exhibitor Support
The Surgical Infection Society wishes to recognize and thank the following companies for their marketing support:
# PROGRAM

## Wednesday, May 18, 2016

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anytime</td>
<td>Speaker Ready Room</td>
<td>Phipps</td>
</tr>
<tr>
<td>Anytime</td>
<td>Committee Meetings</td>
<td>Flagler III</td>
</tr>
<tr>
<td>12:00–</td>
<td>Registration Foyer</td>
<td>Banyon</td>
</tr>
<tr>
<td>13:00–15:00</td>
<td>Executive Council</td>
<td>Banyon</td>
</tr>
<tr>
<td>15:00–18:00</td>
<td>Council Meeting</td>
<td>Banyon</td>
</tr>
<tr>
<td>18:00–18:30</td>
<td>Nominating Committee</td>
<td>Banyon</td>
</tr>
<tr>
<td>19:00–21:30</td>
<td>Presidential Dinner (By invitation)</td>
<td>The Living Room</td>
</tr>
</tbody>
</table>

## Thursday, May 19, 2016

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>06:30–07:30</td>
<td>Breakfast</td>
<td>Flagler Pre-Function</td>
</tr>
<tr>
<td>07:30–11:30</td>
<td><strong>SURGICAL INFECTION UPDATE SYMPOSIUM</strong></td>
<td>Flagler I and II</td>
</tr>
<tr>
<td></td>
<td>Moderators: Jeffrey Claridge, MD and Lillian Kao, MD</td>
<td></td>
</tr>
<tr>
<td>07:30–07:45</td>
<td>High Risk Patients (Lillian Kao, MD)</td>
<td></td>
</tr>
<tr>
<td>07:45–08:00</td>
<td>High Risk Procedures (Brian Zuckerbraun, MD)</td>
<td></td>
</tr>
<tr>
<td>08:00–08:15</td>
<td>Optimum OR Environment (John Alverdy, MD-Jack Gilbert, MD)</td>
<td></td>
</tr>
<tr>
<td>08:15–08:30</td>
<td>WHO Guidelines (Joseph Solomkin, MD)</td>
<td></td>
</tr>
<tr>
<td>08:30–08:50</td>
<td>SIS-ACS SSI Guideline (Kristin Ban, MD)</td>
<td></td>
</tr>
<tr>
<td>08:50–09:00</td>
<td>Q and A</td>
<td></td>
</tr>
<tr>
<td>09:00–09:15</td>
<td>Microbiology of Common Pathogens (Kamal Itani, MD)</td>
<td></td>
</tr>
<tr>
<td>09:15–09:30</td>
<td>Atypical SSI pathogens (Philip Barie, MD)</td>
<td></td>
</tr>
<tr>
<td>09:30–09:45</td>
<td>Basic Science-Immune Response (Carl Hauser, MD)</td>
<td></td>
</tr>
<tr>
<td>09:45–10:00</td>
<td>Q and A</td>
<td></td>
</tr>
<tr>
<td>10:00–10:15</td>
<td>Optimum Wound follow up (Heather Evans, MD)</td>
<td></td>
</tr>
<tr>
<td>10:15–10:30</td>
<td>Costs and Consequences (Charles Cook, MD)</td>
<td></td>
</tr>
<tr>
<td>10:30–10:45</td>
<td>Q and A</td>
<td></td>
</tr>
<tr>
<td>11:00–12:15</td>
<td><strong>LUNCHEON SYMPOSIUM</strong></td>
<td>Royal Poinciana 1 and II</td>
</tr>
<tr>
<td></td>
<td><em>(Industry-sponsored; not part of scientific program)</em></td>
<td></td>
</tr>
<tr>
<td>12:30–17:00</td>
<td><strong>Top Plenary Papers</strong></td>
<td>Flagler I and II</td>
</tr>
<tr>
<td></td>
<td><em>(10 minute presentation, 5 minute discussion)</em></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>The Art and Science of Surgical Infections</strong> (Papers 1–11)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Moderators: John C. Alverdy, MD, and John E. Mazuski, MD, PhD</td>
<td></td>
</tr>
</tbody>
</table>
O1. Impact of Extended versus Short Course Peri-operative Antibiotics on Surgical Site Infection in Liver Transplant Patients. Puja M. Shah (Resident), presenting. University of Virginia.  
   Discussant: Pamela Lipsett, MD

   Discussant: Philip Barie, MD

   Discussant: Rachel Khadaroo, MD

O4. Prospective Surgical Site Infection Prevention Bundle Project in a High Outlier Institution. Emre Gorgun, (New Member) presenting. Cleveland Clinic.  
   Discussant: Mark Malangoni, MD

   Discussant: William Cheadle, MD

   Discussant: John Alverdy, MD

O7. Comparison of Infection Rate in 1:1 vs. 4:1 Packed Red Blood Cell to Fresh Frozen Plasma Transfusion Strategy During Burn Excision. Tina Palmieri, presenting. University of CA, Davis & Shriners Hospital for Children Northern CA.  
   Discussant: Basil Pruitt, MD

O8. Use of StO2 Monitoring In Conjunction with Sepsis Screening Tool to Improve Early Recognition of Sepsis. Natacha Villegas (New Member), presenting. The University of Texas HSC Houston TX.  
   Discussant: Nick Namias, MD

   Discussant: Kevin Mollen, MD

   Discussant: John Marshall, MD

   Discussant: Michaela West, MD

Thursday, May 19, 2016

17:00–18:00 Committee Meetings  Flagler III
18:00–19:00 SIS Foundation Board Meeting *(By Invitation)* Banyon
18:00–19:00 OASIS Global Meeting: Exploring Clinical Research in Low and Middle Income Health Care Mizner
19:00–20:30 Welcome Reception Poolside

Friday, May 20, 2016

07:00–08:00 Breakfast Royal Poinciana I and II
07:00–08:00 Breakfast Symposium Royal Poinciana I and II  
   *(Industry-sponsored; not part of scientific program)*
08:00–09:45 SESSION I (Papers 12–18) (10 minute presentation, 5 minute discussion) Flagler I and II  
   Moderators: Gregory Beilman, MD, and Rachel Khadaroo, MD
O12. Comparative genomics and phenotype analysis of paired Enterococcus faecalis strains isolated from rat colon tissues at the time of surgery and from leaking anastomoses. Kristina Guyton (Resident/New Member), presenting. University of Chicago.  
   Discussant: Gregory Beilman, MD

   Discussant: Donald Fry, MD

O14. Does the Addition of Endoscopic Retrograde Cholangiopancreatography (ERCP) to Cholecystectomy Affect the Rate of Surgical Site Infection? Michele Loor (New Member), presenting. University of Minnesota Medical Center.  
   Discussant: Carl J. Hauser, MD

   Discussant: Sara Buckman, MD

   Discussant: Jared Huston, MD

O17. Current Pneumonia Surveillance Methodology: Similar Underestimation in Trauma and Surgical ICU Patients. Brenda Zosa (Resident), presenting. MetroHealth Medical Center, Case Western Reserve University School of Medicine.  
   Discussant: Therese Duane, MD

O18. Hypertonic saline infusion after damage control laparotomy is not associated with risk of organ-space surgical site infection. Ronald Chang (Resident), presenting. University of Texas Medical School at Houston.  
   Discussant: Jeffrey Shupp, MD

09:45–10:00 BREAK-Visit the Exhibits
10:00–11:00 William A. Altemeier Memorial Lecture Flagler I and II  
   “Invisible Influence: The Microbiome in Surgery”  
   Jack Gilbert, Ph.D.  
   Professor of Surgery  
   Department of Ecology & Evolution  
   Department of Surgery—University of Chicago

11:00–12:00 Surgical Infection Society Presidential Address Flagler I and II  
   “Beyond Guidelines”  
   John Mazuski, MD, PhD  
   Professor of Surgery, Washington University in Saint Louis  
   School of Medicine.

12:00–13:15 LUNCHEON SYMPOSIUM Royal Poinciana I and II  
   (Industry-sponsored; not part of scientific program)

13:30–15:00 SESSION II (Papers 19–24) (10 minute presentation, 5 minute discussion) Flagler I and II  
   Moderators: Daithi Heffernan, MD  
   and Sandy Swoboda, RN, MSN

   Discussant: Fredric Pieracci, MD
O20. Primary Closure of High Risk Abdominal Incisions, Safer Than We Thought. 
Jack He (Resident), presenting. MetroHealth Medical Center Case Western Reserve University School of Medicine.  
*Discussant: Nicole Stassen, MD*

O21. Significance of TCRγδ T cells to control secondary lung infection after injury. 
Kazuma Yamakawa (Resident), presenting. Brigham & Women’s Hospital.  
*Discussant: Matt Rosengart, MD*

Christopher Guidry (Resident), presenting. UVA Health System.  
*Discussant: Lillian Kao, MD*

O23. Comparison of Delafloxacin (DLX) and Vancomycin (VAN) in Treatment of Obese Patients with Acute Bacterial Skin and Skin Structure Infections (ABSSSI). 
Sue Cammarata, presenting. eStudySite, San Diego, CA.  
*Discussant: Vanessa Ho, MD*

*Discussant: Amy McDonald, MD*

15:00–15:15 Break-Visit the Exhibits

15:15–17:00 SESSION III (Papers 25–31) (10 minute presentation, 5 minute discussion)  
*Flagler I and II*

**O25.** Early routine bronchoalveolar lavage improves outcomes for a select cohort of intubated trauma patients. 
Tyler Loftus (Resident), presenting. University of Florida Health, Gainesville.  
*Discussant: Soumitra Eachempati, MD*

**O26.** Survival From Traumatic Injury Does Not End At Hospital Discharge - Hospital Acquired Infections Increase Post Discharge Mortality. 
Nitasha Dhiman (New Member), presenting. Virginia Tech Carilion School of Medicine.  
*Discussant: Kaysie Banton, MD*

**O27.** Synthetic vs Biologic Mesh in Single-Stage Repair of Complex Abdominal Wall Defects in a Contaminated Field. 
Eden A Nohra (New Member), presenting. Washington University in St Louis.  
*Discussant: Heather L. Evans, MD*

**O28.** CaMKIV regulates mitophagy during AKI. 
*Discussant: Alfred Ayala, PhD*

**O29.** Clinical Outcomes of Short-Course Versus Long-Course Treatment With Ceftolozane/Tazobactam and Meropenem for Complicated Intrabdominal Infections. 
Joseph Solomkin, presenting. University of Cincinnati College of Medicine.  
*Discussant: E. Patchen Dellinger, MD*

**O30.** Monitoring Anastomotic Healing: Microbial and inflammatory mediator analysis of endoscopic lavage of human colon anastomoses. 
Kristina Guyton (Resident/New Member), presenting. University of Chicago.  
*Discussant: Traci Hedrick, MD*

17:00–18:00 Annual Business Meeting (Members only) Flagler I and II
18:15–19:30 Surgical Infections Editorial Reception (By Invitation) Grazc

Saturday, May 21, 2016

07:00–08:00 Executive Council Meeting (By invitation) Banyon
07:00–08:00 Breakfast Royal Poinciana I and II
08:00–09:00 UPDATE SYMPOSIUM II Flagler I and II
Vivek Prachand, MD “Quality: Onerous Fad or Actionable Opportunity”
Moderator: John Alverdy, MD

09:00–10:15 UPDATE SYMPOSIUM III Flagler I and II
PRO-CON DEBATES
Moderators: Mike Liang, MD and Jeffrey Claridge, MD

DEBATE: Colectomy: To Prep or Not To Prep
Traci Hedrick, MD vs. Brian Zuckerbraun, MD

DEBATE: Uncomplicated Appendicitis: Surgery or Antibiotics?
Lillian Kao, MD vs. Jared Huston, MD

10:15–10:30 BREAK–Visit the Exhibits

10:30–10:45 FELLOWSHIP AWARD RECIPIENT PRESENTATIONS Flagler I and II

Moderators: Philip S. Barie, MD, MBA and Kevin P. Mollen, MD

SIS Foundation Basic or Translational Research Training Fellowship-2015
Kristina L. Guyton, MD
University of Chicago

SIS Foundation Clinical Research Training Fellowship-2015
Michelle I. Scerbo, MD
University of Texas Health Science Center at Houston

SIS Foundation Junior Faculty Fellowship-2015–2016
Meihong Deng, MD
University of Pittsburgh

10:45–12:00 SESSION IV (Papers 32–37) (10 minute presentation, 5 minute discussion) Flagler I and II
Moderators: Jill Cherry, MD and David P. Blake, MD

O32. Acid Suppressive Therapy and C. difficile Infection: Beyond Gastric pH Effects. Samantha Tarras (New Member), presenting. Wayne State University. Discussant: Brian Zuckerbraun, MD

O34. Timing of Surgical Site Infections Following Ventral Hernia Repair.
Julie Holihan (Resident), presenting. University of Texas Health Science Center at Houston.
   Discussant: Joseph Golob, MD.

O35. Antibiotic Impregnated Central Venous Catheters Do Not Change Antibiotic Resistance Patterns.
Isaiah Turnbull (New Member), presenting. Washington University School of Medicine.
   Discussant: Laura Kreiner, MD

Paul Waltz (Resident), presenting. University of Pittsburgh.
   Discussant: Daithi Heffernan, MD

O37. Does Compliance with Antibiotic Prophylaxis for Pediatric Simple Appendicitis Matter?
Krislynn Mueck (Resident), presenting. University of Texas Health Science Center at Houston.
   Discussant: Joe Sharma, MD

O38. Variability in Antibiotic Regimens for NEC Highlight the Need for Strict Guidelines.
Brian Blackwood (New Member), presenting. Ann and Robert H. Lurie Children’s Hospital of Chicago.
   Discussant: Kevin Mollen, MD

   Discussant: Brian Blackwood, MD

O40. G-protein genes are altered in children with septic shock.
   Discussant: Katherine Davenport, MD

Jordan Bowling (Resident), presenting. Children’s Hospital of Los Angeles.
   Discussant: Catherine Hunter, MD

Arthur Celestin (Resident), presenting. Beth Israel Deaconess Medical Center, Harvard Medical School.
   Discussant: Michael George DeBusk, MD

O43. No Difference in Outcomes of Fungal IAI with a 4 Day Treatment Regimen.
Nathan Elwood (Resident), presenting. University of Virginia.
   Discussant: David Blake, MD

O44. Duration of Antimicrobials For Intraabdominal Infection Does Not Prevent Treatment Failure Among High-Risk Patients.
Taryn Hassinger (Resident), presenting. University of Virginia Health System.
   Discussant: Jill Cherry, MD

O45. Age and Its Impact on Outcomes with Intraabdominal Infection.
Drew Farmer (Resident/New Member), presenting. Baylor University Medical Center at Dallas.
   Discussant: Mark Shapiro, MD

12:00–13:15 LUNCHEON SYMPOSIUM
   Royal Poinciana I and II
   (Industry-sponsored; not part of scientific program)

13:30–15:30 Topic Selected Papers Pediatric and STOP-IT (Papers 38–45)
   Flagler I and II
   Moderators: Rob Sawyer, MD, Kevin Mollen, MD
   and Catherine Hunter, MD
15:30–17:30 POSTER SESSION (Posters 1–69)
Basic and Clinical Studies in Surgical Infection
Flagler III and Royal Poinciana III

Moderators:

Group 1: Cell Biology (P10–P18)
Brian Eliceiri, PhD and Celeste Finnerty, PhD

Group 2: Outcomes I (P19–P27)
Phillip Chang, MD and Chaitan Narsule, MD

Group 3: Pathogens I (P36–P44)
Philip Barie, MD and Jeff Tessier, MD

Group 4: Wounds and Incisions I (P54–P61)
Mike Liang, MD and Christopher Gayer, MD, PhD

Group 5: Antibiotics (P1–P9)
Vanessa Ho, MD and Phil Efron, MD

Group 6: Outcomes II (P28–P35)
Kaysie Banton, MD and Laura Kreiner, MD

Group 7: Pathogens II (P45–P53)
William Cheadle, MD and Kristina Guyton, MD

Group 8: Wounds and Incisions II (P62–P69)
Jeffrey W. Shupp, MD and William Symons, MD

19:00–19:45 Meet the New Member Reception
Royal Poinciana I and II

19:45–22:00 Awards Banquet
Royal Poinciana I and II

22:00 ADJOURNMENT
Oral Presentation Abstracts

O01. IMPACT OF EXTENDED VERSUS SHORT COURSE PERI-OPERATIVE ANTIBIOTICS ON SURGICAL SITE INFECTION IN LIVER TRANSPLANT PATIENTS

Pujah Shah, University of Virginia; Laura Rosenberger, Memorial Sloan Kettering; Christopher Gaudry, University of Virginia; Robert Sawyer, University of Virginia HS.

Background: The appropriate duration of surgical antibiotic prophylaxis in orthotopic liver transplant (OLT) is unclear, and an extended course of perioperative antibiotics may provide protection against infections specifically among these immunocompromised patients.

Hypothesis: We hypothesized that 72 hours of peri-operative antibiotic prophylaxis would decrease rates of surgical site infection (SSI) in an OLT population when compared to intra-operative antibiotic prophylaxis alone.

Methods: We randomized OLT recipients to receive either 72 hours of perioperative antibiotics (extended antibiotics- EA) or intra-operative antibiotics only (short antibiotics- SA). Continuous variables were analyzed using Student’s t-test or Wilcoxon’s Rank Sum, and categorical variables were analyzed with Chi-square test. Kaplan-Meier analysis identified time to infection for the two arms.

Results: 102 patients were randomized—52 to the EA and 50 to SA. Randomization was successful for age, gender, body mass index, race, model for end stage liver disease scores, pre-operative steroid use, and patients on maintenance antibiotics. Rates of SSI and nosocomial infection (NI) were lower in the SA group, though these differences were not statistically significant (Table). Piperacillin-tazobactam was administered to 66% of all patients needing additional antibiotics. Intensive care unit (ICU) lengths of stay (LOS), hospital LOS, 30-day mortality, and time to infection were also similar between the two groups. Patients developing infection had longer ICU LOS, hospital LOS and a higher association with re-operation, ERCP, and 30-day readmission (Table).

Conclusions: Contrary to our hypothesis, extending the course of peri-operative antibiotics to 72 hours from intra-operative dosing alone in OLT patients does not appear to decrease the incidence of SSI or NI. Although a larger, multicenter, randomized trial is required to verify these results, our data imply that the likelihood of finding a clinically relevant difference is low. These results suggest that it is acceptable for OLT recipients to receive intra-operative antibiotic prophylaxis alone.

Table. Intention to treat outcome results in liver transplant patients.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Extended Prophylaxis</th>
<th>Short Prophylaxis</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical Site Infection</td>
<td>13 (26%)</td>
<td>9 (19%)</td>
<td>0.39</td>
</tr>
<tr>
<td>Nosocomial Infection</td>
<td>18 (37%)</td>
<td>15 (31%)</td>
<td>0.57</td>
</tr>
<tr>
<td>ICGP LOS††† (median, IQC)</td>
<td>2 (1.4)</td>
<td>3 (2.4)</td>
<td>0.45</td>
</tr>
<tr>
<td>Hospital LOS (median, IQC)</td>
<td>7 (6, 12)</td>
<td>7 (5, 12)</td>
<td>0.83</td>
</tr>
<tr>
<td>Mortality</td>
<td>1 (2%)</td>
<td>1 (2%)</td>
<td></td>
</tr>
<tr>
<td>Time to Infection</td>
<td>7 (1, 12)</td>
<td>6 (3, 10)</td>
<td>0.39</td>
</tr>
</tbody>
</table>

Developed NI* No Infection 2 (2.5) 2 (1.4) 0.03*

ICGP LOS (median, IQC) 12 (9, 20) 7 (5, 9) <0.0001

Hospital LOS (median, IQC) 11 (33%) 10 (16%) 0.03

Re-operation (N, %) 11 (33%) 7 (11%) 0.01

ICG (N, %) 15 (45%) 8 (13%) 0.0003

30-Day Readmission (N, %)

Conclusions: The combination of short-term starvation, surgical injury and antibiotic use eliminates the normal microbiota in intestinal crypts providing opportunity for hospital pathogens to occupy these critical niches. The consequence of this process is a disruption of epithelial stem cell function which may have far reaching implications on host immune homeostasis.

O02. SURGICAL INJURY DEPLETES CECAL CRYPTS OF THEIR MICROBIOTA AND IS ASSOCIATED WITH PATHOADAPTIVE ACTIVATION OF STEM CELLS DURING GUT-DERIVED SEPSIS

Alexander Zaborin, The University of Chicago; Jennifer DeFazio, University of Chicago; Sanjiv Hyoju, University of Chicago; Monika Krezałek, University of Chicago; Vyta Bindokas, University of Chicago; Olga Zaborina, University of Chicago; John Alverdy, University of Chicago.

Background: The normal microbiota provide tonic stimulation to the host immune system to protect against sepsis. The spatial context and mechanism of this action remains unknown.

Hypothesis: Here we hypothesized that loss of the normal microbiota within cecal crypts during surgical injury causes a defect in epithelial regeneration creating a high risk environment for the development of gut-derived sepsis.

Methods: We used a mouse model of gut-derived sepsis in which mice undergo a short period of pre-op starvation (H2O only), antibiotic administration (IM cefoxitin) and a 30% hepatectomy with intracecal injection of a 4-pathogen community to mimic major surgical intervention with exposure to hospital pathogens. This prep results in >50% mortality rate due to sepsis and a near 100% rescue when a fecal transplant is administered. To examine the spatial location of microbiota and pathogens, cecal crypts were analyzed by scanning electron microscopy and fluorescent in situ hybridization. In situ hybridization was used to probe for Lgr5, a biomarker of epithelial stem cells.

Results: In this multiple hit model of surgical injury we observed complete emptying of cecal crypts of their microbiota. This was not observed in mice starved alone, given antibiotics alone or both. When hepatectomy alone was performed, spotty areas of cecal crypts were emptying of the microbiota were observed. In mice undergoing the multiple hit model (starvation + antibiotic + hepatectomy), the expression of Lgr5 was highly activated and Lgr5+ cells were abnormally distributed along the villous tips of empty crypts (n = 2000 crypt/group, p < 0.001). In this group, the introduced pathogen community then occupied the empty crypts which resulted in a significant increase in TUNEL+ cells (n = 2000 crypt/group, p < 0.001). Mice administered a fecal transplant at 24hrs following the introduction of the pathogen community were protected against mortality in association with microbiota re-colonizing the crypts (n = 5 mice/group, 100 crypts/mice). The normalization of Lgr5 expression and localization was reversed in mice displaying re-colonization of their crypts by microbiota (n = 2000 crypts/group, p < 0.01).

Conclusions: The combination of short-term starvation, surgical injury and antibiotic use eliminates the normal microbiota in intestinal crypts providing opportunity for hospital pathogens to occupy these critical niches. The consequence of this process is a disruption of epithelial stem cell function which may have far reaching implications on host immune homeostasis.

O03. ORAL POLYPHOSPHATE AS NON-ANTIBIOTIC APPROACH TO PREVENT ANASTOMOTIC LEAK

Sanjiv Hyoju, University of Chicago; Robin Klabbers, Radboud University Nijmegen, Netherlands; Melissa Arron, Radboud University Nijmegen, Netherlands; Monika Krezałek, University of Chicago; Olga Zaborina, University of Chicago; John Alverdy, University of Chicago.

Background: Anastomotic leak is the most feared and disabling complication following intestinal surgery. Previous work from our lab demonstrated that collagenolytic bacteria present on anastomotic tissues can contribute to the pathogenesis of anastomotic leak. We have demonstrated that phosphate is a universal “cue” that regulates bacterial virulence: phosphate deficiency can activate bacterial virulence whereas local phosphate abundance suppresses virulence.

Hypothesis: We hypothesize that inorganic hexamer polyphosphate (PPi-6) can deliver phosphate to the colon and prevent collagenolytic bacteria from causing an anastomotic leak.

Methods: We developed a mouse model of anastomotic leak using a high collagenase producing bacterium Serratia marcescens isolated from the stool of a critically ill patient. First, in vitro experiments were performed to determine if PPi-6 can suppress S. marcescens collagenase production. Next, groups of mice were randomly assigned to receive either 1% PPi-6 in the drinking water or water alone. Mice were sacrificed at postoperative day (POD) 10 and the anastomotic healing score was calculated (0 = normal healing, 1 = loose adhesions, 2 = dense adhesions/inflammation, 3 = abscess with dense adhesions/inflammation, and 4 = gross leak).

Conclusions: The combination of short-term starvation, surgical injury and antibiotic use eliminates the normal microbiota in intestinal crypts providing opportunity for hospital pathogens to occupy these critical niches. The consequence of this process is a disruption of epithelial stem cell function which may have far reaching implications on host immune homeostasis.
Results: In vitro studies demonstrated that 1% PPi-6 completely suppressed S. marcescens collagenase production without affecting its growth (n = 15, p < 0.001, 3 independent experiments). Mouse experiments demonstrated that mice drinking water only had a poor healing score of 3 ± 0.21 compared to a good healing score of 1 ± 0.21 for mice drinking PPi-6 (p < 0.0001, t-test). Among the 10 control mice drinking water only, 20% developed anastomotic leakage (score = 4) characterized by a visible anastomotic disruption and peritoneal contamination while 40% developed transmural abscesses with dense adhesions (score = 3). Mice drinking PPi-6 displayed significantly improved anastomotic healing with only 2 of 10 mice developing dense adhesions (score = 2), while 6 mice had only mild adhesions (score = 1). The remaining 2 mice demonstrated normal anastomotic healing (score = 0). Histologic and microbiobiologic assays are pending.

Conclusions: Oral polyphosphate protects mice from S. marcescens-induced anastomotic complications perhaps owing to its ability to locally suppress collagenase, an enzyme we previously showed is required for microbe-mediated anastomotic leak. Further work is ongoing to elucidate the mechanisms of PPi-6 protection against anastomotic leak.

O04. PROSPECTIVE “SURGICAL SITE INFECTION PREVENTION BUNDLE PROJECT” IN A HIGH OUTLIER INSTITUTION
Emre Gorgun, Department of Colorectal Surgery, Digestive Disease Institute, Cleveland Clinic; Ahmet Rencuzogullari, Department of Colorectal Surgery, Digestive Disease Institute, Cleveland Clinic; Volkan Orben, Department of Colorectal Surgery, Digestive Disease Institute, Cleveland Clinic; Luca Stocchi, Department of Colorectal Surgery, Digestive Disease Institute, Cleveland Clinic; Thomas Fraser, Departments of Infections Diseases, Quality and Patient Safety Institute, Cleveland Clinic; Feza Remzi, Department of Colorectal Surgery, Digestive Disease Institute, Cleveland Clinic

Background: Surgical site infections (SSI) are the most common hospital-acquired infection after colorectal surgery, and increase morbidity, mortality and hospital costs. The aim of this study was to investigate the impact of preventive measures on colorectal SSI rates in a high volume institution with inherent high-risk procedures.

Hypothesis: Considerable reduction in surgical site infection rates can be achieved by implementing preventive measures with a high compliance rate.

Methods: The “SSI Prevention Bundle Project” was implemented in our colorectal surgery department in February 2014. This bundle includes 14 pre-, intra- and post-operative measures aimed to reduce colorectal SSI occurrence (Figure). A SSI data collection sheet was developed and used to track progress. One-year outcomes were compared with those from a pre-bundle period.

Results: From February 2013 to February 2015, 2279 abdominal colorectal surgical procedures were performed; 986 (43.3%) during the pre-bundle period (February 2013 to February 2014) and 1292 (56.7%) after the bundle project was started (February 2014 to February 2015). Patient characteristics and comorbidities were similar in both periods. Compliance to preventive measures ranged between 75% and 99% during the bundle period. The overall SSI rate decreased from 11.8% at pre-bundle to 6.5% at bundle period (p < 0.001). Although decrease for all types of SSIs was observed after the bundle implementation, a significant reduction was only achieved in organ-space SSI subgroup (5.5% to 1.8%; p < 0.001). The logistic regression models for overall SSI are given in Table.

Conclusions: The prospective SSI Prevention Bundle Project resulted in a substantial decline in SSI rates in our colorectal surgery department. Collaborative and enduring efforts among multiple providers are critical to achieve a sustained SSI reduction.

O05. REMOTE ISCHEMIC PRECONDITIONING PROTECTS THE LIVER FROM HEMORRHAGIC SHOCK/REPERFUSION BY ACTIVATION OF NRF2/HEME-OXYGENASE 1 AND AUTOPHAGY
Chung Ho Leung, University of Toronto; Christopher Caldarelo, Hospital for Sick Children; Ori Rotstein, St. Michael’s Hospital

Background: Oxidative stress resulting from hemorrhagic shock/reperfusion contributes a major role to the development of organ injury. We have previously reported that transient ischemia/reperfusion in the limb known as remote ischemic preconditioning (RIPC) conferred organ protection following a murine model of hemorrhagic shock/reperfusion. To examine the potential mechanisms, we evaluated the role of antioxidant proteins and autophagy in RIPC mediated liver protection.

Hypothesis: Activation of the transcription factor Nrf2 and its downstream antioxidant proteins, and autophagy are protective mechanisms of RIPC.

Methods: Male C57BL/6 mice were subjected to hemorrhagic shock at MAP of 30 mmHg for two hours followed by resuscitation with shed blood plus lactated Ringer’s solution. RIPC was performed prior to hemorrhage by occlusion of the left hindlimb with a tourniquet for four cycles of 5-minute ischemia and 5-minute reperfusion. Serum alanine aminotransferase (ALT), expression of Nrf2 and antioxidant proteins, and activity of autophagy were evaluated in the liver at two hours after reperfusion.

Results: Hemorrhagic shock/reperfusion resulted in liver injury with a significant rise in serum ALT (606 ± 176 U/L) compared to adjacent non-BAC treated segments (p < 0.001). Although decrease for all types of SSIs was observed after bundle implementation, a significant reduction was only achieved in organ-space SSI subgroup (5.5% to 1.8%; p < 0.001). The logistic regression models for organ-space SSI are given in Table.

