Public Reporting of Health Care–Associated Surveillance Data: Recommendations From the Healthcare Infection Control Practices Advisory Committee

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Health care–associated infection (HAI) rates are used as measures of a health care facility's quality of patient care. Recently, these outcomes have been used to publicly rank quality efforts and determine facility reimbursement. The value of comparing HAI rates among health care facilities is limited by many factors inherent to HAI surveillance, and incentives that reward low HAI rates can lead to unintended consequences that can compromise medical care surveillance efforts, such as the use of clinical adjudication panels to veto events that meet HAI surveillance definitions.

The Healthcare Infection Control Practices Advisory Committee, a federal advisory committee that provides advice and guidance to the Centers for Disease Control and Prevention (CDC) and the Secretary of the Department of Health and Human Services about strategies for surveillance, prevention, and control of HAIs, assessed the challenges associated with using HAI surveillance data for external quality reporting, including the unintended consequences of clinician veto and clinical adjudication panels. Discussions with stakeholder liaisons and committee members were then used to formulate recommended standards for the use of HAI surveillance data for external facility assessment to ensure valid comparisons and to provide as level a playing field as possible.

The final recommendations advocate for consistent, objective, and independent application of CDC HAI definitions with concomitant validation of HAIs and surveillance processes. The use of clinician veto and adjudication is discouraged.

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Health care–associated infections (HAIs) cause substantial morbidity and mortality among patients in all types of health care facilities, and a large proportion of HAIs can be prevented with the use of evidence-based practices (1, 2). Prevention of HAIs has become a major focus of quality and patient safety programs, and HAI rates are increasingly used by payers, consumers, and quality improvement organizations to rank a hospital's quality efforts. Of note, the value of comparing HAI rates among health care facilities can be limited by many factors inherent to HAI surveillance, and incentives that reward low HAI rates can lead to unintended consequences that can compromise the integrity of medical care surveillance efforts (3). To be confident in assessment of efforts to eliminate preventable HAIs, we must guarantee that surveillance and reporting are unbiased and transparent.

Health care–associated infections are attractive quality measurements for several reasons, including their substantial burden, the large evidence base of prevention practices, and the long-standing use of a standardized HAI surveillance process (the Centers for Disease Control and Prevention [CDC]'s National Nosocomial Infections Surveillance [NNIS] System/National Healthcare Safety Network [NHSN]) (4, 5). First used in 1970 (**Table 1**) (4), the NNIS definitions were originally designed to classify internal facility-specific quality metrics to guide local prevention efforts. Initially, many programs tracked all HAIs (also known as "hospitalwide" surveillance) (4, 6); however, as the complexity of patient care and subsequent data collection burden increased, HAI surveillance programs refined their focus to selected HAIs (6). Through the NNIS/NHSN system, facilities can benchmark their internal HAI

performance against a deidentified national pool of member facilities. As advocated previously (7), NHSN definitions (as opposed to other metrics, such as administrative coding) continue to be the best choice for HAI outcome measurement because of their long-established application and acceptance among infection prevention and health care epidemiology experts. They are field-tested and, when applied consistently, can provide a careful assessment of HAI burden as well as the effect of prevention efforts.

Over the past decade, HAI surveillance data have been increasingly used as publicly reported metrics for comparing the quality of patient care among health care facilities, such as through mandatory reporting of hospital-specific data to state health departments, public access to hospital-specific HAI rates, and use of such data by insurers and payers to influence reimbursement (8, 9), culminating in the addition of several HAI-specific outcomes to the Centers for Medicare & Medicaid Services (CMS) Hospital Inpatient Quality Reporting (IQR) Program (**Table 1**). The CMS requires hospitals to submit these HAI data to receive their full annual reimbursement updates (pay for reporting), and these data will eventually be incorporated into value-based purchasing metrics (pay for performance). Hospital-specific HAI rates are also accessible to the public (www.hospitalcompare.hhs.gov) (10). Additional HAI metrics, including outcomes in non–acute care patients, will be added to this list in the future. Using HAI surveillance data for these purposes has clearly broadened HAI awareness beyond the infection prevention and control communities and has helped to garner greater support for institutional efforts aimed at reducing HAIs and improving patient safety.

