2151. Accuracy of Physician Adjudication of Infection in Patients with Systemic Inflammatory Response Syndrome (SIRS)

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Session: 236. Healthcare Epidemiology: Epidemiologic Methods
Saturday, October 6, 2018: 12:30 PM

Background. The definition of sepsis evolves with improved understanding of the pathophysiology, but the presence of infection remains essential for the diagnosis. Despite this fact, there are currently no universal objective definitions for infections, which increases the variability in sepsis diagnoses. This variation makes interpretation of diagnostic studies, therapeutic interventions, and prognostic tools challenging. In this study, we compared physician adjudication of infection to standardized definitions of infection in patients meeting two of four Systemic Inflammatory Response Syndrome (SIRS) criteria.

Methods. In a prospective observational study performed in two academic medical centers, patients with two of four SIRS criteria were enrolled in Emergency Departments from February 2016 to December 2016. Diagnostic and physiologic data were abstracted for 151 patients at admission. Each medical record was independently reviewed by one Emergency Medicine and one critical care (CC) physician from a 10-member adjudicating committee to determine the presence of infection. In the case of disagreement, a third CC physician served as the tiebreaker. Objective definitions of infection were derived from consensus surveillance definitions.

Results. Overall, both adjudicators and the objective definitions agreed on the presence of infection 93% of the time and on the absence of infection 82.7% of the time. Of the patients adjudicated as indeterminate or not infected, eight and 13 met one objective definition of infection, respectively. The greatest discordance between physician adjudicated infection and objective definitions occurred in pneumonia patients (Table 1).

| Objective definition of infection | Infected | Indeterminate | Not infected |
|----------------------------------|----------|---------------|-------------|
| Not infected                      | 4        | 11            | 62          |
| Infected (Pneumonia)             | 53       | 8 (5)         | 13 (4)      |
| Total                            | 57       | 19            | 75          |

Conclusion. Implicit to the definition of sepsis is the presence of infection. Therefore, standardized methods of defining infections are necessary to decrease the variability in diagnoses and allow comparability among clinical trials. The application of objective definitions could prove to be a reproducible and reliable foundation for use by clinical investigators.

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2152. Epidemiology and Clinical Outcomes of Contemporary, Third-Generation Left Ventricular Assist Device (LVAD) Infections

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Session: 236. Healthcare Epidemiology: Epidemiologic Methods
Saturday, October 6, 2018: 12:30 PM

Background. Infection is a common complication following implantation of an LVAD. The purpose of this study was to characterize the epidemiology and clinical outcomes of infections in patients who received the HeartWare LVAD, a newer intra- percutaneous device.

Methods. Adults patients with a HeartWare LVAD implanted between 2009 and 2017 at Michigan Medicine were screened for inclusion. LVAD-associated infection was defined using INTERMACS criteria. Patients were followed from device implantation to either infection, death, heart transplantation, device exchange, or last known follow-up to death. Exclusions included implantation of a right-sided VAD, alone or in combination with an LVAD. The primary outcomes were the incidence of LVAD-associated infections per 1,000 device days and per 100 person-years.

Results. Of the 183 patients included, 43 (23.5%) developed an LVAD-associated infection with incidence rates of 0.39 infections per 1,000 device days and 14.3 infections per 100 patient years. The median time to infection was 305 days (IQR, 172–581). Staphylococcus spp. (26%) and Streptococcus spp. (20%) were the most commonly causative pathogens identified. The results of a univariate analysis of each infection are shown in Figure 1. There were no statistically significant differences in all-cause mortality (40% vs. 17%, P = 0.08) and incidence of heart transplantation (19% vs. 34%, P = 0.09) between those with infection and those without infection; the number of hospital readmissions were more common in patients with infection (median, 4 vs. 2, P < 0.01).

Conclusion. LVAD-associated infection remains a major complication among recipients of the HeartWare LVAD, with about one-quarter of patients developing infection over time despite improved device design. Infection contributes to the increased hospitalizations seen in this population.

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2153. Impact of Norovirus Testing Changes on Hospital-Acquired Norovirus Infections

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Session: 236. Healthcare Epidemiology: Epidemiologic Methods
Saturday, October 6, 2018: 12:30 PM

Background. Norovirus is highly contagious and can spread rapidly through healthcare facilities. Controlling transmission of norovirus infections can be challenging. Early diagnosis allows for infection prevention measures to be implemented in a timely manner. The objective of this study was to determine the effect of decreasing barriers to norovirus testing on hospital-acquired (HA) cases.

Methods. A before-after study was conducted evaluating the impact of increasing the availability of norovirus testing on HA infections. From January 1, 2012 to October 16, 2017, all norovirus tests required the approval from the laboratory medicine resident, and testing was performed once a day. A polymerase chain reaction (PCR) system that required a two-step process was used. On October 17, 2017, the laboratory began using a PCR that performs testing in one step, allowing the laboratory to perform testing more frequently. Approval of the laboratory medicine resident was no longer required. HA norovirus rates and percent of positive test pre and post-implementation were compared using chi-square analysis. HA cases were defined as patients admitted without signs or symptoms of norovirus infection on inpatient units. A Mann–Whitney U test was used to compare the average of HA infections per cluster pre and post-implementation. A cluster was defined as two or more associated cases. No other infection prevention interventions were implemented during this time frame.