Conclusions: RIPC prevents organ injury by evoking a robust Nrf2 antioxidant pathway and autophagy in response to hemorrhagic shock. Endogenous induction of antioxidant capacity by remote ischemic conditioning has potential to improve outcome in trauma patients.
007. COMPARISON OF INFECTION RATE IN 1:1 VS. 4:1 PACKED RED BLOOD CELL TO FRESH FROZEN PLASMA TRANSFUSION STRATEGY DURING BURN EXCISION

Tina Palmieri, University of CA, Davis & Shriners Hospital for Children Northern CA; Soman Sen, Shriners Hospital for Children Northern California and the University of California Davis. David Greenhalgh, Shriners Hospital for Children Northern California and the University of California Davis

Background: Burn patients lose 2% blood volume per percent burn excised; hence, massive blood loss (>50% total blood volume) frequently occurs during major burn excisions. This prospective randomized controlled trial compared the impact of a 1:1 versus a 4:1 packed red cell/fresh frozen plasma (PRBC/FFP) transfusion strategy on infection in children with >20% total body surface area (TBSA) burn excision.

Hypothesis: We hypothesize that patients in the 1:1 group will have a lower incidence of infection.

Methods: Children with >20% TBSA burn were randomized to a 1:1 or 4:1 PRBC/ FFP ratio during burn excision. Parameters measured on admission included demographic, burn size, and Pediatric Risk of Mortality (PRISM) scores. Total blood products transfused during operative interventions and during hospitalization were recorded. Blood stream infections (BSI), urinary tract infections (UTI), and pneumonia (PNU), were recorded. Burns were categorized by using the burn consensus guideline for infection.

Results: A total of 45 children were randomized into the two groups (22 in the 1:1 and 23 in the 4:1 group). Mean age (6.9 ± 0.11 vs. 6.8 ± 0.1 years), total body surface area (38.05 ± 0.19 vs. 42.48 ± 0.23%), and admission Sepsis Score (9.8 vs. 12.1) did not differ between groups. Children in the 1:1 group received a total of 193 units PRBC and 150 units FFP during hospitalization compared to 332 units PRBC and 59 units FFP in the 4:1 group. Intraoperatively each patient in the 1:1 group received a mean of 4.6 ± 0.95 PRBC and 4.4 ± 0.11 FFP while the 4:1 group received 8.1 ± 2.0 PRBC and 2.8 ± 0.6 FFP. Children in the 1:1 group had an overall lower number of infections (43 vs. 64), fewer BSI (9 vs. 18), PNU (13 vs. 21), and no difference in UTI (14 vs. 15).

Conclusions: During burn excision a 1:1 PRBC/FFP transfusion strategy, compared to a 4:1 strategy, resulted in less PRBC use and a lower incidence of BSI and PNU. Further study is warranted.

008. USE OF STO2 MONITORING IN CONJUNCTION WITH SEPSIS SCREENING TOOL TO IMPROVE EARLY RECOGNITION OF SEPSIS

Natacha Villegas, The University of Texas HSC Houston TX; John Holcomb, The University of Texas HSC Houston TX; Charles Wade, The University of Texas HSC Houston TX; Michael Swartz, The University of Texas HSC Houston TX; Laura Moore, The University of Texas HSC Houston TX

Background: In the United States, sepsis develops in 10% of patients admitted to ICUs, and in 2% of all hospitalized patients, with a total of 750,000 cases annually. It was the most expensive condition treated in 2011, and the estimated mortality rate from septic shock is 20–30%.

Sepsis is defined as meeting the Systemic Inflammatory Response Syndrome (SIRS) criteria plus suspected or confirmed infection. New methods are needed to detect sepsis earlier, as studies show that early interventions lead to better outcomes. Two new devices have been developed to detect sepsis: the Sepsis Screening Tool (STST), a validated scoring system (figure 1), and the Sto2 (tissue oxygen saturation) monitor.

Hypothesis: We hypothesize that the combined use of the Sepsis Screening Tool and Sto2 monitoring could allow for earlier recognition of sepsis in patients admitted to the shock trauma ICU (STICU).

Methods: Sepsis leads to vasogenic shock, which results in hypoperfusion that can be detected by the Sto2 Monitor. This device works by placing a sensor in the thenar eminence, where near infrared spectroscopy detects the percent hemoglobin saturation in the tissues, not in the arteries as does the pulse oximeter. Sepsis was considered present if the Sto2 values were below 75% or above 90%, and for the STST if the score was above 4.

Results: A total of 91 patients were included in the study, with a mean age of 47, 6 total deaths, 36% female participants, and sepsis incidence of 26%. As per the statistical analysis, the Sepsis Screening Tool by itself had a specificity of 83%, while the combined test had a specificity of 96% (p-value: 0.0002). The difference in sensitivity for the two tests was not statistically significant (p-value: 0.1398).

Conclusions: The improved specificity allows for the earlier detection of sepsis with more confidence. This has powerful implications as it could lead to earlier interventions and thus better outcomes. As sepsis continues to be an important threat to patients in the ICU, a protocol that improves sepsis outcomes could have a tremendous impact in ICU costs, morbidity and mortality.

009. EP2 RECEPTOR BLOCKADE DECREASES THE INCIDENCE AND SEVERITY OF EXPERIMENTAL NECROTIZING ENTEROCOLITIS

Jamie Golden, Children’s Hospital Los Angeles; Laura Illingworth, Children’s Hospital Los Angeles; Patil Kavarian, Children’s Hospital Los Angeles; Jordan Bowling, Children’s Hospital Los Angeles; Brandon Bowling, Children’s Hospital Los Angeles; Monica Loa, Children’s Hospital Los Angeles; Osvaldo Escobar, Children’s Hospital Los Angeles; Joaana Lim, Children’s Hospital Los Angeles; Christopher P. Gayer, Anatoly Grishin, Henri Ford, Children’s Hospital of LA, University of SC.

Background: Low levels of cyclooxygenase-2 (COX-2) and its product, prostaglandin E2 (PGE2), play a critical role in intestinal homeostasis while high levels of COX-2 and PGE have been implicated in the pathogenesis of necrotizing enterocolitis (NEC). PGE2 acts on 4 EP receptors (EP1-EP4) with different downstream effects. modulation of COX-2 and PGE2 levels may be a potential treatment for NEC; yet global inhibition of COX-2 may be detrimental to intestinal barrier function. Previous work in our lab has shown that COX-2 can be induced by PGE2 via EP2 receptor activation in vitro likely contributing to the high levels of COX-2 and runaway inflammation seen in NEC.

Hypothesis: We hypothesized that selective EP2 inhibition, but not global inhibition of COX-2, would decrease the incidence and severity of experimental NEC.

Methods: Neonatal rat pups were subjected to a regimen of formula deprivation and hypoxia three times daily for 4 days. Formula contained a known NEC pathogen, Cronobacter maiiyiensii (CM), at 10^7 CFU with or without the COX-2 inhibitor, Celecoxib 0.1 mg/kg/day, or EP2 antagonist PP-04418948 10 mg/kg/day. Terminal bleeding time was harvested on day of life 4 for NEC scoring, real time PCR analysis, and histological staining.

Results: A score of 2 or greater was considered NEC.

Conclusions: EP2 receptor inhibition, but not COX-2 inhibition, decreases the incidence and severity of experimental NEC. An EP2 receptor antagonist also decreases COX-2 protein expression and mRNA expression in terminal ileal samples. This suggests that blocking specific downstream effects of COX-2 and PGE2 via EP2 may inhibit the inflammatory cascade seen in NEC while maintaining the homeostatic properties of COX-2. Treatment with an EP2 receptor antagonist may have important therapeutic implications in the treatment of NEC.

010. PLATELET-TLR4 KNOCK OUT DOES NOT AFFECT BACTERIAL CLEARANCE IN PATHOGENIC POLYMORPHONUCLEAR SEPSIS AND AMELIORATES ENDOTOXIC SHOCK

Hui Zhou, Meichung Deng, Neil Matthew, Melanie Scott, Timothy Billiar, University of Pittsburgh

Background: Platelets express the cell surface LPS receptor, toll-like receptor 4 (TLR4). In addition, TLR4 on platelets is known to contribute to PMN clearance in the setting of abdominal sepsis.

Hypothesis: We hypothesize that platelet TLR4 knockout would contribute to bacterial clearance in the setting of abdominal sepsis.

Methods: We constructed platelet specific TLR4 knockout mice by crossing TLR4 flox mice with or without the COX-2 inhibitor, Celecoxib, with mice expressing the Cre recombinase driven by PF4. We have previously confirmed platelet-specific TLR4 deletion in this strain. We assessed bleeding time and other coagulation parameters as well as the response of the mice to a systemic LPS injection. We also carried out cecal ligation and puncture (CLP) without antibiotics in control (TLR4 flox mice) and platelet-specific TLR4 knockout mice.

Results: Platelet-specific TLR4 knockout mice demonstrated increased bleeding time; however, normal prothrombin, activated partial thromboplastin time and thrombin time. In ex vivo studies, TLR4 knockout platelets demonstrated suppressed platelet aggregation confirming the role of TLR4 in platelet responses. Platelet-specific TLR4 knockout mice injected with LPS exhibited a marked reduction in circulating IL-6 and IL-1β levels at 6 and 18 hours. Furthermore, the circulating platelet number, WBC, and total neutrophil numbers were higher in the platelet-specific TLR4 knockout mice; however, the number of platelets in the peripheral blood was not different from control. Treatment with TLR4 knockout platelets led to a statistically significant increase in bacterial clearance in the peritoneum and blood indicating that platelet TLR4 was not contributing to bacterial clearance in the setting of intra-abdominal polymicrobial sepsis.

Conclusions: TLR4 on platelets plays an important role in regulating inflammation in response to TLR4 agonists, such as LPS. However, TLR4 on platelets is not required for normal bacterial clearance mechanisms in the setting of CLP. This is most likely explained by the redundancy in functions of pattern recognition receptors on platelets for anti-microbial responses.

011. CXCR4 BLOCKADE DECREASES INNATE AND ADAPTIVE IMMUNE CELL EXHAUSTION IN MURINE POLYMORPHONUCLEAR SEPSIS

Kimberly Ramonell, Emory University; Annette Hadley, Emory University; Kevin McConnell, Emory University
Background: Sepsis triggers extensive apoptosis-induced depletion of immune effector cells including T cells, B cells, and dendritic cells. Many remaining cells take on a dysfunctional or “exhausted” phenotype, characterized by increased expression of negative co-inhibitory markers such as programmed cell death (PD-1) on lymphocytes, and its ligand PD-L1 on monocytes, macrophages, and dendritic cells. Decreasing or preventing immune cell exhaustion restores immune competency and improves survival in murine sepsis. Our previous studies show that septic mice treated with plexiforax, a chemokine receptor 4 (CXCR4) antagonist, have a significant survival advantage over septic control mice.

Hypothesis: We hypothesized that the survival benefit of plexiforax treatment may be due to modulation of sepsis-induced immune cell exhaustion.

Methods: Male C57BL/6 mice underwent 2x25 cecal ligation and puncture (CLP). Two groups were compared: (1) CLP + vehicle, (2) CLP + plexiforax (5 mg/kg, SQ) 1-hour post-sepsis. All mice received ceftriaxone and metronidazole. Spleens were harvested at 24 hours and spleocytes were stained with fluorescently conjugated mAbs for the following markers: CD3, CD4, CD8, F4/80, CD11c, CD11b, PD-1, and PD-L1. Data was collected on an LSRII Flow Cytometer and analyzed on FlowJo.

Results: Plexiforax administration significantly decreased the percentage of PD-1 expressing CD4+ T cells (1.7% vs. 3.3%, p < 0.05) and PD-L1 expressing CD11b+ monocytes (16.7% vs. 30.1%, p < 0.05) compared to septic controls. Plexiforax administration resulted in a trend toward decreased PD-1 expressing CD8+ T cells (p = 0.0644), PD-L1 expressing CD11c+ dendritic cells (p = 0.0075), and PD-L1 expressing F4/80+ macrophages (p = 0.0657) compared to septic controls.

Conclusions: CXCR4-blockade decreases markers of exhaustion in both innate and adaptive immune cells. Specifically, plexiforax significantly decreases the percentage of exhausted CD4 lymphocytes and monocytes in septic mice. These results provide a potential mechanism for plexiforax improving survival in murine sepsis and deserves further study to evaluate the therapeutic role of CXCR4-blockade in sepsis-induced immune dysfunction.

O13. MODELING THE “TROJAN HORSE HYPOTHESIS” OF MRSA SURGICAL WOUND INFECTIONS: THE ROLE OF THE GUT

Monika Krezalek, University of Chicago; Emeka Okafor, University of Chicago; Susan Boyle-Vavra, University of Chicago; Sanjiv Hira, University of Chicago; Kristina Guyton, University of Chicago; Olga Zaborina, University of Chicago; John Alverdy, University of Chicago

Background: Methicillin-resistant staphylococcus aureus (MRSA) is among the leading pathogens causing surgical site infections (SSIs). Although it is presumed that MRSA infections are a result of direct wound contamination from the patient’s skin or the environment, other mechanisms may exist. Here we hypothesized that gut colonized with MRSA can be a source of postoperative wound infections.

Hypothesis: During surgical injury and physiological stress, intestinal MRSA is taken up by intestinal immune cells (neutrophils), which then home to distant sites of tissue damage and release their microbial payload resulting in wound infection (Trojan Horse Hypothesis).

Methods: We established a clinically-relevant murine model of gut-derived MRSA SSI. Mice were administered antibiotics and starved for 24 hours to disrupt the normal gut microbiota. MRSA colonization was achieved by oral gavage with bioluminescent MRSA strain USA300 or GFP-tagged fluorescent MRSA strain. Using aseptic technique, the skin was undermined over the rectus muscle which was then ligated and disrupted to create an area of ischemia and injury. The control group underwent a sham operation without muscle injury/ischemia. Mice were imaged by photon camera on postoperative day (POD) 5 and 8. The rectus muscle was examined for abscess formation, imaged, homogenized, and plated on selective media to detect MRSA. Neutrophils were isolated from pooled mouse blood on POD1 via flow cytometry and assessed for the presence of tagged MRSA.

Results: None of the mice appeared septic. All blood, liver, spleen, kidney cultures revealed no bacterial growth, suggesting lack of post-operative bacteremia and extra-cellular dissemination. One mouse (5.6%, n = 18) subjected to rectus muscle ischemia/injury developed an abscess detected by gross rectus muscle examination and photon camera imaging of the whole mouse body and rectus on POD8. Cultures confirmed imaging positivity. Five additional mice (27.8%) had MRSA present in the excised injury developed an abscess detected by gross rectus muscle examination and photon camera imaging of the whole mouse body and rectus on POD8. Cultures confirmed imaging positivity. Five additional mice (27.8%) had MRSA present in the excised tissue, imaged, homogenized, and plated on selective media to detect MRSA. Neutrophils were isolated from pooled mouse blood on POD1 via flow cytometry and assessed for the presence of tagged MRSA.

Conclusions: We have successfully demonstrated that gut colonized with MRSA can be the source of distant MRSA SSIs in surgically stressed host. The Trojan Horse Hypothesis of MRSA wound infection may be a viable explanation of certain SSIs.

O14. DOES THE ADDITION OF ENDOSCOPIC RETROGRADE CHOLANGIOPANCREATOGRAPHY (ERCP) TO CHOLECYSTECTOMY AFFECT THE RATE OF SURGICAL SITE INFECTION?

Michele Loo, University of Minnesota Medical Center; Jean Dominique Morancy, University of Minnesota Medical Center; JJ Glover, University of Minnesota Medical Center; Catherine Statz, University of Minnesota Medical Center; Gregory Beilman, University of Minnesota

Background: Cholecystectomy (CHOL) is one of the most common procedures performed world-wide. The presence of common bile duct stones complicates treatment, often requiring additional imaging and/or a second procedure for stone retrieval. In these cases, administration of ERCP to cholecystectomy patients provides adequate therapy. This new technique may decrease rates of infection and improve outcomes for patients undergoing this procedure. This study aimed to determine if the addition of ERCP to CHOL was associated with higher rates of surgical site infections (SSI) and microbial resistance.

Hypothesis: ERCP in addition to CHOL leads to increased risk of SSI.

Methods: CHOL or laparoscopic converted to open CHOL was associated with a 5.3 times (CI 1.7-15.7) greater risk of SSI in comparison to laparoscopic cases. When open cases are excluded, CHOL performed within 60 days of ERCP carries a significantly increased...
clinical symptoms and initiation of antimicrobial therapy, with a median delay of two modalties. Yet, human patients with sepsis face significant delays between onset of Anthony Lewis, University of Pittsburgh; Du Yuan, University of Pittsburgh Medical O16.

Organ-space surgical site infection (OSSSI) is a relatively common risk of SSI (p = 0.03, OR 2.6, CI 1.1–6.2). Rates of resistant pathogens, including vancomycin-resistant enterococci (VRE) and extended spectrum beta-lactamase producers (ESBL), were significantly higher in patients who underwent ERCP in addition to CHOL (1.2% vs. 0.2%, p = 0.02, Fisher’s exact test).

Conclusions: ERCP performed within 60 days of CHOL confers increased risk of SSI. In addition, patients who underwent CHOL and then ERCP is more likely to be associated with a An increase in the rate of VRE and ESBL was noted in patients undergoing ERCP. While contaminated equipment may be a factor, other considerations include the increased procedure time and complexity inherent in cholecystectomies that also require ERCP. The added risk of SSI associated with ERCP needs to be considered when selecting treatment pathways for patients with cholecoldolithiasis.

O15. INTRAVENOUS IMMUNOGLOBULIN ON SURVIVAL IN TOXIC SHOCK SYNDROME SECONDARY TO NECROTIZING FASCIITIS: A MULTICENTER PROPENSITY-MATCHED ANALYSIS

Sameer Kadri, Critical Care Medicine Department, NIH-Clinical Center, National Institutes of Health, Bethesda, MD; Bruce Swihart, Department of Biostatistics, National Institute of Allergy and Infectious Diseases, Bethesda, MD; Stephanie Bonne, Rutgers New Jersey Medical School, Samuel Holman, University HealthSystem Consortium, Chicago, IL; Laura Hennessy, Department of Surgery, Harborview Medical Center, Seattle, WA; Peter Louras, Department of Surgery, Harborview Medical Center, Seattle, WA; Heather Evans, University of Washington; Chani Rhee, Department of Population Medicine, Harvard Medical School and Harvard Pilgrim Health Care Institute, Boston, MA; Anthony Suffredini, Critical Care Medicine Department, NIH-Clinical Center, National Institutes of Health, Bethesda, MD; David Hooper, Division of Infectious Diseases, Massachusetts General Hospital, Boston, MA; Dean Folman, Department of Biostatistics, National Institute of Allergy and Infectious Diseases, Bethesda, MD; Eileen Bulger, Harborview Medical Center; Robert Danner, Critical Care Medicine Department, NIH-Clinical Center, National Institutes of Health, Bethesda, MD

Background: Mortality in toxic shock syndrome secondary to necrotizing fasciitis (TSS-NF) remains high despite prompt surgical control and antimicrobial therapy.

We hypothesize that a two hour difference in antibiotic timing will influence inflammatory response and organ dysfunction in marine CLP sepsis.

Methods: C57BL/6 mice (8 to 12 weeks) were subjected to a 1 cm, 21 gauge double puncture model of CLP sepsis and concurrently implanted with an HD-X11 wireless telemetry device (D SI) that enables real-time monitoring of noninvasive blood pressure. Mice were monitored until reaching a previously defined and validated threshold for acute physiologic deterioration. Mice were then randomized to receive imipenem/cilastatin at either the point of acute deterioration or two hours later; this temporal difference is representational only in the case of mice in human trials of sepsis. After 24 hours, plasma and tissue were harvested. Cytokines (IL-6, TNF-a, IL-10) were measured by ELISA. Cytokine and ALT were measured as parameters of organ dysfunction. Cytokine shock was measured by a gas analysis.

Results: Mice receiving earlier antibiotics showed lower levels of inflammatory cytokines when compared to mice receiving antibiotics at a two hour delay: TNF-a (134 vs 245 pg/mL, p = 0.19), IL-6 (1706 vs 466 pg/mL, p = 0.06), and IL-10 (1927 vs. 4897 pg/mL, p = 0.02). Earlier delivery of antibiotics also yielded lower but not statistically significant parameters of shock (lactate, 2.5 vs 3.5, p = 0.21) and organ dysfunction (Cytokine C, 876 vs 942 ng/mL, p = 0.78).

Conclusions: Earlier delivery of antibiotic therapy ameliorates the inflammatory response. There were no differences between experimental groups in terms of organ dysfunction or shock, perhaps due to the absence of concomitant fluid resuscitation with antibiotic delivery, or due to the time point examined. Further investigations will focus on combined fluid and antibiotic therapy in trials of prehospital sepsis protocols.

O17. CURRENT PNEUMONIA SURVEILLANCE METHODOLOGY: SIMILAR UNDERESTIMATION IN TRAUMA AND SURGICAL ICU PATIENTS

Brenda Zosa, MD, MetroHealth Medical Center; David Schechtman, BS, Case Western Reserve University; Joseph Golob Jr, MD, MetroHealth Medical Center; Jeffrey Clainde, MetroHealth Medical Center Case Western Reserve School of Medicine

Background: In 2013, the Centers for Disease Control and Prevention (CDC) developed new surveillance definitions for ventilator-associated events (VAE). This has led to concerns that hospitals may be underreporting the true incidence of ventilator associated pneumonias (VAP). This may lead to the conclusion that pneumonia should be a “never event” and thus not be reimbursed. We sought to compare the rates of clinically diagnosed and treated pneumonia and VAPs in patients who have at least one VAE, this discrepancy will be different between trauma and surgical patients.

Methods: All STICU patients at our institution with at least one VAE between 2013–2015 were identified. Additional data including age, length of stay (LOS), ICU stay, ventilator days, and other clinical data were obtained via the electronic medical record.

Results: A total of 136 patients had at least one VAE. The mean LOS and ICU days were 3.25 (± 3.02) and 6.82 (± 4.65), respectively. The mean age was 53 (± 13) and the mean number of ventilator days was 20 (± 11) days. Of the 136 patients, 76 (56%) were treated for a clinically diagnosed pneumonia, but only 25 (18%) patients met the criteria for a VAP. Of the patients who had a clinical diagnosis of pneumonia, 30% were diagnosed and treated prior to meeting VAE criteria. We then compared the 94 trauma patients and 42 surgical patients with a VAE. Trauma patients were younger (51 vs 60 years p = 0.002), however both groups had similar LOS, ICU days, and ventilator days. The clinical diagnosis of pneumonia was made in 56% in the trauma patients and in 55% of the surgical patients. However, a VAP was reported in 20% of the trauma group and 14% of the surgical group. Lastly, we compared the 53 patients clinically diagnosed with pneumonia, who did not meet CDC criteria for VAP, to the 25 VAP patients. Only significant differences were age, and VAPs were more likely to have an abnormal white blood cell count (84% vs 17% p < 0.001) or abnormal temperature (48% vs 15% p = 0.004) as defined by the VAE criteria.

Conclusions: The new CDC definition for VAP grossly underestimates the clinical diagnosis of VAP and only reports approximately 1 out of 3 patients that we actually treat for VAP in the STICU. There was similar reporting differences between trauma and surgical ICU patients.

O18. HYPERTONIC SALINE INFUSION AFTER DAMAGE CONTROL LAPAROTOMY IS NOT ASSOCIATED WITH RISK OF ORGAN-SPACE SURGICAL SITE INFECTION

Ronald Chang, University of Texas Medical School at Houston; John Harvin, University of Texas Medical School at Houston; Lindsay Folkerson, University of Texas Medical School at Houston; Bryan A Cotton, University of Texas Medical School at Houston; Michael Swartz, University of Texas Medical School at Houston; Charles Wade, University of Texas Medical School at Houston; John Holcomb, University of Texas Medical School at Houston

Background: Organ-space surgical site infection (OSSI) is a relatively common complication following damage control laparotomy (DCL). Earlier fascial closure after DCL is associated with fewer infections complications. In addition to favorable immunomodulatory and anti-inflammatory effects which may reduce risk of infection,
Hypothetically, HTS infusion after DCL is associated with reduced risk of developing OSSSI.

Methods: We analyzed prospectively-collected trauma registry data for adult patients admitted to all 30 level I and II trauma centers in Pennsylvania. 2011–2014. Rates of all complications, infections, mortality, and failure to rescue after infection (FTR) were calculated. We used multivariable logistic regression adjusted for clustering to model risk of infection and FTR. We calculated observed-to-expected (O:E) center-level infection and FTR ratios with 95% CIs and evaluated correlation with Spearman’s ρ.

Results: Of 95,806 admitted patients, 11.3% developed at least one complication. Among these, 30.6% had an infection as the first complication. The death rate was 3.7% overall, 2.7% in patients with no complications; 11.4% in patients with complications; and 8.7% in patients with infections. 1,241/3,569 deaths (34.8%) were preceded by complications. UTI was the most common infection (45.4%), followed by pneumonia (40.9%), and SSI or traumatic wound infection (7.5%). In multivariable analysis, significant risk factors for developing OSSSI were full thickness abdominal abscess, bowel/anastomotic leak, or enterocutaneous fistula. A purposeful multivariate logistic regression model was created to compare the risk of OSSSI in the two groups, followed by propensity score adjustment.

Conclusions: HTS infusion after DCL is not associated with reduced risk of OSSSI.
O22. AGGRESSIVE ANTIMICROBIAL INITIATION FOR SUSPECTED INTENSIVE-CARE-UNIT-ACQUIRED INFECTION IS ASSOCIATED WITH DECREASED LONG-TERM SURVIVAL FOLLOWING CRITICAL ILLNESS

Christopher Guidry, UVA Health System; Tjasa Hranjec, UT Southwestern Medical Center; Robert Sawyer, University of Virginia HSC

Background: The long-term significance of early and prolonged antibiotic use in critically ill patients is yet to be described. Several studies have suggested that withholding antibiotics until infection is confirmed may be beneficial in critically ill; avoiding unnecessary treatment, shortening the course of antibiotics, and reducing resistance.

Our group previously conducted a quasi-experimental, before and after observational cohort study of stable surgical patients suspected of having an ICU-acquired infection. This study demonstrated that aggressive initiation of antimicrobial therapy was associated with increased 30-day mortality.

Hypothesis: In this follow-up survival analysis we hypothesized that aggressive antimicrobial treatment would not be a significant predictor of long-term mortality.

Methods: Survival data for the 201 patients included in the initial aggressive versus conservative treatment analysis was obtained from our clinical data repository. Uni- and multivariate analysis, Kaplan-Meier and Cox proportional hazard models were used. Age, sex, APACHE II score, and comorbidities were chosen a priori for potential inclusion in the model.

Results: Follow-up data was available for 190 patients (95 in each group) representing 94.5% of the initial cohort. Median follow-up was 443.5 days for the aggressive group and 681.5 days for the conservative group. Twenty-four patients (25.3%) in the aggressive group had initial APACHE II scores <15 compared with 13 patients (13.7%) in the conservative group (p=0.04). Otherwise there were no differences between the groups on univariate analysis. There was a trend toward higher mortality in the aggressive group (43.2% vs. 30.5%; p-value = 0.07). Kaplan-Meier analysis did not demonstrate a difference in survival (p-value = 0.09). Cox proportional hazard model, showed a higher long-term mortality for patients in aggressive antimicrobial group (HR = 1.95, CI 1.14 – 3.34) (Figure).

Conclusions: Aggressive initiation of antimicrobial therapy is independently associated with decreased long-term survival following critical illness. While further work is needed to confirm these findings, waiting for evidence of infection before initiation of antibiotics may be beneficial.

O23. COMPARISON OF DELAFLOXACIN (DLX) AND VANCOMYCIN (VAN) IN TREATMENT OF OBESE PATIENTS WITH ACUTE BACTERIAL SKIN AND SKIN STRUCTURE INFECTIONS (ABSSSI)

William O’Riordan, eStudySite, San Diego, CA; Jeff Kingsley, Columbus Regional Research Institute, Columbus, GA; Eugenia Henry, HE2 Clinical, LLC; Hunt Valley, MD; Carol Tseng, HSO Clinical, LLC, Hunt Valley, MD; Megan Quintas, Melinta Therapeutics, Inc., New Haven, CT; Laura Lawrence, Melinta Therapeutics, Inc., New Haven, CT

Background: DLX is an investigational fluoroquinolone antibiotic with a broad spectrum of activity in development for treatment of ABSSSI. There is a high unmet medical need for data focusing on obese patients.

Hypothesis: It was hypothesized that DLX would perform better in obese patients, as results from a retrospective analysis of phase 2 data showed higher cure rates in obese patients with DLX compared to VAN.

Methods: Data on obese (BMI ≥20.5 kg/m²) patients were reviewed from 2 randomized, double-blind trials of adults with ABSSSI. At baseline, patients were required to have lesion size ≥75 cm² with at least 2 signs of systemic infection. Patients received 5–14 days BID either DLX 300 mg IV or VAN 15 mg/kg (actual body weight) with aztreonam. Both studies included endpoints for objective response at 48–72 hrs based on ≥20% reduction of lesion size by digital measurement, as well as investigator-assessed response rates based on complete resolution of signs and symptoms (Cure) at Follow up (FU; Day 14) and Late Follow up (LFU; Day 21–28).

Results: In the combined patient pool, 288 obese patients (153 DLX, 135 VAN) had mean BMI 36 kg/m², mean age 47 yrs, and were majority male (52%). At Baseline, mean lesion size was 401 cm². Infection types included 55% cellulitis, 24% wound infection, 20% major cutaneous abscess and 1% burn infection. Key endpoints comparing DLX and VAN:

<table>
<thead>
<tr>
<th>DLX</th>
<th>VAN</th>
<th>Delta</th>
</tr>
</thead>
<tbody>
<tr>
<td>112/150 (75%)</td>
<td>96/134 (72%)</td>
<td>6/16 (4.0, 26.7)</td>
</tr>
</tbody>
</table>

The objective response at 48–72 hrs was comparable in the ITT population (DLX 75%, VAN 72%). The investigator assessment of cure (ITT) at both FU (61% DLX, 46% VAN) and LFU (75% DLX, 56% VAN) were statistically better with DLX. DLX was comparable to VAN in eradication of baseline MRSA.

Overall, DLX was well tolerated with 58% of DLX and 65% of VAN obese patients reporting TEAEs. The most common treatment-related AEs were nausea, pruritus, and diarrhea.

Conclusions: In the pooled obese patients, DLX had statistically better outcomes than VAN at the FU and LFU. DLX was also well tolerated. Since VAN dosing can be challenging in this population, DLX may offer a promising alternative to VAN in ABSSSI treatment. Further data are required to confirm this outcome in obese patients.