Table 1. Timeline of Key Events in CDC HAI Surveillance

Date	Event
1970	CDC's NNIS System developed Use of CDC-defined HAI surveillance definitions Many HAI surveillance programs track all HAIs (also known as "hospitalwide" surveillance)
1990s	As complexity of patient care increases, HAI surveillance programs refine their focus to selected HAIs (e.g., only high-risk units and high-frequency or high-risk procedures)
2004	Pennsylvania becomes the first state to require public reporting of facility-specific rates for certain HAIs
2005	NNIS becomes the NHSN
2011	CMS adds ICU CLABSI rates as the first of several HAI-specific outcomes to its Hospital IQR Program
2012	As of 1 January 2012, thirty-seven states have enacted or are evaluating legislation focused on public HAI reporting CAUTIs in ICU patients and SSIs after colon and abdominal hysterectomy added to CMS IQR for public reporting
2013	Laboratory-identified events related to methicillin-resistant *Staphylococcus aureus* bacteremia and *Clostridium difficile* and outpatient dialysis events added to CMS IQR for public reporting Revised NHSN definitions for device-associated infections, ventilator-associated complications, and SSIs are released, with additional modifications planned for future years

CAUTI = catheter-associated urinary tract infection; CDC = Centers for Disease Control and Prevention; CLABSI = central line–associated bloodstream infection; CMS = Centers for Medicare & Medicaid Services; HAI = health care–associated infection; ICU = intensive care unit; IQR = Inpatient Quality Reporting; NHSN = National Healthcare Safety Network; NNIS = National Nosocomial Infections Surveillance; SSI = surgical site infection.

LIMITATIONS OF HAI SURVEILLANCE DATA FOR INTERFACILITY COMPARISONS

Although NHSN HAI surveillance provides a standardized process to determine the occurrence of an HAI, implementing NHSN surveillance definitions is associated with interpretive variation independent of the quality of care (6, 11, 12). First, some definition components are subjective, such as "purulent drainage from the deep incision" to determine the presence of a surgical site infection (13). Second, determining the presence of an HAI often relies on documentation of a provider's clinical assessment, and the variability between individual clinician determinations and documentation of those assessments can be considerable. Third, various data sources are required to apply surveillance definitions, and the ease of accessing this information can vary greatly among hospitals. Facilities with robust electronic medical record or electronic surveillance systems will be more likely to capture data used to determine the presence of an HAI and will thus report higher HAI rates than other facilities with limited access to a patient's record. Health care–associated infection surveillance is also resource-intensive, requiring trained reviewers to review many medical records, and the effort available for surveillance can vary substantially, affecting the completeness of case ascertainment. Finally, with limited patient-specific data included in the surveillance definitions, risk adjustment is incomplete. Efforts should be made to improve risk adjustment as necessary to prevent potentially misleading interfacility comparisons.

As a result of these challenges, there is marked variation and low interrater reliability in the interpretation of HAI criteria, even among experienced infection preventionists (12, 14, 15). Recognizing the need for more objective HAI definitions that correlate with clinical outcomes (16), the CDC has partnered with key stakeholders and content experts to revise NHSN's HAI definitions to enhance clinical relevance and reduce subjectivity (17). These modifications are essential to ensure the quality of reported HAI data and improve the clinical credibility of surveillance data.

Another important concept that is underappreciated by many clinicians is the distinction between HAI surveillance definitions and clinical diagnoses. Clinical diagnoses are based, in part, on the subjective judgment of clinicians and are used to guide treatment of individual patients. Surveillance definitions are used to assess a facility's HAI burden and the need for and effect of prevention efforts. Of note, HAI surveillance definitions are *not* intended for clinical diagnosis or to guide patient treatment. Surveillance definitions should ideally depend on objective data, demonstrate high interrater reliability, use readily accessible data to ascertain an event, and enable risk adjustment to account for varying case mix and underlying comorbid conditions that affect infection risk independent of the quality of care. If the definitions are applied consistently, the assessment of outcome trends over time should be reliable and instances of misclassification should be minimized. With public reporting and consequences for poor performance, however, new challenges with the use of HAI surveillance data have emerged.

UNINTENDED CONSEQUENCES OF USING HAI SURVEILLANCE DATA FOR INTERFACILITY COMPARISONS

Ideally, the alignment of the increasing focus on HAI rates and financial incentives to reduce these outcomes should motivate hospitals to invest in HAI prevention efforts. Many health care facilities have used the emphasis on HAI reduction to implement or complement existing comprehensive programs and have made dramatic reductions in HAIs and their associated morbidity. With public reporting of HAI surveillance data and consequences for poor performance, however, there can be skewed incentives to reduce HAI rates by excluding or reclassifying events as opposed to preventing actual negative outcomes. This potential risk is magnified by the inherent subjectivity and potential variability of HAI surveillance described previously. In a system where there is great disincentive to have unfavorable outcome data, persons responsible for ascertaining the presence of an HAI come under increased scrutiny and pressure to exclude an event when reporting it could have dramatic financial and public consequences. As stakes increase for poor performance, the pressure, implicit or explicit, on infection prevention programs to reclassify and exclude specific HAIs from reported data will be amplified.

