Measures to avoid these infections include screening of windows and monitoring and controlling *Aedes* breeding sites.

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## Utility of the Central Venous Catheter-Related Bloodstream Infection Patient Safety Indicator

Central-line–associated bloodstream infections (CLABSIs) are important causes of morbidity and mortality, and public reporting of these infections is mandated.[1] The National Healthcare Safety Network (NHSN) CLABSI metric requires relatively labor-intense surveillance for identifying cases. The Agency for Health Research Quality (AHRQ) has developed the central venous catheter (CVC)–related bloodstream infection patient safety indicator (PSI 07), which uses administrative data based on the *International Classification of Disease, 9th Revision* (ICD-9).[2] The PSIs were developed to screen for problems that patients experience as a result of exposure to the healthcare system and that are likely amenable to prevention by changes at the system or provider level.[3]

The NHSN approach to CLABSI employs active surveillance with standardized definitions by infection preventionists.[4] This method of identifying healthcare-associated infections (HAIs) has been considered the gold standard for hospital surveillance,[4] and few studies have validated metrics utilizing administrative data for HAIs.[3,5–7]

The purpose of this study was to determine the utility of the CVC-related bloodstream infection metric as a proxy for the NHSN CLABSI metric. The University of Iowa Hospitals and Clinics (UIHC) is a 732-bed, tertiary-care, teaching hospital. All cases of patients with the AHRQ CVC-related bloodstream infection PSI 07[2] were retrieved from the Vizient (formerly University HealthSystem Consortium) database for the time period January 1, 2015 through December 31, 2015. CLABSI cases were identified via NHSN surveillance[3] for the same time period. Because the AHRQ metric (ie, PSI 07)[2] excludes patients with an immunocompromised state, underlying malignancy and those <18 years old, in a second analysis we excluded NHSN CLABSI cases with those criteria to allow for
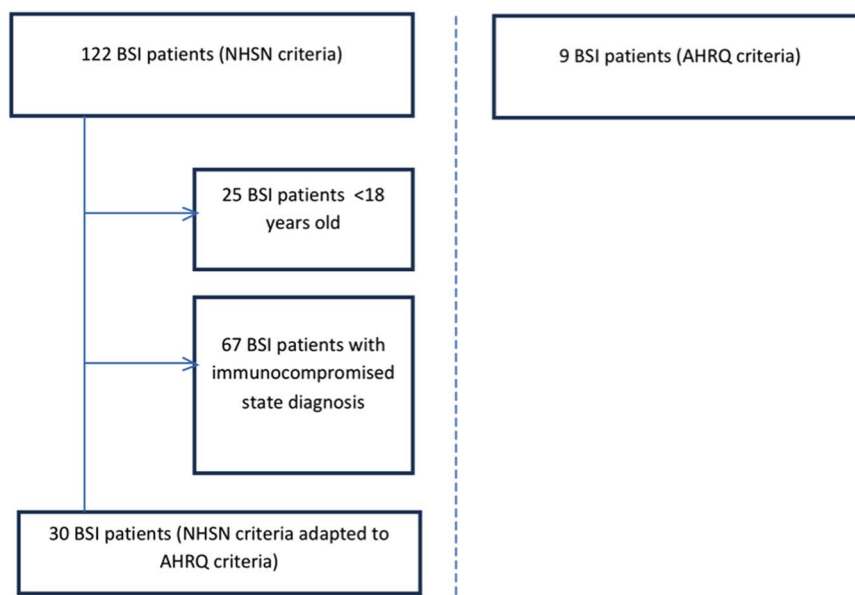
FIGURE 1. Case findings using National Health Safety Network (NHSN) and Agency for Healthcare and Research Quality (AHRQ) criteria.

direct comparison. Rates of infection derived using both methods were then compared using the same denominator (surgical and medical discharges). Using NHSN as the gold standard, sensitivity of the AHRQ metric was calculated. The correlation between metrics was assessed using Fisher's exact test when appropriate.

We identified 122 CLABSI cases using the NHSN criteria. For the same time period, only 9 cases had CVC-related bloodstream infection according to AHRQ criteria. Of these 9 AHRQ cases, 8 (88.9%) were detected via NHSN criteria; the discordant case was reviewed, and we confirmed that it did not meet NHSN criteria. The sensitivity of the AHRQ metric to identify CLABSI was 6.6% (95% confidence interval [CI], 3.4%–12.4%). Excluding CLABSI cases with an immunocompromised state diagnosis and underlying malignancy (N = 67) and patients <18 years old (N = 25), the number of CLABSI cases was reduced to 30 (Figure 1). With these exclusions to allow for a more direct comparison of the 2 metrics, the sensitivity of the AHRQ metric to detect CLABSI improved to 26.7% (95% CI, 14.2%–44.4%).

There were 15,576 surgical and medical discharges during the 2015 calendar year. Bloodstream infection rates were 1.93 CLABSIs per 1,000 discharges (adjusted to exclude the same populations as the AHRQ metric) and 0.58 CVC-related bloodstream infections per 1,000 discharges. The proportion of adjusted CLABSI cases identified by the AHRQ metric was not different based on geographic site of infection. Patients in the intensive care unit (ICU) comprised 36.4% of cases identified and non-ICU patients comprised 21.1% of cases identified (P = .42).

The NHSN and AHRQ metrics have different definitions and consequently produce different results. We do not recommend replacing the NSHN CLABSI metric with the AHQR PSI metric to measure healthcare-associated bloodstream infections due to CVCs. However, both are being used in similar ways to meet legislated mandates for reporting HAIs.[3]

Surveillance systems that link administrative and patient care data from hospital settings are increasingly prevalent and have been used to perform automated, integrated surveillance.[8] However, administrative data have been criticized for lack of accuracy and completeness of diagnosis codes. Previous studies have found that ICD-9 codes and other hospital administrative data did not accurately identify patients that had a CVC inserted.[3,8] This may explain why we have so few AHRQ CLABSI cases and only 8 concordant cases, representing 6.5% of the total NHSN CLABSIs (122 cases). One difference is that the AHRQ quality indicator excludes cases with age <18 years old and an immunocompromised state or underlying cancer.[2] Immunocompromised conditions are increasingly prevalent considering the severity of illness and length of stay of our patients. In addition, the AHRQ PSI indicator excludes a large number of clinical conditions that occur in patients with severe illnesses (eg, pancytopenia, chronic kidney diseases, postoperative intestinal absorption problems, and the need for total parenteral nutrition). These are clinical situations in which vulnerability to acquire BSI is increased, and these cases need to be prevented and reported. In contrast to our results, other researchers have found that coding data overreported BSIs by 3- to 4-fold compared with NHSN surveillance.[5]

The limitations of this study are that it was performed in a single medical center and we did not review the negative cases via either method; we also assumed that traditional surveillance (NHSN) is the gold standard and is a valid surveillance

method. Therefore, it was not possible to calculate specificity because our aim was to compare only NHSN and AHRQ CLABSI cases.

In summary, we found that the AHRQ PSI has a very low sensitivity for detecting CLABSI cases, producing an infection rate that is less than one-third that determined using NHSN methodology. Administrative coding for this HAI is not a good tool for widespread use as a surveillance method.

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