O24. DIAGNOSING SURGICAL SITE INFECTION USING WOUND PHOTOGRAPHY: A SCENARIO-BASED STUDY

Patrick Sanger, University of Washington; Vlad Simiun, University of Washington; Cheryl Armstrong, University of Washington; Andrea Hartzler, Group Health Research Institute; Ross Londen, University of Washington; William Lober, University of Washington; Heather Evans, University of Washington

Background: Surgical site infections (SSI) are diagnosed most often after hospital discharge and are the most common reason for surgical readmissions. Patients are often advised by telephone to seek urgent evaluation when there is uncertainty about an infection. Mobile health (mHealth) approaches incorporating patient-generated wound photos are being increasingly adopted; our goal was to determine how photos modify provider decision-making about SSI.

Hypothesis: Incorporation of wound photos to existing data sources will improve diagnostic accuracy, diagnostic confidence, and management of SSI.

Methods: A national sample of surgical infections experts responded to a web-based survey with a range of real patient scenarios with surgical history, physical exam and wound description. Participants completed ≥2 of 16 scenarios stratified by stratified randomization ensuring a balanced sample of SSI/non-SSI and ambiguous/non-ambiguous cases. All participants reported diagnosis, diagnostic confidence, and management recommendations, first without, and then with wound photos. Primary outcomes were changes in diagnostic accuracy, diagnostic confidence, and management decisions with the addition of wound photos.

Results: Eighty-three subjects completed a median of 5 scenarios (IQR 4–7). Most participants were MDs (N = 72, 87%) in academic surgical specialties (N = 70, 84%). Addition of photos improved overall diagnostic accuracy across all scenarios from 67% to 78% (p <0.001), and increased specificity from 77% to 92% (p <0.001), but did not significantly increase sensitivity (55% to 65%, p = 0.16). Photos increased diagnostic confidence from 5.9/10 to 7.4/10 (p < 0.001). Overtreatment (recommendation antibiotics, same day visits or ED visits) among non-SSI patients decreased from 48% to 16% (p <0.001) while undertreatment (not prescribing antibiotics, same day clinic visit, or ED visit) among SSI patients did not appreciably change (28% to 23%, p = 0.20) with addition of photos.

Conclusions: Addition of wound photos to data available via chart review and telephone consultation with patients improved diagnostic accuracy and confidence, and prevented overtreatment of patients without SSI. Use of mHealth to capture wound photos and other patient generated data after discharge may facilitate patient-centered care, and improve care coordination and clinical outcomes.

O25. EARLY ROUTINE BRONCHOALVEOLAR LAVAGE IMPROVES OUTCOMES FOR A SELECT COHORT OF INTUBATED TRAUMA PATIENTS

Tyler Loftus, University of Florida Health, Gainesville, FL; Stephen Lemon, University of Florida Health, Gainesville, FL; Philip Efron, University of Florida, Health Science
O26. SURVIVAL FROM TRAUMATIC INJURY DOES NOT END AT HOSPITAL DISCHARGE - HOSPITAL ACQUIRED INFECTIONS INCREASE POST DISCHARGE MORTALITY

Nitasri Dhiman, Virginia Tech Carilion School of Medicine; Mark Hamill, Carilion Roanoke Memorial Hospital; Eric Bradburn, Carilion Roanoke Memorial Hospital; Daniel Lollar, Carilion Roanoke Memorial Hospital; Ram Rimal, Carilion Roanoke Memorial Hospital; Bryan Collier, Carilion Roanoke Memorial Hospital

Background: Hospital acquired infections in trauma patients have been shown to increase inpatient morbidity and mortality. However, once discharged, the impact hospital infection has on mortality is poorly understood.

Hypothesis: We hypothesized that trauma patients with hospital acquired infections (pneumonia and UTI) were at higher risk for post discharge mortality.

Methods: A retrospective trauma registry analysis of all patients admitted to an academic level 1 trauma center between 7/1/2008-12/31/2012 was performed. Patients included in this study survived to discharge and were ≥18 years of age. Age, gender, ISS, ventilator use, history of COPD, and hospital acquired infections were reviewed. To confirm diagnosis from our registry, pneumonia and UTI diagnoses were cross referenced with physician progress notes and pharmacy antibiotic use. Name, SSN and date of birth were masked and used as a unique patient identifier.

Results: 132 patients were included. There was no difference in age, injury severity, initial PaO2/FIO2, smoking status, or diabetes between E-BAL and L-BAL. The E-BAL group had fewer days on antibiotic therapy and mechanical ventilation, fewer tracheostomies, shorter intensive care unit length of stay (LOS), and shorter hospital LOS. Rates of pneumonia, recurrent pneumonia, and overall mortality were similar between both groups.

Conclusions: Early routine BAL for intubated trauma patients with TBI and chest trauma facilitated early identification of respiratory conditions present on admission and led to improved outcomes when compared to BAL performed after clinical suspicion of pneumonia was apparent.

O27. SYNTHETIC VS BIOLOGIC MESH IN SINGLE-STAGE REPAIR OF COMPLEX ABDOMINAL WALL DEFECTS IN A CONTAMINATED FIELD

Jad Chamieh, Washington University in St Louis; William Symons,

Background: Patients with traumatic brain injury (TBI) or chest trauma are at increased risk for aspiration, pneumonia, and prolonged mechanical ventilation. In order to assess post-injury aspiration, remove debris, and guide antibiotic therapy, we performed routine bronchoalveolar lavage (BAL) 24–48 hours following admission for mechanically ventilated patients with TBI or chest trauma.

Hypothesis: We hypothesized that early routine BAL would decrease antibiotic use and duration of mechanical ventilation compared to controls that underwent BAL after development of clinical signs of pneumonia.

Methods: We performed a retrospective review of patients who had ≥48 hours of mechanical ventilation, fiberoptic bronchoscopy with quantitative BAL, and at least one of the following: head Abbreviated Injury Score ≥2, three or more rib fractures, or radiographic signs of aspiration or pulmonary contusion. Patients with any infection other than pneumonia or bacteremia were excluded. The study period was 5/11-9/30/15, incorporating populations before and after early routine BAL protocol institution. Selected patients were grouped by interval between admission and BAL routine BAL ≤48 hours: early BAL (E-BAL) vs. clinical suspicion for pneumonia BAL > 48 hours: late BAL (L-BAL). Pneumonia was defined as ≥10^5 organisms on BAL or Clinical Pulmonary Infection score (CPS) > 6, and the diagnosis of recurrent pneumonia required a 72 hour period off antibiotics and a new infection source.

Results: 132 patients were included. There was no difference in age, injury severity, initial PaO2/FIO2, smoking status, or diabetes between E-BAL and L-BAL. The E-BAL group had fewer days on antibiotic therapy and mechanical ventilation, fewer tracheostomies, shorter intensive care unit length of stay (LOS), and shorter hospital LOS.

Conclusions: Early routine BAL for intubated trauma patients with TBI and chest trauma facilitated early identification of respiratory conditions present on admission and led to improved outcomes when compared to BAL performed after clinical suspicion of pneumonia was apparent.

O28. CAMKIV REGULATES MITOPHagy DURING AKI

Xianghong Zhang, University of Pittsburgh; Du Yuan, University of Pittsburgh Medical Center; Anthony Lewis, Emma Lee, Brian Zuckerbraun, University of Pittsburgh School of Medicine; Matthew Rosengart, University of Pittsburgh School of Medicine; Joseph Solomkin, University of Cincinnati College of Medicine; Myra Popejoy, Merck & Co., Inc.; Benjamin Miller, Merck & Co., Inc.; Jasmim Long, Merck & Co., Inc.; Ellie Hersberger, Merck & Co., Inc.; John Marnski, Washington University School of Medicine

Background: Mitochondrial dysfunction occurs early during sepsis, and the removal of dysfunctional mitochondria, a process termed mitophagy, is essential for survival. Mitophagy is regulated by CaMKIV, a calcium-sensing kinase expressed in the heart, brain, adipose tissue, and macrophages.

Hypothesis: We hypothesized that CaMKIV regulates mitophagy during AKI.

Methods: CaMKIV knockout (CaMKIV−/−) mice were used to compare mitophagy in untreated and treated groups. The mice were treated with either chloroethyl phosphorothioate (H2O2) or low dose ibuprofen for 24 hours to increase oxidative stress.

Results: In vivo, mitochondria were isolated from the RAW264.7 macrophage cell line. H2O2 treatment increased Parkin expression at the mitochondrion. In vitro, mitochondria were isolated from the RAW264.7 macrophage cell line. H2O2 treatment increased Parkin expression at the mitochondrion.

Conclusions: These findings suggest that CaMKIV regulates mitophagy during AKI.

O29. CLINICAL OUTCOMES OF SHORT-COURSE VERSUS LONG-COURSE TREATMENT WITH CEFTOLOZANE/TAZOBACTAM AND MEROPENEM FOR COMPLICATED INTRAABDOMINAL INFECTIONS

Joseph Solomkin, University of Cincinnati College of Medicine; Myra Popejoy, Merck & Co., Inc.; Benjamin Miller, Merck & Co., Inc.; Jasmim Long, Merck & Co., Inc.; Ellie Hersberger, Merck & Co., Inc.; John Marnski, Washington University School of Medicine
Background: A recent study suggests short-course antibiotic therapy (4 ± 1 d) may be as efficacious as longer course therapy in complicated intraabdominal infection (cIAI) when adequate source control is achieved (STOP-IT: Sawyer N Engl J Med 2015). ASPECT®-cIAI was a randomized, double-blind phase 3 trial in patients treated with ceftriaxone/tazobactam (CT) + metronidazole (MTZ) or meropenem (MEM).

Hypothesis: Physician decisions to provide short- (3–< 5 days; SC) vs long-course therapy (>5 days, LC) are driven by patient risk factors.

Methods: Patients with cIAI were randomized to CT (1.5 g) + MTZ (500 mg) or MEM (1 g) every 8 h, with treatment duration at physician discretion but not to exceed 14 d. In a post hoc analysis, infection site, disease characteristics, and clinical response at the test-of-cure (TOC) visit were described in patients treated with SC or LC therapy.

Results: Of 806 patients in the microbiological intent-to-treat population, 29% (237) received SC therapy and 66% (322) received LC therapy; 5% (37) received <3 days of treatment, mainly due to early study withdrawal. Median (range) age was 54 (18–88) and 43 (18–92) yrs in LC and SC patients; a higher percentage of LC patients also had risk factors such as APACHE II scores ≥10 and mild to moderate renal impairment (Table). Physicians were more likely to provide brief therapy for infection arising from the appendix (41.4% LC vs 63.5% SC). Other sites of infection were more often treated for longer duration durations (stomach [12.4% LC vs 4.2% SC], small bowel [6.8% LC vs 1.7% SC], colon [17.3% LC vs 7.2% SC]). A higher proportion of LC patients had multiple abscesses, diffuse peritonitis, nonappendiceal sites of infection, and failure of previous therapy. Cure rates at the TOC visit by patient characteristics are presented in the Table.

Conclusions: These data suggest that clinicians are comfortable with SC therapy in lower risk patient subsets (based on age, APACHE II score, renal function, or less severe teaching center population). Although sample sizes were small, improved cure rates were associated with LC, consistent with findings of the STOP-IT trial.

O30. MONITORING ANASTOMOTIC HEALING: MICROBIAL AND INFLAMMATORY MEDIATOR ANALYSIS OF ENDOSCOPIC LAVAGE OF HUMAN COLON ANASTOMOSES

Kristina Guyton, University of Chicago; Baddr Shakhsheer, University of Chicago; Natalia Belogortseva, University of Chicago; Olga Zaborina, University of Chicago; Zoe Levine, University of Chicago; Luke Versten, University of Chicago; Kristina Guyton, University of Chicago; Baddr Shakhsheer, University of Chicago; Carla Schulman, University of Miami School of Medicine; Carl Schulman, University of Miami-Miller School of Medicine; Kenneth Proctor, Ryder Trauma Center, Divisions of Trauma, Surgical Critical Care, and Burns, Dewitt Daughtry Family Department of Surgery, University of Miami Leonard M. Miller School of Medicine, Miami, FL, 33136; Jonathan Meizoso, Ryder Trauma Center, Divisions of Trauma, Surgical Critical Care, and Burns, Dewitt Daughtry Family Department of Surgery, University of Miami Leonard M. Miller School of Medicine, Miami, FL, 33136; Juliet Ray, Ryder Trauma Center, Divisions of Trauma, Surgical Critical Care, and Burns, Dewitt Daughtry Family Department of Surgery, University of Miami Leonard M. Miller School of Medicine, Miami, FL, 33136; Nicholas Namias, University of Miami School of Medicine; Carl Schulman, University of Miami-Miller School of Medicine; Kenneth Proctor, Ryder Trauma Center, Divisions of Trauma, Surgical Critical Care, and Burns, Dewitt Daughtry Family Department of Surgery, University of Miami Leonard M. Miller School of Medicine, Miami, FL, 33136; Xiomara Ruiz, Ryder Trauma Center, Divisions of Trauma, Surgical Critical Care, and Burns, Dewitt Daughtry Family Department of Surgery, University of Miami Leonard M. Miller School of Medicine, Miami, FL, 33136; Davis Horkan, Ryder Trauma Center, Divisions of Trauma, Surgical Critical Care, and Burns, Dewitt Daughtry Family Department of Surgery, University of Miami Leonard M. Miller School of Medicine, Miami, FL, 33136; Xiomara Ruiz, Ryder Trauma Center, Divisions of Trauma, Surgical Critical Care, and Burns, Dewitt Daughtry Family Department of Surgery, University of Miami Leonard M. Miller School of Medicine, Miami, FL, 33136

Background: Blood transfusion is a known risk factor for infection in trauma patients. Differences based on mechanism of injury have not been well described.

Hypothesis: Infection risk in trauma patients with early blood transfusion is different based on blunt or penetrating mechanism of injury.

Methods: Retrospective review of adults admitted to the trauma intensive care unit from 01/2010–01/2015 was performed. Patients only receiving transfusion after 24 h were excluded. Infections were defined as positive bronchoalveolar lavage (>10^4 CFU or blood, urine, wound, or abdominal collection cultures. Parametric data is presented as mean ± standard deviation and nonparametric data as median (interquartile range). Logistic regression was used to identify independent predictors of infection. Odds ratios (OR) and 95% confidence intervals (CI) are reported. Significance was considered at p ≤ 0.05.

Results: Patients with blunt trauma (n = 625) had a transfusion rate of 36% (n = 223), with 30% (n = 186) developing an infection. Those with an infection were more likely to develop an infection (OR 4.6, 95% CI 2.3–9.0). Logistic regression analysis demonstrated that the presence of a hematocrit < 30% at admission was an independent predictor of infection (OR 1.6, 95% CI 1.1–2.4)

ORAL PRESENTATION ABSTRACTS S-17

Table: Overall Clinical Cure Rates and by Baseline Patient Characteristics at the TOC Visit

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>3–5 Day Treatment</th>
<th>5–Day Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall cure rate, %</td>
<td>46.9±12.6</td>
<td>48.1±16.7</td>
</tr>
<tr>
<td>MITT population (primary analysis)</td>
<td>46.1±12.7 (96.7)</td>
<td>48.1±16.7 (92.7)</td>
</tr>
<tr>
<td>GE population</td>
<td>43.4±12.3 (87.2)</td>
<td>46.7±10.9 (92.7)</td>
</tr>
<tr>
<td>ME population</td>
<td>187.9±16.3 (93.1)</td>
<td>376.4±60.1 (93.1)</td>
</tr>
<tr>
<td>Clinical cure by baseline patient characteristics, % (MITT population)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age ≥ 65 y</td>
<td>34.9±12.7 (87.2)</td>
<td>10.4±13.1 (79.7)</td>
</tr>
<tr>
<td>APACHE II ≥ 10</td>
<td>20.2±8.3 (83.1)</td>
<td>49.0±11.5 (78.3)</td>
</tr>
<tr>
<td>Mid to moderate renal impairment (creatinine clearance &lt; 80 mL/min)</td>
<td>43.9±8.7 (88.7)</td>
<td>149.1±17.9 (78.3)</td>
</tr>
<tr>
<td>Multiple abscesses</td>
<td>8.8±10.0 (43.9)</td>
<td>42.5±9.7 (78.3)</td>
</tr>
<tr>
<td>Diffuse peritonitis</td>
<td>5.5±10.0 (87.2)</td>
<td>18.9±10.0 (78.3)</td>
</tr>
<tr>
<td>Appendiceal as site of infection</td>
<td>142.0±14.9 (94.7)</td>
<td>220.2±99.9 (78.3)</td>
</tr>
<tr>
<td>Nonappendiceal site of infection</td>
<td>75.8±16.7 (88.2)</td>
<td>259.1±62.0 (88.2)</td>
</tr>
<tr>
<td>Failure of previous therapy</td>
<td>0.0±0.0 (100.0)</td>
<td>0.0±0.0 (100.0)</td>
</tr>
</tbody>
</table>

N = total number of patients in each group, n = number of patients in each category; m = number of clinical cure rates in each category.

A box-and-whisker plot of patient characteristics at the TOC visit is presented in the Figure. The median (IQR) age was 54 (18–88) and 43 (18–92) yrs in LC and SC patients, respectively. A higher percentage of LC patients also had risk factors such as APACHE II scores ≥10 and mild to moderate renal impairment.

Conclusions: These data suggest that clinicians are comfortable with SC therapy in lower risk patient subsets (based on age, APACHE II score, renal function, or less substantial infectious pathology [single/no abscesses, no diffuse peritonitis, appendix as site of infection]). Although sample sizes were small, improved cure rates were not associated with LC, consistent with findings of the STOP-IT trial.
more severely injured, had a higher operation rate, lower GCS, longer hospital stay, and higher transfusion rate (Table 1). Patients with penetrating trauma (n = 292) had a transfusion rate of 54% (n = 159), with 26% (n = 77) developing an infection. Those with an infection were older, more severely injured, had a higher operation rate, lower GCS, longer length of stay, and higher transfusion rate (Table 2). Controlling for age, ISS, RTS, GCS, and hospital stay, transfusion was found to be an independent predictor of infection in patients with blunt trauma (OR: 2.1, 95% CI: 1.272–3.393, p = 0.003), but not in patients with penetrating trauma. Length of stay was the only independent predictor of infection in penetrating trauma (OR: 1.1, 95% CI: 1.069–1.132, p < 0.0001).

Conclusions: Early blood transfusion may increase infection risk in blunt, but not penetrating trauma.

### Table 2. Penetrating Trauma

<table>
<thead>
<tr>
<th></th>
<th>− Infection</th>
<th>+ Infection</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male Gender</td>
<td>84%</td>
<td>91%</td>
<td>NS</td>
</tr>
<tr>
<td>Age (years)</td>
<td>33 ± 14</td>
<td>38 ± 15</td>
<td>0.022</td>
</tr>
<tr>
<td>Injury Severity Score</td>
<td>15 ± 10</td>
<td>24 ± 15</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Revised Trauma Score</td>
<td>8 (7-8)</td>
<td>8 (6-8)</td>
<td>0.002</td>
</tr>
<tr>
<td>GCS</td>
<td>14 ± 2</td>
<td>12 ± 4</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Surgery &gt; 2h</td>
<td>48%</td>
<td>66%</td>
<td>0.007</td>
</tr>
<tr>
<td>Hospital Stay (days)</td>
<td>8 (4-13)</td>
<td>30 (18-65)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Transfused</td>
<td>46%</td>
<td>79%</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

#### O32.

**ACID SUPPRESSIVE THERAPY AND C. DIFFICILE INFECTION: BEYOND GASTRIC PH EFFECTS**

Samanta Tarras, Wayne State University; Lawrence Diebel, Wayne State University Health Center; David Liberati, Wayne State University

**Background:** Several predisposing factors for *Clostridium difficile* infection (CDI) have been proposed including exposure to gastric acid reducing agents such as H2 blockers and proton pump inhibitors (PPI). The mechanism(s) for this include an effect on *C. difficile* spor germination via gastric acid suppression. A recent murine model of CDI demonstrated that PPI exposure increased the severity of intestinal inflammation. A comparative effect with H2 blockers and potential mechanisms for this “direct effect” of acid suppressive agents on the intestinal barrier against *C. difficile* are unknown.

**Hypothesis:** To compare the “non-acid suppressive” effects of H2 blockers and PPIs on intestinal barrier function following *C. difficile* toxin A exposure in an in vitro model.

**Methods:** HT29-MTX (mucus producing) colonic epithelial cell (IEC) monolayers were incubated for 48 hrs. with cimetidine (3 μM), omeprazole (OME, 100 μM) or media control. Tox A (50 μg/ml) was added to the apical media. IEC tox A uptake, percent apoptosis, and permeability to FITC-Dextran 10 quantitated. Mucin content of the mucus layer was determined using an ELISA.

**Results:** Mean ± SD, N = 5 for each group.

**Conclusions:** Both H2 blockers and PPIs appear to render colonic epithelial cell monolayers “at risk” for perturbations and intestinal barrier dysfunction following *C. difficile* toxin exposure. It appears that this effect is more profound with omeprazole versus cimetidine after cimetidine exposure. The mechanisms include an effect on the mucus layer by H2 blockers and likely a direct effect on IEC cellular function by PPIs.

<table>
<thead>
<tr>
<th></th>
<th>Tox A uptake (ng/ml)</th>
<th>% apoptosis (nmol/cm²/hr)</th>
<th>Perm.</th>
</tr>
</thead>
<tbody>
<tr>
<td>MTX</td>
<td>4.4 ± 0.2</td>
<td>0.47 ± 0.01</td>
<td></td>
</tr>
<tr>
<td>MTX + cimet</td>
<td>4.6 ± 0.1</td>
<td>0.48 ± 0.03</td>
<td></td>
</tr>
<tr>
<td>MTX + OME</td>
<td>5.2 ± 0.2*</td>
<td>0.61 ± 0.03*</td>
<td></td>
</tr>
<tr>
<td>MTX + Tox A</td>
<td>3.28 ± 3.2</td>
<td>8.2 ± 0.4*</td>
<td>0.56 ± 0.02*</td>
</tr>
<tr>
<td>MTX + OME</td>
<td>133.8 ± 5.3*</td>
<td>32.1 ± 1.33*</td>
<td>1.25 ± 0.06*</td>
</tr>
<tr>
<td>MTX + OME</td>
<td>106.6 ± 6.58*</td>
<td>17.1 ± 1.18*</td>
<td>1.02 ± 0.07*</td>
</tr>
</tbody>
</table>

*p < 0.001 vs. MTX and MTX + cimetidine, *p < 0.001 vs. MTX + Tox A, *p < 0.001 vs. MTX + Tox A + OME.

Treatment of IEC with cimetidine decreased the mucin content of the mucus layer from 5.0 ± 0.5 to 1.3 ± 0.4 ng/ml (p < 0.001). No effect of mucin content was noted with the PPI.

#### O33.

**ELECTRONICALLY TRIGGERED SEPSIS ALERT IN SURGERY PATIENTS USING MODIFIED SYSTEMIC INFLAMMATORY RESPONSE SYNDROME (SIRS) CRITERIA: FIRST LOOK**

Syndy Muratore, University of Minnesota; JJ Glover, University of Minnesota; Susan Kline, University of Minnesota; Craig Weinert, University of Minnesota; Greg Beilman, University of Minnesota

**Background:** Mortality from sepsis remains high despite research and best practices. In response to a statewide sepsis initiative, a Sepsis Best Practice Alert (sBPA) was initiated in our center to aid in early sepsis detection and treatment. The inflammatory response of surgery often alters perioperative physiology and may trigger an sBPA for noninfectious causes.

**Hypothesis:** BPAs in surgery patients will have low rates of lactic acidosis detection, but will be associated with surgical infections.

**Methods:** This single-center review of prospective data included non-ICU patients >18 yrs (excluding obstetrics) undergoing inpatient surgery Aug-Oct, 2015. An sBPA fired to an RN if patients had at least 2 modified systemic inflammatory response syndrome (mSIRS) criteria (HR > 100, T > 101F, WBC > 12,000, RR > 20, SBP < 90) or 3 mSIRS criteria (using T > 101.5F) within 24 hours of surgery. The RN then ordered a stat serum lactate draw and MDs were notified for lactates >2.

**Results:** Over 3 months, 1181 patients had surgery with 30% (354) triggering sBPs, totaling 3466 alerts (including simultaneous caregiver BPAs). BPAs resulted in 769 lactates: 86% were 5.2, 13% were 2.1–3.9, and 1% were ≥4 mmol/L respectively. Increases in lactate draws per BPA and lactates >2 were seen over time suggesting improved specificity (Fig 1). Of the patients with sBPAs, 18% (65) had lactates >2. sBPA patients were older: 59 vs 56 yrs, p = 0.01. Importantly, more sBPA patients had surgical site infections (SSI) versus those with no alert, 7% vs 1%, p < 0.01, and 70% of patients with SBPs triggered sBPAs. In comparison to nonsurgical patients triggering sBPAs during this time (n = 1260), a smaller proportion of lactates were >2 in surgery patients (Fig 2).

**Conclusions:** The ideal alert facilitates early sepsis detection while discriminating from abnormal vitals from noninfectious perioperative physiology. BPAs fired in 30% of patients; 18% of which had lactates >2 indicating abnormal lactate production or clearance. Even as utilization increased over time, the alerts identified a greater proportion of patients with abnormal lactates. Also, BPAs fired in 70% of patients with SSIs. Further protocol refinements should increase BPA specificity while preserving sensitivity.
O34. TIMING OF SURGICAL SITE INFECTIONS FOLLOWING VENTRAL HERNIA REPAIR
Julie Holihan, University of Texas Health Science Center at Houston; Juan Flores-Gonzalez, University of Texas Health Science Center at Houston; Tien Ko, University of Texas Health Science Center at Houston; Lillian Kao, BJ General Hospital; Mike Liang, University of Texas Health Science Center at Houston

Background: The Centers for Disease Control allows up to 90 days following surgery to diagnose a surgical site infection (SSI). However, many databases, including the National Surgical Quality Improvement Project, only track outcomes up to 30 days. The cost and effort to increase follow-up to 90 days following surgery is high, and the benefit is unclear.

Hypothesis: The vast majority of SSIs following ventral hernia repair occur within 30 days of surgery.

Methods: All patients who underwent ventral hernia repair from 2010–2015 at a single institution were evaluated for evidence of SSI. The duration between surgery and the development of a post-operative SSI was assessed. A late SSI was defined as an SSI beginning at least 31 days after surgery without a preceding SSI in the first 30 days post-operative. Baseline and operative characteristics were compared between patients with an early SSI (within 30 days) and those with a late SSI using chi-square (categorical variables) or unpaired, t-test (continuous variables).

Results: Among 652 patients who underwent ventral hernia repair, 50 (7.7%) developed a SSI. The median (range) of days between surgery and SSI was 14.5 (3–93) days. There were 10 (20.0%) late SSIs that developed; of these, 9 developed between 31–90 days, and 1 developed later than 90 days. There were few differences in patient characteristics, operative details, or type of SSI between those with an early SSI and those with a late SSI (table). Patients with late SSI were more likely to have undergone a recurrent ventral hernia repair and to have had a bridged repair while those with an early SSI were more likely to have had a component separation.

Conclusions: While the majority of SSIs following ventral hernia repair occurred within the first 30 days, a substantial number of late SSIs occurred. It is worthwhile to follow patients for at least 90 days post-operative in order to capture a more accurate picture of the true rate of SSI.

O35. ANTIBIOTIC IMPREGNATED CENTRAL VENOUS CATHETERS DO NOT CHANGE ANTIBIOTIC RESISTANCE PATTERNS
Isaiah Turnbull, Washington University School of Medicine; Sara Buckman, Washington University School of Medicine; Grant Boech hoeck, Washington University School of Medicine; John Mazurk, Washington University School of Medicine

Background: Antibiotic impregnated central venous catheters (A-CVC) have been shown to decrease the incidence of catheter-related bloodstream infections in high risk populations, such as the Surgical Intensive Care Unit (SICU). However, increased use of these catheters carries the theoretical risk of inducing antibiotic resistance.

Hypothesis: We hypothesized that routine use of A-CVC in a single intensive care unit could change the resistance profile of Staphylococcus aureus, as compared to areas where A-CVC were not used.

Methods: Susceptibilities for S. aureus cultures in a large urban teaching hospital from 2002–2015 were reviewed. Resistance patterns were compared before and after implementation of routine use of minocycline-rifampin A-CVC in SICU in August of 2006. We assessed S. aureus resistance in positive cultures before and after August of 2006, in all areas of interest above (ICU and non-ICU settings where A-CVC were not used). Resistance to rifampin, oxacillin and clindamycin were available over the entire time period; tetracycline and doxycline data where available only from 2009–2015. Rates of resistance were compared by Chi² using SPSS.

Results: 8342 positive cultures for S. aureus where identified. After implementation of routine use of A-CVC in the SICU in 2006, there was no change in rifampin resistance, with rates remaining the same as other ICU or non-ICU populations (3%). After 6 years of routine A-CVC use in the SICU, the rate of tetracycline resistance remained the same in the SICU, other ICUs, and non-ICU patients (1–3%). A-CVC use was not associated with a change in oxacillin resistance over time or across populations (55–66%). However, over time there was an unexplained decrease in clindamycin resistance (59% vs 34%, p < 0.05) which resulted lower rates of clindamycin resistance in the SICU compared to the non-ICU population. This may have been associated with penetrance of community-associated strains of MRSA into the SICU population.

Conclusions: Despite routine use of rifampin-minocycline impregnated A-CVC in the SICU over a prolonged period of time, no associated changes in S. aureus resistance to rifampin or tetracyclines was detected.

O36. HEME OXYGENASE-1/ CARBON MONOXIDE TREATMENT OF TRAUMA PREVENTS SUBSEQUENT INFECTION AND SUSCEPTIBILITY IN A MURINE MODEL VIA MODULATION OF MACROPHAGES
Paul Waltz, Sophie Darwiche, Yanting Wang, Brian Zuckerbraun, University of Pittsburgh School of Medicine

Background: Immune/inflammatory dysfunction after trauma results in increased organ dysfunction and infection/sepsis. Trauma alters immune cells including macrophages. Resuscitative adjuncts to limit the consequences of trauma may help resolve immune dysregulation and limit these morbidities. Heme oxygenase-1 (HO-1) and carbon monoxide (CO) are critical signaling molecules that act to turn off inflammation and have been shown to be protective against organ injury in trauma.

Hypothesis: The purpose of these investigations was to test the hypothesis that HO-1/CO protect against infection after trauma, in part, via modulation of macrophage phenotype and responses.