One practice that has increased with public reporting of HAI data is the use of clinical adjudication panels or clinician veto by personnel external to the infection prevention and control program to make the final determination of HAI occurrence. As part of this adjudication, events that meet the HAI surveillance definitions are presented to facility leaders or clinicians to judge whether they are considered HAIs. These reviews frequently confuse the distinction between medical care surveillance and clinical diagnosis (**Table 2**). Of note, this type of clinical adjudication must be contrasted with the important discussions among the infection prevention and control personnel trained in HAI surveillance and health care epidemiology during data review to examine whether an event strictly meets the NHSN definition criteria. This latter form of decision making occurs in the initial assessment of potential HAIs and allows for consistency in application of the NHSN definitions but must avoid clinical overinterpretation of an individual patient's findings to guide HAI determination.

Whether intentional or unintentional, the pressure to adjudicate cases by persons without familiarity of or strict adherence to NHSN criteria is problematic. Such individuals are not trained in HAI surveillance and may have difficulty distinguishing clinical assessment from application of surveillance definitions. Of note, adjudicators can be consciously or unconsciously biased if they are held accountable for institutional HAI performance. This clear conflict of interest creates a disincentive to adjudicate on the side of infection.

Unfortunately, such clinical adjudication practices are common. A recent survey of infectious disease specialists found that 70% of respondent infection prevention and control programs incorporated clinical judgment in the form of clinician veto or consensus adjudication into assessments of central line–associated bloodstream infections (CLABSIs) rather than strictly adhering to NHSN criteria (18). The issues of clinical adjudication and clinician veto are somewhat new, as reflected by the limited discussion of these issues in traditional guidance surrounding the implementation of HAI surveillance data (7).

In addition, the increasing push to reduce and even "eliminate" all HAIs can have unintended consequences (19). The goal of elimination must be contrasted with eradication, as in such other public health initiatives as tuberculosis elimination. Although many HAIs are preventable, intrinsic patient risk factors, the medical need for invasive devices, procedures that breach patients' usual defense mechanisms, and major remaining gaps in our knowledge about preventing infections imply that eradicating all HAIs may not be realistic (2, 20). Although we must still strive to eliminate all *preventable* HAIs, the drive to "reach zero" can exacerbate the pressure to err on the side of underreporting HAIs described earlier. With the increasing pressure for excellent performance, continued clarification about the distinction between surveillance definitions and clinical judgment and additional guidance on implementation of HAI surveillance definitions and the use of HAI data for public reporting are necessary.

METHODS

With the issues outlined earlier, additional guidance on the implementation and interpretation of HAI surveil-

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Table 2. **Examples of Clinician Veto of an NHSN-Defined HAI Surveillance Event**

Scenario	NHSN-Defined HAI	Potential Clinician Veto/Adjudication
Patient has central-vascular catheter placed 6 d prior; fever and growth of *Staphylococcus epidermidis* in 2 separate blood culture specimens. No other source of bacteremia or fever is identified.	CLABSI	Blood culture results are due to contamination of culture during collection process; therefore, this was not a central line–related infection (regardless of whether it was treated with antibiotics).
Patient has central-vascular catheter placed 8 d prior; fever and growth of *Enterococcus faecium* in 1 blood culture specimen. He recently had intestinal surgery and reports several days of moderate diarrhea. No abdominal abscess or SSI is detected on evaluation.	CLABSI	Blood culture results are due to bacterial translocation of intestinal flora related to bowel inflammation/mucosal injury; therefore, this was not a central line–related infection.
Patient who had a coronary artery bypass graft procedure presents 3 wk later with a low-grade fever (100.5 °F) and erythema and drainage associated with her chest incision. Computed tomography of the chest reveals a small fluid collection abutting the sternotomy, and the wound is opened with minimal "cloudy" drainage detected and is then packed in the clinic by the surgeon. No specimens are sent for culture.	Deep SSI	Fluid collection was not an abscess but was postsurgical seroma. Wound was opened to allow drainage, but infection was not present on the basis of examination in the clinic.
Patient has indwelling urinary catheter placed 4 d prior, fever without another attributing source, and growth of *Escherichia coli* and *Candida albicans* in a urine culture specimen. Urinalysis shows 7 leukocytes per high-powered field.	CAUTI	Polymicrobial urine culture results are due to contamination of culture during collection process, and *Candida* is probably a colonizing, rather than infecting, organism. Pyuria is explained by the presence of the catheter. Thus, this was not a urinary catheter infection (regardless of whether it was treated with antibiotics).

