Editorial

Surveillance for Surgical-Site Infections: It's Getting Better All the Time

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You've got to admit it's getting better, it's getting better all the time.—John Lennon and Paul McCartney

In this issue of *Infection Control and Hospital Epidemiology,* two groups of authors present strategies for important aspects of surveillance of surgical-site infections (SSIs): case finding and data interpretation. Sands et al. describe the use of health plan data for identifying cases of SSI and compare this with the standard hospital-based surveillance programs.[1] Monge Jodra et al. describe the use of the standardized infection ratio (SIR) for interpretation of SSI rates for three common surgical procedures reported to the Spanish nosocomial infection surveillance network (VICONOS).[2]

Sands et al. expand on their previously published reports on the use of the Harvard Pilgrim Health Care claims and information systems to identify SSIs, particularly during the postdischarge period.[3,4] In this article, they test the sensitivity of this previously described method and compare it with usual surveillance activities at five different hospitals for identifying both inpatient and postdischarge diagnoses of SSIs after coronary artery bypass graft (CABG) procedures. They report an overall significantly increased sensitivity of the health plan data (71.8%) compared with hospital-based surveillance (49.7%). This is an impressive difference, especially considering that the screening algorithm of the health plan data generated only 388 charts for review, compared with prospective surveillance of the 1,352 CABG procedures that occurred during the study period.

The two methods, however, appear to be approximately equal for identifying infections that occur before discharge (54% with hospital-based surveillance vs 58% with health plan data), although only 14% of all of the identified infections occurred before hospital discharge. The difference in sensitivity appears to be largely driven by the large differences in detection of SSIs after discharge (42% with inpatient surveillance vs 99% with health plan data). This high rate of detection of postdischarge infections is remarkable. The methods used by the hospitals for postdischarge surveillance, if any, were not specified. Additionally, for one hospital (hospital E in the table), the hospital surveillance detected no infections at all, raising questions about the adequacy of surveillance measures for that facility. The inclusion of this facility with its low sensitivity of hospital-based surveillance may have biased the results toward an increased difference.

The authors recommend further exploration of the use of these types of data for SSI surveillance, which is definitely worthwhile. The more limited number of charts to review is a huge benefit in terms of time saved for overburdened infection control specialists. However, some caveats do exist, several of which the authors acknowledge. The development of the algorithm used to generate the infection probability score, as described in a previous article,[3] is not trivial. Not all areas in the United States have as significant levels of health maintenance organization penetration or the dominance of one particular health plan that made this kind of method so useful in Boston. Additionally, for two of the five hospitals (hospitals B and C), the sensitivity of the hospital-based surveillance was actually better than that of the health plan data. Whether more infections in these hospitals develop prior to discharge or whether one of these hospitals was the one that also used automated screening of inpatient antibiotic exposure is not stated. For those two facilities, a switch to health plan data screening would decrease their ability to find cases of SSI. The suggestion of augmenting traditional methods with health plan data methods is perhaps the most intriguing for although there was significant overlap between the two methods, according to the figure, each method identified several infections missed by the other method. The use of health

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plan data would almost certainly increase most hospitals' ability to detect infections developing after discharge. This article is a valuable addition to the ongoing assessment of the use of these types of data for surveillance purposes.

Monge Jodra et al. describe the use of the SIR to benchmark their SSI rates to SSI rates reported by the Centers for Disease Control and Prevention National Nosocomial Infections Surveillance (NNIS) System. The VICONOS network in Spain is similar to the NNIS System network in the United States, with 43 participating Spanish hospitals, all with more than 250 beds, who use Centers for Disease Control and Prevention definitions to report their SSI rates. In addition to reporting number of infections and number of procedures, each participating hospital also reports multiple other factors, including patient age and gender, American Society of Anesthesiologists risk category, whether surgery was elective or emergent, antibiotic prophylaxis given, wound classification, infecting microorganism, treatment, and surgical team. To perform the SIR calculations, the authors used data from the three most commonly reported surgical procedures: cholecystectomy, herniorrhaphy, and appendectomy. The SIR was calculated, as described by Gustafson in 2000, as a ratio of observed infections to expected infections.[5] To generate the denominator, for each procedure and NNIS System risk category, the number of operations performed was multiplied by the infection rate reported by the NNIS System for that operation, for that risk category. The numbers obtained for each risk category were added together to achieve a single SIR for each procedure, now adjusted for risk category.

Gustafson stated in his 2000 article that there were several advantages to using the SIR: (1) it adjusts for known variations in patient risk levels; and (2) any reported standard could be used as a benchmark.[5] In the article by Monge Jodra et al., the authors already have a national system for benchmarking individual hospitals within the country (VICONOS) but are using the SIR to benchmark Spanish SSI rates against U.S. rates as reported by the NNIS System. They found that benchmarking to the NNIS System for each risk category for each procedure was cumbersome and resulted in small numbers that were difficult to interpret. Using the SIR, they were able to generate a "global comparison" for each procedure. These comparisons revealed an elevated ratio for all three procedures. The SIR was 3.32 for cholecystectomies, 2.86 for appendectomies, and 1.64 for herniorrhaphies. The authors suggest several potential explanations for the elevated ratios at Spanish hospitals, including deficiencies in healthcare infrastructure, staff motivation to comply with antisepsis, staff awareness of the need to comply with antisepsis, presurgical preparation and technique, and antibiotic prophylaxis.

A recently published article reported the use of the SIR to benchmark a Thai hospital's nosocomial infection rates to NNIS System rates for multiple nosocomial infections.[6] Elevated ratios were found for SSIs (2.3) and urinary tract infections (2.1), but ratios approximating 1 were found for catheter-associated bacteremias (1.1) and ventilator-associated pneumonias (0.8). Those authors also stressed the utility of being able to make a single comparison of rates, adjusted for risk category, instead of multiple comparisons specific to procedure and risk category with smaller numbers.

The third advantage to using the SIR is that it allows pooling of data to achieve adequate monthly or quarterly numbers to use for denominators for tracking trends over time. One of the other goals stated by Monge Jodra et al. was to analyze their SSI rates by quarter to better assess trends over time, while adjusting for changes in patient acuity during the same time frame. Interestingly, the SSI rate and the SIR gave fairly similar trend results for both cholecystectomy and herniorrhaphy, implying a fairly stable risk category distribution during this time period for those procedures. For appendectomies, however, the SSI rate rose out of proportion to the SIR, suggesting more variability in risk category distribution among those patients. Use of the SIR for trend surveillance could prevent overreaction to an elevation in the SSI rate that might be reflecting an increased prevalence of patients in higher risk categories during that time. For procedures for which the SSI rate closely approximates the SIR, using the more simply calculated SSI rate might be sufficient. Gustafson, however, found that using the SIR to develop specific types of control charts identified special cause rate variations with greater sensitivity and distinguished them from common or natural cause variation with greater specificity.[5] It is also worth reiterating that the process control charts generated for a specific procedure using the SIR are not meant for continuous comparison with NNIS System rates, but are an assessment of local trends. The control limits on the process control charts are derived from the local facility's own historical data, and are not a marker of the degree of deviation from the NNIS System benchmark.

Both of these interesting articles highlight ongoing efforts to improve infection control surveillance. Sands et al. demonstrate continued commitment to streamlining, automating, and simultaneously enhancing the surveillance process to improve case finding. Monge Jodra et al. are putting innovative methods to work to interpret the surveillance data they have, through international benchmarking and risk-adjusted trend analysis.

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