Health Care–Associated Bloodstream Infections: A Change in Thinking

It is not necessary to change. Survival is not mandatory.

—W. Edwards Deming

Nosocomial, or hospital-acquired, bloodstream infections (BSIs) are an important cause of morbidity and mortality, affecting more than 200 000 patients per year in the United States (1). These infections are often associated with the use of catheters. Catheter-related infections make up about 14% of all hospital-acquired infections (2) and are responsible for more hospital days and death than any other hospital-acquired infection (3). Bloodstream infections can be primary or secondary. A primary infection is an infection directly into the vascular system; a secondary infection originates at a site other than the vascular system, such as the urinary tract, respiratory tract, or wounds, and spreads to the vascular system. According to the definitions from the Centers for Disease Control and Prevention (CDC) National Nosocomial Infection Surveillance (NNIS) System, primary BSIs account for 64% of nosocomial BSIs (2, 4).

“Nosocomial,” “community-acquired,” “bloodstream infections,” and “primary/secondary” are surveillance terms that have stood, essentially unaltered, for almost two decades (4). Yet the health care system has been anything but static during this period. Routine care for patients with serious underlying illnesses and with invasive devices, such as intravascular catheters, has shifted from exclusively acute care settings to nursing homes, rehabilitation centers, free-standing dialysis centers, and homes. Complications of caring for patients with serious illness occur in all of these settings.

In this issue, Friedman and colleagues propose a new classification scheme for BSIs (5). This scheme does not change the fundamental classification of what we call BSIs. It only changes the number of categories of BSIs from two (nosocomial and community-acquired) to three (nosocomial, health care–associated, and community-acquired). Clinicians have recognized that the pathogens and pathogenesis of nosocomial BSIs (for example, those resulting from complications related to placement of an intravenous catheter) and community-acquired BSIs (that is, those not related to a complication from a medical device or procedure) differ. The authors take issue with the term “community-acquired,” stating that it is too broad and no longer useful in the new world of serious illness in diverse venues.

The authors reviewed daily microbiology laboratory reports from adults in three hospitals. After excluding patients with contaminated blood cultures, the authors classified patients with BSIs into one of the three new categories. A nosocomial BSI was an infection from patients hospitalized 48 hours or longer. A health care–associated BSI was an infection from a patient who had recent contact with some aspect of health care, such as intravenous therapy via a home health care agency, residence in a nursing home, recent hospitalization, or dialysis. A community-acquired BSI was an infection in a patient with no discernible recent contact with the health care community. After the authors classified the BSIs, they used the CDC definitions to classify whether each patient had a primary or secondary BSI; they then performed a descriptive analysis of the patients.

The authors found that patients with health care–associated BSIs are similar to patients with nosocomial BSIs but different from patients with community-acquired BSIs. On the surface, this distinction seems rather obvious. The invasive devices that might be associated with a BSI in a hospitalized patient are the same as or similar to those used in nonhospitalized patients; in addition, nonhospitalized patients often have the same comorbid factors. The authors’ important observation is that patients with health care–associated BSIs are similar to patients with hospital-acquired BSIs. Rather, it is that they are different from patients with community-acquired BSIs.

The frequency of bacteremia resulting from the use of intravascular devices and from gastrointestinal tract infection was similar in patients with health care–associated and nosocomial BSIs. The frequency of BSIs secondary to urinary tract infection was higher in patients with community-acquired BSIs than in patients with nosocomial and health care–associated BSIs. The pathogens also differed among these groups. Staphylococcus aureus was the most frequently isolated pathogen in health care–associated and nosocomial BSIs; Escherichia coli and Streptococcus pneumoniae were most frequently isolated in community-acquired BSIs. The authors assert that patients with suspected BSIs who have had recent contact with the health care community (health care–associated BSIs) should receive empirical treatment that is similar to the treatment of hospitalized patients with suspected BSIs.

These results should be viewed cautiously. First, the authors studied 504 patients, whereas an estimated 200 000 patients have BSIs annually in the United States. Although some of their findings may not apply to the population as a whole, their basic contribution—the distinction between a health care–associated and a community-acquired BSI—is likely to endure because it reflects fundamental changes in health care. Second, the authors did not measure the risk for health care–associated BSIs. They examined only patients with BSIs (the numerator in a calculation of risk) and did not attempt to determine the size of the population at risk for a health care–associated BSI (the denominator for a risk calculation).

Measuring the risk for BSI can be important for several reasons. It could identify the patients at highest risk for an event so that resources could be used more efficiently
for monitoring and intervention. For example, when compared with other hospitalized patients, those patients in critical care areas are disproportionately at risk for BSIs and other nosocomial infections, largely as a result of their exposure to invasive devices (6). Measuring the risk for health care–associated BSI could also be the first step in setting benchmarks of expected performance to avoid BSIs. Benchmarking has resulted in substantial reductions in the rate of BSIs in intensive care units in the NNIS System (7). Benchmarking for health care–associated BSIs, particularly with home health care agencies that provide intravenous therapy in the home, would be an important step toward improving community-based care of serious illness.

Monitoring for BSIs will be more difficult in communities than in hospitals, where it is relatively easy to determine the denominator for a risk calculation. Friedman and colleagues provide some guidance for defining the numerator for a health care–associated BSI rate. However, after patients leave the hospital, data collection for the denominator for a risk calculation becomes exceedingly difficult. An integrated electronic medical record across all venues of health care may eventually solve this problem (8).

As the care of serious illness shifts away from acute care facilities, other complications of care are likely to occur outside the hospital (9, 10). Therefore, the study by Friedman and colleagues should prompt efforts to find other possible adverse events associated with the care of serious illness in the community. Undoubtedly, events such as thrombotic complications, which we have learned to monitor and expect in the hospital setting, are occurring in patients in other settings. Quantifying these events in the community is an attractive target for research.

The study by Friedman and colleagues presents an important clinical message—that clinicians should reconsider therapy for patients with community-acquired BSIs if their recent care falls into the health care–associated category. Empirical treatment with antibiotics that are effective against the commonly isolated Staphylococcus species (often with oxacillin resistance) and not only E. coli or Streptococcus pneumoniae, which are more characteristic of community-acquired BSIs, should be selected. We must change our thinking such that we not only care for serious illness but also look at the setting in which that care is taking place.

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