

**Session:** 235. Healthcare Epidemiology: Surgical Site Infections  
 Saturday, October 6, 2018: 12:30 PM

**Background.** In countries with a high incidence of interpersonal violence involving firearms, gunshot wound (GSW) related infection is a regular and serious complication. However, limited evidence supports the efficacy of antimicrobial prophylaxis (AP) in resource restricted areas. At Tygerberg Hospital, South Africa, it is standard care for GSW patients to receive one dose of amoxicillin-clavulanic acid or cefazolin to prevent GSW-related infection. For various reasons protocol adherence can be suboptimal. This study aimed to assess the efficacy in regard to reduction of in-hospital GSW infection and to identify opportunities for practice improvement.

**Methods.** All GSW patients admitted between October 12, 2017 and January 3, 2018 were prospectively included. Data regarding injury characteristics, circumstances of the incident, type of AP and surgery were obtained. The occurrence of in-hospital GSW infection was monitored over 30 days or until discharge, whichever occurred first. Univariate analyses were performed to compare characteristics of patients with and without prophylaxis. A multivariate logistic regression model was used to obtain propensity scores. To correct for confounding, propensity score matching (PSM) and inverse probability weighting (IPW) methods were used to assess the effect of AP on the occurrence of GSW infection.

**Results.** A total of 165 consecutive patients were included. Hundred-and-three patients received AP according to protocol within 12 hours after admission, 62 patients did not. Only 63.9% of the multi-GSW patients and 69.1% of the patients with a fracture received AP. These conditions were associated with an uncorrected relative risk for infection of 2.08 (95% CI 1.32–3.26) and 1.81 (95% CI 1.08–3.04), respectively. PSM showed a reduced in-hospital GSW infection risk of 12% (95% CI 0.2–24%,  $P = 0.046$ ) with AP. IPW showed that AP reduced the risk for infection by 14% (95% CI, 3–27%,  $P = 0.015$ ).

**Conclusion.** Providing antimicrobial prophylaxis to GSW patients appeared to result in a clinically relevant lower risk of in-hospital GSW infection. In this study setting, optimization of provision of AP for all patients with multiple GSW's or a GSW-related fracture are opportunities for reduction of GSW infection.

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**2147. Sample Size Estimates for Cluster Randomized Trials in Infection Control and Antimicrobial Stewardship**

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**Background.** Cluster randomized control trials (CRCTs) are used frequently in the field of infection control and antimicrobial stewardship because randomization at the patient level is often not feasible due to contamination, ethical, or logistical issues. The correlation and thus non-independence that exists among individual patients in a cluster must be accounted for when estimating sample size for such trials, yet many studies neglect to consider or report the intracluster correlation coefficient (ICC) and the resulting coefficient of variation (CV) in rates between hospitals. The aim of this study was to estimate the sample sizes needed to adequately power studies of hospital-level interventions to reduce rates of healthcare-associated infections.

**Methods.** We calculated the minimum number of clusters or hospitals that would need to be included in a study to have good power to detect an impact of the intervention given a range of different assumptions. We estimated parameters needed for these calculations using national rates from the National Healthcare Safety Network (NHSN) for methicillin-resistant *Staphylococcus aureus* (MRSA) bacteremia, central-line associated bloodstream infections (CLABSI), catheter-associated urinary tract infections (CAUTI), *C. difficile* infections (CDI) and variation between hospitals in these rates. These calculations were based on the assumption that hospitals were uniform and moderate in size and were studied for 1 year.

**Results.** To study an intervention leading to a 50% decrease in daily rates and using the C vs. calculated from NHSN, 22 average-sized hospitals for MRSA bacteremia are needed, 34 for CAUTI, 9 for CDI, and 27 for CLABSI to have a statistically significant decrease with a type I error rate of 0.05 and a type II error rate of 0.8. If a 10% decrease in rates is expected instead, 709, 1205, 279, and 866 hospitals, respectively, are needed.

**Conclusion.** Sample size estimates for CRCTs are most influenced by the CV and the expected effect size. Given the large sample size requirements, it is likely that many CRCTs in hospital epidemiology are under-powered. We hope that these findings lead to more definitive CRCTs in the field of hospital epidemiology that are properly powered and more studies reporting their ICC or CV.

