

Variability of Surveillance Practices for Central Line–Associated Bloodstream Infections and Its Implications for Health Care Reform

Central line–associated bloodstream infections (CLABSIs) are health care–associated infections (HAIs) that occur in an estimated 250,000 to 500,000 patients annually in the United States,¹ have a 10%–30% mortality rate, and burden the health care system with an additional \$300 million to \$2.3 billion a year.² Because of the great danger CLABSIs pose to patients and because they are in large part preventable, health care organizations should be vigilant about performing surveillance to prevent CLABSIs. Despite the presence of a standardized definition for CLABSI, surveillance is not always a clear-cut process, and this complication has important implications in today's world of health care reform.

Payment Implications of CLABSI Surveillance Practices

CLABSIs are defined based on a laboratory confirmation of infection using the Centers for Disease Control and Prevention's (CDC) National Healthcare Safety Network (NHSN). Sidebar 1 on page 7 describes the NHSN's surveillance definition for CLABSI.

In the August 2010 Hospital Inpatient Prospective Payment System (IPPS) final rule, a new HAI measure was added for CLABSI rates in intensive care units (ICUs) and high-risk nurseries beginning with January 1, 2011, discharges for Fiscal Year 2013 payment determination. Furthermore, hospitals will be required to use the CDC's NHSN as the mechanism to submit CLABSI data. It is important

Joint Commission Requirements

IC.02.01.01, EP 1: The organization implements its infection prevention and control activities, including surveillance, to minimize, reduce, or eliminate the risk of infection.

NPSG.07.04.01, EP 5: Provide central line–associated bloodstream infection rate data and prevention outcome measures to key stakeholders, including leaders, licensed independent practitioners, nursing staff, and other clinicians.

to note that two hospital-acquired conditions (HACs) address HAIs, but they are not the same measures: HACs are calculated using Medicare claims-based data, and HAI measures for CLABSI are collected through the NHSN. (See the article on page 4 for additional information on HACs.)

Hospitals that have not submitted data using the NHSN as the mechanism to submit data will be subjected to a reduction in their Medicare inpatient annual payment update beginning Fiscal Year 2013. "This type of financial incentive, while helpful in moving hospitals toward prevention efforts, can also have unintended consequences of encouraging underreporting of infections," says Michael Lin, M.D., M.P.H., assistant professor, Rush University Medical Center, Chicago.

Matthew Niedner, M.D., medical director, Pediatric Intensive Care Unit and assistant professor of pediatrics, University of Michigan Medical Center, Mott Children's Hospital, Ann Arbor, Michigan, concurs. "If you're a quality improvement specialist, you'll want aggressive surveillance to find all of the defects and eradicate them," Niedner says. "But if results are attached to mandatory public reporting, public reputation, and economic incentives, then you'll want to omit any borderline cases. Wiggle room in the CDC's definition can put hospitals and improvement means at odds regarding how to use this metric. But if we don't use some kind of metric, there will be no accountability, and no one will work to make it better."

Variations in CLABSI Surveillance Practices

Although the NHSN developed a standardized surveillance definition for CLABSI, several research studies have discovered variability in surveillance practices among individual practitioners. These studies have shown that when blood cultures and medical data are reviewed by different infection preventionists or other experts, significant disagreement can exist. Disagreement can occur because although there are some objective aspects to classifying the presence of CLABSIs (for example: Was there a central line present? Was there a positive blood culture?), there are also subjective aspects that rely on clinical judgment (for example, deciding whether the bloodstream infection resulted from the central line or another source).

Recently, additional studies have documented this same phenomenon at the institutional level; that is, significant variability in diagnosing CLABSI occurs among institutions.^{3,4} Lin et al.⁴ conducted a study at 20 ICUs across 4 medical centers to see how infection preventionists used the NHSN surveillance definition to diagnose CLABSIs. A validated computer algorithm that used the same NHSN criteria (the code is available at <http://bsi.cchil.org>) was then retrospectively applied to the same clinical data using electronic medical records.

The results were surprising: The correlation between infection preventionists and the computer algorithm in identifying CLABSIs was weak ($\rho = 0.34$). When the data are stratified using a linear regression model according to the various medical centers, significant variation in how the institutions applied the NHSN CLABSI surveillance definition was documented, with each organization varying to differing degrees from the computer algorithm in their CLABSI rates. For example, the medical center that calculated the lowest CLABSI rate using traditional surveillance methods had the highest rate when the computer algorithm was used. “We found significant variation in correlation between the two methods, which was unexpected, suggesting that different institutions may be inconsistently performing CLABSI infection surveillance,” says Lin.

Niedner also investigated variability in CLABSI surveillance practices.³ His study employed surveys to gather data on staff knowledge of CLABSI best practices and surveillance strategies at 16 pediatric intensive care units from 14 institutions. The study uncovered the following variations in CLABSI surveillance practices among the facilities:

- Defining central lines according to the NHSN criteria

Sidebar 1. NHSN Surveillance Definition for CLABSI

The NHSN defines a bloodstream infection based on laboratory confirmation of infection. A laboratory-confirmed bloodstream infection is diagnosed if the patient meets at least one of the following three criteria. The first two criteria may be used for patients of any age.

Criterion 1. Recognized pathogen is cultured from one or more blood cultures, and cultured organism is not related to an infection at another site.

Criterion 2. Clinical signs or symptoms include the following:

- Fever $> 100.4^{\circ}$ F ($> 38^{\circ}$ C), chills, or hypotension, and
- Signs and symptoms and positive laboratory results are not related to an infection at another site, and
- A common skin contaminant is cultured from two or more blood cultures drawn on separate occasions.