Methods: C57Bl/6 mice underwent trauma and hemorrhagic shock/resuscitation (pseudofracture, soft tissue injury and hemorrhage to a MAP of 25 mmHg for 90 minutes and resuscitation with LR at 2X shed blood volume). Induction or inhibition of HO-1 via CoPP or SnPP, respectively (Ip, 12 hours prior to trauma), was carried out in some experiments, or treatment with inhaled CO (250 ppm for 30 minutes at the time of resuscitation). Splenocytes or peritoneal macrophages were harvested 48 hours in some experiments and cell types and responses were determined. Additionally, phagocytosis ability of peritoneal macrophages was determined ex vivo. In other experiments, mice were challenged with intraperitoneal E. Coli 48 hours after trauma.

Results: Induction of HO-1 or CO treatment limited trauma-induced inflammation and organ injury, while SnPP exacerbated injury. HO-1 induction or CO led to non-mobilization of splenocyte proliferative and cytokine responses to ex vivo stimulation 48 hours after trauma. Additionally, HO-1 and CO led to an increased relative percentage of M2 macrophages (2.56 ± 0.6 fold over trauma; P < 0.05). 48 hours after treatment, peritoneal macrophages from HO-1 treated mice demonstrated increased phagocytosis of GFP-E. Coli by 3.06 ± 1.2 fold over trauma; P < 0.05). Furthermore, mice challenged with intraperitoneal E.Coli demonstrated increased clearance of bacteria as determined by quantitative cultures 8 hours after inoculation. In vitro treatment of macrophages with CO also augmented phagocytosis and this was limited by inhibition of autophagic signaling.
Precise timing of antibiotic prophylaxis may be more difficult to achieve in patients undergoing urgent procedures since many receive antibiotics starting at diagnosis or admission.

**Hypothesis:** We hypothesized that compliance with an institutional protocol for antibiotic prophylaxis for appendectomy for simple appendicitis in pediatric patients results in reduced surgical site infections (SSIs).

**Methods:** This retrospective study assessed all pediatric patients (<= 18 years) who underwent appendectomy for confirmed simple appendicitis at a tertiary children’s hospital between 2012 and 2015. During this time, a standardized protocol was in place for antibiotic prophylaxis within an hour of incision. Demographic, admission, and operative data were recorded. Appropriateness of all preoperative antibiotics was determined based on national guidelines. Univariate analyses were performed to identify factors associated with any SSI and inappropriate antibiotic timing or coverage.

**Results:** Of 699 patients, 10 (1.4%) developed a SSI, 62 (8.9%) did not receive antibiotics within an hour of incision and 19 (2.8%) received inadequate coverage preoperatively. The majority (646, 93%) received a single-antibiotic regimen, and the majority (661, 95%) received the same regimen consistently prior to surgery when multiple doses were scheduled. Only receipt of any antibiotics within an hour of incision was associated with decreased odds of SSI (OR 0.22, 95% CI 0.06–0.87) (Table 1). No factors were associated with inappropriate antibiotic timing or coverage.

**Conclusions:** An institutional protocol for simple appendicitis can yield high compliance with prophylactic antibiotic administration. Although the SSI rate is low, antibiotic administration within an hour prior to the incision is associated with fewer infections. Timing of the preoperative dose may matter more than starting antibiotics early in preventing SSIs.

**O38. VARIABILITY IN ANTIBIOTIC REGIMENS FOR NEC HIGHLIGHT THE NEED FOR STRICT GUIDELINES**

Brian Blackwood, Ann and Robert H. Lurie Children’s Hospital of Chicago; Julia Graowski, Ann and Robert H. Lurie Children’s Hospital of Chicago

**Background:** Necrotizing enterocolitis (NEC) is the most common gastrointestinal emergency in the newborn. As the etiology of NEC remains unknown, the treatment consists of antibiotic therapy and supportive care with the addition of surgical intervention as necessary. Unlike most surgical diseases, clear guidelines for the type and duration of perioperative antibiotic therapy have not been established.

**Hypothesis:** Our aim was to review the antibiotic regimens applied to surgical NEC patients within a single NICU in order to evaluate outcomes and help develop guidelines for antibiotic administration in this patient population.

**Methods:** A single center retrospective review was performed of all patients that underwent surgical intervention for NEC (ICD-10 code: K87.0) 01/01/2005–11/01/2015. Relevant data was extracted including gestational age, age at diagnosis, sex, preoperative antibiotic treatment, post-operative antibiotic treatment, development of stricture, and mortality. Patients were excluded if there was incomplete data documentation.

**Results:** A total of 90 patients were identified who met inclusion criteria. There were 56 male patients and 34 female patients. The average gestational age was 30 5/8 weeks and average age of diagnosis 16.7 days. A total of 20 different preoperative antibiotic regimens were identified with an average duration of 10.6 days. The most common preoperative regimen was Ampicillin, Gentamycin, and Flagyl for 14 days. A total of 15 different post-operative antibiotic regimens were identified with average duration of 6.6 days. The most common post-operative regimen was Ampicillin, Gentamycin, and Flagyl for 2 days. There were 26 strictures and 15 deaths. No regimen or duration was superior when it came to outcome analysis.

**Conclusions:** In conclusion, we found that there is a high degree of variability in the antibiotic regimen for the treatment of NEC, even within a single NICU, with no one regimen showing superiority. As antibiotic resistance becomes more problematic, our data highlight the need for guidelines in the antibiotic treatment of NEC and suggest that an abbreviated course of post-operative antibiotics may be safe.

**O39. HARBORING A PLASMID AFFECTS INTESTINAL COLONIZATION AND INDUCTION OF NEC BY ESCHERICHIA COLI 07:K1 CE10 AND CRONOBACTER MUYTJENSII M.D.E.N.A 4-8**

Jordan Bowling, Children’s Hospital of Los Angeles Department of Surgery; Mubina Isam, Children’s Hospital Los Angeles Department of Surgery; Jamie Golden, Children’s Hospital of Los Angeles Department of Surgery; Ayaata Dosu, Children’s Hospital of Los Angeles Department of Surgery; Brandon Bell, Department of Surgery, Keck School of Medicine of the University of Southern California; Jin Wang, Department of Surgery, Keck School of Medicine of the University of Southern California; Anatoly Grishin, Department of Surgery, Keck School of Medicine of the University of Southern California; Henri Ford, Children’s Hospital of LA, University of SC

**Background:** The early post-natal microflora plays a vital role in the pathogenesis of necrotizing enterocolitis (NEC), a severe gastrointestinal disease that predominantly affects premature infants. Whereas some bacteria may act as opportunistic pathogens when they colonize the gut, others might be innocuous and even protective in nature. In our previous studies, the presence of E. coli CE10 (CE10) in 4-day old rats had a negative correlation with the incidence of experimental NEC, while Cronobacter muytjensii M.D.E.N.A 4-8 (CM) had a positive correlation.

**Hypothesis:** Test the hypothesis that CE10 and CM are capable of colonizing neonatal rats, and while CM may be pathogenic, CE10 may protect from NEC.

**Methods:** E. coli CE10 and CM were transformed with a plasmid (pKL:pro-KI4, I.eCFR) conferring expression of green fluorescent protein (GFP) and ampicillin resistance. During the first feed neonatal rat pups received the transformed or non-transformed bacteria at either 106 or 107 colony forming units (CFU), or no bacteria at all. Following this, the animals were subjected to 4 days of the NEC-inducing formula-feeding/hypoxia (FHF) regimen. NEC was scored histologically. Stool and ileum samples were plated for total bacterial load.

**Results:** E. coli CE10 and CM established themselves as first colonizers in all animals that received them. FHF alone caused NEC in 60% of neonatal rats. E. coli CE10 reduced the incidence of NEC to 39% (p = 0.027). Transformed CM induced NEC in 55% of animals, compared to 69% in non-transformed control (p = 0.22). Non-transformed CM at 107 CFU increased the incidence to 94% (p = 0.009).

**Conclusions:** CE10 and CM are efficient first colonizers in neonatal rats. CE10 significantly reduces the incidence of NEC. Harboring a plasmid affected the virulence of CM, decreasing the incidence of NEC when compared to non-transformed CM, especially at 107 CFU. Bacteria similar to CE10 strain can be used for the prophylaxis of NEC. Further studies are needed to elucidate the mechanism of CM virulence.
were markedly attenuated in the iNK/-pups. On Western blot, PECAM-1 expression was unchanged in the WT pups following CS; however PECAM-1 expression was increased in iNK/- pups. Vinculin was decreased in WT. This decline was more marked in iNK/- pups. PD-1/- pups were then assessed to ascertain a potential mechanism modulating these findings. Similarly, CS in PD-1/- pups was associated with increased PECAM-1 and decreased vinculin expression. To further delineate our prior observations of PD-1 attenuating peritoneal microbial clearance, we characterized the peritoneal macrophage phenotypes. CS vs Sham induced greater levels of activated macrophages into the peritoneal cavity in the WT (49% vs 3%; p < 0.01), with decreased levels of activation and the emergence of Ly6Chigh subpopulation. This macrophage influx was markedly decreased in the iNK/- mice (11% vs 4%; p = 0.03). However compared to WT, iNK/- macrophages displayed a higher level of activation and greater percentage of Ly6Chigh macrophages.

Conclusions: We demonstrate a key role for iNKT cells in affecting end organ damage as well as alterations in phagocytes phenotypes in neonatal sepsis. This iNKT cell mediated effect is driven by the central checkpoint protein PD-1, a ligand for which signaling pathway were available for analysis (Figure 1). Three G-protein genes GNAQ (FC 2.6, p = 2.87E-13), GNA15 (FC 2.6, p = 6.45E-10), GNG10 (FC 2.3, p = 3.26E-10), and the β-arrestin 2 gene AARB2 (FC 2.1, p = 1.43E-10) were elevated in children with septic shock. GNAQ activates phospholipase C, GNA15 has a role in hematopoiesis, and β-arrestin inhibits G-protein activity.

Conclusions: Our findings suggest that specific subunits of the heterotrimetric G-proteins and β-arrestin genes have altered levels of expression in children with septic shock. These genes occupy a critical region of convergence in G-protein signaling that initiates multiple intracellular cascades and thus the expression of these genes may provide a simplified molecular view of cell signaling activity during septic shock.

Results: All genes occupying the critical region of convergence in G-protein signaling pathway were available for analysis (Figure 1). Three G-protein genes GNAQ (FC 2.6, p = 2.87E-13), GNA15 (FC 2.6, p = 6.45E-10), GNG10 (FC 2.3, p = 3.26E-10), and the β-arrestin 2 gene AARB2 (FC 2.1, p = 1.43E-10) were elevated in children with septic shock. GNAQ activates phospholipase C, GNA15 has a role in hematopoiesis, and β-arrestin inhibits G-protein activity.

Conclusions: Our findings suggest that specific subunits of the heterotrimetric G-proteins and β-arrestin genes have altered levels of expression in children with septic shock. These genes occupy a critical region of convergence in G-protein signaling that initiates multiple intracellular cascades and thus the expression of these genes may provide a simplified molecular view of cell signaling activity during septic shock.

Research is needed to determine whether the pattern of G-protein gene expression can provide a molecular signature of sepsis and other disease processes.

O41. G-PROTEIN GENES ARE ALTERED IN CHILDREN WITH SEPTIC SHOCK

Jonathan Halbach, University of California San Diego; Erin Ward, University of California San Diego; Simone Langness, University of California San Diego; David Cauvi, University of California San Diego; Stephen DeMao, University of California San Diego; Stephen Beckler, University of California San Diego

Background: Septic shock results in profound changes in cellular function that are driven by hormones, neurotransmitters, and local mediators. Because the majority of these signaling molecules are hydrophilic, and therefore cannot cross the hydrophobic plasma membranes, Eukaryotes rely on signal transduction systems to relay information from the outside to the inside of cells. Heterotrimetric G-proteins (α, β and γ subunits) occupy a molecular convergence point in one of the largest signal transduction systems. While there are hundreds of G-protein coupled receptors on the cell surface and thousands of intracellular effectors, there are only 30 G-protein genes.

Hypothesis: The aim of the present study is to examine if G-protein gene expression in this critical region of convergence is altered in children with septic shock.

Methods: We queried gene array data (NCBI GDS4273) from children with septic shock (n = 82) and age matched controls (n = 21) to determine whether the expression of G-protein subunits and β-arrestin genes are altered during sepsis. Genes with greater than twofold change (FC) and a p value < 0.05 (ANOVA) were considered significant.

Results: All genes occupying the critical region of convergence in G-protein signaling pathway were available for analysis (Figure 1). Three G-protein genes GNAQ (FC 2.6, p = 2.87E-13), GNA15 (FC 2.6, p = 6.45E-10), GNG10 (FC 2.3, p = 3.26E-10), and the β-arrestin 2 gene AARB2 (FC 2.1, p = 1.43E-10) were elevated in children with septic shock. GNAQ activates phospholipase C, GNA15 has a role in hematopoiesis, and β-arrestin inhibits G-protein activity.

Conclusions: Our findings suggest that specific subunits of the heterotrimetric G-proteins and β-arrestin genes have altered levels of expression in children with septic shock. These genes occupy a critical region of convergence in G-protein signaling that initiates multiple intracellular cascades and thus the expression of these genes may provide a simplified molecular view of cell signaling activity during septic shock.

Research is needed to determine whether the pattern of G-protein gene expression can provide a molecular signature of sepsis and other disease processes.

O42. NOVEL METHOD ALLOWS PROOF OF SUPERIORITY IN ANTIBIOTIC TRIALS USING SMALLER COHORTS

Arthur Celestin, Department of Surgery, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA; Stephen Odom, Department of Surgery, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA; Robert Sawyer, Department of Surgery, University of Virginia HSC; Drew Farmer, Baylor University Medical Center at Dallas; Jeffrey Tessier, JPS Health Network; James Sanders, JPS Health Network; Billy Moore, JPS Health Network; Arthur Celestin, Department of Surgery, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA; Charles Cook, Department of Surgery, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA

Background: The STOP-IT trial suggests that short-duration antibiotic therapy is not inferior to traditional duration therapy (until resolution of physiologic abnormalities). STOP-IT was powered for non-inferiority and like many such trials had difficulty reaching enrollment targets. Recently, Desirability of Outcome Ranking and Response Adjusted for Duration of Antibiotic Risk (DOOR/RADAR) have been suggested as innovative statistical approaches to increase the power of such studies. We retrospectively applied DOOR/RADAR methodology to STOP-IT data to determine if the achieved sample size was adequate to demonstrate superiority of short fixed course antibiotic duration.

Hypothesis: DOOR/RADAR methodology will show superiority of short duration antibiotic therapy for intra-abdominal infection.

Methods: DOOR scores were calculated for the 517 STOP-IT trial patients based on ordinal clinical outcomes and duration of antibiotic use. Clinical outcomes were catego-
O45. DURATION OF ANTIMICROBIALS FOR INTRAABDOMINAL INFECTION DOES NOT PREVENT TREATMENT FAILURE AMONG HIGH-RISK PATIENTS

Taryn Hassinger, University of Virginia Health System; Christopher Guidry, UVA Health System; Robert Sawyer, University of Virginia HSC

Background: Recent studies have suggested that the treatment of intraabdominal infections (IAI) can be shortened without detrimental effects on patient outcomes. However, data involving high-risk patient populations are lacking.

Hypothesis: Patients at high-risk for treatment failure will benefit from longer antimicrobial therapy.

Methods: Patients enrolled in the Surgical Infection Society Study to Optimize Peritoneal Infection Therapy (STOP-IT) trial were evaluated to identify risk factors associated with treatment failure. Patients were randomized to either a fixed 4-day antimicrobial regimen (experimental) or a longer clinical based duration (control). Treatment failure was defined as the composite outcome of recurrent intraabdominal infection, surgical site infection, or death. Variables were considered risk factors if there was a positive statistical association with the composite outcome. Patients were then stratified based on the presence and number of these risk factors. Univariate analysis using Kruskal-Wallis, Chi-Square, and Fisher’s exact test were performed. Multivariate analysis controlling for number of risk factors and original randomization group was also performed.

Results: We identified the presence of corticosteroid use, APACHE II score ≥ 15, hospital acquired infection, or a colonic IAI source as risk factors for treatment failure. Of the 518 patients enrolled, 279 (53.8%) had at least one risk factor. Of these, 263 (94.3%) had 1–2 risk factors and 16 (5.7%) had 3–4 risk factors. Composite outcome rates increased as the number of risk factors increased (Table). When controlling for randomization group, the presence and number of risk factors were independently associated with treatment failure (C-statistic = 0.60; Table).

Conclusions: We were able to identify patients at high risk for treatment failure in the STOP-IT Trial. However, patients at high risk of treatment failure did not benefit from increased duration of antibiotics. Further study is needed to evaluate the optimum duration of antimicrobial therapy in high-risk patients.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Composite Outcome</th>
<th>Odd Ratios (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment Group: Experimental</td>
<td>21.7%</td>
<td>0.89 (0.58 – 1.36)</td>
<td>0.60</td>
</tr>
<tr>
<td>Number of Risk Factors: 0</td>
<td>15.9%</td>
<td>Reference</td>
<td></td>
</tr>
<tr>
<td>1-2</td>
<td>25.1%</td>
<td>1.78 (1.14 – 2.78)</td>
<td>0.01</td>
</tr>
<tr>
<td>3-4</td>
<td>62.5%</td>
<td>9.05 (3.09 – 26.51)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>
P01. KEEPING IT SIMPLE: IMPACT OF A RESTRICTIVE ANTIBIOTIC POLICY FOR VENTILATOR-ASSOCIATED PNEUMONIA IN TRAUMA PATIENTS ON INCIDENCE AND SENSITIVITIES OF CAUSATIVE PATHOGENS

Danielle Barnard, UTHSC; Louis Jude Magnotti, UTHSC; Cory Evans, UTHSC; Jordan A. Weinberg, UTHSC; Joseph Swanson, UTHSC; Thomas Schroeppe, UTHSC; G Christopher Wood, UTHSC; L Paige Clement, UTHSC; Timothy Fabian, UTHSC; Martin Croce, UTHSC

Background: Optimal diagnosis and appropriate choice of empiric antibiotics remain two of the most important facets of ventilator-associated pneumonia (VAP) management. For more than two decades, empiric antibiotics (dictated by length of hospitalization) for our VAP clinical pathway have remained unchanged. In order to ensure optimal empiric therapy for VAP, periodic evaluation of causative pathogens is vital.

The purpose of the current study (CS) was to evaluate the impact of a restrictive antibiotic policy for VAP in trauma patients on the incidence and sensitivities of these causative pathogens over time.

Hypothesis: Adherence to a restrictive antibiotic policy for VAP management would have negligible impact on the incidence and sensitivities of causative pathogens.

Methods: Consecutive patients over 9 years with VAP (defined as ≥ 10^5 CFU/mL in the bronchoalveolar lavage effluent) subsequent to a previous study (PS) were identified. Data regarding the incidence and sensitivities of each organism identified were recorded. The adequacy of empiric antibiotic therapy for each episode of VAP was determined. Therapy was considered to be adequate if one or more antibiotics had in vitro activity against the organism causing VAP. The CS was then compared to the PS.

Results: Over 9 years, 1679 patients underwent 3202 BALs. 2387 organisms were isolated. The incidence of Staphylococcus aureus (SA) increased in the CS compared to the PS (23% vs 17%, p = 0.001). Not surprisingly, the incidence of methicillin-resistant SA also increased (10% vs 6%, p = 0.001). The incidence of Pseudomonas aeruginosa (PA), Acinetobacter baumannii (AB) and Stenotrophomonas maltophilia remained unchanged. Susceptibility patterns to cephalosporins, extended-spectrum penicillins, aminoglycosides and fluoroquinolones were unchanged for PA. However, there was minor improvement in the sensitivity of AB to imipenem/cilastatin (85% vs 78%, p = 0.142). Adequacy of empiric therapy for all VAP episodes was also unchanged (80% vs 78%, p = 0.075).

Conclusions: Continued adherence to the current empiric antibiotics employed in the VAP clinical pathway was associated with only minor changes in the causative pathogens. In addition, these antibiotics continue to provide adequate empiric coverage in the majority of VAP episodes. Thus, periodic culture surveillance ensures optimal VAP therapy by maintaining adequacy of empiric therapy.

P02. ANTIMICROBIAL GUIDELINES FOR INTRA-ABDOMINAL INFECTIONS: DO WE PRACTICE WHAT WE PREACH?

Sara Buckman, Washington University School of Medicine; Isaiah Turnbull, Washington University School of Medicine; Robert Sawyer, University of Virginia HSC; John Ma-zuski, Washington University School of Medicine

Background: Published guidelines from the Surgical Infection Society (SIS) describe selection of antimicrobial therapy for patients with IAI. These guidelines describe use of different antimicrobial regimens for lower and higher risk patients, and use of supplemental agents in selected higher risk patients. This study was undertaken to determine the frequency with which investigators from the SIS followed these guidelines during a large prospective trial of antimicrobial duration.

Hypothesis: To determine adherence to published guidelines regarding antimicrobial therapy for intra-abdominal infections (IAI).

Methods: After approval by the Washington University Investigational Review Board, we reviewed the database of patients previously collected from the STOP-IT trial. Based on the available information, patients were separated into cohorts of lower risk patients with community-acquired (LR-CAIA) infections, higher risk patients with the same (HR-CAIA), and patients with healthcare-associated intra-abdominal infections (HA-IAI). Compliance was based on adherence with either the 2002 or 2010 SIS guidelines for IAI. When recommendations were somewhat ambiguous, we used both strict and liberal criteria for judging compliance.

Results: Overall compliance to the guidelines was 50% using liberal criteria and 43% using strict criteria. Compliance varied across the cohorts, being lowest in the LR-CAIA group. The primary reason was use of an excessively broad-spectrum empiric antibiotics. In HR-CAIA patients non-compliance with strict criteria was frequently due to lack of enterococcal coverage; however, even using liberal criteria, non-compliance was still 33%. In HA-IAI patients, adherence was 45% with strict criteria, due to inappropriate antibiotic selection and lack of empiric enterococcal coverage and 53% using liberal criteria.
P04. PREVALENCE OF RECENT ANTIMICROBIAL EXPOSURE AMONG ELECTIVE SURGICAL PATIENTS

Christopher Guidry, UVA Health System; Robert Sawyer, University of Virginia HSC

Background: Exposure to antimicrobials is associated with significant alterations in normal host microbiota resulting in an increased risk for nosocomial infection, particularly with resistant organisms. These effects have been observed as much as six months following initial exposure. Logically, one would expect surgical patients to be particularly susceptible to any negative effects of recent antimicrobial exposure. However, despite these observations, it is surprising that the prevalence of recent antimicrobial exposure among surgical patients remains undefined.

Hypothesis: The overall prevalence of recent antimicrobial exposure among elective surgical patients is low.

Methods: Patients presenting for elective surgery between August and October 2015 at our institution were prospectively asked about any antimicrobial exposure in the previous three months. Answers were recorded as either yes, no or unsure. Patients were grouped according to age, American Society of Anesthesiologists (ASA) score, primary operative service, and post-operative destination. Descriptive statistics were employed grouped according to age, ASA score, primary surgical patients is low.

Hypothesis: The overall prevalence of recent antimicrobial exposure among elective surgical patients is low.

Methods: Patients presenting for elective surgery between August and October 2015 at our institution were prospectively asked about any antimicrobial exposure in the previous three months. Answers were recorded as either yes, no or unsure. Patients were grouped according to age, American Society of Anesthesiologists (ASA) score, primary operative service, and post-operative destination. Descriptive statistics were employed using simple percentages and chi-square analysis when appropriate.

Results:
- There were 4,870 elective surgical cases performed during the study period among elective surgical patients. Answers were recorded for 4,132 (84.8%) cases. The overall prevalence of antimicrobial exposure during this period was 28.3%. Exposure by age is listed in the figure below. Urology and transplant surgery cases had the highest prevalence of exposure (42.9% & 36%) while adult and pediatric orthopedic cases had the lowest (22.4% & 14.9%). Exposure prevalence increased steadily as ASA score increased (19.0% for ASA 1 vs. 45.0% for ASA 4). Patients with recent antimicrobial exposure were less likely to be discharged home on the same day (33.6% vs. 22.8%; p < 0.0001) than those who denied recent exposure.

Conclusions: In this descriptive analysis, the prevalence of recent antimicrobial exposure is overall approximately 28.3% and is higher than we anticipated. Prevalence varies significantly by operative service and ASA classification. Further work is underway to determine to what extent, if any, recent antimicrobial exposure impacts post-operative outcomes.

P05. A POOLED, POST-HOC EVALUATION OF THE LENGTH OF ANTIMICROBIAL THERAPY FROM IGNITE1: A PHASE 3 STUDY OF ERAVACYCLINE (ERV) AND ERTAPENEM (ETP) FOR COMPLICATED INTRA-ABDOMINAL INFECTIONS (CIAI)

Holly Hoffman-Roberts, Tetraphase Pharmaceuticals; Patrick Scoble, Tetraphase Pharmaceuticals; Andrew Marsh, Tetraphase Pharmaceuticals; Philip Barie, Weill Medical College of Cornell University; Patrick Horn, Tetraphase Pharmaceuticals

Background: A previous study has shown that in patients with cIAI after adequate source control procedures, outcomes were similar after short courses of antibiotic therapy (~ 4 d) compared to longer courses of therapy (~ 8 d). Patients with documented cIAI were randomized (1:1) to either ERV 1 mg/kg IV q12h or ETP 1g IV QD. DoRx was up to 14 d at the clinician’s discretion. Clinical outcome at the test of cure (TOC) visit, ~ 28 d after randomization, was the primary efficacy endpoint in the microbiological-intent-to-treat (micro-ITT) population. Data were pooled and three groups were stratified based on DoRx, ≤ 5 d, 6 to 8 d, and > 8 d, respectively. Statistical analysis was performed using multi-group X² to compare data among groups, p < 0.05.

Results: Patients who received longer DoRx had higher APACHE II scores, were older, had higher rates of bacteremia, were more likely to have received prior antibiotics, and were more likely to have an open procedure as compared to those receiving shorter DoRx (Table). Overall average DoRx was 7 d, and for each of the groups were 4.2 d, 6.8 d, and 11.2 d, respectively. There was adequate source control in 98.2% of the patients. Clinical success rates for the stratified groups were 79.5%, 92.4%, and 83.7%, respectively (p < 0.01).

Conclusions: In IGNITE1, patients who received longer DoRx for cIAI were older, had higher rates of bacteremia, were more likely to have received prior antibiotics, and were more likely to undergo open surgery. DoRx was longer than in a recently published prospective study of short-course DoRx for cIAI except in the shortest DoRx group. Whether prolonged DoRx is indicated for more complex subpopulations deserves prospective evaluation.

P06. HUMAN ERROR FACILITATED BY LACK OF EFFECTIVE CLINICAL DECISION SUPPORT IN THE EMR: MISSING VANCOMYCIN TROUGH LEVELS ARE ASSOCIATED WITH WORSENED KIDNEY FUNCTION

Michelle Scebor, Hari Radhakrishnan, Deciso Health; John Holcomb, UTHealth

Background: Vancomycin is frequently ordered as a first-line, broad-spectrum antibiotic in critically-ill patients with suspected sepsis. Standard practice is to obtain a trough level prior to the 4th dose and adjust dosing based on target levels. However, this process is cumbersome and lacks accurate measurement of the actual level of vancomycin in the patient. Therefore, the user must place two orders, which is cumbersome when caring for critically-ill patients. Failure to obtain trough levels result in sub- or supra-therapeutic drug levels, which can result in ineffective treatment, the development of resistant pathogens or increased risk of acute kidney injury.

Hypothesis: We hypothesized that the uncoupling of two tightly related CPOE events would result in discordant clinical practice, resulting in worsened patient outcomes.

Methods: The ordering practices for patients admitted to our 23-bed Surgical Intensive Care Unit were studied from 04/2015 to 10/2015 via a patient dashboard that automatically extracts data from the electronic health record. The time of an order for a vancomycin trough in relation to initial dose was recorded. The % change in creatinine was calculated based on the ratio of creatinine levels prior to vancomycin administration and at the expected trough time. Usability software was used to evaluate the effort to properly generate these two associated orders. Student’s t-test with unequal variances was used to compare the % change in creatinine in patients that had a trough to those that did not. DoRx was longer than in a recently published prospective study of short-course DoRx for cIAI except in the shortest DoRx group.

Results: 243 patients received vancomycin during the 6 month study period. Only 150 (62%) patients had a trough drawn while 93 (38%) patients did not. Patients that did not have a trough drawn had an associated increase in creatinine in the time that elapsed from pre-vancomycin dosing to expected trough level (% change: 8 ± 3% increase (no trough) versus < 1 ± 2% decrease (trough), p = 0.04). Usability testing of our CPOE demonstrated that 34 mouse clicks and 53 keystrokes were necessary to order vancomycin and trough levels properly.

Conclusions: The uncoupling of two tightly related CPOE events resulted in human error and failure to obtain a required test, significantly affecting patient outcomes. CPOE should couple closely related events in order to ensure safe and effective medication administration. Useful clinical decision support tools should help clinicians improve the quality of care.

P07. THE ADMINISTRATION OF RIFAMPICIN TO THE FRACTURED PATIENT WITH STAPHYLOCOCCAL INFECTION THAT OCCURRED AFTER INTERNAL FIXATION

Yasutaka Nakahori, Osaka General Medical Center; Satoshi Fujimi, Osaka General Medical Center; Noriaki Kubo, Osaka General Medical Center; Akemi Kawamura, Osaka General Medical Center; Hiroki Matsuda, Osaka General Medical Center; Takeyuki Kimishita, Osaka General Medical Center; Nariaki Nakamoto, Osaka General Medical Center; Yoshiaki Yoshikawa, Osaka General Medical Center; Takayuki Kinoshita, Osaka General Medical Center; Hiroshi Ito, Osaka General Medical Center

Background: It is known that the antibiotics combination therapy with rifampicin is effective on a staphylococcal infection in the implanted device. However, there is no good report about this therapy to the patients with staphylococcal infections that occurred after internal fixation.

Hypothesis: The aim is to review the fractured patients treated with antibiotics combination therapy with rifampicin to the staphylococcal infections after surgery and to consider the indication of this therapy.

Methods: This study was a retrospective study. Setting is a department of trauma, critical care and emergency medicine in Osaka General Medical Center, Japan. There were 9 fracture patients with culture-proven staphylococcal infection associated with orthopedic implants and treated with antibiotics combination therapy with rifampicin.