**Disclosures.** All authors: No reported disclosures.

**2148. 100 Years of Sepsis: Using Topic Modeling to Understand Historical Themes Surrounding Sepsis**

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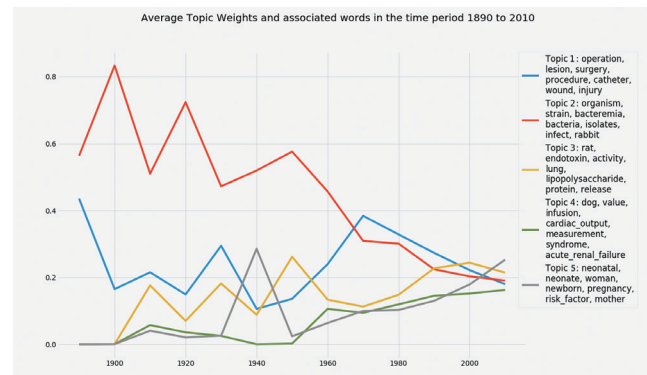
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**Background.** Medical research publications on sepsis have increased at an exponential rate, whereas our capacity to absorb and understand them has remained limited. We used topic modeling, a method that allows machines to distill large amounts of information into its elemental themes, to help us infer the discourse that led us to the present model/understanding of sepsis. Using this model to augment our understanding of sepsis, an evolving, networked and complex disease, we aimed to recognize connections that could be further explored and aid in knowledge discovery.

**Methods.** We extracted all abstracts from PubMed containing the terms "sepsis", "septic shock", and "septicemia" between 1890 and 2017 and retained the most informative words. Using topic modeling approaches based on Latent Dirichlet Allocation, we trained dynamic models to five topics from the corpus. We conducted a thematic analysis of topics across publication periods by examining the 30 most frequent words in each topic for each decade. We then fit a static topic model to the last 5 years. We compared the respective themes and their relatedness, and compared the frequency of each topic over the first and second halves of the century.

**Results.** Five themes emerged overall: surgery, physiology, microbiology, neonatal/maternal health, and cellular and endothelial responses to infection. When limited to the last 5 years, topics were: acute organ failure and ICU management, early sepsis management and cost, cellular and endothelial response, biomarkers and viruses, and neonatal infection. For the first half of the twentieth century, the bulk of research focused on microbiology while in the latter half of the century there was increased attention on the host response.

**Conclusion.** When visualizing the frequency of each topic over the last 100 years we found that the focus has shifted from the pathogen to the host response both from a cellular and physiologic perspective. In the last 5 years, biomarkers, early recognition and system management emerged as new themes. Reasons for this may include: evolution of scientific tools, treatments and statistical abilities, an increasing focus on healthcare cost, and ultimately an incorporation of the individual host response into the disease model.



Topic 1: 14.4%	Topic 2: 27.7%	Topic 3: 19.4%	Topic 4: 22.6%	Topic 5: 15.9%	Term Relevance
user safety injury	0.0049 blood culture	0.0001 septicemia	0.0001 c-reactive protein	0.0002 bacteremia	0.0005
injury	0.0036 department	0.0017 antibiotic	0.0001 syndrome	0.0004 neutro	0.0018
injury	0.0017 system	0.0001 safety	0.0001 medicine	0.0004 stress	0.0011
procedure	0.0015 research	0.0001 membership	0.0001 sensitivity	0.0004 neutrophil	0.0008
infect	0.0006 antibiotic	0.0001 gene	0.0001 specificity	0.0003 bloodstream infection	0.0003
infect	0.0002 sepsis	0.0001 function	0.0001 infect	0.0001 neutro	0.0009
infect	0.0001 emergency department	0.0001 gb	0.0001 vaccine	0.0001 pathogen	0.0005
ARDS	0.0001 sample	0.0001 lung	0.0001 virus	0.0001 neutro	0.0002
confidence interval	0.0001 unit	0.0001 system	0.0001 value	0.0001 neutro	0.0002
mechanical ventilation	0.0001 identification	0.0001 site	0.0001 symptom	0.0001 neutro	0.0001
CDI	0.0001 infection	0.0001 production	0.0001 sample	0.0001 neutro	0.0001
length	0.0001 protocol	0.0001 site	0.0001 serum	0.0001 neutro	0.0001
injury	0.0001 estimate	0.0001 management	0.0001 system	0.0001 bloodstream	0.0001
emergency department	0.0001 practice	0.0001 fu, g	0.0001 marker	0.0001 bacteremia	0.0001

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**2149. Real-Time Nationwide Surveillance for Antimicrobial Resistance of Major Pathogens Using Automated Data Collection System in Korea: A KARS-Net Study**

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