CONCISE COMMUNICATION

Completeness of Methicillin-Resistant *Staphylococcus aureus* Bloodstream Infection Reporting From Outpatient Hemodialysis Facilities to the National Healthcare Safety Network, 2013

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Reports of bloodstream infections caused by methicillin-resistant *Staphylococcus aureus* among chronic hemodialysis patients to 2 Centers for Disease Control and Prevention surveillance systems (National Healthcare Safety Network Dialysis Event and Emerging Infections Program) were compared to evaluate completeness of reporting. Many methicillin-resistant *S. aureus* bloodstream infections identified in hospitals were not reported to National Healthcare Safety Network Dialysis Event.

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In 2012, the Centers for Medicare and Medicaid Services began to allocate reimbursement to outpatient dialysis facilities on the basis of participation in the Centers for Disease Control and Prevention's National Healthcare Safety Network Dialysis Event (NHSN DE) surveillance. These data will be used for performance measurement.[1] Measuring disease burden and publicly reporting performance metrics depend on accurate and complete data. By the end of 2013, more than 93% of all Medicare-certified hemodialysis facilities were reporting bloodstream infections (BSI) and other related events to NHSN. However, most hemodialysis facilities are new participants in NHSN. Therefore, we compared hemodialysis facility reporting to NHSN DE with data reported to Centers for Disease Control and Prevention's Emerging Infections Program (EIP), a longstanding public health network that served as the reference standard.

METHODS

The EIP has performed active, laboratory- and population-based surveillance for invasive methicillin-resistant *Staphylococcus aureus* (MRSA) infections in selected counties in California, Colorado, Connecticut, Georgia, Maryland, Minnesota, New York, Oregon, and Tennessee since 2005.[2,3] Invasive MRSA infection cases are defined by isolation of MRSA from normally sterile body sites in residents of the surveillance catchment area; trained personnel in each EIP site review case patients' medical records and collect clinical and demographic information, including whether the patient was receiving chronic hemodialysis at the time of the culture and the health-care setting in which the case-defining culture was obtained (eg, hospital, dialysis facility).[2,3]

Outpatient dialysis facility staff report several types of dialysis events among their hemodialysis patients to NHSN DE, including all positive blood cultures collected at the dialysis facility or at a hospital within 1 calendar day after admission (including antibiotic susceptibility data for the recovered organism if available) and outpatient starts of intravenous (IV) antimicrobials.[4] Limited clinical and demographic data are collected for each dialysis event.

We compared reporting of MRSA BSI among chronic hemodialysis patients to EIP and NHSN DE. EIP conducts active population-based surveillance through trained, dedicated surveillance staff, whereas NHSN's facility-based surveillance is performed by clinic staff with multiple duties. For EIP, we included all MRSA infection cases with positive blood cultures (ie, BSI) collected from chronic hemodialysis patients at an outpatient location or at a hospital within 1 calendar day after admission. For NHSN DE, we included all *S. aureus* positive blood cultures (ie, BSI) regardless of antimicrobial susceptibility results and IV vancomycin starts reported from outpatient hemodialysis facilities located within the EIP catchment areas. For this comparison, *S. aureus* positive blood cultures reported to NHSN were classified as MRSA BSI if the organism was reported as resistant to cefoxitin, oxacillin, or methicillin. From each system, data from 2013, the most recent full-year data available, were used.

Because there is no common patient identifier between the 2 systems, we assumed MRSA BSI events were the same reported in both systems if (1) the patient date of birth and sex reported to EIP and NHSN were identical; (2) the dialysis facility reporting the NHSN event was located within the site of the EIP BSI report; and (3) the event dates were no more than 5 days apart. If no match was found in NHSN, we then attempted to find and match any *S. aureus* BSI or IV vancomycin start in NHSN with MRSA BSI in EIP because those events might represent the same infection if susceptibility data or culture results were not available or were incorrectly entered into NHSN.

Data analysis was performed using SAS, version 9.3 (SAS Institute). The number of MRSA BSI from EIP that matched to MRSA BSI, other *S. aureus* BSI, and IV vancomycin starts from NHSN DE was determined.