Results: Criteria determined debridement when necessary. Cure was defined as (1) lack of clinical signs and symptoms of infection, (2) C-reactive protein level less than 5 mg/L, and (3)
absence of radiological signs of loosening or infection at the final follow-up. Failure was defined as (1) persisting clinical and/or laboratory signs of infection or (2) persisting or new isolation of the initial microorganism.

**Results:** There were 3 patients with open fracture. The average follow-up period was 15.9 months. All patients were cured. One patient had an adverse event to stop antibiotics therapy. Four patients were cured without removal of the device. Two patients were required to exchange implant.

**Conclusions:** 8 patients were able to tolerate long-term therapy with rifampicin. All patients experienced the cure of the infection. The antibiotics combination therapy with rifampicin may be effective on a staphylococcal infection that occurred after internal fixation even with the open fracture.

---

**P08. USE OF CLINICAL DECISION SUPPORT TO DISPLAY REAL-TIME ANTIBIOTOGRAMS AND UNIQUE SUSCEPTIBILITY PATTERNS OF P. AERUGINOSA AND E. COLI IN A SURGICAL INTENSIVE CARE UNIT**

Michelle Scerbo, Annamaria Macaluso, Memorial Hermann Hospital Houston, Texas; John Holcomb, UHealth

**Background:** Antibiotics are designed to provide clinicians with information on current trends in antimicrobial resistance, guide empiric antimicrobial selection, influence antimicrobial stewardship programs and effect hospital-wide formulations. National guidelines recommend for these documents to be updated annually and tailored to specific units, however time and training constraints are often cited barriers to optimal implementation.

**Hypothesis:** (1) Antimicrobial susceptibility trends in our Surgical Intensive Care Unit (SICU) differ from those reported for the hospital and (2) this could be elucidated with the use of real-time clinical decision support (CDS).

**Methods:** All cultures and antimicrobial susceptibility results obtained from patients admitted to the SICU from 04/2015-12/2015 were included. CDS was employed to calculate rates of susceptibility in the SICU as results were obtained. SICU susceptibility patterns of P. aeruginosa, E. coli and S. aureus obtained from all sources were compared to the hospital-wide antibiogram. 

**Results:** The hospital-wide antibiogram is published annually while the CDS-provided antibiogram is updated in real-time. Isolates of P. aeruginosa (n=49), E. coli (n=40) and S. aureus (n=40) were obtained from patients admitted to the SICU during the study period, compared to 936, 1313 and 1631 hospital-wide isolates from 2014, respectively. P. aeruginosa isolates obtained from patients in the SICU had lower rates of susceptibility to Piperacillin/Tazobactam (74% vs. 86% p < 0.05; Figure) while E. coli isolates had lower rates of susceptibility to Ceftriaxone (78% vs. 92%, p < 0.05).

**Conclusions:** There were no differences in susceptibility patterns of S. aureus.

---

**P09. A MULTIDISCIPLINARY APPROACH TO ANTIBiotic STEWARDship LIMITS DEVELOPMENToF ANTIBiotic RESISTANCE**

Thomas Schreoppel, UTHSC; John Sharpe, UTHSC; I. Paige Clement, UTHSC; Louis Jude Magnotti, UTHSC; Jordan A Weisenberg, UTHSC; Martin Croce, UTHSC; Timothy Fabian, UTHSC

**Background:** Antibiotic resistance is a global concern in the healthcare community. Many different strategies exist to limit resistance including de-escalation, antibiotic rotation, and limited duration of therapy for common infections. A unit specific approach including physicians and clinical pharmacists to track organisms and sensitivity patterns can help guide choice of antibiotics with de-escalation as soon as feasible.

**Hypothesis:** We hypothesize that a multidisciplinary approach to antibiotic stewardship and utilization will limit development of antibiotic resistance.

**Methods:** A review of a prospectively maintained database was performed over a 138-month period ending December 2014. Sensitivities were obtained from all infections in the intensive care unit for Escherichia coli, Acinetobacter baumannii, Enterobacter species, Klebsiella pneumoniae, Pseudomonas aeruginosa, and Serratia marcescens for Gram-negative organisms. Gram-positive organisms included Staphylococcus aureus and Streptococcus pneumoniae. Simple linear regression was used to determine if the sensitivity patterns changed over time.

**Results:** The study period spanned from July 2003 to December 2014. There were 5591 total isolates from infections.

**Conclusions:** The only sensitivity to worsen was E. coli to ciprofloxacin. The remainder of the Gram-negative organisms either improved or did not change. No changes were observed in Gram-positive organisms.

---

**P10. COMPLEX SEQUENCE AND SPlicing POLYMORPHISMS OF THE HUMAN GLUCOCORTICOID RECEPTOR**

Anna Eley, UC Davis Medical Center; Debora Lim, UC Davis Medical Center; Stacey Leventhal, Shriners Hospitals for Children Northern California; Taja Green, Shriners Hospitals for Children Northern California; Kiho Cho, UC Davis Medical Center; David Greenhalgh, UC Davis Medical Center

**Background:** A patient’s reaction to infection demands an appropriate response to glucocorticoids, which is highly influenced by the human glucocorticoid receptor (hGR). The critical role of hGR makes it an obvious target in the treatment of sepsis but clinical trials evaluating the use of steroids have been variable. It is likely that the variable response to steroids is related to a poor understanding of hGR. In addition to mutations and polymorphisms, modifications of the hGR gene occur at many levels, increasing the diversity of protein expression and function. In addition to hGR-n, eight alternative splice isoforms and eight alternative translation start sites have been described. However, much of this work has been done in cell lines and may not translate to hGR regulation in humans.

**Hypothesis:** In order to understand the signals that control hGR expression and the downstream effects on a patient’s response to infection we must look directly at hGR expression in human patients. We suspect that modification of the hGR gene can occur as a differential response to physiologic stress including sepsis.

**Methods:** Blood was collected from over 100 burn patients at incremental time points, RNA isolated, cDNA prepared and PCR used to look for altered splicing patterns thus far. In addition to mutations and polymorphisms, modifications of the hGR gene occur at many levels, increasing the diversity of protein expression and function. In addition to hGR-n, eight alternative splice isoforms and eight alternative translation start sites have been described. However, much of this work has been done in cell lines and may not translate to hGR regulation in humans.

**Results:** Data collection is ongoing but the diversity of hGR splicing patterns thus far is extensive. We created a database to compile the growing number of polymorphisms and cross-reference it with our previous work on hGR expression in healthy volunteers and asthma patients. To date, our database contains 90 deletions, 10 single nucleotide additions, 8 splice isoforms and 1229 SNPs, which have not been reported previously.

**Conclusions:** We are far from understanding hGR regulation in humans and the process is proving more complex than imagined. As we move forward, it is essential to maintain a dynamic annotation of hGR polymorphisms that will allow us to look at the frequency and patterns of isoform expression. We expect that correlation with clinical data will ultimately reveal patterns that may serve as markers for sepsis and predict or explain individual response to steroid treatment.
P11. DYSREGULATION OF NF-kB IN THE IMPAIRED HUMAN MONOCYTE LEADS TO A DECREASED TNF-RESPONSE

Norman Galbraith, Price Institute of Surgical Research, University of Louisville; Samuel Walker, Price Institute of Surgical Research, University of Louisville; Sarah Gardner, Price Institute of Surgical Research, University of Louisville; Hiram Polk, University of Louisville School of Medicine

Background: Major trauma can lead to simultaneous pro- and anti-inflammatory ge- nomic responses of the host defenses. Some trauma victims have subnormal monocyte function; exaggerated or prolonged negative feedback mechanisms can also result in the impairment of monocyte function, predictive of sepsis and/or death. An incomplete understanding of the underlying pathophysiology continues to prevent accurate risk stratiﬁcation and more speciﬁc therapy for the “high risk” patient.

Hypothesis: The goal of the study was to determine if the function of Inhibitor of kB Kinase (IKK) was dysregulated, causing a decreased TNF-α response.

Methods: Primary human monocytes were freshly isolated from healthy donors using CD14 magnetic beads. Cells were treated for 16 hrs with low dose LPS (10 ng/ml), compared with naïve cells (media only). Following correction for cell concentration, cells were re-suspended in fresh media and challenged with high dose LPS (100 ng/ml) at 37°C. Cell culture supernatant was collected and TNF-α protein concentrations were measured by ELISA. Monocyte messenger RNA (mRNA) was ex- tracted and TNF-α gene expression determined by qRT-PCR. Intracellular protein concentrations of IkB and NFkB p65 were measured by Western Blot. Statistical analysis was performed using the Wilcoxon signed-rank test. All experiments were based on a minimum of 5 different donors.

Results: Monocytes treated with low dose LPS (10 ng/ml) had a signiﬁcantly im- paired TNF-α response to the subsequent LPS 100 ng/ml challenge. TNF-α was de- creased in terms of mRNA at 2 and 6 hours, and supernatant protein at 16 hours after the challenge compared to naive cells (p < 0.01). Western Blot analysis revealed de- creased densitometry of NFkB p65 (p = 0.07), but also defective IkBα degradation in response, in the impaired monocyte (p = 0.04).

Conclusions: Low dose LPS leads to monocyte impairment, expressed as decreased TNF-α production, representative of the “high risk” trauma patient. In this model of impaired primary human monocytes, our analysis reveals dysregulation of the NFkB pathway, and speciﬁcally suggestive of defective IkK signaling. This warrants future study into focusing on upstream mechanisms for potential therapy.

P12. HEAT-SHOCK PROTEIN 90 (HSP90) INTERACTS WITH NOX-2 TO SUSTAIN RESPIRATORY BURST ACTIVITY IN INFLAMMATORY NEUTROPHILS DURING CLINICAL SEPSIS

Sahil Gupta, University of Toronto; Hajera Amatullah, University of Toronto; Robert D’Cruz, University of Toronto; Song-Hui Jia, St. Michael’s Hospital; Jennifer Tsang, McMaster University; Claudia Dos Santos, University of Toronto; John Marshall, University of Toronto

Background: Polymorphonuclear neutrophils (PMN) kill bacteria through NADPH oxidase-mediated reactive oxygen species (ROS) production. PMN from patients with sepsis demonstrate both prolonged survival and sustained ROS generation.

Hypothesis: We hypothesized that the molecular chaperone Heat-Shock Protein 90 (Hsp90) promotes sustained NADPH oxidase activity through the stabilization of NADPH oxidase components such as gp91phox/NOX-2.

Methods: We studied circulating PMNs from ICU patients meeting clinical criteria for sepsis and having a Multiple Organ Dysfunction Syndrome (MODS) score ≥4 and healthy controls. PMNs were isolated by density gradient centrifugation and incubated for 21 hours with or without LPS; 1 µg/ml. Hsp90 was either silenced genetically using siRNA or pharmacologically inhibited using Radicicol (Rad; 1 µM). Respiratory burst activity was analyzed by flow cytometry as DHR123. Protein-protein interactions were established through co-immunoprecipitation and protein expression was analyzed by Western blot analysis.

Results: PMNs from septic patients displayed increased Hsp90 protein expression in comparison to PMNs from healthy donor volunteers (HD: 1.1 ± 0.1, n = 9, SP: 15.1 ± 6.8, n = 18, p = 0.01). gp91phox/NOX-2 co-immunoprecipitated with Hsp90 and p47phox (Figure 1). Pharmacological inhibition of Hsp90 by radicicol signiﬁcantly diminished interactions between Hsp90 and NOX-2 (SP Baseline: 3.3 ± 0.23, n = 5; SP + Rad: 1.6 ± 0.25, p = 0.0001), and decreased Hsp90 interaction with ubi- quitin-mediating molecular chaperone, Hsp70 (SP Baseline: 0.15 ± 0.05, n = 5, SP + Rad: 0.56 ± 0.12, n = 5, p = 0.011). Genetic silencing of Hsp90 using siRNA reduced respiratory burst activity (SP Baseline: 5 ± 0.04, n = 4; SP + Hsp90siRNA: 0.84 ± 0.1, n = 3;). As was observed when using pharmacological inhibition (SP Baseline: 269, n = 1; SP + Rad: 182, n = 1).

Conclusions: Hsp90 stabilizes major components of the NADPH oxidase and protects NOX-2 from ubiquitin-mediated degradation, resulting in increased respiratory burst activity.

P13. BACTERIAL DEBRIS CAUSES MORTALITY IN AN ANIMAL MODEL OF SEVERE SURGICAL SEPSIS

Jonathan Halbach, Naval Medical Center San Diego; Dennis Hawishir, University of California San Diego; Stephen Beckler, University of California San Diego; David Carvill, University of California San Diego; Antonio De Maio, University of California San Diego

Background: Severe sepsis remains the most significant illness in the acute care setting with an incidence of 50 to 100 cases per 100,000 people in the population. Murine Cecal Ligation and Puncture (CLP) has been the most widely used animal model for studying severe surgical sepsis over the past 30 years. Multiple variables, including the length of ligation and size of puncture modulate mortality in this ex- perimental animal model. Antibiotics are commonly used to more closely mirror clinical human sepsis.

Hypothesis: The aim of the present study is to observe the effects of variable antibiotic use on survival in this model of severe surgical sepsis.

Methods: CLP was performed with ligation of the cecum 1.5 cm from the tip of a 16 gauge needle single perforation. Male mice (CD-1, 8 week-old) were continuously monitored for changes in core body temperature and mortality for 72 hrs after surgery. We performed a review of the literature to identify differences in antibiotic administra- tion in CLP. Imipenem was administered utilizing a variety of dosing strategies that present a model of critical care: pre-operative dosing; post-op dosing at 2 hours; post-op and multiple interval post-op doses; intra-cecal antibiotic injection prior to puncture. In addition, cecal ligation (without puncture) followed by peritoneal injection of sterilized vs. non-sterilized cecal contents was performed to observe the effects of sterile bacterial debris.

Results: No statistically significant difference in survival was observed between the different antibiotic strategies. Moreover, there were no differences in survival between mice challenged with sterile or non-sterile cecal contents.

Conclusions: Antibiotic use in this severe surgical sepsis model does not impact survival and may introduce undesired variability. The mortality associated with sterile cecum contents suggests that bacterial debris contributes to mortality in this model of severe surgical sepsis. Further investigation is required to determine the impact of antibiotics and bacterial debris in severe sepsis.

P14. TCA STIMULATES INTESTINAL CELL PROLIFERATION VIA A TGR5- AND ERK-DEPENDENT MECHANISM

Michael Mallicot, Children’s Hospital Los Angeles; Oswald Escobar, Children’s Hospital Los Angeles; Avafia Dossa, Christopher P. Gayer

Background: TGR5 is a G protein-coupled receptor known to interact with bile acids and to be located in intestinal epithelial cells. Bile acids have shown that taurocholic acid (TCA), a primary bile acid, stimulates intestinal cell proliferation via MAPK activation.

Hypothesis: We hypothesize that TCA functions through a TGR5-and ERK-de- pendent mechanism to promote intestinal epithelial cell proliferation.

Methods: Rat small intestine epithelial cells (IEC-6) and mouse small intestinal epithelial cells (MIESE) were subjected to varying doses of oleic acid (OA), a natural model for TGR5 agonist. Proliferation was measured using crystal violet staining and confirmed with nucleic acid incorporation (EdU). Migration was measured using a modified wounding assay by creating circular holes in cell monolayers and measuring them over time. ERK phosphorylation was assessed with Western blot.

Results: IEC-6 or MIESE cells were treated with oleic acid ranging from 0.01– 10 µM dose. Proliferation was stimulated maximally at 1 µM in IEC-6 (1.25 fold increase versus control, p < 0.004), similar to TCA treatment alone. MIESE cell proliferation appeared maximal at a lower dose: 0.1 µM (1.47 fold increase versus control, p < 0.01). TCA-induced proliferation is blocked by siRNA knockdown of TGR5, as we have previously reported. At similar doses, OA did not alter cell migration, while at doses of 12.5 µM and higher, there was a decrease in cell migration. TCA treatment did not alter cell migration. These data suggest that stimulation of TGR5 increases intestinal epi- thelial cell proliferation without a change in cell migration, via MAPK and ERK phosphorylation. This may represent the mechanism by which TCA stimulates intestinal epithelial cell proliferation.

P15. DECREASED EARLY EXPRESSION OF T-BET IN NK CELLS MAY PREDISPOSE TO INFECTION AFTER INJURY

Anupama Seshadri, Brigham and Women’s Hospital; Gabriel Brat, Brian Yorktis, Joshua Keegan, James Dolan, Ali Salim, Brigham and Women’s Hospital; Reza Askari, Brigham & Women’s Hospital; James Lederer, Brigham and Women’s Hospital

Background: Trauma induces a complex immune response with both pro- and anti- inflammatory characteristics. With the use of a novel technology, cellular time-of-flight mass cytometry (CyTOF), we can deeply phenotype these changes over multiple time points to provide new insights into how trauma influences immune cells.

Hypothesis: Immunophenotyping using CyTOF will identify novel injury-specific cellular changes in peripheral blood.

Methods: Peripheral blood from trauma patients with injury severity score >20 (n = 10) was collected at days 1, 3 and 5 after injury. Peripheral blood mononuclear cells (PBMCs) were stained with a CyTOF panel with 38 cell-surface and intracellular marker antibodies. Multi-dimensional analytical methods were used to reveal time-dependent changes in immune cell subsets. Patient age, gender, type of injury, and subsequent development of infection were also collected.

Results: CyTOF immunophenotyping revealed a specific increase in expression of the transcription factor T-bet in NK cells over the time course after trauma (Figure 1A). Patients diagnosed with infection had a significantly higher expression of T-bet (n = 1 at day 2 and n = 3 at day 3) showed a delayed increase of T-bet in NK cells, an important
transcription factor in terminal maturation of NK cells, with statistically significant lower expression levels at day 3 (difference between means 13.04 ± 4.18 or 32.6% of uninfected level; Figure 1b). Comparable peak levels were reached in infected and uninfected patients on day 5.

Conclusions: Deficient NK cell activity after injury is associated with sepsis and multisystem organ failure, but the responsible underlying mechanism is not known. This study demonstrates that injury induces increased T-bet expression in NK cells. This implies a trend to NK cells maturation caused by injury. Patients that developed an infection after injury had significantly lower expression of T-bet in NK cells at day 3 after trauma. These observations suggest that patients with peripheral blood delayed NK cell maturation are more susceptible to infection after trauma. Future work will elucidate the functional importance of this finding.

P16. EFFECT OF “IMMUNONUTRITION” COMPARED TO STANDARD NUTRITION IN GASTROINTESTINAL MALIGNANCIES

Background: Intestinal malignancies (Colon / stomach) out over a period of 24 months.

Aims: The correct nutritional assessment for the diagnosis of malnutrition in surgical patients and highly prevalent in cancer, and CD16⁺/CD40⁺ T-cells, CD16⁺/CD40⁺ Neutrophils and CD16⁺/HLA-DR⁺ Monocytes were measured by FACS Analysis.

Methods: A prospective study conducted in a surgical critical care center of a Chinese tertiary care hospital. Consecutive septic patients were enrolled at admission. Aims: Improve nutritional parameter outcomes, morbidity and hospital stay of patients diagnosed of gastrointestinal neoplasia (colon / stomach). In order to contribute to the patients preoperative and immediate postoperative immunomodulating enteral diet, their nutritional status was assessed.

Hypothesis: Increased comorbidities and occurrence of post-operative complications predict 30-day and 6-month readmission after emergency abdominal surgery in an elderly population.

Hypothesis: The response of the immune system after severe trauma is one of the major determinants for the hospital course and patients outcomes. To identify possible early markers for the immunologic status we investigated CD28⁺ T-Cells, activated Neutrophils and Monocytes for influence on septic complications and complications during the hospital stay.

Hypothesis: We hypothesized that the expression frequency of leukocyte subgroups at admission might serve as a indicator for the current immunologic state and might predict infectious complications and patient outcomes.

Methods: Trauma patients with an ISS > 16 (n = 31) and burned patients ≥30% TBSA (n = 29) were included in this study. Patients were grouped by the incidence of Sepsis. Demographics, biochemical markers, and clinical outcomes were recorded. Blood was collected at day 0, 1, 5, and 7. CD28⁺ T-cells, CD16⁺/CD40⁺ Neutrophils and CD16⁺/HLA-DR⁺ Monocytes were measured by FACS Analysis.

Results: The groups consisted of 41 nonseptic (NS) and 5 septic (S) patients. Both populations were comparable in age (NS: 45.1 ± 2.7 S: 45.5 ± 8.2 years), gender distribution (NS: 80.5%, S: 80% male), ISS (NS: 26 ± 1.6 S: 21.8 ± 4.2) and burn size (NS: 36.4 ± 2.7 S: 38.0 ± 6.2). No differences were found regarding SIRS, MOF, and maximum Denver2 score. NS had a significantly (p = 0.0066) higher percentage of CD16⁺/CD40⁺ cell (NS: 5.6 ± 1.88% gated; S: 1.09 ± 0.99% gated on day 0. CD28⁺/CD3⁺ started at similar levels in both groups but dropped beginning day 3 in the S group reaching significance day 5 (NS: 30.64 ± 3.60% gated; S: 2.29 ± 1.78% gated, p < 0.001) and day 7 (NS: 29.16 ± 3.38% gated; S: 1.84 ± 1.21% gated, p < 0.001). At days 0 and 1 NS showed remarkable higher values for CD16⁺/HLA-DR⁺ cells with a significant difference at day 3 (NS: 0.0251 ± 0.0073% gated; S: 0.002 ± 0.002% gated, p = 0.004).

Conclusions: This analysis suggests that early expression of CD16⁺/CD40⁺ Neutrophils, CD16⁺/HLA-DR⁺ Monocytes and sustained elevation of CD28⁺ T-cells have positive effects on infectious complications.

P17. EARLY EXPRESSION PATTERNS OF CD28⁺ T-CELLS, CD16⁺/CD40⁺ NEUTROPHILS AND CD16⁺/HLA-DR⁺ MONOCYTES ARE ASSOCIATED WITH THE INCIDENCE OF SEPSIS
Robert Kraft, Klinikum Memmingen/University of Munich; Heiko Trentzsch, Klinikum der Universität München, INM - Institut für Notfallmedizin und Medizinmanagement, Bereich Medizin, Andreas Lenz, Department of Trauma, University of Munich, Germany; Siegfried Zoller, Clinical Study Center Klinikum der Universität München; Eugen Faust, Ludwig-Maximilians University Munich

Background: The correct nutritional assessment for the diagnosis of malnutrition in surgical patients and highly prevalent in cancer, and CD16⁺/CD40⁺ T-cells, CD16⁺/CD40⁺ Neutrophils and CD16⁺/HLA-DR⁺ Monocytes were measured by FACS Analysis.

Aims: To determine predictors of 30-day and 6-month readmission after emergency abdominal surgery in an elderly population.

Methods: We carried a prospective, randomized study of 80 patients with gastrointestinal malignancies (Colon / stomach) over a period of 24 months.

We use to select the patients the generated subjective global assessment by the patient (VGS-GP), biochemical and anthropometric parameters. The patients were selected with a globally accepted assessment tool (VGS-GP) that focuses on measuring the patients preoperative and immediate postoperative immunomodulating enteral diet.

Results: A decrease of infectious complications was observed, as well as a lower readmission analysis, respectively. Mean ages were 75.7 and 76.6 and mean CFS were
3.4 and 3.5, respectively. 30-day and 6-month readmission rates were 30 (11.2%) and 47 (18.9%), respectively. Higher CFS correlated with increased 30-day readmission: compared to non-frail patients (CFS 1–2), patients with a CFS of 3–4 (OR 4.4, 95% CI 1.0–20.0, p = 0.051) and a CFS of 5–6 (OR 6.9, 95% CI 1.4–34.1, p = 0.017) were more likely to be readmitted, after adjusting for sex and surgery type. For 6-month readmission, dyslipidemia was the only predictor of readmission (aOR 2.7, 95% CI 1.2–6.3, p = 0.021). Interestingly, studies have shown an associated risk of post-operative infection with dyslipidemia in our study, 23.4% of patients were readmitted for infectious complications (including 8.5% due to a surgical site infection) – the second most common cause for readmission, after gastrointestinal complications (accounting for 34.0%).

Conclusions: Increasing frailty identified increasing risk of 30-day readmission after surgery in older patients and may help to target post-operative care interventions. Readmissions result in increased health care costs and can be a marker of poor-quality care, hence this high-risk population can allow targeted interventions to prevent readmission following emergency surgery.

P20. EXAMINING THE INFLUENCE OF BLOOD ALCOHOL LEVEL IN THE INCIDENCE OF PNEUMONIA & SEPSIS COMPLICATIONS FOLLOWING INJURY: A PROPENSITY SCORE MATCHED ANALYSIS

Nasim Ahmad, Jersey Shore University Medical Center; Patricia Koeker pkoeker@meridianhealth.com

Background: The purpose of the study was to see the impact of blood alcohol level (BAL) on the occurrence of pneumonia and sepsis complications in trauma victims.

Hypothesis: Presence of blood alcohol level above the legal limit increases the incidence of pneumonia and sepsis complication following injury.

Methods: A retrospective analysis was performed using data from those who were tested for BAL at the time of hospital admission following physical trauma. The data was extracted from the RDS data set from 2007–2010 from the American College of Surgeons’ National Trauma Databank. Data on patients’ baseline and trauma characteristics were compared between two groups: those whose BAL tested negative and those whose BAL tested positive above the legal limit. Propensity score matching was performed using baseline characteristics in an attempt to better balance the two groups. Both absolute risk reduction (ARR) and McNemar’s tests were used to evaluate the risk difference of pneumonia and sepsis between the paired groups.

Results: A total of 279,406 patients qualified for the final analysis. Of those, 92,960 patients tested positive for alcohol with a BAL above the legal limit. There were statistically significant demographic differences found between the two groups regarding age (P < 0.001), gender (P < 0.001), and race (P < 0.001). Therefore, propensity score matching was performed using these three factors to better balance the two groups. The mean standardized difference was less than 10% between the groups after matching, indicating that the matching procedure was successful. When comparing the occurrence of both pneumonia and systemic sepsis between the matched pairs, there was a significantly higher rate of pneumonia cases (P = 0.03) in the alcohol positive patients, but no significant difference was observed for sepsis (P = 0.62). Absolute risk reduction in patients who were alcohol negative was 0.005 (CI[0.00,0.001]).

Conclusions: A higher incidence of pneumonia complication cases were observed in patients who tested positive for alcohol with a BAL over the legal limit. However, no significant difference was seen in the incidence of sepsis between the alcohol positive and alcohol negative groups.

P21. DISMAL OUTCOMES: INFECTION AND DEATH AFTER LAPAROTOMY IN ELDERLY TRAUMA PATIENTS

Eric Benoit, Rhode Island Hospital; Hector Nuñez, Rhode Island Hospital; Jacob Sim, Rhode Island Hospital; Daithi Heffernan, Rhode Island Hospital; Sean Monaghan, Rhode Island Hospital; Tareq Khierbek, Rhode Island Hospital; Charles Adams, Jr., Brown Medical School/R.I. Hospital; William Civetti, Rhode Island Hospital; Andrew Stephen, Rhode Island Hospital

Background: Infectious complications after trauma correlate with the overall burden of injury and the patient’s physiologic and immune response. Older trauma patients with decreased reserve may be less able to tolerate the added stress of laparotomy. Injuries such as Harmonic scalpel, Enseal or Ligasure with electrocautery or clips being cheaper options. Most surgeons secure the appendix stump with a stapler, however clips or endoloop are also good and less expensive options.

Hypothesis: Older patients have higher rates of infection after laparotomy and are higher overall mortality.

Methods: A retrospective review of Level 1 trauma patients who underwent laparotomy from 2005–2015. Patient characteristics included age, gender, Injury Severity Score (ISS), mechanism, infections and outcomes such as mortality. Infections were defined by microbiological criteria (UTI, VAP or CDC criteria for clinically evident infection (surgical site infections (SSI)). Time to operation was defined as immediate (< 3 hours) versus delayed (>3 hours). Young (18–35 years old) versus older (>65 years of age) were compared. The mean standardized difference was less than 10% between the groups after matching, indicating that the matching procedure was successful. When comparing the occurrence of both pneumonia and systemic sepsis between the matched pairs, there was a significantly higher rate of pneumonia cases (P = 0.03) in the alcohol positive patients, but no significant difference was observed for sepsis (P = 0.62). Absolute risk reduction in patients who were alcohol negative was 0.005 (CI[0.00,0.001]).

Conclusions: A higher incidence of pneumonia complication cases were observed in patients who tested positive for alcohol with a BAL over the legal limit. However, no significant difference was seen in the incidence of sepsis between the alcohol positive and alcohol negative groups.

P22. PEDIATRIC PATIENTS WITH AN ABNORMAL BMI HAVE AN INCREASED RISK OF DEVELOPING A SURGICAL SITE INFECTION

Brian Blackwood, Ann and Robert H. Lurie Children’s Hospital of Chicago; Jamie Harris, Rush University Medical Center; Christina Theodorou, Northwestern University Feinberg School of Medicine; Catherine Hunter, Ann and Robert H. Lurie Children’s Hospital of Chicago

Background: Surgical Site Infections (SSI) are complications that affect all surgical specialties and can lead to significant increases in postoperative healthcare cost. The incidence of childhood obesity is rising, and while obesity is a known risk factor for SSI in the adult population, its significance in the pediatric patients has not been clearly defined.

Hypothesis: We hypothesized that an abnormal BMI would be a risk factor for pediatric patients developing SSI.

Methods: We performed a single center retrospective review of all patients 2 years – 18 years old who underwent an operation that resulted in a postoperative infections (superficial incisional SSI, deep incisional SSI, and organ space SSI) from 3/1/2010 – 3/1/2015. All patients were classified as underweight, normal, overweight, or obese based on BMI percentiles, according to CDC pediatric growth charts. Comorbidities associated with wound infection, including operative wound classification, diabetes mellitus, immunosuppression, history of transfusion, and steroid use were analyzed. Surgical specialties and operations performed were recorded.

