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 2.8 (95% CI 1.95–3.99). The IRR for fracture (CI 1.88–3.04), 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 AP for all patients with multiple GSW’s or a GSW-related fracture are opportunities for reduction of GSW infection.

Disclosures. All authors: No reported disclosures.

2147. Sample Size Estimation for Cluster Randomized Trials in Infection Control and Antimicrobial Stewardship
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Session: 236. Healthcare Epidemiology: Epidemiologic Methods
Saturday, October 6, 2018: 12:30 PM

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 unrealistic or unethical. A recent report from the Institute of Medicine stated that the majority of CRCTs do not use finite population correction. This paper focuses on sample size calculations for CRCTs. Past sample size calculations focused on the intracluster correlation coefficient (ICC) and the resulting coefficient of variation (CV) in rates between hospitals. These calculations were based on the assumption that hospitals were uniform and moderate in size and were studied for 1 year.

Methods. All authors:

We calculated the minimum number of clusters or hospitals that would be needed to include 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), and 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 CV 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.

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2148. 100 Years of Sepsis: Using Topic Modeling to Understand Historical Themes Surrounding Sepsis
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Session: 236. Healthcare Epidemiology: Epidemiologic Methods
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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, 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.

Disclosures. All authors: No reported disclosures.

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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Session: 237. Healthcare Epidemiology: Surveillance and Prevention
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Background. 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. Therefore, the use of antimicrobial prophylaxis (AP) to prevent GSW-related infection is standard practice in South Africa. The objective of this study was to compare the risk of GSW infection between patients who received AP and those who did not.

Methods. In a retrospective study of all consecutive patients admitted to Tygerberg Hospital, South Africa, between October 2017 and January 2018, we included patients who sustained GSW injuries. The primary outcome was the occurrence of GSW infection. Propensity score matching (PSM) and inverse probability weighting (IPW) were used to adjust for confounders and to estimate the risk of GSW infection in patients who received AP compared to those who did not.

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 2.8 (95% CI 1.95–3.99). The IRR for fracture (CI 1.88–3.04), 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 AP for all patients with multiple GSW’s or a GSW-related fracture are opportunities for reduction of GSW infection.

Disclosures. All authors: No reported disclosures.
Background. Information on the most current status of antimicrobial resistance (AMR) in local and national levels has critical importance. However, collection and analysis of a large number of antimicrobial susceptibility test (AST) results often results in additional workload in healthcare facilities and latency in final reporting. We sought to develop an automated nationwide surveillance network in Korea.

Methods. Data collection servers were set up at each participating institution, which collects AST results of every bacterial isolate from blood, cerebrospinal fluids, urine, and respiratory specimens. Collected results are anonymized and transmitted to central data server every day without human input. End-user can perform various analyses using data warehouse server through web interface. Only first isolates of same species from individual patients were included in analysis.

Results. A total of 19 hospitals located in various regions in Korea participated to the network. From January 2015 through December 2017, AST results of 347,356 isolates were collected. The proportion of MRSA among S. aureus (n = 17,761) was 65.3%, which declined gradually from 71.5 to 62.3% during study period (P < 0.001). The proportion of VRE increased from 29.3 to 36.3% (P = 0.001). Resistance rates of E. coli (n = 63,628) to third and fourth generation cephalosporins, fluoroquinolone, and piperacillin–tazobactam were 31.6, 23.0, 44.0, and 4.2%, respectively. Resistance rates of K. pneumoniae (n = 16,875) to same classes were 32.2, 28.1, 31.0 and 19.1%, respectively. Among E. coli and K. pneumoniae, 0.4 and 4.3% were resistant to carbapenem. Resistance rates of P. aeruginosa (n = 12,895) to carbapenem was 30.5%. However, 72.7% of A. baumannii isolates (n = 9,885) were resistant to carbapenem. Colistin resistance rate was still low at 0.5%.

Conclusion. We have established a fully automated nationwide surveillance network for AMR in Korea. Our system provided data on the most current status of AMR, which revealed increase in resistance rates among major Gram-negative pathogens compared with previous studies.

Figure 1. Schematic diagram of the Korean Antimicrobial Resistance Surveillance Network (KARSNet).

Figure 2. Temporal trends of the resistance rates of S. aureus and E. faecium.