CAUTI = catheter-associated urinary tract infection; CLABSI = central line–associated bloodstream infection; HAI = health care–associated infection; NHSN = National Healthcare Safety Network; SSI = surgical site infection.

lance data could help ensure that patients are provided with more comparable data in order to make informed health care choices and provide as level a playing field as possible for comparison. The Healthcare Infection Control Practices Advisory Committee (HICPAC) is a federal advisory committee that provides advice and guidance to the CDC and the Secretary of the Department of Health and Human Services about the practice of infection control and strategies for surveillance, prevention, and control of HAIs. To address concerns surrounding the increasing use of HAI surveillance outcomes for transparent public reporting, HICPAC convened members to discuss further recommendations to guide such surveillance. At several standing triannual committee meetings, these issues were discussed with committee members and stakeholder liaisons and formal guidance was developed.

RECOMMENDED STANDARDS FOR HAI AND OTHER MEDICAL CARE SURVEILLANCE DATA

This HICPAC guidance complements and serves as an adjunct to the 2005 guidance on public reporting of healthcare-associated infections (7) and recommends the following standards of practice for the use of HAI surveillance data for internal and external performance measurement.

Recommendation 1: Hospital infection prevention and control staff should use NHSN definitions (5) for HAI outcome measurement.

Recommendation 1a: It should be recognized that these surveillance definitions serve a different purpose from clinical disease diagnosis and, therefore, it is acceptable that complete concordance between surveillance-defined and clinically defined outcomes is not present.

Recommendation 1b: Although NHSN provides training cases to improve interrater reliability for persons ascertaining HAIs, consideration for additional tools (for example, standardized case reviews or audits) that would lead to more balanced interfacility comparisons should also be considered.

Recommendation 2: Hospital administrative leadership should clearly assign authority for final decision making about whether an event meets an HAI surveillance definition to individuals with specific content expertise and training in health care epidemiology and infection prevention and control.

Recommendation 3: Hospital leadership should enable health care epidemiology and infection prevention and control staff to maintain the integrity of HAI surveillance data through strict adherence to surveillance definitions regardless of financial or other ramifications.

Recommendation 4: Persons responsible for determining whether specific events meet the NHSN definitions should systematically document which definition criteria are met or reasons for an event's exclusion to maintain

consistency of surveillance over time and to provide clear and consistent assessment of the surveillance process.

Recommendation 5: Although discussion of challenging cases among health care epidemiology and infection prevention and control staff to determine whether the NHSN definition is met is encouraged, facilities should not use clinical adjudication panels or clinician veto to determine whether a given event should be reported as an HAI.

Recommendation 6: Reported data should be systematically validated to provide consequences for variations in the use and interpretation of HAI surveillance data and such practices as post hoc clinical adjudication.

Recommendation 6a: Such a validation program should be conducted by an impartial, independent party, such as a state health department or CMS surveyor.

Recommendation 6b: Validation should include an evaluation of whether reported HAIs meet NHSN definitions and an assessment of potentially unreported events (such as thorough review of positive blood culture results to assess the presence of an unreported CLABSI). It should also include a review of the facility's surveillance methods and operations.

Recommendation 6c: Additional metrics to assess for potential manipulation of reported data should be examined (for example, examination of total number of bloodstream infections [BSIs] and total number of such BSIs classified as secondary to another infection when assessing CLABSI surveillance data; low CLABSI rates in the setting of increasing secondary BSI rates may be an indication of gaming the data).

Recommendation 6d: Frank review of any claims of institutional pressure to underreport HAIs is also extremely important.

A key component of these recommendations is ensuring validation of reported data. Studies of other reported infection surveillance data have shown the variability in reported outcomes and illustrate the need for validation (21–24). In Connecticut, a third-party review of facility-reported CLABSI data identified greater than 50% underreporting, primarily related to misinterpretation of the NHSN definitions, whereas in Oregon, validation increased the statewide reported CLABSI rate by 27% (21, 22). Validation of reported HAI data is essential to verify complete reporting of selected HAIs; to examine whether clinical adjudication practices are present; and, most important, to provide fair comparisons of HAI prevention efforts among health care facilities and to ensure that high performance is actually due to improved patient care.

CONCLUSION

The use of HAI surveillance data as publicly reported measurements of health care quality has been a positive step toward improving patient care and reducing morbidity and mortality. With expanded use of these data, we

must ensure data integrity and reliability to provide a level playing field for facility-based comparisons. Unbiased and transparent reporting of HAI rates based on standardized surveillance definitions, proscription of post hoc clinical adjudication, and data validation are critical. Investments will be necessary to create such a level playing field and will have to occur at multiple levels, including additional investment in efforts to maintain and expand NHSN, state health departments for data validation and infection prevention activities, and health care facilities to support informatics infrastructure and staffing of infection prevention programs while ensuring unbiased assessments of outcome ascertainment.

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