

Best Practices in Applying Standardized Definitions for National Healthcare Safety Network (NHSN) Reporting

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Objectives

- State the essential elements for surveillance of HAIs
- Describe the current status of HAI public reporting
- Understand the need for accurate and consistent application of standardized definition criteria and techniques when performing HAI surveillance
- Navigate the NHSN webpage to locate information and training materials
- Locate the surveymonkey tool to complete AJIC case studies



Introduction

- Systematic surveillance methodology for the detection of healthcare-associated infections (HAIs)
 - Essential function of infection prevention and control (IPC) programs
 - Allows for valid and reliable HAI detection
- Active, prospective surveillance for HAIs introduced into hospitals
 - Establish endemic infection rates
 - Recognize adverse trends
 - Assess performance improvement initiatives



Background

- National Nosocomial Infection Surveillance System (NNIS)
 - Established by CDC in 1970, concurrent with the development of hospital-based IPC programs
 - Voluntary program which provided hospitals with standardized definitions for HAI case-finding
 - Ability to submit monthly data
 - Reports generated from the data allowed for external benchmarking of HAI rates with the NNIS aggregated data and provided information about changing patterns of HAIs



Background

- Study on the Efficacy of Nosocomial Infection Control (SENIC)
 - Funded by CDC; a scientific assessment of the efficacy of IPC programs
 - 338 U.S. hospitals randomly selected and stratified by geography, inpatient bed capacity, and teaching status; approximately half of the hospitals had established IPC programs
 - Determined that hospitals with IPC programs had significantly lower HAI rates than did hospitals without programs: 32% reduction with very effective programs

Haley RW, Culver DH, White JW, et al. The efficacy of infection surveillance and control programs in preventing nosocomial infections in US hospitals. *Am J Epidemiol* 1985;121:182-205.



Background

- Mandate for IPC programs from accrediting organizations
 - Joint Commission requirement in 1976
 - Catalyst for programmatic support
- Formation of professional societies
 - Association of Practitioners in Infection Control (APIC)
 - Society of Healthcare Epidemiologists of America (SHEA)
 - Professional training requirements highlighted the performance of HAI surveillance



Defining HAI Surveillance

- SHEA Consensus Panel on essential activities of IPC programs in hospitals
 - HAI surveillance most important data management activity
 - *Surveillance process to include: **standardized definitions of numerators and denominators, identification and description of data sources and data collection personnel and selection of appropriate methods of measurement** (Category I recommendation)*
 - Additional Category I recommendation emphasized the need for appropriate data analysis to monitor and improve HAI outcomes

External Reporting of HAI Rates



- In the 1990's, the requirements for hospitals to move beyond local surveillance with internal benchmarking increased
- As external benchmarking to HAI rates of similar institutions utilizing the NNIS HAI aggregate database expanded, questions were raised about the accuracy of the data
- Assessment was performed by NNIS personnel for infections reported for intensive care unit patients by nine NNIS participating hospitals



NNIS Data Validation

TABLE 7
ESTIMATES OF THE ACCURACY OF PROSPECTIVELY REPORTED AND RETROSPECTIVELY DETECTED INFECTIONS

Infection Site	No. of "True" Infections in the Population	Prospectively Identified and Reported by Study Hospitals			Retrospectively Detected by Data Collectors		
		Predictive Value Positive	Sensitivity	Specificity	Predictive Value Positive	Sensitivity	Specificity
BSI	136	87%	85%	98.3%	75%	90%	96.0%
PNEU	244	89%	68%	97.8%	49%	95%	72.9%
SSI	92	72%	67%	97.7%	73%	93%	96.9%
UTI	220	92%	59%	98.7%	91%	98%	97.6%
Other	174	80%	30%	98.6%	59%	92%	88.3%

Abbreviations: BSI, bloodstream infection; PNEU, pneumonia; SSI, surgical-site infection; UTI, urinary tract infection.

Emori TG, Edwards JR, Culver DH, Sartor C, Stroud LA, Gaunt E, Horan TC, Gaynes RP. Accuracy of reporting nosocomial infections in intensive care unit patients to the National Nosocomial Infections Surveillance System: a pilot study. *Infect Control Hosp Epidemiol* 1998;19(5): 308-16.