Results: A total of 136 patients were identified who developed a SSI. There were 79 male patients and 57 female patients. The average age was 9.2 years. Of the 136 patients who developed a SSI, 41 (30%) had an abnormal BMI (underweight, overweight, or obesity) vs. 95 (70%) who did not. Further analysis of these patients revealed no other identifiable SSI risk factors. Only 7 of these 41 patients did not receive prophylactic antibiotics within 1 hour of incision time. The average duration of surgery was 112 minutes and the average body temperature was 36.6°C. Furthermore, the majority of these 41 patients had a Wound Classification of I (27 pts) or II (5 pts). None of these patients were diabetic or immunosuppressed. None of these patients had a history of transfusion or steroid use. The surgical specialties with the most recorded SSI were Pediatric Surgery, Pediatric Orthopedics, and Otolaryngology. The most common operations resulting in SSI were appendectomy, skin lesion excision, and spinal fusion.

Conclusions: Surgical site infections are significant complications that affect all surgical specialties. Herein we have shown that nearly 1/3 of all the pediatric patients who developed a SSI had an abnormal BMI without any other identifiable SSI risk factors. This indicates that an abnormal BMI is an independent risk factor for developing SSI, and this knowledge should be utilized in preoperative management.

P23. CAN WE SAVE COSTS AND IMPROVE TECHNIQUE IN LAPAROSCOPIC APPENDECTOMY: REPORT FROM A RURAL HOSPITAL

Hugo Bonatti, University of Maryland Shore Health

Background: Laparoscopic appendectomy is most commonly performed using two 5mm and one 10–12 mm port. Various attempts to reduce the number and size of ports have been made. The mesoappendix is usually divided with a stapler or energy device such as Harmonic scalpels, Enseal or Ligasure with electrocautery or clips being cheaper options. Most surgeons secure the appendix stump with a stapler, however clips or endoloop are also good and less expensive options.

Hypothesis: With optimization of the technique a less invasive procedure can be obtained, which is not only equally safe as the standard.

Methods: The study includes 51 consecutive laparoscopic appendectomies performed at a rural hospital. Median age of the patients was 31.4 years, 63% were female. Patients were divided into 4 groups: G1 (n = 12) – standard technique, G2 (n = 12) – feasibility of portless technique, G3 (n = 12) – optimized technique, G4 (n = 15) – optimized technique with use of first entry port.

Results: Whereas in G1 all patient had standard port placement, in an increasing number of patients in G2-4 only 2 mm ports and as the last the portless minigrasper without trocar were used. In G3 and G4 increasingly the first entry port was used. Usage of staplers and/or energy devices was reduced from 100% in G1 to 20% in G4 and in the majority of cases both the appendix and the vascular pedicle are secured with an endoloop. Cost savings are approximately 4005$ per case allowing the use of the port-less minigrasper.

Conclusions: “Microinvasive” appendectomy with use of 2 ports and a port-less minigrasper was associated with high patient satisfaction and excellent cosmetic results.
P24. ACUTE CARE SURGERY CONSULTATION FOR ABDOMINAL COMPLAINTS ARE ASSOCIATED WITH HIGH MORTALITY IN BONE MARROW TRANSPLANT PATIENTS

Melissa Coleman, Brigham and Women’s Hospital; Philippe Armand, Dana-Farber Cancer Institute; Natasha Coleman, Brigham and Women’s Hospital; Zara Cooper, Brigham and Women’s Hospital; Joaquim Havens, Brigham and Women’s Hospital; Ali Salim, Brigham and Women’s Hospital; Reza Askari, Brigham and Women’s Hospital.

Background: The use of bone marrow transplant for the treatment of patients with hematologic malignancies continues to increase in frequency. Our aim was to better understand the complications of bone marrow transplant which lead to Acute Care Surgery (ACS) consultations. Improvements in the understanding of complications requiring ACS consultation can be used to inform management decisions.

Hypothesis: We hypothesized that ACS consultation is associated with high mortality for bone marrow transplant patients.

Methods: A retrospective review of the medical records of 1446 patients who underwent bone marrow transplant at the Dana-Farber/Brigham and Women’s Cancer Center from 2006 to 2012 was performed. All instances of ACS consultation which occurred after bone marrow transplant were identified and cataloged.

Results: From 2006 to 2012, 246 ACS consultations were requested for bone marrow transplant patients. Operative interventions were performed for 109 (44%) of these consultations. Abdominal complaints were the most common reasons for consultation, leading to 168 (68%) consults, with a median time of 10 months between the time of bone marrow transplant and consultation. Twenty-one percent of patients died within 30 days of ACS consultation for an abdominal complication. Of those consulted for abdominal complaints, 69 (41%) had surgery with an associated 30-day mortality of 7%.

Conclusions: This retrospective review of ACS consultations in bone marrow transplant patients is the largest reported to date. We found that ACS consultations for abdominal complaints are associated with a high mortality for bone marrow transplant patients. Further analysis is needed to identify the factors contributing to this high mortality. Continued research will improve our understanding of the indications and the outcomes associated with ACS consultations for bone marrow transplant patients.

P25. PATIENTS WITH PREEXISTING PSYCHIATRIC ILLNESS HAVE AN INCREASED RISK OF INFECTIOUS COMPLICATIONS FOLLOWING INJURY

Catherine Dickinson, Brown University; Hector Nunez, Rhode Island Hospital; Sean Monaghan, Rhode Island Hospital; Tareq Kheirbek, Rhode Island Hospital; Charles A Adams, William Cuttili, Rhode Island Hospital; Daithe Hefferman, Andrew Stephen, Rhode Island Hospital.

Background: A large portion of the general population has a psychiatric illness which has been shown to be a risk factor for the development of an infectious complication following admission. Affective disorders are known to be associated with immunosuppression. Significant work has been undertaken to better understand psychoneuroimmunology, however there has been scant investigation into how this applies to injured patients with psychiatric disease.

Hypothesis: Patients with preinjury psychiatric illnesses have increased rates of infection following admission for traumatic injury.

Methods: This is a retrospective chart review of all admitted trauma patients age 18 years and older over 5 years. Data was reviewed for demographics, mechanism and Injury Severity Score (ISS). Comorbidities included diabetes, obesity, preinjury steroid use and ICD-9 based psychiatric illness. All infections were diagnosed by microbiological criteria (UTI, VAP) or CDC criteria for clinically evident infections (surgical site infection). Data was analyzed by chi-square, t-test and regression analysis.

Results: Of the 11,147 admitted trauma patients, 14.5% had a preinjury psychiatric illness (PI) diagnosis. PI patients were older (61.5 ±/0.5 vs 54.3; p < 0.001), more likely female (56.5% vs 39.1%; p < 0.001) and there was no difference in blunt mechanism (88.4% vs 89.9%; p = 0.06) or median ISS (9 vs 9; p = 0.06). There was no difference between PI and non-PI patients in preinjury diabetes (13.4% vs 12.7%; p = 0.4) or steroid use (2.5% vs 1.9%; p = 0.1), but PI patients were more likely to be obese (15.7% vs 13.6%; p = 0.03). PI patients were more likely to develop any infection (10.4% vs 7.5%; p < 0.001). The most common infection in both groups was UTI (6.9% vs 4.7%; p < 0.05). Compared with non-PI patients, adjusting for age, gender, ISS, diabetes and obesity, PI patients were more likely to develop an infection (OR 1.3, 95% CI 1.1–1.5).

Conclusions: Patients with an underlying psychiatric illness are at increased risk of having an infectious complication after a traumatic injury requiring admission. This study identifies a previously unknown independent risk factor for infectious complications in the trauma patients which may result in increased awareness and attention to this vulnerable population. Further translational research should be done to gain a better understanding of the immunologic ramifications of psychiatric disease specifically in injured patients.

P26. MACHINE LEARNING AND CLOUD COMPUTING ENABLE ENHANCED PREDICTION OF SURGICAL SITE INFECTION

Zachary Dietch, Christopher Guidry, UVA Health System; Stephen Davies, UVA Health System; Paja M. Shah, Robert Sawyer, University of Virginia HSC.

Background: Advances in machine learning, computing, and data availability have led to superior predictions by automating the process of variable selection in the context of vast amounts of data.

Hypothesis: Based on wisdom-of-crowds literature, we hypothesized that an ensemble, or average, of machine-learning prediction models would generate a robust prediction model for surgical site infection (SSI).

Methods: Preoperative characteristics and SSI outcomes from the ACNSQIP Participant Use Files (PUF) 2005–2013 were split into training and testing sets. R statistical software was utilized on Microsoft’s Azure cloud environment to parallel-process variable selection and SSI predictions. Two machine-learning algorithms—regularized logistic regression and random forest—were fit to the training set and averaged to generate probabilistic predictions in the testing set. The primary outcome was prediction accuracy of the ensemble for SSI. The Brier score, represented by the mean squared difference between predicted probability and actual outcome for a set of observations, was used to evaluate performance. Calibration was also assessed using a graphical representation of predicted versus actual outcomes.

Results: Models were trained on 1,847,818 records and predictions tested on 615,939 records. Regularized logistic regression selected 99 predictors, including 27 new variables engineered using ACNSQIP PUF data. The random forest utilized 85 selected predictors, including 17 engineered variables. Ensemble predictions demonstrated improved accuracy over individual models as measured by the Brier score where lower is better (Ensemble: 0.03127, Random forest: 0.03180, p < 0.001). A graphical representation of model calibration is presented (Figure).

Conclusions: Advances in machine learning and cloud computing have enabled rapid, robust, and affordable predictive analysis and we generated predictive models that demonstrated excellent accuracy in predicting SSI. An ensemble of machine-learning models offered significant improvement in accuracy over either model alone. Because outcomes vary by institution, we would expect further improvement by including institution-specific data in our model.
Hypothesis: A clinical pathway offers standardized care and provides evidence to improve care.

Methods: Appendectomies performed from January 2010 to August 2015 identified by ICD9 codes. All appendectomies within 30 days of the initial hospital discharge were reviewed. Readmissions due to infection were defined by imaging, elevated inflammatory markers, and treatment with antibiotics +/- additional drainage procedure, and confirmed by initial appendix histopathology.

Results: A total of 4,761 appendectomies were performed, >99% laparoscopically. Only 118 children were readmitted for infection (2.48%). No statistically significant variation in readmission rate was noted by surgeon, or by year. Of the 118 readmissions, initial hospitalization appendix histopathology documented: nonperforation in 36%, nonperforation/contaminated in 20%, and frank perforation in 44%. Ages of readmitted patients (0-2 years, 1%; 2-5 years, 12%; 5-12 years, 52%; > 12 years, 34%) were similar to those at initial admission. Therapy during initial admission was cefoxitin in 65% and meropenem in 53% (some converted to meropenem following procedure). 42% of readmitted children had been switched to oral convalescent therapy; 82% received TMP-SMX/metronidazole. Of those readmitted, imaging documented localized infection in 91.5%, with 36% having abscesses large enough for drainage, usually performed by interventional radiology. Cultures of abscesses at readmission largely yielded bacteria with antibiotic susceptibility patterns similar to those noted on the initial admission, with 33% TMP-SMX resistance in E. coli. Surprisingly, 19% of abscesses were sterile.

Conclusions: A low readmission rate was documented in a series of 4,761 children with laparoscopic appendectomy over a 68 month period. Clinical pathway IV antibiotic therapy was well-matched to pathogenesis; readmission isolates remained susceptible to initial therapy.

P28. THE IMPACT OF EARLY MOBILITY AND OSH TRANSFERS ON PRESSURE-ULCER FREE DAYS IN THE SURGICAL INTENSIVE CARE UNIT (SICU)

Kathleen To, University of Michigan; Sharon Dickinson, University of Michigan Medical Center; Candace Friedman, University of Michigan Medical Center; Preethi Patil, University of Michigan Medical Center; Pauline Park, University of Michigan Health System; Krishnan Raghavendran, University of Michigan Health System; Lena Napolitano, University of Michigan Health System

Background: Pressure ulcer development remains a significant quality issue in critically ill patients. Hospital-acquired pressure ulcers (PU) may have impact on hospital reimbursement. Under the current system, a PU noted after transfer from an Outside Hospital (OSH) is attributed to the receiving hospital.

Hypothesis: We hypothesize that: 1) compliance with an Early Mobility (EM) protocol increases pressure-ulcer-free (PUF) days; and 2) PUs which develop in OSH transfer cases (PUF) is attributed to the receiving hospital.

Methods: We evaluated the EM episodes documented. Separate analyses of this period was undertaken. Additional OSH transfers (PUF) days with “de novo” UH cases. Statistical analysis included t-test and logistic regression.

Results: A total of 4,761 appendectomies were performed, >99% laparoscopically. Only 118 children were readmitted for infection (2.48%). No statistically significant variation in readmission rate was noted by surgeon, or by year. Of the 118 readmissions, initial hospitalization appendix histopathology documented: nonperforation in 36%, nonperforation/contaminated in 20%, and frank perforation in 44%. Ages of readmitted patients (0-2 years, 1%; 2-5 years, 12%; 5-12 years, 52%; > 12 years, 34%) were similar to those at initial admission. Therapy during initial admission was cefoxitin in 65% and meropenem in 53% (some converted to meropenem following procedure). 42% of readmitted children had been switched to oral convalescent therapy; 82% received TMP-SMX/metronidazole. Of those readmitted, imaging documented localized infection in 91.5%, with 36% having abscesses large enough for drainage, usually performed by interventional radiology. Cultures of abscesses at readmission largely yielded bacteria with antibiotic susceptibility patterns similar to those noted on the initial admission, with 33% TMP-SMX resistance in E. coli. Surprisingly, 19% of abscesses were sterile.

Conclusions: A low readmission rate was documented in a series of 4,761 children with laparoscopic appendectomy over a 68 month period. Clinical pathway IV antibiotic therapy was well-matched to pathogenesis; readmission isolates remained susceptible to initial therapy.

P29. EARLY SEPSIS DETECTION WITH AN ELECTRONIC MEDICAL RECORD SIRS ALERT PROGRAM

Mark Falimirs, Indiana University; Hazel Crews, Indiana University; Timothy Broach, Indiana University; Gabriel Bosslet, Indiana University

Background: Surviving Sepsis Guidelines recommend routine screening for sepsis to increase early detection. Most screening tools are static commonly applied upon admission, afford only interval screening, use parameters other than SIRS criteria and/or are used only within critical care environments.

Hypothesis: The goal of this study was to implement a computerized real-time SIRS screening process in noncritical care wards for early sepsis detection leading to decreased sepsis related mortality index.

Methods: A computerized program was developed to constantly screen electronic medical records in real-time for adjusted SIRS criteria (temperature <36 or >38, HR >100*, RR >20, WBC <4 or >12, pCO2 <30) for a 90-day time period on 2 noncritical care pilot wards in a university referral hospital. As number of SIRS criteria increased to ≥3, a “SIRS alert” was generated to a Rapid Response Team member. The respondents would evaluate the patient optimally within 15 minutes and determine the need to obtain an Arterial Blood Gas and Lactate level. A resident physician was notified of results and interventions were at their teams discretion. Measures for sepsis were gauged by the University HealthSystem Consortium (UHC). The principle outcome measure was mortality index related to sepsis.

Results: There were 714 SIRS alerts among 313 patients during the pilot period. 150 patients were considered to have an infectious concern; 127 were already receiving treatment for an infection diagnosis. 23 patients (15.3%) were identified to have a new infectious concern incurring a change in treatment including transfer to a higher level of care. Hospital wide, 930 cases met the UHC criteria for sepsis by ICD-9 codes in the previous 90-day period resulting in a sepsis mortality index of 1.21. During the pilot period, 406 cases met the same UHC ICD-9 codes with a mortality index of 0.96. The Student t-test comparing indices resulted in a p-value of 0.061.

Conclusions: Although the interventions during this pilot period involved a small proportion of an entire hospital population, the trend and impact toward an improvement in sepsis mortality (Sepsis Mortality Index from 1.21 to 0.96) is quite evident. There was greater awareness for sepsis resulting in a proportional increase in the UHC ICD-9 diagnostic codes for sepsis. Having the opportunity to apply the pilot across the entire patient population with early PU development have similar PUF days when total hospitalization time is used. Our results highlight the importance of continuity of care across different transitions.
P31. INFECTIOUS COMPLICATIONS FOLLOWING SPLENECTOMY FOR TRAUMA: DUE TO MULTIPLE INJURIES AND NOT SPLENECTOMY

Michael Mackowski, University of Louisville; Charles Kimbrough, University of Louisville; Katie Love, Virginia Tech Carilion School of Medicine; Jason Smith, University of Louisville; Kenneth, University of Louisville; Glen A Franklin, University of Louisville; Brian Harbrecht, University of Louisville

Background: One impetus for non-operative management is the reported higher infectious complication rate associated with splenectomy, estimated by some to be 26–30%. One impetus for non-operative management is the reported higher infectious complication rate associated with splenectomy, estimated by some to be 26–30%.

Hypothesis: We hypothesized that most infectious complications in patients undergoing splenectomy are due to their associated multi-system injuries, distinguishing infections caused by the splenectomy versus associated multisystem injuries is challenging.

Methods: Using video surveillance, all health care worker (HCW)-patient interactions for 30 patients were retrospectively reviewed for HH compliance during initial patient contact with and before patient contact with body fluid. HH compliance was considered as compliant, compliance was 57% overall, best before (72%) and after (99%) patient contact and with body fluid (68%). Compliance including glove donning/removal was similar among different HCW types. No HH was observed before clean procedures. HH compliance was 75% of the time before bedside procedures but only 29% of the time prior to device insertion. There was no significant difference in HH compliance between critical and noncritical patients (p > 0.05).

Results: HH compliance is low in the setting of active trauma resuscitation. Our compliance is lower than other studies, but our results may be more accurate since HCW were unaware they were being assessed. Since time spent in direct patient care during the golden hour of trauma is crucial to improving outcomes, HH compliance may be prioritizing the time with the patient over hand washing. Guidelines that focus on glove use for fewer HH moments may more effectively promote compliance in this setting. To further evaluate this, a survey of HH knowledge/perceptions in this setting and a larger, multi-center study of compliance are planned.

Conclusions: The risk of infectious complication attributed directly due to performance of a splenectomy is low. The primary determinant of infectious complications in patients with splenic injury is the magnitude of associated injuries.

P32. EMERGENCY GENERAL SURGERY: CAUSES OF DEATH IN THE STATE OF MARYLAND

Ronald Tesetiero, University of Maryland Medical Center; Adams Cowley Shock Trauma Center; Brandon Bruns, University of Maryland Medical Center; Adams Cowley Shock Trauma Center; Anthony Herrera, University of Maryland Medical Center; Adams Cowley Shock Trauma Center; Margaret Lauter, University of Maryland Medical Center; Adams Cowley Shock Trauma Center; Haggan Chen, Department of Epidemiology & Public Health, University of Maryland School of Medicine; Jose Diaz Jr, R Adams Cowley Shock Trauma Center

Background: A bimodal distribution of death in emergency general surgery (EGS) patients has become apparent. This bimodal mortality distribution is similar to what is seen in trauma patients. The etiologies are likely to be different between these patient populations. As EGS volumes increase, investigations into the etiology of mortality in EGS patients will help us identify where patient care can be improved.

Hypothesis: We hypothesize that sepsis will be the major cause of mortality within the EGS population.

Methods: We retrospectively reviewed the Maryland Health Services Cost Review Commission database, which contains discharge medical record and billing data from each of the state’s 800,000 annual inpatient admissions. Adult EGS patients who were urgently or emergently admitted to any of Maryland’s tertiary care hospitals from 2009–2014 were included. We aimed to identify clinical predictors for in-hospital mortality, categorized into early (<2 days), middle (2–7 days), and late (>7 days) mortality. Univariate and bivariate analyses of clinical data were performed and p-values were calculated by χ², Fisher’s exact, Kruskal-Wallis, and independent t-tests.

Results: There were 2,769 cases of in-hospital mortality. The average age of patients who died in the 3 mortality groups (early, middle, and late) was 64.0 ± 64.4 ± 62.1 (p < 0.01). The median LOS for early, middle, and late mortality is 1 (IQR = 1) vs. 5 (IQR = 3) vs. 17 (IQR = 18) (p < 0.01). While there were no significant differences inpatient demographics, patients who died later had a higher severity of illness. A significantly higher percentage of patients who died were in the ICU. The most common diagnosis related group among all patients that died was “Sepsis/Infection.” Pulmonary diagnoses were the next most common etiologies for those who died >7 days, while cardiac diagnoses were the next most common etiology for those who died ≤2 days. Non-ICU, intraoperative procedures comprise the largest percentage of procedures performed on these patients (17.4%). Of that proportion, GI and source control procedures comprised 83.4%.

Conclusions: Our study identified sepsis as the primary cause of death in the EGS population. This is consistently seen, no matter whether the patient expired early or later in their hospital course. Rapid identification of etiology of sepsis and management of source control has been shown to improve outcomes. Time to source control should be an outcome metric used QA in the EGS patient population.

P33. ISOLATIONISM – DIVERGENT INFECTION CONTROL PRACTICES BETWEEN INPATIENT AND OUTPATIENT CARE

Philip Walker, Kimmel School of Medicine at Thomas Jefferson University; Nels Munch, University of PA School of Medicine; Jose Pascual, Perelman School of Medicine, University of Pennsylvania; Lewis Kaplan, Perelman School of Medicine, University of Pennsylvania

Background: While infection control (IC) practices, including isolating patients with MDRO, are commonplace in the inpatient setting, their penetration into outpatient care is less clear.

Hypothesis: We hypothesized that outpatient IC practices focused on MDRO patients would be deployed at >50% of institutions with SIS members.

Methods: States with SIS members were identified and one member per state was identified; members at institutions with multiple SIS members were preferentially selected to maximize SIS member practice representation. An individual phone interview was conducted by a trained volunteer using a template to ascertain institution and outpatient setting characteristics, as well as IC practices for patients with prior inpatient MDRO infection or colonization (MDRO). Data was curated using Excel and analyzed using descriptive statistics.

Results: Every state with an SIS member was contacted (100% response rate; n = 44). While 100% had programs to identify and isolate inpatients with MDRO, only 56.8% had a matching program for the clinic. Isolation gowns (31.8%) and rooms (25%) were not common in the clinic; only 2.7% had a separate isolation patient waiting area. While 93.1% accepted ambulance transport patients, only 22.7% report ambulance crews wearing isolation gowns for MDRO patients. 93.2% changed open wounds in clinic including VAC (90.9%). Only 27.3% had between MDRO patient terminal room cleaning. 90% practiced in a multiple specialty setting where a non-surgical specialty would use the same clinic space afterwards. None had an active surveillance program for clinic staff.

Conclusions: SIS membership does not necessarily correlate with robust outpatient IC programs for MDRO patients. Despite well-deployed IC approaches for inpatients, outpatient care in the same building or campus may have divergent practices that have the potential to support MDRO transmission to staff, patients and visitors. The outpatient sector, including medical transport programs are underexplored domains for enhanced infection control.
P34. CAN WE PREDICT THE POSTOPERATIVE INFECTION? IS THE POSTOPERATIVE INFECTION HARMFUL OR BENEFICIAL?

Tibor Mózes, Military Hospital Budapest; Katalin Gornicsar, Dept. of Urology, Péterfy Hospital, Budapest, Hungary; Andor Grosz, Dept. of Aerospace Medicine, University of Szeged, Hungary; Zsolt Domjan, Dept. of Urology, Péterfy Hospital, Budapest, Hungary; Istvan Buzogany, Dept. of Urology, Péterfy Hospital, Budapest, Hungary.

Background: Many patients develop infections following operations. Decreased immune competence has been demonstrated in acute neurological conditions. A strong cytokine-mediated anti-inflammatory response was observed in stroke patients at infection, although infection due to the decreased pro-inflammatory mediators can be expected as well. In 1891, William B. Coley injected streptococcal organisms into a patient with inoperable cancer. He thought that the infection he produced would have the side effect of shrinking the malignant tumor. To investigate this question the following experiment was performed.

Hypothsis: Surgical infection may improve host response.

Methods: 55 urinary bladder cancer patients, with radical cystectomy and lymphadenectomy were studied. Blood samples were taken on day 0 (before) and day 1, 3, 6, 9 and 14 after operation and a 5 year follow up. TNF alpha, soluble TNF alpha receptor I and IL-6 levels in sera were determined by HS ELISA and/or ELISA kits. Plasma cortisol values were measured by RIA kits.

Results: From 55 patients 30 infected (wound and urine infections) were found in 14 days and 6 urine and wound infections in 30 days after surgery, 6 died in five years due to the infection or metastatic tumor. All patients were bacterially contaminated, as wound samples taken at the end of operation demonstrated. On the day 0 the circulating TNF alpha values were lower in infected patients. TNF started to increase from day 3 till day 9 never reaching values of uneventful healing group. Soluble TNF receptor I, IL-6 and cortisol concentrations did not demonstrate any difference on day 0 except cortisol what was higher in septic patient however from day 1 started to increase transiently, reaching higher levels in septic patients.

Conclusions: A low pro-inflammatory response is a key facilitating factor for the development of infection. Thus measuring serum TNF alpha levels before and after operations can predict the outcome. The infection may improve host response. However the postoperative infection is a double edge sword can result in a severe sepsis and/or can improve immune response improving the outcome from operation and/or from tumor disease.

P35. THE IMPACT OF COMBINED BACTERIAL AND FUNGAL INFECTIONS UPON OUTCOMES IN SURGICAL PATIENTS REQUIRING HIGHER LEVEL OF CARE

Tristen Chun, Rhode Island Hospital - Brown University; Eleanor Fallon, Brown University / Rhode Island Hospital; Andrew Stephen, Rhode Island Hospital; Charles Adams, Jr., Brown Medical School/R.I. Hospital; William Cieffi, Rhode Island Hospital; Alfred Ayala, RI Hospital; Daithi Heffernan, Brown University, Division of Surgical Research.

Background: Infections frequently complicate surgical patients requiring higher level care. Many infections result from factors extrinsic to a non-immunocompromised patient. However, a double-hit phenomenon of both bacterial and fungal/BAF infections likely arises in patients with immunoparalysis and may represent a unique risk for mortality. There is a paucity of data pertaining to the measurable immune profile of patients who develop a BAF infection.

Methods: BAF infection is a marker of immunoparalysis, and will confer a greater risk of mortality.

P36. STOCHASTICITY AMONG ANTIBiotic RESISTANCE PROFILEs OF COMMON BURN-RELATED PATHOGENS OVER A SIX YEAR PERIOD

Zachary Collier, Pritzker School of Medicine, University of Chicago, IL, USA; Anoop Mayampurath, Computation Institute, University of Chicago, IL, USA; Julie Johnson, Center for Research Informatics, University of Chicago, IL, USA; John Alverdy, Department of Surgery, University of Chicago, IL, USA.

Background: Despite dramatic improvements in burn care resuscitation and surgery, post-burn infections continue to cause significant morbidity and remain a major cause of mortality. Therefore the aim of the present study was to investigate the resistance profiles of the three most common burn-related pathogens over the last six years in order to inform antibiotic therapy.

Hypothesis: The antibiotic resistance for the three most common burn-related pathogens (P. aeruginosa, MSSA, E. faecalis) exhibit an increasing pattern of resistance over the six year study period.

Methods: The study utilized the Clinical Research Institute’s prospectively collected and de-identified database of over 40,000 patients to aggregate data for all burn patients admitted to the university’s burn unit between 2009 and 2014. This database query included standard patient demographics (age, gender, ethnicity, co-morbidities) along with all data regarding positive cultures from any source (wound, sputum, urine, stool, blood), which included isolated pathogens and their antibiotic resistance profiles. These profiles were constructed using Mean Inhibitory Concentration (MIC) standards to determine whether each pathogen was susceptible (S), intermediary (I), or resistant (R) to each tested antibiotic. The aggregated data were then used to construct a 3-dimensional heat map for the three most common pathogens and their resistance profiles over the six year study period.

Results: A 3-dimensional heat map for three of the most common pathogens (Pseudomonas aeruginosa, MSSA, and Enterococcus faecalis) was constructed as depicted below. The respective organisms are on the y-axis, tested antibiotics on the x-axis and the z-axis is the percentage of resistance. The colors represent complete susceptibility (# susceptible counts/total # counts = 0) while red signifies absolute resistance (# resistant counts/total # counts = 1). Applied statistical analysis does not yield any pattern of resistance over the time period indicating that antibiotic resistance patterns are highly stochastic.

Conclusions: There are no discernible patterns of antibiotic resistance for the three most common burn-related pathogens over the examined time course. Emerging genomic technology that can generate point-of-care pathogen-specific antibiotic sensitivity is needed to more precisely guide antibiotic choice.

P37. INTRAOPERATIVE MIESMA: THE INFLUENCE OF STANDING TIME ON INTRAOPERATIVE FLUID CONTAMINATION

Jonathan Cook, PinnacleHealth Network - Department of General Surgery; Sarah Joseph, PinnacleHealth Network - Department of Internal Medicine, Cata Wiest, Drexel University College of Medicine; Yujin Wert, PinnacleHealth Network; Joseph Fleck, PinnacleHealth Network - Department of Internal Medicine, Infectious Disease; Anastasius Peter, PinnacleHealth Network - Department of General Surgery.

Background: In the pre-scientific era of medical practice, one prevailing theory of pathogenesis was that diseases spread via miasma, or “bad air.” Hundreds of years later, since the advent of germ theory and a microbiological understanding of disease, we seek to answer an important question: do airborne contaminants pose a threat of infection when irrigation fluid is allowed to stand prior to use in the operating room.

Hypothesis: We believe irrigation fluid will be more likely to harbor airborne contaminants if left to stand prior to use in the operating room.

Methods: Operating rooms used for testing included non-emergent (i.e. scheduled) open general surgery cases. A room-temperature 1L bottle of sterile normal saline was...
poured into a sterile pitcher on the back table prior to the start of each case. Fluid samples were taken every 30 minutes, beginning at the start of the case and ending when the sterile dressing was applied. Samples were obtained by pouring 10–15 mL into a sterile specimen container, which was then closed and passed off the field. All fluid samples were cultured in our microbiology lab.

**Results:** A total of 73 specimens were collected from 17 surgeries, with an average of 4 specimens per surgery (Table 1). Three (4.1%) of the 73 specimens showed a positive culture, two had micrococcus species and one was coagulase negative staphylococcus. No correlation was found between positive cultures and the operating room used or type of surgery (Table 2). There was no statistically significant difference between cases with positive and negative cultures, regarding OR duration and surgery duration (Table 3 & 4). Overall 96% of specimens had negative cultures with a 95% confidence interval of 88.5% – 99.1% (p < 0.0001).

**Conclusions:** We found no evidence to suggest that the risk of inoculation increases by the way fluid samples are obtained to stand in the operating room. There was no association between positive fluid cultures and the independent variables measured, suggesting that contamination of these fluid samples occurred after collection.

