Abstract:

Leveraging Electronic Medical Records in the Surveillance of Surgical Site Infections in a Total Joint Replacement Population

Background:

The surveillance of Surgical Site Infections (SSI) in the total joint replacement (TJR) population is a challenging task. Historically, surveillance has been performed via chart review, which is labor-intensive and can result in a large population of TJR charts. Chart review burden was also evaluated. Using ICD-9 coding and other standardized indicators of infection, procedures related to infections, and wound reported complications captured at the point of care, we implemented an electronic surveillance system during the study period. The process of deciding whether flagged SSI cases are true positives involves chart review, CDC/NHSN guidelines for superficial and deep surgical site infections within our system.

Methods:

Between 01/06 and 12/08 there were 4173 TJR procedures performed at this organization. 1308 (31.3%) were primary THA, 1513 (32.8%) were revision THA, 370 (8.3%) were THRs, and 1793 (4.2%) were revision THRs. The overall confirmed SSI rate for this population was 1.07% (40/3745). 0.06% (4/609) had a primary THA and 0.09% (1/1124) had a revision THA. Revision procedures had the highest rate of infection, 2.8% (8/284) for THR and 1.9% (1/52) for THA. Primavera THRs had the lowest rate at 1.4% (1/71) followed by revision THRs (1.0% (1/102)). Using the combined screening algorithm (including all the different indicator components) 403 cases (0.95) out of the 4173 procedures identified were flagged for review by the clinical content experts. The reduced volume of ICF chart review by 5021 charts over the course of 5 years. Of the 4011 charts reviewed, 461 (11.5%) were positive for SSI. ThePipe method supported by this hybrid algorithm in combination with the surveillance. Laboratory test screening were found to be reliable and analytic prescription generally decreased the sensitivity of our algorithm as shown in other studies. A limitation of this algorithm is the misclassification of at least 10 cases as fake negative. We investigated the reasons for the misclassification of these cases and found that two cases had been incorrectly because the infection reporting occurred during the hospital stay. Seven cases were screened for at least once and the method had been used for procedure like draining, manipulation under anesthesia, or the time frame of our algorithm had been violated. The total case, had a superficial infection, was determined from the data from a known surgery facility where the patient received post-operative and its data source was not used by our algorithm.

Conclusion:

The hybrid algorithm presented in this study decreased the number of charts that are reviewed by our institution's ICF for TJR SSI surveillance by 95.6%. This efficiency and effectiveness with a high specificity of 97% and 97% respectively. This algorithm assures the reviewed SSI cases are not overlooked. This study shows that the algorithmic structure created for SSI compared to the previous surveillance methodology. The hybrid algorithm is a unique approach, which we believe that the surveillance system can be used by institutions.

The infection indicator of the algorithm with the highest sensitivity (8.4%) and PPV of 77% were whether the patient had any hospital stay, the inclusion of any visit to the emergency room, urgent, urgent care, urgent care, or inpatient setting. Cellulitis and stitch abscess reported to the registry were the indicators with the lowest sensitivity. Both the PPV (9.9%) and PPV (9.6%) respectively. Specificity was consistently high for all infection indicators in the algorithm, ranging from 99% for wound diagnosis and deep infection to 100% for any hospital activity. Table I summarizes PPV, NPV, specificity and sensitivity for each component of the algorithm. The hybrid algorithm in combination with the surveillance had a low sensitivity of 19.6%, but a high specificity of 99.2%. The infection indicator of the algorithm with the highest sensitivity (8.4%) and PPV of 77% were whether the patient had any hospital stay, the inclusion of any visit to the emergency room, urgent, urgent care, urgent care, or inpatient setting. Cellulitis and stitch abscess reported to the registry were the indicators with the lowest sensitivity. Both the PPV (9.9%) and PPV (9.6%) respectively. Specificity was consistently high for all infection indicators in the algorithm, ranging from 99% for wound diagnosis and deep infection to 100% for any hospital activity. Table I summarizes PPV, NPV, specificity and sensitivity for each component of the algorithm. The hybrid algorithm in combination with the surveillance had a low sensitivity of 19.6%, but a high specificity of 99.2%. The infection indicator of the algorithm with the highest sensitivity (8.4%) and PPV of 77% were whether the patient had any hospital stay, the inclusion of any visit to the emergency room, urgent, urgent care, urgent care, or inpatient setting. Cellulitis and stitch abscess reported to the registry were the indicators with the lowest sensitivity. Both the PPV (9.9%) and PPV (9.6%) respectively. Specificity was consistently high for all infection indicators in the algorithm, ranging from 99% for wound diagnosis and deep infection to 100% for any hospital activity. Table I summarizes PPV, NPV, specificity and sensitivity for each component of the algorithm. The hybrid algorithm in combination with the surveillance had a low sensitivity of 19.6%, but a high specificity of 99.2%.

Discussions: