A Large Animal Model of Lipopolysaccharide-induced Hypotension to Mimic Sepsis and Septic Shock
Eric S Wise, MD, Kyle M Hocking, PhD, Zachary R Bergman, MD, Richard Bianco, PhD, Roy Kiberenge, MD, Bret Dwight Alvis, MD
University of Minnesota, Minneapolis, MN
Vanderbilt University, Nashville, TN
INTRODUCTION: Large animal models of sepsis are notoriously difficult to develop and implement. Lipopolysaccharide (LPS)-induced hypotension is a promising though underexplored approach to mimic hemodynamic perturbations seen in sepsis. Described here is a porcine model of LPS-induced hypotension that is cost-effective, rapid, modifiable and reproducible.

METHODS: A series of pigs were anesthetized, intubated and catheterized with intravascular lines and a pulmonary artery catheter via carotid artery cutdown. After equilibration to a pulmonary capillary wedge pressure (PCWP) of 10 mmHg via crystalloid infusion, a continuous IV infusion of LPS is administered until paused due to the onset of an initial sensitization event characterized by precipitous hypotension and elevated pulmonary pressures. After stabilization, resumption of LPS dose escalation until septic hypotension was obtained. Volume and vasopressor-based resuscitation was subsequently initiated. After model development with six pigs, a series of six pigs was used for prospective validation.

RESULTS: Baseline heart rate and mean arterial pressure (MAP) were 91±10 bpm (mean±standard deviation) and 66±10 mmHg, respectively. LPS sensitization occurred at a dose of 5±2 mg/mL. Three pigs required a small (≤20 ug) epinephrine bolus for stabilization. After recovery, critical septic hypotension was achieved at a LPS dose of 130±83 mg/mL, with a heart rate of 123±26 bpm, MAP of 47±17 mmHg, and PCWP of 6±4 mmHg. None of the six pigs died during this protocol.

CONCLUSION: Despite limitations, this continuous LPS infusion-based porcine model to mimic hemodynamic changes of sepsis may be effectively adapted for physiologic and metabolic studies.

Acute Care Surgeon Perception of System Response to the Initial Phase of the COVID-19 Pandemic
Julie Y Valenzuela, MD, FACS, Katherine McKeane, DO FACS, R Jonathan Robitsek, PhD, Melissa K James, PhD, Thomas J Esposito, MD, MPH FACS
Jamaica Hospital Medical Center, Jamaica, NY
OSF HealthCare, Peoria, IL
INTRODUCTION: Surgical perspective is lacking surrounding the systems issues and response to the COVID-19 pandemic. This study sought the perspective of Acute Care Surgeons regarding the initial phase of the pandemic and its management.

METHODS: An Acute Care Surgery professional organization was queried (N=2277; SurveyMonkey) regarding COVID-19 pandemic management. Regression modeling including only attending physician responses (n=360/408 responses) was performed (R).

RESULTS: Respondents were 65% male; the overall median age was 44. Most (69%) practiced in urban, academic (59%), hospital-based group practices (97%). COVID-19 tests were performed in 59%. Voluntary removal from practice was reported by 4.5%, with 12% involuntarily removed primarily for COVID+ status. Shortages of PPE, COVID-19 tests, and medications were reported most often, with ventilators less frequently (n=62; 18.6%). Rural surgeons were more likely to report shortages (56%; p=0.02), though overall adverse events resulting from ventilator shortages were rare. Hospital financial measures addressing the pandemic were commonly reported, relating to salaries, bonuses, retirement contributions, and hazard pay. Pandemic management at the institutional level was viewed most favorably (66%) whereas few agreed it was managed well by the Federal government (9%). Respondents played a leadership role in pandemic management at their hospital (38%), regionally (7%), statewide (4%), and nationally (3%). COVID-related information from professional organizations was utilized by 81% of respondents, but only 53% found the information useful.

CONCLUSION: As pandemic management policies evolve, the limited leadership role played by surgeons, along with the content and quality of COVID-19 information provided should receive further consideration.

Calculation and Feedback of Risk-adjusted Antibiotic Days as a Process Measure in a Statewide Trauma Collaborative
Naveen F Sangji, MD, MPH, Anne H Cain-Nielsen, MS, Pooja Neiman, MD, Christopher J Tignanelli, MD, FACS, John W Scott, MD, MPH, Mark R Hennimia, MD, FACS
University of Michigan, Ann Arbor, MI
University of Minnesota, Minneapolis, MN
INTRODUCTION: Antibiotic stewardship requires determining the appropriate antibiotic and duration of use. Our current method of identifying infectious complications alone does not measure the resources required to treat infections in trauma patients. We sought to develop a method to account for treatment of infections and length of antibiotic administration to benchmark trauma hospitals with regard to days of antibiotic use.

METHODS: Using trauma quality collaborative data from 35 ACS-verified Level I and Level II trauma centers between July 1, 2018 and September 30, 2020, a two-part model was created to account for: 1) the probability of any antibiotic use, using logistic regression; and 2) the duration of usage, using negative binomial distribution. We adjusted for injury severity, presence/type of infection (for e.g. ventilator acquired pneumonia or skin/soft tissue infection), and comorbid conditions. We performed observed-to-expected adjustments to calculate each center’s risk-adjusted antibiotic days, bootstrapped O/E ratios to create confidence intervals, and flagged potential high outliers as hospitals whose confidence intervals lay above the overall mean.
RESULTS: There were 75,323 antibiotic treatment days within the collaborative. We found wide variation in the number of risk-adjusted antibiotic days, ranging from 1.31 [1.19-1.42] days to 2.56 [2.18-2.99] days, with an overall mean of 1.80 days. Six centers were identified as high outliers.

CONCLUSION: There exists wide variation in the duration of risk-adjusted antibiotic use amongst Level I and Level II trauma centers. Further study is needed to address the underlying cause of variation and for improved antibiotic stewardship in high outlier centers.

Cryoprecipitate Use During Massive Transfusion Does Not Reduce Mortality in Propensity Score Analysis
Andrew M Fleming, MD, Kinjal Shah, MD, Saskia Byerly, MD, Louis J Magnotti, MD, FACS, Peter E Fischer, MD, FACS, Catherine P Seger, MD, Andrew J Kerwin, MD, FACS, Martin A Croce, MD, FACS, Isaac W Hawley, MD, MPH
University of Tennessee Health Science Center, Memphis, TN

INTRODUCTION: Cryoprecipitate is frequently administered as an adjunct to balanced transfusion in the setting of traumatic hemorrhage; civilian studies have not demonstrated a clear survival advantage. Prior observational studies noted selection bias when analyzing cryoprecipitate use. This study used propensity score analysis to minimize selection bias and evaluate the effects of early cryoprecipitate administration on inpatient mortality in the setting of massive transfusion for exsanguinating trauma.