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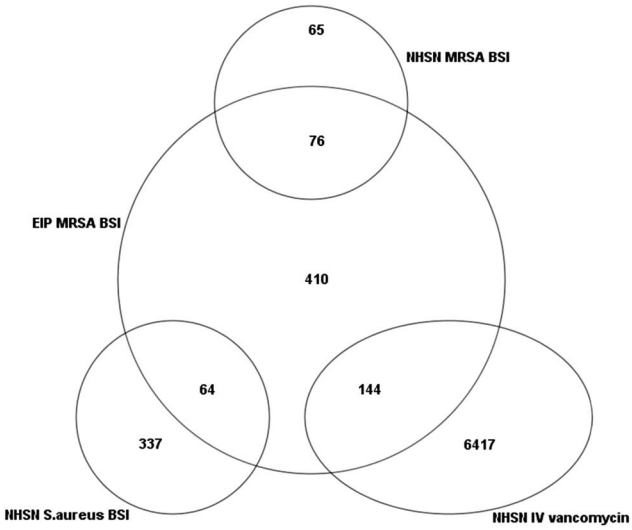

FIGURE 1. Comparison between methicillin-resistant *Staphylococcus aureus* (MRSA) bloodstream infections (BSI) in Emerging Infections Program (EIP) and National Healthcare Safety Network (NHSN) Dialysis Event Surveillance—matching result, 2013. IV, intravenous.

RESULTS

In 2013, EIP identified 694 MRSA BSI among chronic hemodialysis patients residing in the surveillance catchment area. During the same period, dialysis facilities within the EIP catchment areas reported a total of 9,943 dialysis events to NHSN, including 141 MRSA BSI, 401 other *S. aureus* BSI (145 [36%] without susceptibility data), and 6,561 IV vancomycin starts.

Only 76 (11%) of 694 MRSA BSI reported to EIP could be matched to a MRSA BSI reported to NHSN (Figure 1). An additional 64 EIP MRSA BSI matched an NHSN *S. aureus* BSI. Finally, among EIP MRSA BSI without a corresponding NHSN *S. aureus* BSI, 144 IV vancomycin starts from NHSN matched. Thus, 284 EIP MRSA BSI (41%) matched an NHSN event. In all, 759 distinct MRSA BSI were identified between both surveillance systems: 618 in EIP alone, 65 in NHSN alone, and 76 in both systems (Figure 1).

Among the 64 MRSA BSI from EIP that matched only non-MRSA *S. aureus* BSI from NHSN DE, 60 (94%) did not have any cefoxitin, oxacillin, or methicillin susceptibility data reported in NHSN. Among 410 MRSA BSI from EIP that had no matching BSI or IV vancomycin start in NHSN DE (Figure 1), 378 (92%) were identified from blood cultures collected outside the dialysis facility (345 at hospitals). Of the 65 MRSA BSI (9% of total) reported to NHSN and not to EIP, no data were available regarding where cultures were collected.

DISCUSSION

This comparison of early national reporting to NHSN shows that NHSN DE underestimated MRSA BSI burden among dialysis patients: 81% of cases were not reported as MRSA BSI to NHSN DE in 2013. Other studies have similarly found underreporting.[5,6] When criteria were broadened to include additional NHSN events (ie, *S. aureus* BSI and IV vancomycin starts), 410 MRSA BSI cases (59%) were still missing from NHSN DE data. A significant contributor to underreporting to NHSN DE appears to be BSI identified from blood cultures obtained in hospitals (at the start of a hospital admission) that are not systematically captured in NHSN DE.[6] Underreporting might occur because hospitals cannot directly report events to NHSN DE. Instead, they are expected to communicate to dialysis facilities who report these cases. Challenges in communication between hospitals and dialysis facilities are well recognized.[7] Another factor in underreporting was incomplete antibiotic susceptibility data in NHSN; most of the *S. aureus* BSI matches did not have susceptibility data reported. Potential reasons are that either susceptibility data were not communicated to dialysis facilities or available susceptibility data were not entered into NHSN. Notably, during 2013, most facilities were still establishing surveillance and had not begun developing means of assessing their data quality. Finally, it has been suggested that public reporting programs could discourage accurate reporting of healthcare-associated infection data.[8] We believe that sharing these findings will further promote efforts to improve communication between hospitals and dialysis clinics during care transitions and improve reporting quality in subsequent years. The Centers for Disease Control and Prevention is working with partners specifically on these efforts.

One limitation of this evaluation is that surveillance methods differ between the 2 systems. Even complete reporting to each surveillance system could still result in some unmatched MRSA BSI—for example, if a resident of an EIP surveillance area was dialyzed at a facility outside that area. We performed a secondary analysis to include dialysis facilities outside of but near the borders of EIP catchment areas to find additional matches; however, none were identified. It is possible that not all dialysis

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centers in the EIP catchment areas were reporting to NHSN. Because the great majority of hemodialysis centers are Medicare-certified and NHSN participants, this is unlikely to explain the large gap in reporting between the 2 systems.

In conclusion, we observed significant gaps in reporting of MRSA BSI from outpatient hemodialysis facilities to NHSN DE, particularly for MRSA BSI identified at the start of a hospitalization. Improved communication and data sharing between hospitals and dialysis facilities are needed to increase the usefulness of NHSN DE data.

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