Criterion 3. For patients < 1 year of age:

- The child has at least one of the following signs or symptoms: fever $> 100.4^{\circ}$ F ($> 38^{\circ}$ C) rectal, hypothermia $< 98.6^{\circ}$ ($< 37^{\circ}$ C) rectal, apnea, or bradycardia, and
- Signs and symptoms and positive laboratory results are NOT related to an infection at another site, and
- Common skin contaminant is cultured from two or more blood cultures drawn on separate occasions.

Source: Centers for Disease Control and Prevention: *Central Line-Associated Bloodstream Infection (CLABSI) Event. Device-Associated Module, CLABSI*, Jun. 2010. http://www.cdc.gov/nhsn/PDFs/pscManual/4PSC_CLABScurrent.pdf (accessed Jan. 4, 2011).

- Calculating central-line days
- Having a standardized, written policy for defining CLABSIs
- Methods, timing, and resources for performing surveillance for CLABSIs

In addition, a surveillance aggressiveness score was developed to assess the relationship between surveillance practices and the rate of diagnosing CLABSIs. There was a strong relationship between the score and the rate of CLABSIs being reported (*see* Figure 1 on page 8), suggesting “that the harder one looks for CABSI [CLABSIs], the more likely they are to find them.”³ According to Niedner, “There has been a lot of consternation over the CDC’s

definition and the fidelity to which institutions apply it. While institutions are usually consistent with maintaining the CDC’s definition internally, that is not necessarily the case between institutions. Ideally, surveillance practices should be standardized.”

Proceeding with Caution

The variations in CLABSI surveillance practices documented by these research studies raise significant concerns about the usefulness of benchmarking CLABSI rates and comparing inter-institutional CLABSI rates.

Furthermore, these differences cast

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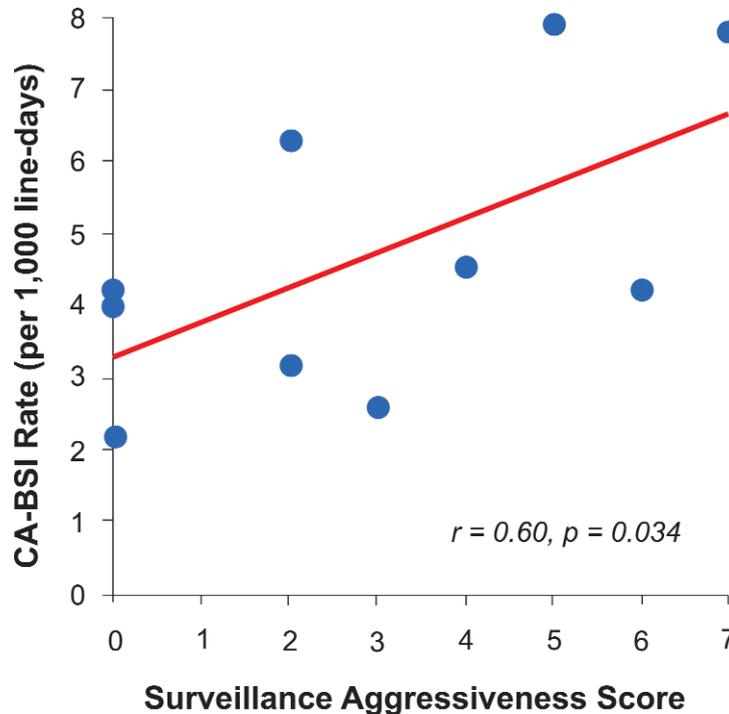
doubt on the validity of public reporting of infection rates and the financial incentives and penalties tied to these rates mandated by health care reform legislation.

According to Lin, “the CDC’s NHSN system (which is what hospitals used in our study) remains the best system for carrying out surveillance of infections. However, variability inherent in CLABSI surveillance means that hospital-to-hospital comparisons of CLABSI rates may need to be viewed with caution.” And regarding legislative mandates, Lin says, “The concept of using CLABSI rates for public reporting, ranking hospitals, and for hospital report cards is relatively recent and requires further validation. Performance measurement professionals who are tasked with comparing hospitals across systems or across regions need to understand the strengths and limitations of current infection measures such as CLABSI.”

Research under way will determine whether other types of metrics, which can be applied in an objective and potentially automated fashion, can serve as a superior metric for tracking hospital-acquired bloodstream infections, especially as interhospital comparisons become more important. Such automated metrics (computer algorithms, for example) would also allow infection preventionists to spend less time counting infections and more time preventing infections, Lin says.

Furthermore, it will be imperative for infection preventionists to standardize CLABSI surveillance best practices to facilitate benchmarking, inter-institutional comparisons, and public reporting, all of which have important financial tie-ins in the new era of health care reform. **B**

Figure 1. Relationship Between Surveillance Aggressiveness Score and CLABSI Rates



The graph shows a strong relationship between those units with more aggressive surveillance and higher rates of CLABSIs compared to units with less aggressive surveillance who reported lower rates of CLABSIs.

Source: Niedner M.F.: The harder you look, the more you find: Catheter-associated bloodstream infection surveillance variability. *Am J Infect Control* 38:585–595, Oct. 2010. Used with permission.

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Visit the **Benchmark** blog at <http://www.jcrinc.com/Blogs-All-By-Category/Benchmark-Blog/> for a copy of process and outcome surveillance measures to prevent CLABSI.