Nonetheless, with the potential devastation caused by deep infections, any means of reducing inoculation could have far-reaching benefits with little or no risk. We therefore recommend that irrigation fluid remain bottled until it is required for use.

### P38. ENTEROCOCCUS FAECALIS GELATINASE (GELE) AND SERINE PROTEASE (SPRE) CONTRIBUTE TO THE LOSS OF COLON EPITHELIAL CELLS AND TISSUE ORGANIZATION

Natalia Belogorlova, University of Chicago; Monika Krezałek, Olga Zaborina, University of Chicago; John Alveryd, University of Chicago

**Background:** Tissue structures and shapes are formed by polarized cellular arrangements in space and time. Cell and tissue polarity are essential to maintain tissue homeostasis which in the case of the intestine, can be disrupted by colonizing pathogens. We previously demonstrated that intestinal E. faecalis cause macrophages to release soluble products that disrupt intestinal epithelial tight junctions that is dependent on E. faecalis gelatinase (GELE) and serine protease (SPRE) encoded by the gelEspr operon.

**Hypothesis:** Here we hypothesized that E. faecalis GELE and SPRE induce macrophages to also disrupt the extracellular matrix underlying epithelial cells.

**Methods:** The clinical isolate of E. faecalis (VS83), its derivative mutant deficient in the gelEspr operon (∆gelEspr) and the mutant complemented with gelE and sprE (AXgelE/AXsprE) were used in experiments. Strains were co-incubated with 374 macrophages and the resultant conditioned media collected, sterilized, and applied onto either mouse colon tissue explants or cecal crypts. The luminal side of tissue explants was inspected for crypt organization using fluorescence staining. Cecal crypts were exposed to the conditioned media and allowed to form into organoids and then examined by phase-contrast microscopy. Organoid conditioned media (OCM) was analyzed by Western blot for fibronectin, a glycoprotein critical for extracellular matrix assembly.

**Results:** Cecal crypts grown in conditioned medium harvested from macrophages exposed to the E. faecalis ∆gelEspr were able to readily form intact organoids with intact fibronectin being detected in the OCM. However, crypts exposed to ∆gelEspr macrophages and the resultant conditioned media collected, sterilized, and applied onto either mouse colon tissue explants or cecal crypts. The luminal side of tissue explants was inspected for crypt organization using fluorescence staining. Cecal crypts were exposed to the conditioned media and allowed to form into organoids and then examined by phase-contrast microscopy. Organoid conditioned media (OCM) was analyzed by Western blot for fibronectin, a glycoprotein critical for extracellular matrix assembly.

**Conclusions:** The proteolytic enzymes GELE and SPRE of E. faecalis cause macrophage to also disrupt the extracellular matrix underlying epithelial cells. This may occur in particular through alterations in fibronectin, a major protein involved in extracellular matrix assembly.

### P39. EXAMINING THE EFFECTS OF HYPOXIA ON ACINETOBACTER SOFT TISSUE INJURIES WITH AN AGENT BASED MODEL

Andrew Benjamin, University of Chicago; Gary Chun-I An, University of Chicago

**Background:** Acinetobacter baumannii is a microbe of growing importance in trauma related soft tissue infections (STIs) and has also become a significant cause of multi-drug resistant infection in the intensive care setting. Injury and tissue ischemia have been shown to promote A. baumannii virulence, with virulent strains exhibiting increased accumulation of HIF-1α secondary to sidophore chelation of iron. HIF-1α accumulation has numerous downstream effects via activation of hypoxia response elements, leading to changes in host inflammatory pathways and alterations in host-pathogen interactions.

**Hypothesis:** Characterizing for ischemia related responses provides insight into the tipping points that lead to A. baumannii STIs (AStIs). Towards this end we have adopted a prior agent-based model (ABM) of AStI to incorporate detailed host responses to ischemia in order to characterize the dynamics of wound host-pathogen interactions with the hypothesis that ischemia promotes AStIs.

**Methods:** Our prior muscle wound ABM (MWABM) was extended by adding host responses to hypoxia. The resulting ABM incorporates muscles cells, neutrophils, macrophages, avirulent commensal bacteria, and the detailed representation of A. baumannii performance traits were performed to simulate dynamic patterns of injury secondary to ischemia and its effect on microbial community composition, free iron release from damaged tissue, A. baumannii virulence activation mediated by free-iron, and host mediator levels in relation to the development of AStI.

**Results:** Simulation interventions included differing levels of soft tissue damage, tissue hypoxia, HIF-1α accumulation, and free iron availability. A series of interconnected thresholds related to these variables were identified which lead to AStIs. We demonstrated the role of hypoxia and decreased free-iron availability on A. baumannii virulence, and the related increase in HIF-1α accumulation secondary to virulence activation mediated by free iron. The resulting increase in HIF-1α resulted in decreased iNOS/dimerization, inhibition of inflammatory cell apoptosis, and an increase in pro-inflammatory cytokines.

**Conclusions:** The modified MWABM effectively provides dynamic knowledge representation of A. baumannii virulence in the pathogenesis of AStI, demonstrating the downstream effects of tissue hypoxia which promote A. baumannii virulence and infection. This type of model can serve as a framework to add more detailed mechanistic knowledge as well as investigate novel anti-virulence strategies.

### P40. SUSCEPTIBILITY AND MULTIDRUG RESISTANCE AMONG GRAM-NEGATIVE ISOLATES FROM INTRA-ABDOMINAL INFECTIONS (IAI) IN THE UNITED STATES – SMART 2011–2014


**Background:** Multidrug resistance has compromised many agents used to treat intra-abdominal infections (IAI), with resistance patterns varying geographically. These data from the Study for Monitoring Antimicrobial Resistance Trends (SMART) summarize multidrug resistance and susceptibility (%S) trends among gram-negative isolates collected between 2011–2014 from IAI in the United States.

**Hypothesis:** Monitoring of MDR and ESBL rates are recommended in all medical centers, and local resistance patterns should be taken into account when making empiric treatment decisions for IAI patients.

**Methods:** 6,179 gram-negative isolates from IAI were collected at 28 sites in the United States in 2011–2014. Antimicrobial susceptibility was determined using the CLSI broth microdilution method and breakpoints. Multidrug-resistant (MDR) isolates were defined as resistant to ≥3 antibiotic classes. Extended-spectrum β-lactamase (ESBL) production was determined using the CLSI ESBL confirmation test.

**Results:** %MDR, %ESBL (based on E. coli, K. pneumoniae, K. oxytoca and P. mirabilis only) and %S are shown below. %S ≥ 90% are highlighted.

**Conclusions:**
- Multidrug resistance in gram-negative isolates from IAI in the United States was 6.9% for Enterobacteriaceae, 45.8% for A. baumannii and 9.9% for P. aerugi nosa.
- Susceptibility of all Enterobacteriaceae was ≥90% to AMK, FEP, ETP, IPM, and TZP. None of the agents tested had activity >67% (IPM) for A. baumannii. Only AMK (96.6%) had %S >90% against P. aerugi nosa.
- Reduced susceptibility against MDR and ESBL isolates are cause for concern as resistance enzymes continue to spread globally. Monitoring of MDR and ESBL rates are recommended in all medical centers, and local resistance patterns should be taken into account when making empiric treatment decisions for IAI patients.

### P41. IDENTIFICATION OF DISTINCT LACTOBACILLUS STRAINS IN THE EARLY POSTNATAL RAT MICROBIOTA

Mubina Isani, Children’s Hospital of Los Angeles; Anatoly Grishin, Henri Ford, Children’s Hospital of LA, University of SC

**Background:** Necrotizing enterocolitis (NEC) affects premature infants and its etiology remains largely unknown. Colonization of the neonatal gastrointestinal tract with opportunistic pathogens is thought to be a prime initiating event. Opportunistic pathogens compromise the gut barrier, leading to bacterial translocation, inflammation, and ultimately necrotizing enterocolitis. Lactobacillus strains have shown a number of studies to protect against NEC. However, results remain inconclusive due to the use of different species/strains and doses. Moreover, whether the lactobacilli used as probiotics are colonizing the intestine remains unanswered.

**Hypothesis:** An efficient probiotic strain should not only protect the intestinal epithelium, but should also be capable of colonizing the GI tract.
viable CFU measured using standard microbiological techniques. Carriers were harvested in an appropriate neutralizing buffer solution and the number of (MRSA, Acinetobacter and Candida). After either 1 or 5 minutes of contact time, the inoculated with a concentrated pooled suspension of three test microorganisms with either Provodine or CHG and allowed to dry. After drying, the carriers were achieved optimal relative colonization (85.5%, $p < 0.05$) at 10^5 CFU/ml. Contact Time Provodine CHG Log Reduction % Kill Log Reduction % Kill MRSA ATCC 33592 1 minute 1.87 98.65 0.14 27.03 5 minutes > 3.17 99.93 0.37 56.89 A. baumannii ATCC 19606b 1 minute 2.47 99.66 0.93 88.18 5 minutes > 3.34 99.95 1.62 97.59 C. Albicans ATCC 10231 1 minute 2.52 99.7 0 0 5 minutes > 3.22 > 99.94 0.09 18.24

Figure 1. Relative ability of Lactobacillus reuteri to colonize intestine

Methods: Animal experiments were approved by IACUC. Neonates were obtained from timed pregnant Sprague Dawley rats. They were kept in a temperature and humidity controlled incubator, and fed with formula for 4 days. To enumerate and isolate the lactobacilli, the content of the large intestine was serially diluted and plated on MRS agar. After a 2-day incubation at 37°C, the colonies were classified according to their appearance, and numbers in each class counted. Pure cultures were established. Lactobacilli were identified as Gram +/− non-spore-forming rods. Species identity was established by sequencing a variable region of the 16S rRNA gene.

One species, Lactobacillus reuteri, was re-introduced to neonates utilizing the above rat model at different doses: 10^7 and 10^8 CFU/ml.

Results: Three unique species of lactobacilli were isolated from 138 rat pups: L. reuteri, L. murinus, and L. acidophilus. Upon re-introduction of L. reuteri at various dosages, we achieved optimal relative colonization (85.5%, $p < 0.05$) at 10^5 CFU/ml (Figure 1).

Conclusions: Various lactobacilli are common first GI tract colonizers in neonatal rats. As 10^6 is the optimal dosage of one naturally occurring Lactobacillus species to colonize the intestine, we can utilize this dose to evaluate the ability of other Lactobacillus strains to colonize the intestine and protect against NEC.

P43. CUTANEOUS MUCORMYCOSIS IN A SEVERELY INJURED, DIABETIC TRAUMA PATIENT

Georgia Alizo Arruebarrena, Andrea Romano, Asst Prof USC - Grand Strand Medical Center; Jason Scarretta, University of South Carolina; Melanie Hopkins, Grand Strand Medical Center; Lewis Dickinson, Grand Strand Medical Center; John Davis, Professor of Clinical Surgery USC - Grand Strand Medical Center

Background: Mucormycosis is an uncommon, but life-threatening fungal infection. The infection is caused by the Mucorales fungal family. It has several clinical manifestations depending on the anatomical site of invasion and remains difficult to cure because of its rapid progression.

Hypothesis: N/A

Methods: N/A

Results: A 34-year old male admitted with multiple long bone fractures and contusions following a motor vehicle collision with rollover. On admission his Injury Severity Score (ISS) was 66. On his initial laboratory tests he was noted to have a glycosylated hemoglobin (HbA1c) level of 12.7%. An open tibial fracture required fixation of the injury and reconstruction of the popliteal artery. On hospital day eight the patient developed an ecchymotic lesion on his left flank associated with surrounding erythema and edema Figure 1. The edges of the lesion became necrotic and surrounding erythema expanded on hospital ten. An extensive surgical debridement was performed, extended until healthy bleeding tissue was seen. On the same day Liposomal amphotericin B at 5 mg/kg/day was started. Histopato-

P42. BEYOND PERSISTENCE: THE ABILITY TO KILL NEWLY ENCOUNTERED PATHOGENS FOR NINE HOURS AFTER APPLICATION

Peter Lentini, Microdermis Corporation; Nathanael Reynolds, US Navy; Mark Simons, US Navy; John Cheronis, Microdermis Corporation

Background: The “persistence” of an antiseptic surgical skin preparation is defined by the FDA as the ability to maintain the number of recoverable colony forming units (CFU) below baseline for at least 6 hours after application. There is no mention of the ability of a product to kill newly encountered pathogens hours after application.

Hypothesis: Provodine®, a novel formulation of povidone-iodine that either meets or exceeds the FDA requirements for a topical professional antiseptic, but not 4% chlorhexidine gluconate (CHG, Hibiclens®) will maintain active microbiocidal activity for at least 9 hours after application to an standardized skin preparation.

Methods: A standardized artificial skin carrier (VitroSkin®, 1” x 3”) was painted with either Provodine or CHG and allowed to dry. After drying, the carriers were inoculated with a concentrated pooled suspension of three test microorganisms (MRSA, Acinetobacter and Candida). After either 1 or 5 minutes of contact time, the carriers were harvested in an appropriate neutralizing buffer solution and the number of viable CFU measured using standard microbiological techniques.

Results: Provodine maintained its ability to actively kill (> 3 log10 reductions) clinically important pathogens (MRSA, Acinetobacter and Candida) when challenged at 3, 6, and 9 hours after application. CHG was found to have reasonable activity when tested against Acinetobacter but had no activity against Candida. Against MRSA, CHG had modest activity (≤ 1 log10 reduction) at 3 hours and progressively diminished activity at 6 and 9 hours (9 hour data shown below).

Provodine has also been demonstrated to be equally effective against 65 different strains of either sensitive or resistant clinical isolates of E. coli, Acinetobacter spp, K. pneumoniae, P. aeruginosa, and S. aureus.

Conclusions: By maintaining the ability to kill newly introduced exogenous pathogens for hours after application, Provodine may be able to reduce both surgical and non-surgical wound infections in either controlled or uncontrolled (field/military) environments when used as a first aid antiseptic or as a perioperative surgical skin preparation.
logical findings showed hypoxia in the area of the epidermal necrosis (Figure 2). The tissue was culture positive for Rhizopus species. The patient underwent subsequent bed-side debridements and received a total course of 4 weeks of liposomal amphotericin B. Fifteen days from initial debridement, a split thickness skin graft was performed. No mucormycosis relapse was noted 3 months after initial fungal infection presentation.

Conclusions: Mucormycosis remains a real menace to the diabetic population. It has been estimated that mucormycosis had presented as the diabetes-defining illness in 16% of a population composed of 337 diabetics. A prompt diagnosis, an extended surgical resection and an antifungal chemotherapy are essential components for effective treatment of mucormycosis.

P44. SOFT TISSUE INFECTIONS. THORACOABDOMINAL FULMINANT SPONTANEOUS GRANULOSUS MYOSITIS. CASE REPORT AND REVIEW OF LITERATURE

Federico Grasa González, Lotfi Emlalaki Hossain, David Sanchez Relinque,

Background: Necrotizing soft tissue infections (NSTI) include necrotizing forms of cel-lulitis, myositis and fasciitis. Are characterized by fulminant destruction of various tissue planes, systemic signs of toxicity and high mortality. NSTI could be divided on 4 groups.

Hypothesis: Methods: 39-year-old woman from Morocco, with medical history of chronic lymphedema, rheumatoid arthritis treated with Delfazacort and Tocilizumab bimonthly for 1 year. Started with severe pain in right subcutaneous-right breast, without trauma wound or injury. Treated with corticosteroids and NSAIDs by her GP by 3 days. On Emergency admission, woman had SIRS symptoms. Skin blisters broken in right axillary and lateral thoracoabdominal wall. No crepitus. Thoracoabdominal CT showed soft tissue swelling and disorganization of peritoneal muscles, back muscles scapula and oblique abdominal wall. No gas was shown. Emergency surgery was performed with necrosectomy and making crops. Patient presented hemodynamic instability although aggressive fluid therapy and vasoactive drugs. Twelve hours after surgery, in the ICU developed progression of soft tissue involvement to back right deltoid region, pubic symphysis and right iliac region.

Conclusions: NSTI are characterized clinically by fulminant tissue destruction, systemic signs of toxicity and high mortality rate. Conditions associated include diabetes, drug use, obesity, immunosuppression, recent surgery and traumatic wounds. NSTI is associated with a high mortality, even with optimal therapy, with 21% in type I and 14–34% in type II necrotizing fasciitis. The overall mortality rate in NSTI is 17%. Surgical exploration is the only way to definitively establish the diagnosis and treatment, and it should be establish together with the CT scan.

P45. SA4A, A 4-ANTIGEN STAPHYLOCOCCUS AUREUS VACCINE DESIGNED TO PREVENT INVASIVE SURGICAL SITE INFECTIONS, RAPIDLY INDUCES HIGH LEVELS OF BACTERIA-KILLING ANTIBODIES

Elizabeth Begier, Pfizer Vaccine Clinical Research; David Seiden, Broward Research Group, Hollywood, FL, USA; Michael Patton, Pfizer Vaccine Clinical Research; Maidehead, UK; Edward Zito, Pfizer Vaccine Clinical Research, Pearl River, NY, USA; Joseph Severs, Pfizer Vaccine Clinical Research, Pearl River, NY, USA; David Cooper, Pfizer Vaccine Research & Development, Pearl River, NY, USA; Joseph Eiden, Pfizer Vaccine Clinical Research, Pearl River, NY, USA; William Graber, Pfizer Vaccine Clinical Research, Pearl River, NY, USA; Kathrin Jansen, Pfizer Vaccine Research & Development, Pearl River, NY, USA; Annalesa Anderson, Pfizer Vaccine Research & Development, Pearl River, NY, USA; Alejandra Gurtman, Pfizer Vaccine Clinical Research, Pearl River, NY, USA

Background: Staphylococcus aureus is a leading cause of surgical site infections, but no vaccine is currently licensed to prevent S. aureus infection. Pfizer’s investigational 4 antigen S. aureus vaccine (SA4Ag) contains capsular polysaccharide conjugates of se-rotypes 5 and 8 (CPS and CPS), recombinant surface protein clumping factor A (CfA), and recombinant manganese transporter protein C (MntC). Two placebo-controlled Phase 1/2 studies in healthy adults aged 18 to 85 years found SA4Ag was well tolerated and elicited robust functional immune responses after a single vaccination. Subse-quently, SA4Ag’s manufacturing process was finalized. An additional Phase 1 study was conducted in early 2015 to confirm SA4Ag’s safety and immunogenicity before initiating its first efficacy study in a surgical population.

Hypothesis: SA4Ag produced by the final manufacturing process has a satisfactory safety profile and induces robust functional immune responses.

Methods: Healthy subjects aged 18 to 64 years received a single intramuscular injection of SA4Ag. Serum functional antibody levels were measured at baseline, Day 15, and Day 29. Specifically, we measured the ability of subject’s antibodies to CPS and CPS to kill clinical S. aureus strains in functional opsonophagocytic activity killing assays (OPA). For CfA and MntC, we assessed antigen-specific immunogenicity via competitive luminescent immunoassay (cLIA). Reactogenicity and adverse event data were collected.

Results: Ninety-eight subjects were vaccinated and completed the study. Robust functional immune responses were observed. On Day 29, OPA geometric mean titer (GMTs) were 45,738 (CPS; 95% CI: 38078–540499) and 42,652 (CPS; 95% CI: 32792–55477), consistent with 12.3 and 19.6 fold rises, respectively. Day 29 GMTs were 3081.4 (CfA; 95% CI: 2422.2–3920.0) and 2064.4 (MntC; 95% CI: 1518.2–2807.0), consistent with 12.3 and 19.6 fold rises, respectively. Day 15 titers were overall higher than Day 29. SA4Ag was well tolerated with satisfactory safety profile.

Conclusions: SA4Ag was safe, well tolerated, and rapidly induced high levels of bacteria-killing antibodies in healthy adults. Pfizer has initiated an efficacy trial in adults undergoing elective surgical spinal fusion to assess SA4Ag’s ability to prevent postoperative invasive surgical site infection and bloodstream infection caused by S. aureus.

P46. A SERIES OF HAE莫PHILUS PARAINFLUENZAE SURGICAL INFECTIONS

Hugo Bonatti, University of Maryland Shore Health; Rosa Mateo, University of Maryland Shorehealth

Background: Haemophilus parainfluenzae (HPI) is a rare pathogen, however, recent reports emphasize that the organism may be underreported. It is part of the HACEK group and associated with endocarditis. Even less information about HPI is available for surgical infections, especially in patients with intraabdominal infections, the vast majority being case reports.

Hypothesis: Haemophilus parainfluenzae may be an under-diagnosed and/or under-reported pathogen in surgical infections.

Methods: We herein report a series of patients with HPI surgical infections from a rural hospital. Identification and identification of the pathogen was done according to standard guidelines. A total of 273 isolates were analyzed, there were 15 patients with pathological findings.

Results: A total of 43 patients with 36 isolates with surgical infections with HPI were identified during the 2 year study period. This represents 13.2% of all isolates of HPI with 64.8% coming from patients with respiratory tract infections, 17.9% from patients with ENT/Eye infections, 3% from genital/urologic infections and the remaining 3 (1%) were from positive blood cultures. Within the surgical infections, the majority of isolates came from skin/soft tissue infections (n = 28) including abscesses of the upper extremities (n = 14), lower extremities (n = 5), face (2) and other sites (n = 7). There were two cases of bone infection (one associated with an infected hip replacement), two perirectal abscesses and one infected myositis. In all three cases the pathogen was isolated from blood and no antibiotic therapy was administered. In all three cases HPI was part of a mixed infection. Our HPI isolates in general were found to be negative for betalactamase production.

Conclusions: This is the largest thus far reported series of HPI isolates. The exact significance of our findings cannot be determined at this stage especially as most infections were from mixed infections. Nevertheless, more research with regard to this elusive pathogen is warranted.
Background: While the most common organism in pleural infections has historically been Streptococcus pneumoniae, recent European studies have reported non-pneumococcal streptococcus as the most common empyema-associated organism. Organisms previously considered nosocomial have increased in the community whose population grows older and immune deficient due to underlying comorbidities. The purpose of this paper is to better characterize the bacteriology and patient demographics in patients with surgically treated empyema.

Hypothesis: Characterization of the characteristics of patients with CAP to HAP will reflect causes for the changing bacteriology of empyema.

Methods: The surgical database was searched for all patients that had an operation including the terms “thoracotomy”, “decoration”, or “Video Assisted Thoracic Surgery (VATS)” Additionally, electronic medical records were searched for all patients with the diagnosis “empyema”. Patients who had been diagnosed with empyema preoperatively and had either an open or VATS decortication from January 2010 to September 2015 were included. Patient demographics were recorded as well as the following risk factors: smoking, alcohol abuse, intravenous drug abuse, autoimmune disease, cancer, and diabetes.

Results: The average age of the 47 patients studied was 54.7 ± 16.8 years (X ± SD). Sixty percent of the patients had community acquired pneumonia (CAP). Streptococcus pneumoniae was not found in any of the isolates. Anaerobes were the most common isolate at 21%, followed by Streptococcus species and Staphylococcus aureus (50% MRSA) both at 17%. Coagulase negative Staphylococcus species was next most frequent at 13%. Patients with HAP had a higher incidence of Streptococcus aureus infections than patients with CAP (32% versus 7%), (P = 0.047, Fisher exact test). One of the 2 patients with fungal infections died. Among CAP patients, the median length of stay for IV drug abusers (n = 3) was 31 days (95% confidence interval [15, NA]). It is significantly longer than the others (median 12 days, 95% CI [9, 18], P = 0.014). Length of stay between CAP and HAP were not different. Only 17% of patients did not have any of the risk factors assessed. The rate of negative cultures was 4.

Background: Limited data are available on post-surgical Staphylococcus aureus infection (SAI) following hysterecetomy and its associated clinical and economic consequences.

Hypothesis: Patients with SAI following elective hysterecetomy experience increased morbidity and healthcare resource utilization compared to patients with no or other infections.

Methods: We conducted a retrospective cohort study using 8-year (2007–2014) of integrated managed care system data. Eligible patients were ≥ 21 years old undergoing elective hysterecetomy with ≥ 12 months of continuous membership and drug eligibility before surgery. We categorized hysterectomies by surgical setting, inpatient procedure (IP), outpatient procedure (OP), and further stratified procedures as abdominal, laparoscopic, or vaginal based on ICD-9/CPT codes. To avoid preexisting SAI, we excluded SAI patients with SAI based on cultures from the 12 months before surgery, on day of surgery, or day after SAI. SAI was defined as any growth of S. aureus from clinical microbiological culture (any source except nasal, groin, and “surveillance”). We calculated SAI incidence rate at 90 days post-surgery and healthcare utilization and costs within 120 days post-surgery.

Results: Overall, 31,133 eligible patients were identified; two-thirds had IPs (N = 20,675, abdominal: 47.8%; laparoscopic: 24.8%; vaginal: 27.3%) while a third had OPs (N = 10,458, abdominal: 17.1%; laparoscopic: 84.6%; vaginal: 13.7%). At 90 days post-surgery, SAI incidence was 0.8% for IPs (abdominal: 1.2%; laparoscopic: 0.5%; vaginal: 0.2%) and 0.4% for OPs (abdominal: 0.8%; laparoscopic: 0.5%; vaginal: 0.1%). The proportion of SAI due to MRSA for IPs and OPs was 32.5% and 26.7%, respectively. Median time to infection was 24 days for IPs, and 31 days for OPs. For both IPs and OPs, patients with SAI had significantly more emergency visits, hospitalizations, and reoperations compared to both patients with no or with other infections. Consistently, average total costs for patients with SAI (IP: $18,261; OP: $4,422) was significantly higher compared to patients with no SAI (IP: $6,171; OP: $905) or other infection (IP: $11,011; OP: $8,334).

Conclusions: Post-surgical SAI is associated with increased morbidity and correspondingly higher healthcare costs. More effective infection control strategies should be identified to reduce SAI-associated outcomes in patients undergoing elective hysterecetomy.

P48. BURDEN OF DISEASE ASSOCIATED WITH STAPHYLOCOCCUS AUREUS INFECTION AMONG PATIENTS WHO UNDERWENT AN ELECTIVE HYSTERECTOMY PROCEDURE IN AN INTEGRATED MANAGED CARE SYSTEM

Nazia Rashid, Kaiser Permanente Southern California; Jim Nomura, Southern California Permanente Medical Group; Elizabeth “Beth” Begier, Pfizer, Inc; Kathy Lin, Kaiser Permanente Southern California; Holly Yu, Pfizer, Inc.

P50. EMERGING OPPORTUNITIC STENOTROPHOMONAS MALTOPHILIA INFECTIONS IN BURN PATIENTS

Omar Nunez Lopez, University of Texas Medical Branch; Charles Voigt, University of Texas Medical Branch; Mehta Hemalkumar, University of Texas Medical Branch; Paul Wurzer, University of Texas Medical Branch; Celeste Finnerty, University of Texas Medical Branch; David N Herndon, University of Texas Medical Branch; Jong O Lee, University of Texas Medical Branch

Background: Despite the variety of available antibiotic treatments, bacterial infections remain the leading cause of death in burn patients. Stenotrophomonas maltophilia, an aerobic ubiquitous gram-negative bacillus, is rarely responsible for community-acquired infections. However, it has been increasingly reported as a cause of life-threatening infections in immunocompromised patients, including burn patients.

Hypothesis: Stenotrophomonas maltophilia infection is associated with poor clinical outcomes in burn patients.

Methods: Retrospective chart review from a single burn center from 2007 to 2014. Adult burn patients with documented infection with S. maltophilia were identified and compared to an age, gender and burned total body surface area (TBSA) matched group. Demographic variables were summarized by means and standard deviations for continuous data or counts and percentages for discrete. Comparisons between groups were by Welch’s t-test or chi-square test, respectively.

Results: Forty burn patients had documented S. maltophilia infection, most were male (90%), mean age was 41 years, mean burned TBSA was 50%. The most common source of infection was burn wounds (88%), while 28% of the patients had bacteremia. Eighty-five percent of S. maltophilia infections were associated with healthcare-associated infections and antimicrobial resistance.

Conclusions: S. maltophilia infection has significantly longer length of stay (LOS) (53 ± 47 vs 17 ± 14 days) and more surgical procedures (6 ± 4 vs 2 ± 2). There were no significant differences when comparing hospital readmissions and mortality between both groups.
Conclusions: Antibiotic resistance of *S. maltophilia* infection in burn patients is not uncommon, most infections are sensitive to TMP/SMX. *S. maltophilia* infection is associated with increased LOS and increased number of surgical procedures.

PS1. EFFECT OF SURGICAL HAND ANTISEPSIS AGENT SELECTION ON SURGICAL SITE INFECTION PATHOGENS

Brad Ortiz, VA Boston Healthcare System; Qi Chen, VA Boston Healthcare System; Kevin Wong, VA Boston Healthcare System; Kamal Itani, VA Boston Healthcare System

Background: Preoperative hand antiseptic agent selection has not been studied with regard to surgical site infection (SSI) culture data. In our hospital, we introduced an alcohol-based hand rub (ABR) in 2012 as an alternative to traditional water-based surgical scrub (TSS). It was the goal of this study to review any effect of this implementation on SSI pathogen characteristics. In addition, we sought to compare our SSI culture data with National Healthcare Safety Network (NHSN) available data.

Hypothesis: It is our hypothesis that SSI pathogens and resistance differ among hospitals and are affected by surgical hand antiseptic technique.

Methods: Prospectiveely collected data between 2007 and 2014 were retrospectively analyzed for two different time periods in a single institution (VAHBS): before ABR implementation (TSS group) and after (ABR group). Pathogen distribution, pathogenic isolate resistance profiles and SSI data for different surgical procedures were compared between VAHBS and NHSN. Similar comparisons were made between ABR and TSS. All VAHBS data were interpreted and categorized according to NHSN definitions.

Results: Among 6,344 patients, 158 (2.5%) developed SSIs yielding 202 organisms; culture data were not available for 24 patients. Coagulase-negative staphylococci (4%) and Klebsiella pneumoniae/oxytocak (Klebsiella; 10%) at VAHBS accounted for the biggest difference with NHSN (12% and 4%, respectively). Aside from methicillin-resistant Staphylococcus aureus (MRSA), where there was no difference between VAHBS and NHSN (43% versus 44%, respectively), resistance differences were observed among multidrug-resistant Klebsiella (0% versus 7%, respectively) and Escherichia coli (E. coli; 10% versus 2%, respectively), as well as among extended-spectrum cephalosporin-resistant Klebsiella (5% versus 13%, respectively) and Enterobacter (58% versus 28%, respectively). VAHBS had a higher proportion of SSIs in abdominal and vascular cases compared to NHSN (49% versus 22% and 13% versus 2%, respectively). Compared to TSS, ABR had a higher rate of MSSA (28% versus 21%), E. coli (13% versus 10%), Pseudomonas aeruginosa (9% vs. 3%) and Enterobacter (11% versus 3%), and a lower rate of Klebsiella (4% versus 8%) and MRSA (15% versus 26%), where differences were significant (p < 0.05).