Results. After implementation of the new testing methodology, there was no difference in percent of positive norovirus test between the study periods [9.4% (46/487) pre-implementation vs. 6.9% (11/160) post-implementation, P = 0.16]. The proportion of norovirus infections that were HA increased slightly after implementation [37% (17/46) pre-implementation vs. 55% (6/11) post-implementation, P = 0.16]. There was no difference in HA norovirus infections associated with a cluster between the study periods (3.6 cases/cluster pre-intervention vs. 2.5 cases/cluster post-intervention, P = 0.86).

Conclusion. There was no significant difference in the number of HA norovirus cases with improved testing availability. A limitation to this study is the short length of the post-implementation evaluation period compared with the pre-implementation period.

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2154. How Well Are We Estimating the True Burden of Acute Gastroenteritis?

Validation of Acute Gastroenteritis-Related ICD Codes in Pediatric and Adult U.S. Populations

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Session: 236. Healthcare Epidemiology: Epidemiologic Methods Saturday, October 6, 2018: 12:30 PM

Background. International Classification of Diseases (ICD) diagnostic codes from acute gastroenteritis (AGE)–associated medical encounters are used for AGE disease burden estimates, yet the validity of AGE-related ICD codes in both pediatric and adult populations is unknown. We estimated the validity of AGE-related diagnostic codes in these populations using two different multi-regional AGE active surveillance platforms.

Methods. Diagnostic codes, demographic and clinical characteristics, and stool pathogen results from AGE–associated medical encounters were obtained for enrolled children <5 years old from seven sites in NVSN from December 1, 2011 to June 30, 2016, and for adult Veterans in four sites from SUPEROVA from December 1, 2016 to February 28, 2018. SUPEROVA also enrolled age– and time–matched non–AGE controls. Using AGE cases from the active surveillance networks, sensitivity and specificity of AGE ICD codes were estimated overall and stratified by age and health care setting using exact binomial tests.

Results. ICD codes were collected from 14,952 enrolled children <5 years old with AGE, and 625 enrolled adults (525 AGE cases and 100 controls). The sensitivity of all-cause AGE codes in children was 54% (95% CI 51–57%), whereas in adults was 54% (283/525; 95% CI 50–58%), with a specificity of 100% (100/100; 95% CI 97–100%). Stratified analyses demonstrated higher sensitivity of all-cause AGE codes in children in the inpatient as compared with outpatient setting: 59% (417/714; 95% CI 57–61%) vs. 53% (934/1827; 95% CI 52–54%). In adults, this trend was reversed; all-cause AGE codes had a higher sensitivity in the outpatient as compared with the inpatient setting: 72% (50/69; 95% CI 60–83%), vs. 51% (233/456; 95% CI 46–56%), respectively.

Conclusion. Across two different AGE active surveillance platforms, one enrolling only children and one enrolling only adults, the estimated sensitivity of all-cause AGE ICD codes were similarly low. This suggests that current national estimates for AGE disease burden may be underestimating the true burden of AGE pathogens in the United States, and emphasizes the importance of active, prospective surveillance.

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2155. Elevated Temperature Results in Earlier Diagnosis of Infectious and Inflammatory Postoperative Complications

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Session: 236. Healthcare Epidemiology: Epidemiologic Methods Saturday, October 6, 2018: 12:30 PM

Background. Medical students are taught that wind, water and wound complications occur at specific post-operative times. This may influence the timing of work-up for specific complications. The goal of this study was to investigate the relationships between post-operative temperature curve and time to diagnosis of inflammatory complications.

Methods. We reviewed patients who underwent pancreatectomy at an academic health system from January 2015–February 2018. Clinical data including complications were extracted using definitions set by the National Surgical Quality Improvement Program and temperature was extracted from the Data Warehouse. Improvement Program and temperature was extracted from the Data Warehouse. Diagnostic codes, demographic and clinical characteristics, and stool pathogen results from AGE–associated medical encounters were obtained for enrolled patients in different racial/ethnic groups were compared using a logistic regression model adjusted for age and sex. Outcomes in multiple categories were reviewed—primary risk factors for limb loss (e.g., diabetes mellitus and peripheral vascular disease), secondary risk factors for limb loss (e.g., osteomyelitis and multiple musculoskeletal infection types), and outcomes or complications of infection (e.g., sepsis, antibiotic use, and amputation). Preliminary cyclical visualization tools were used to demonstrate differences in health outcomes across racial/ethnic groups.

Results. Although significantly younger than other members of the cohort, American Indian/Alaskan Native patients (17.7% of cohort) had high odds of primary and secondary risk factors yet low odds of amputation. Hispanic patients (40.2% of cohort) tended to have high odds of primary and secondary factors as well as amputation. Black non-Hispanic patients (2.6% of cohort) had high odds of primary risk factors and low odds of osteomyelitis, yet Black non-Hispanic patients were most likely to undergo an amputation. Initial cyclical visualization techniques showed promise for comparing the relative distribution of racial/ethnic disparities across the clinical course.

Conclusion. Health disparities encountered by patients with serious musculoskeletal infections may be studied using a process-based approach. Future development of cyclical continuum modeling methods should focus on applications of both relative and absolute epidemiological measures and cyclical visualization methods.

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