NNIS Data Validation

Conclusions

- Sensitivity estimates indicated that hospitals were underreporting some infections
- Evaluation of surveillance methodologies was not performed; however, inadequate case-finding was cited as the cause of underreporting
- To ensure data integrity, surveillance must include:
 - Scientifically-based and unambiguous infection criteria
 - Consistent application of criteria by trained staff
 - Efficient and sensitive case-finding methods
- Clarification/revision of the infection criteria and training improvements of NNIS participants was needed



Call for Public Reporting of HAIs

- Driving forces
 - IOM report in 1999 – HAIs as “preventable harms”
 - *Chicago Tribune* series on HAIs
 - Consumer advocacy groups
 - State legislatures: initially, Illinois, Florida, Missouri and Pennsylvania passed laws mandating public reporting
- Proponents of heightened transparency argued that quality of care would improve as hospitals became focused on reducing HAIs



Public Reporting of HAIs

- Guidance document developed by the CDC Healthcare Infection Control Practices Advisory Committee (HICPAC) 2005
 - Did not recommend for or against public reporting
 - Cited that despite the “patients’ right to know” and the improvement in healthcare quality that could result from HAI reduction, ***the reliability of the data may be compromised by institutional variability in surveillance methodologies***
 - Details specific process and outcome measures for states, emphasizes the use of established public health surveillance methods and a phase-in period to permit evaluation of data validity



Current Status of Public Reporting

- 28 states have passed legislation requiring public reporting of one or more HAIs
 - 23 states and the District of Columbia mandate the use of NHSN as the platform for mandatory reporting
- 2008 - Congress mandated that the Centers for Medicare and Medicaid Services (CMS) financially penalize hospitals if patients develop “potentially preventable” HAIs
- 2010 – HAI prevention incorporated into the Affordable Care Act Value Based Purchasing program
 - Pay for performance: up to 2% incentive for superior performance on standard measures vs. peers

Current Status of Public Reporting



- Through the VBP program, CMS now requiring public reporting through NHSN of:
 - central line-associated bloodstream infections (CLABSI)
 - catheter-associated urinary tract infections (CAUTI)
 - surgical site infections – colon surgeries and abdominal hysterectomies; deep incisional and organ/space; inpatients 18 years or age or older
 - Additional HAIs anticipated to follow

Public Reporting of HAIs

Improving America's Hospitals

The Joint Commission's Annual Report on Quality and Safety

2011



New: Top Performers on Key Quality Measures



**"REPUTATION AND PERFORMANCE ON IMPORTANT MEASURES OF QUALITY DO NOT ALWAYS CORRELATE"
DR. MARK R. CHASSIN,
THE JOINT COMMISSION'S PRESIDENT.**

Health care-associated infection reporting: The need for ongoing reliability and validity assessment

Rocco J. Perla, EdD, Carol J. Peden, MB, ChB, MD, Donald Goldmann, MD, and Robert Lloyd, PhD
Cambridge, Massachusetts

“As demands for public reporting of infection rates escalate, data accuracy becomes increasingly important”

Assessing Accuracy of HAI Data



- Reliable measures = measuring something consistently or precisely
- However, you may not be measuring what you intended to measure
 - An IP who consistently rules HAIs as being present or absent but does so incorrectly based on feedback from peers demonstrates good reliability but poor validity

Assessing Accuracy of HAI Data



- Perla and colleagues from the IHI highlighted the challenge of having consistent, well-defined and continuous methods for data detection and reporting
 - Emphasis on the need for both standardized case definitions as well as operational methodology
 - Proposed the development of a standardized data quality and management system
 - Identify problems with interpretation of case criteria by IPs
 - Create opportunities for shared learning
 - Suggested a web-based proficiency testing module on the NHSN website using clinical vignettes



How accurate is reported CLABSI data?