Conclusions: VAHBS and NHSN data differed in SSI pathogen distribution, pathogenic isolate resistance profiles and procedure-associated SSIs. These differences, along with those observed between ABR and TSS, warrant further investigation.

PS2. THE MICROBIOTA ACROSS FIVE BODY SITES IN CRITICALLY ILL ADULT SURGICAL PATIENTS IS HIGHLY DISORDERED AND UNSTABLE OVER TIME

Andrew Yeh, University of Pittsburgh; Matthew Rogers, Brian Firek, Children’s Hospital of Pittsburgh; Brian Zuckerbraun, University of Pittsburgh School of Medicine; Matthew Neal, University of Pittsburgh; Michael Morowitz, Children’s Hospital of Pittsburgh

Background: Knowledge of the human microbiome has vastly expanded in recent years, partly due to new culture-independent methods. In general, these methods have not been used to study critically ill patients. The aim of this study was to conduct a high-resolution pilot analysis of the microflora of critically ill surgical patients across five body sites.

Hypothesis: We hypothesize that bacterial community diversity decreases over time in surgical ICU patients with a shift from commensal to pathogenic species.

Methods: Skin, oral, trachea, urine, rectal/fecal samples were collected from 21 patients every 3 to 4 days in a surgical ICU. 16S rRNA gene sequences from extracted bacterial DNA were amplified/sequenced on the Illumina MiSeq platform. QIIME was used for taxonomic analyses. LEFSE was used to compare ICU samples with healthy subjects in the Human Microbiome Project (HMP).

Results: A mean of 10.9 samples were collected from each subject with a mean sampling period of 7.5 days (range 1–20 days). Species richness decreased over time in the gut and oral samples but increased in the skin (p < 0.05). Principal coordinates analysis showed substantial microbiota changes at all body sites relative to HMP samples (PERMANOVA p < 0.05).

Compared to HMP data, ICU samples of the mouth, skin, and gut were depleted of normal flora and enriched with pathogens. For example, the gut was depleted of the phylum Bacteroidetes and enriched with the family Enterobacteriaceae (p < 0.05). Some urine and trachea samples had little bacterial DNA but others were enriched with pathogens, e.g. *Mycoplasma* in trachea samples. In many cases, there was loss of site specificity, i.e. pathogens such as *Pseudomonas* were found simultaneously on 3 or more body sites. Many patients had positive clinical cultures; in some cases, the offending pathogen was found at significant abundance in microbiome samples before clinical evidence of infection.

Conclusions: The microbiota of ICU patients undergoes early and late alterations across multiple body sites with loss of healthy community composition over time. Microbiome changes precede and correlated with clinical infections. Further work will determine the utility of microbiome monitoring/modification in the ICU.

PS3. GAUZE IMPREGNATED WITH QUATERNARY AMMONIUM SALT REDUCES BACTERIAL COLONIZATION OF SURGICAL DRAINS AFTER BREAST RECONSTRUCTION

Amy Strong, Tulane University; Emily Wolfe, Tulane University; Abigail Chaffin, Tulane University; David Jansen, Tulane University

Background: Surgical site infection (SSIs) following breast reconstruction is associated with increased length of hospital stay, readmission rates, cost, morbidity, and mortality. Identifying methods to reduce SSI without the use of antibiotics may be beneficial at reducing methicillin resistant Staphylococcus aureus and vancomycin resistant *Staphylococcus aureus*, reserving the use of antibiotics for more severe cases. Quaternary ammonium salts have previously been shown to be a safe and effective antimicrobial in the setting of *in vitro* and *in vivo* animal experiments.

Hypothesis: The current study investigated the efficacy of quaternary ammonium salts in reducing surgical drain site colonization following breast reconstruction with the hypothesis that use of the quaternary ammonium salt will reduce surgical drain colonization.

Methods: A prospective, patient-controlled study was conducted to investigate the antimicrobial properties of a quaternary ammonium salt, 3-trimethoxysilyl propyldimethyloctadecyl ammonium chloride (QAS-3PAC; Bio-spearTM), at reducing surgical drain site colonization following breast reconstruction (deep inferior epigastric perforator (DIEP) flap reconstruction or tissue expander placement). Non-impregnated gaaze (control group) was compared to QAS-3PAC impregnated gaaze (treatment group) secured over surgical drains at reducing drain site colonization during the first and second post-operative week. Antibiotic sensitivity testing was also conducted when bacterial cultures were positive.

Results: The overall incidence of bacterial colonization of surgical drains was lower in the treatment group compared to that in the control group (17.6% vs. 63.4%, respectively; p = 0.008). QAS-3PAC impregnated gaaze reduced the incidence of bacterial colonization of surgical drains during the first (0.0% vs. 33.3%) and second (40.0% vs. 87.5%; P = 0.04) post-operative week. Furthermore, no enhanced antibiotic resistance was noted in drains treated with QAS-3PAC impregnated gaaze.

Conclusions: The results of this study suggest that QAS-3PAC impregnated gaaze applied over surgical drains may be an effective method in reducing the incidence of bacterial colonization.

PS4. A PRELIMINARY STUDY OF THE IMPACT OF ENHANCED RECOVERY AFTER SURGERY (ERAS) PROTOCOL ON THE INCIDENCE SURGICAL SITE INFECTION

Richard Efen, Collin Brathwaite, Winthrop Surgical Associates, P.C.; Matthew Giuca, Winthrop-University Hospital; Linnea Drew, Winthrop-University Hospital

Background: Enhanced Recovery After Surgery (ERAS) is an evidence-based and multi-modal surgical pathway associated with reduced hospital length of stay and mortality. Recently, questions have arisen about aspects of the pathway that have the
potential to increase rates of infections. The aim of the present study is to evaluate the impact of a newly implemented ERAS protocol on the incidence of infection rates in colorectal surgery.

Hypothesis: ERAS protocol is proven to support faster recovery from surgery, decrease length of hospital stay, and earlier return to normal function. There should be a significant decrease in rate of surgical infections secondary to diminished the impact of the postoperative catabolic state.

Results: A retrospective analysis of cases from January 2014 through April 2015 prior to implementation of ERAS protocol was conducted. Additionally post-ERAS implementations data was collected from prospective study from May 2015 through October 2015. Patients were matched for the type of surgery and if procedure was elective as well as outcome measures of their superficial and deep surgical site infections. The secondary outcomes were length of hospital stay, and the number of readmissions within 30 days.

Conclusions: Sixty-two patients treated according to the ERAS protocol were compared with 179 patients who received traditional postoperative care. The two groups were comparable with type of surgery, gender, age (median 60 years, range 30-87 vs. median 62 years, range 20-96; P = 0.94). There was no statistically significant ERAS group compared to the control group in the rate of superficial surgical site infections (7.46% versus 6.42% respectively; P = 0.78), the rate of deep surgical site infections rate (1.49% versus 0.53% respectively; P = 0.55) and readmission rate (9.00% vs. 8.02%; P = 0.82). Patients in the ERAS spent fewer days in the hospital (median 4 days, range 1–33 vs. median 3 days, range 0–107; P = 0.029).

P57. OVERLAY PLACEMENT OF MESH AS COMPARED TO UNDERLAY PLACEMENT IS ASSOCIATED WITH GREATER BACTERIAL CLEARANCE AND LOWER INTRA-ABDOMINAL INFECTION RATE IN A CONTAMINATED VENTRAL HERNIA REPAIR MODEL

Eden Nohra, Section of Acute and Critical Care Surgery, Washington University in St. Louis; Robert Winfield, Section of Acute and Critical Care Surgery, Washington University in St. Louis; Asiah Turnball, Section of Acute and Critical Care Surgery, Washington University in St. Louis; Christopher Davis, Section of Acute and Critical Care Surgery, Washington University in St. Louis; Ana Fuchs, Section of Acute and Critical Care Surgery, Washington University in St. Louis; Jad Chamieh, Section of Acute and Critical Care Surgery, Washington University in St. Louis; Grant Bochicchio, Chief, Section of Acute and Critical Care Surgery, Washington University in St. Louis

Background: Ventral hernia repairs performed in a contaminated field (bowel perforation/resection, enterocutaneous fistula, etc.) present a significant risk of infectious complications. There is limited data available describing the effect of onlay versus underlay technique of mesh placement on subsequent infection.

Hypothesis: We hypothesized that in a grossly contaminated field, onlay mesh placement would be more resistant to infection as compared to an underlay technique in our animal model.

Methods: 48 New Zealand White rabbits underwent creation of a 3x3cm abdominal defect as previously described. Animals were randomized between overlay and underlay mesh repair (1:1 ratio). After the mesh was placed, 1x10^6 CFU of Methicillin-resistant Staphylococcus aureus (MRSA) was applied directly to the mesh. Animals were sacrificed at 7 or 21 days; we evaluated bacterial counts in mesh, tissue and intra-abdominal fluid. Mesh incorporation, adhesions, and signs of infection were documented by a blinded grader. Multivariate logistic regression was used to identify variables significantly correlated with onlay versus underlay mesh placement; bivariate analysis was done by Fisher Exact Test.

Results: Bivariate analysis found that underlay was associated with significantly higher rates of positive intraabdominal fluid cultures as compared to overlay (15/22, 68.2% vs. 4/14, 28.6%; p < 0.05 by Fisher Exact). Logistic regression revealed a statistically significant correlation between underlay mesh placement and persistence of bacteria in the mesh (P = 0.004) and in tissue (p = 0.004), as well as confirming the influence of mesh infection detected in bivariate analysis (P = 0.007). These findings were present at both time points. In addition, regression analysis found that repair with overlay mesh placement was correlated with better mesh incorporation (P = 0.01), less bowel adhesions (P < 0.001), and discharge (P < 0.001) compared to underlay.

Conclusions: In this experimental model of large ventral hernia repair in a contaminated field, overlay mesh placement is associated with a decreased rate of intraabdominal infection and increased rate of bacterial clearance. Furthermore, mesh appears to incorporate better into surrounding tissue and adhere less to bowel in the overlay position when the surgical field is contaminated. These findings suggest that for ventral hernia repair in a contaminated field, onlay technique may result in improved clinical outcomes. Further investigation is required for confirmation.

P58. PROPORTION OF SURGICAL SITE INFECTION FROM CESAREAN SECTION OCCURRING AFTER HOSPITAL DISCHARGE: META-ANALYSIS

Erik Woelber, University of Washington; Emily Schrick, University of Washington; Heather Evans, University of Washington

Background: Surgical site infection (SSI) is the third most common complication observed following cesarean section, an operation performed over 1.2 million times per year in the United States. A significant percentage of these surgical wound infections occur following post-discharge PSI. With the increasing trend of laparoscopic mesh analysis along with the potential/reduction of cesarean section infections, this study aimed to determine the proportion of these SSIs that occurs after hospital discharge, as well as factors associated with the incidence of post-discharge SSI. We also aimed to describe the potential role of mobile health platforms for wound surveillance in women of reproductive age.

Hypothesis: The majority of surgical site infections occur after discharge, but the proportion is largely determined by the aggressiveness of post-discharge surveillance.

Methods: Systematic search was conducted using multiple online databases to identify manuscripts reporting the proportion of SSIs following cesarean sections. Meta-analysis was performed using a random effects model to
ascertain a pooled estimate of the proportion of SSI identified after discharge. Multiple linear regression was used to determine potential moderators of post-discharge SSI proportion.

Results: 20 articles from 11 countries met inclusion criteria, with data from 84,526 operations and 3,668 surgical site infections. The overall rate of surgical site infection was 4.3%. Of the 3,668 SSIs, 2,531 (69%) occurred after discharge. Tests of non-combinability demonstrated a high degree of heterogeneity in post-discharge SSI proportions among included studies (I2 = 92.2%). Bivariate regression showed that study quality and aggressive surveillance were associated with a higher proportion of SSI identified after leaving the hospital. Multiple linear regression indicated that telephone surveillance may be associated with a higher proportion of post-discharge SSI identified relative to other follow-up strategies.

Conclusions: The majority of SSIs following cesarean section occur after discharge. Post-discharge SSI is an international problem worthy of greater attention and the development of more sensitive surveillance strategies, including mobile health platforms.

P59.
PROPORTION OF SURGICAL SITE INFECTION OCCURRING AFTER HOSPITAL DISCHARGE: A SYSTEMATIC REVIEW

Erik Woelber, University of Washington; Emily Schrick, University of Washington; Brad Gesner, Epidemiology and Vaccinology Consulting; Heather Evans, University of Washington

Background: Surgical site infection (SSI) is the most common type of healthcare-associated infection, contributing to significant annual morbidity, mortality, and cost associated with the treatment of surgical patients. It is the number one reason for hospital readmission following surgery in the United States. In comparison to overall SSI rates, relatively little attention has been paid to the proportion of SSI that occurs after discharge. This paper systematically reviews two decades of publications to better characterize the proportion of SSIs that occur post-discharge and the need for improved early detection and treatment.

Hypothesis: The majority of surgical site infections occur following discharge.

Methods: A restricted systematic literature search was conducted on PubMed to identify English-language studies published after 1995 that included the occurrence of pre- and post-discharge surgical site infections. Data were abstracted for date of publication, country of origin, procedure, study design, surveillance system, population size, follow-up rate, and SSI counts and proportions. Descriptive statistics and forest plots were used to characterize the data set, represent the overall proportion of surgical site infections occurring after discharge, and assess the heterogeneity of included studies.

Results: 55 articles met inclusion criteria, with data from 1,432,293 operations and 141,347 surgical site infections based on studies in 15 countries. The overall proportion of surgeries leading to SSI was 9.9%. Of the 141,347 surgical site infections, 84,984 (60.1%) occurred after discharge. The proportion of SSIs after discharge varied between studies from 13.5 to 94.8% and was heterogeneous for all studies and for most individual surgery types.

Conclusions: Post-discharge SSI constitutes the majority of SSI and poses a significant disease burden for surgical patients globally and for different surgery types. Further examination is warranted to determine the methodologic and clinical factors moderating the proportion of post-discharge SSI.

P60.
CONCEPT FOR STERNAL WOUND CLOSURE AFTER MEDIAN STERNOTOMY IN OFF PUMP CORONARY ARTERY BYPASS USING SKELETONIZED BILATERAL INTERNAL MAMMARY ARTERY: THE BRUSSELS HEART CENTER EXPERIENCE

Mircea Robu, Brussels Heart Center; Jan Remes, Brussels Heart Center; Jan De Raet, Brussels Heart Center

Background: Mediastinitis is a potentially devastating surgical side infection (SSI) after CABG. The incidence ranges from 1.3 to 4.7% in patients with bilateral internal mammary arteries (BIMA) and the risk increases >10% in diabetic patients. Daily practice in our center presumes harvesting a skeletonized BIMA for every patient.

Hypothesis: The aim of this study is to present our experience and results to prevent superficial and deep SSIs.

Methods: 30 consecutive patients that underwent off pump coronary artery bypass (OPCAB) using BIMA between October and November 2015 were included in the study. We used the Fowler model to identify the high risk patients for SSI. Three steps were designed for sternal wound closure. First step includes sternal closure. Second step refers to pre-sternal subcutaneous tissue closure. Third step refers to skin closure with either 2-octylcyanoacrylate or negative pressure wound therapy.

Results: Mean age was 72.3 ± 8.79 years. Mean risk for major infection was 3.23% ± 2.14. There were no cases of mediastinitis or other SSI. 6 patients had diabetes, 9 patients had a BMI over 30 and 6 patients had both diabetes and obesity. In these patients, previous myocardial infarction in 10 patients and COPD in 3 patients. The highest risk of SSI was 8.5% using Fowler score in a female patient that associated 5 risk factors.

Conclusions: We used this strategy in all our patients including those with diabetes, obesity or both. We managed to have no SSI by carefully following the steps designed for sternal wound closure. This concept can be easily applied in any cardiac surgery service in order to prevent SSI.

P61.
THE EFFECTS OF CIRRHOSIS ON TEMPORARY ABDOMINAL CLOSURE OUTCOMES

Tyler Loftus, University of Florida Health, Gainesville, FL; Janeen Jordan, University of Florida Health, Gainesville, FL; Chasen Croft, University of Florida Health, Gainesville, FL; Stephen Smith, University of Florida Health, Gainesville, FL; Philip Efron, University of Florida Health, Gainesville, FL; Frederick Moore, University of Florida Health, Gainesville, FL; Alicia Mohr, University of Florida Health, Gainesville, FL; Scott Brakenridge, University of Florida Health, Gainesville, FL

Background: Damage control surgery and temporary abdominal closure (TAC) are occasionally necessary in managing cirrhotic patients undergoing urgent or emergent laparotomy. However, the effects of cirrhosis on physiologic parameters, resuscitation requirements, and outcomes for TAC patients are unknown.

Hypothesis: We hypothesized that cirrhotic TAC patients would have different physiologic characteristics, resuscitation requirements, and outcomes than non-cirrhotic TAC patients.

Methods: We performed a three year retrospective cohort analysis of patients managed with TAC following laparotomy for sepsis, trauma, or abdominal compartment syndrome at our institution from 6/1/12–6/30/15. All patients were initially managed with negative pressure wound therapy (NPWT) TAC per surgeon discretion with intention for planned relaparotomy and sequential abdominal closure attempts at 24–48 hour intervals.

Results: Two hundred and thirty-one patients were included. At presentation, cirrhotic patients had higher incidence of acidosis (33% vs. 17%, p = 0.013) and coagulopathy (87% vs. 54%, p = 0.013) than non-cirrhotic patients. Forty-eight hours after presentation, cirrhotic patients had persistently higher rates coagulopathy (77% vs. 44%, p = 0.022) despite receiving more fresh frozen plasma (10.8 units vs. 4.4 units, p = 0.031). Cirrhotic patients also had higher NPWT output (4,427 mL vs. 2,375 mL, p = 0.030) and developed higher vasoressor infusion rates (5% vs. 29%, p = 0.024) despite having similar net fluid balance as non-cirrhotic patients. Following 48 hours of resuscitation, the cirrhotic cohort experienced >70% decreases in rates of hypothermia and acidosis, but only an 11% decrease in incidence of coagulopathy. Cirrhotic patients had fewer ICU-free days (2.3 vs. 7.6 days, p = 0.001) and higher rates of multiple organ failure (64% vs. 34%, OR 4.5, 95% CI 1.2–17.5, p = 0.029), in-hospital mortality (67%
Surveillance data for general surgery patients from Jan 2000 through Dec 2014. We examined 15 years of SSI data at a single tertiary care academic medical center, with a focus on trends and microbiologic characteristics.

Background: Right lower quadrant (RLQ) phlegmone or abscess is commonly associated with perforated appendicitis, and traditionally has been treated with emergent appendectomy. However, antibiotics and percutaneous drainage is now favored by many surgeons. The issue of interval appendectomy remains controversial and it should be considered that such infections may be caused by other processes such as right sided diverticulitis or perforated right colon tumors.

Hypothesis: A diverse pathology may cause RLQ infections and appropriate workup after initial treatment will tailor further interventions.

Methods: We report on five patients who required surgery after they had presented with RLQ phlegmone/abscess and were primarily managed non-operatively.

Results: There were three men and two women with a median age of 78.7 (range 63.9 to 80.6) years. All had significant comorbidities. Four with drainable abscesses had a percutaneous drainage placed. On colonoscopy after a median 46 (range 27–71), ongoing pathology at the appendix orifice was seen in 4 patients, one had additional left colonic polyposis with an adenocarcinoma at the rectosigmoid junction and underwent combined laparoscopic low anterior resection with appendectomy. In one patient an adenocarcinoma of the ascending colon with localized colitis and perforation was found as cause of the RLQ infection and the patient had a laparoscopic right hemicolectomy. Two patients had ongoing RLQ pain compatible with ongoing appendicitis and both underwent interval laparoscopic appendectomy without complications. The last patient had ongoing RLQ infection on CT scan and on laparoscopy an inflammatory pseudotumor was found and a right hemicolecetomy was done revealing a perforated appendix carcinoid. Surgery was done median 110 (range 34–204) days after onset of RLQ infection.

Conclusions: Treating RLQ phlegmone/abscess with antibiotics and percutaneous drainage is a favorable strategy and a colonoscopy should be included in the workup, especially in the elderly population as a diverse spectrum of underlying conditions should be expected.

P62. DIVERSE PATHOLOGY AFTER NON OPERATIVE MANAGEMENT OF RIGHT LOWER QUADRANT INFECTION: A CASE SERIES FROM A RURAL HOSPITAL

Hugo Bonatti, University of Maryland Shore Health; Andrew Pelczer, University of Maryland Shorehealth; Aboubakir Kharait, University of Maryland Shorehealth; Dale Johnson, University of Maryland Shorehealth

Background: Right lower quadrant (RLQ) phlegmone or abscess is commonly associated with perforated appendicitis, and traditionally has been treated with emergent appendectomy. However, antibiotics and percutaneous drainage is now favored by many surgeons. The issue of interval appendectomy remains controversial and it should be considered that such infections may be caused by other processes such as right sided diverticulitis or perforated right colon tumors.

Hypothesis: A diverse pathology may cause RLQ infections and appropriate workup after initial treatment will tailor further interventions.

Methods: We report on five patients who required surgery after they had presented with RLQ phlegmone/abscess and were primarily managed non-operatively.

Results: There were three men and two women with a median age of 78.7 (range 63.9 to 80.6) years. All had significant comorbidities. Four with drainable abscesses had a percutaneous drainage placed. On colonoscopy after a median 46 (range 27–71), ongoing pathology at the appendix orifice was seen in 4 patients, one had additional left colonic polyposis with an adenocarcinoma at the rectosigmoid junction and underwent combined laparoscopic low anterior resection with appendectomy. In one patient an adenocarcinoma of the ascending colon with localized colitis and perforation was found as cause of the RLQ infection and the patient had a laparoscopic right hemicolectomy. Two patients had ongoing RLQ pain compatible with ongoing appendicitis and both underwent interval laparoscopic appendectomy without complications. The last patient had ongoing RLQ infection on CT scan and on laparoscopy an inflammatory pseudotumor was found and a right hemicolecetomy was done revealing a perforated appendix carcinoid. Surgery was done median 110 (range 34–204) days after onset of RLQ infection.

Conclusions: Treating RLQ phlegmone/abscess with antibiotics and percutaneous drainage is a favorable strategy and a colonoscopy should be included in the workup, especially in the elderly population as a diverse spectrum of underlying conditions should be expected.
P65. PERINEAL SURGICAL SITE INFECTIONS AFTER ABDOMINOGENITAL RESECTION: DOES INTRAOPERATIVE RADIATION THERAPY WORSEN OUTCOMES?

Justin Brady, University Hospitals Case Medical Center/Case Western Reserve University; Yuxiang Wen, University Hospitals Case Medical Center/Case Western Reserve University, Eslam Doskoezy, University Hospitals Case Medical Center/Case Western Reserve University; Murali Jabri, University Hospitals Case Medical Center/Case Western Reserve University; Vanessa Ho, University Hospitals Case Medical Center/Case Western Reserve University; Sharon Stein, University Hospitals Case Medical Center/Case Western Reserve University; Harry Reynolds, University Hospitals Case Medical Center/Case Western Reserve University; Scott Steele, University Hospitals Case Medical Center/Case Western Reserve University

Background: External beam radiation is a risk factor for perineal complications following abdominoperineal resection (APR) for rectal adenocarcinoma.

Hypothesis: We hypothesized that additional radiation exposure with intraoperative radiation therapy (IORT), which improves rates of local control, would not affect perineal superficial surgical site infection (SSI) rates.

Methods: A retrospective review identified patients undergoing APR for rectal adenocarcinoma with or without IORT between 2005 and 2015. Patients who did or did not undergo IORT were case-matched 1:2 based on age, gender, diagnosis, procedure, and neoadjuvant therapy. Perineal SSI diagnosis was defined using the World Health Organization criteria.

Results: 17 patients who underwent APR + IORT were case matched to 34 patients who underwent APR alone. Mean age for patients undergoing APR was 64.6 and for APR + IORT was 63.6 (range, 44 – 80, P = 0.73). The percentage of patients in the APR and APR + IORT groups who received neoadjuvant chemotherapy (97.1% vs. 82.4%) and neoadjuvant radiation (91.2% vs. 82.4%) was similar (P > 0.1). Comorbidities including smoking, diabetes, steroid use and immunosuppression medications were similar between groups (P > 0.4). Primary wound closure was performed on 70.6% of APR patients versus 64.7% of APR + IORT patients. The remaining patients’ perineal defects were closed with a gracilis or rectus abdominis myocutaneous flap. There was no significant difference in closure method between groups (P > 0.6). The overall perineal SSI rate was 17.6%. Patients receiving IORT had a non-significant lower rate of perineal SSI compared to patients not receiving IORT (5.9% vs. 23.5%, P = 0.24). On univariate analysis, age, gender, neoadjuvant therapy, IORT and perineal closure method were not associated with increased rate of perineal SSI. There were no identified independent risk factors for development of a perineal SSI.

Conclusions: The addition of IORT to APR is not associated with an increase risk of perineal SSI compared to patients undergoing APR without IORT. The impact of myocutaneous flap for perineal defect closure with IORT warrants further investigation.

P66. ILEAL NEobladder OPERATION VERSUS SIMPLE FISTULAS RESECTION IN PATIENTS WITH ENTEROVESICAL FISTULA AFTER RADIOTHERAPY

Yuan Li, Department of General Surgery, Jinling Hospital, Medical School of Nanjing University; Jianan Ren, Nanjing General Hospital of Nanjing; Gefei Wang, Department of General Surgery, Jinling Hospital, Medical School of Nanjing University; Gusheng Gu, Department of General Surgery, Jinling Hospital, Medical School of Nanjing University; Xuewen Wu, Department of General Surgery, Jinling Hospital, Medical School of Nanjing University; Song Liu, Drum Tower Hospital, Medical School of Nanjing University; Jieshou Li, Department of General Surgery, Jinling Hospital, Medical School of Nanjing University

Background: Enterovesical fistula represents an abnormal communication between the intestine and the bladder. Enterovesical fistula is a rare but severe complication of pelvic radiation and it can occur years after radiation therapy even in the absence of tumour recurrence. Physicians chose ileal neobladder operation as a new technology to treat enterovesical fistula instead of simple fistulas resection recently.

Hypothesis: Ileal neobladder operation can decrease the postoperative complications of enterovesical fistula related surgery.

Methods: Eighteen patients with a definite diagnosis of enterovesical fistula after radiotherapy were studied retrospectively. Nine patients received ileal neobladder operation, while others received simple fistulas resection. We accessed the relationship between complications and choices of operation.

Results: Hospitalization days in ileal neobladder operation group (93.1 ± 26.9 days) were longer than simple fistulas resection group (57.2 ± 26.9 days, P = 0.048). Hospitalization costs was also higher in ileal neobladder operation group (42105.0 dollars vs 240807.7 ± 12527.8 dollars, P = 0.041). Postoperative urinary tract infection and hemorrhage emerged less and later in ileal neobladder operation group respectively (0 versus 66.7%, P = 0.004; 11.1% versus 100.0%, P = 0.001).

Conclusions: In our study, ileal neobladder operation is a better option for surgeons to treat radiation-enterovesical fistula. It decreases and delays the occurrence of urinary tract infection and hemorrhage.
P69.
RATES AND PREDICTORS OF READMISSION IN PATIENTS WITH NECROTIZING SOFT TISSUE INFECTIONS

Arturo J. Rios-Diaz, Brigham and Women’s Hospital, Harvard Medical School; Rene Borscheid, Brigham and Women’s Hospital, Harvard Medical School; Olubode Olufajo, Brigham and Women’s Hospital; David Metcalfe, Brigham and Women’s Hospital, Harvard Medical School; Brian Yorkgitis, Brigham and Women’s Hospital, Harvard Medical School; Ali Salim, Brigham and Women’s Hospital, Harvard Medical School; Reza Askari, Brigham & Women’s Hospital, Harvard Medical School

Background: Necrotizing soft tissue infections (NSTI) occur rarely but result in significant morbidity. There is a paucity of data regarding the causes and rates of readmissions. The objective of this study was to determine 30-day and one-year readmission rates and associated patient-level risk factors following NSTI.

Hypothesis: There is significant morbidity after discharge that results in readmission in patients with NSTI.

Methods: Patients 18 years old and older with diagnosis of ICD-9-CM diagnosis of NSTI were identified in the California State Inpatient Database (2007–2010), which includes 98% inpatient admissions. NSTI was defined by a primary ICD-9-CM diagnosis code indicating necrotizing fasciitis, gas or Fournier’s gangrene, and a ICD-9-CM procedure code indicating surgical debridement, excision of soft tissue, fasciectomy, myectomy or amputation. Patients who died during index admission and transfers were excluded. Patients were tracked longitudinally to determine 30-day (main outcome) and one-year readmission rates, as well as the proportion of readmissions that occurred at the same index-hospital. Logistic multivariable regression models adjusted for age, gender, race, payer status, length-of-stay, discharge disposition and pertinent comorbidities, were used to determine independent predictors of 30-day readmissions.

Results: A total of 2,106 NSTI patients were included in the analysis, 160 (7.6%) died during index admission. 30-day readmission rate was 14%, of which 23.2% were not readmitted at the index hospital. One-year readmission rate was 15%. The most common causes for 30-day readmission were wound complications (23.2%), other postoperative infections/sepsis (14.8%), necrotizing fasciitis (10.6%) and acute complications of diabetes (5.7%). Independent predictors of readmission were chronic diabetes (adjusted OR 1.63, 95% Confidence Interval 1.16–2.30) and discharge against medical advice (3.43, 1.29–9.11). Peripheral vascular disorders, obesity, drug and alcohol abuse were not associated with 30-day readmission after NSTI.

Conclusions: Most NSTI readmissions occur within 30 days and relate mainly to wound and infectious complications. Nearly a quarter of readmissions are to a different hospital. Patients with diabetes should be followed-up closely after discharge for possible wound care complications.