AJIC major articles

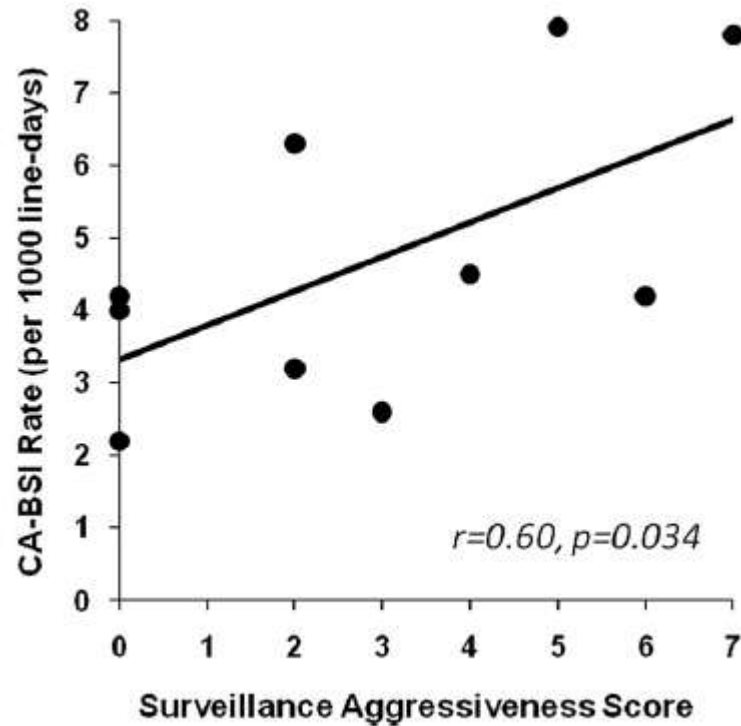
The harder you look, the more you find: Catheter-associated bloodstream infection surveillance variability

Matthew E Niedner, MD,^a and the 2008 National Association of Children's Hospitals and Related Institutions Pediatric Intensive Care Unit Patient Care FOCUS Group^b
Ann Arbor, Michigan, and Alexandria, Virginia

Substantial variability in reported surveillance practices for CLABSI among PICUs

AND

Surveillance Bias



More aggressive surveillance correlates to higher CLABSI rates

Quality of Traditional Surveillance for Public Reporting of Nosocomial Bloodstream Infection Rates

Michael Y. Lin, MD, MPH

Bala Hota, MD, MPH

Yosef M. Khan, MBBS, MPH

Keith F. Woeltje, MD, PhD

Tara B. Borlowsky, MA

Joshua A. Doherty, BS

Kurt B. Stevenson, MD, MPH

Robert A. Weinstein, MD

William E. Trick, MD

for the CDC Prevention Epicenter

Context Central line–associated bloodstream infection (BSI) rates, determined by infection preventionists using the Centers for Disease Control and Prevention (CDC) surveillance definitions, are increasingly published to compare the quality of patient care delivered by hospitals. However, such comparisons are valid only if surveillance is performed consistently across institutions.

Objective To assess institutional variation in performance of traditional central line–associated BSI surveillance.

Design, Setting, and Participants We performed a retrospective cohort study of 20 intensive care units among 4 medical centers (2004-2007). Unit-specific central line–associated BSI rates were calculated for 12-month periods. Infection preventionists, blinded to study participation, performed routine prospective surveillance using CDC definitions. A computer algorithm reference standard was applied retrospectively using criteria that adapted the same CDC surveillance definitions.

CLABSI rates increased 3-fold with the use of a computerized algorithm as compared to IP prospective surveillance suggesting significant variability in the application of surveillance definitions across medical centers



HAI Surveillance Variability

- Inconsistencies may be related to:
 - Lack of a standardized approach to case-finding
 - Variation in the application of surveillance definition criteria; the “clinical versus surveillance” disconnect
 - Resources committed to surveillance: hospitals with intensive surveillance efforts would likely report higher HAI rates
 - “Gaming” – knowingly misreport
- Implications:
 - Invalid HAI quality metrics used by consumers and for inter-hospital comparisons
 - Economic and reputational risks for hospitals



“Gaming”

- 74 yo female with ALL, syncope and ankle fracture with historical port accessed during hospitalization
 - POD 5 single temp spike to 101.2; two sets of peripheral blood cultures grow coagulase-negative *Staphylococcus*. No other symptoms, fever reduced to baseline w/in 4 hours
 - Discharged 4 days later with no antibiotic ever given, port intact, no note of infection in the chart. Not readmitted.
- Infection? Probably not
- Did this patient have a line? Does she meet CLABSI definition? **Yes**
- Is it an NHSN reportable infection? **Yes**

A reminder of the initial enrollment



6 ACKNOWLEDGEMENT AND AGREEMENT

I have read and agree to comply with the terms and condition governing the appropriate and allowed use of NHSN as defined by this document, applicable agency policy, and Federal law. I understand that infractions of these rules will be considered violations of CDC standards of conduct and may result in disciplinary action including the possibility of supervisory notification, suspension of system privileges, and/or criminal and civil prosecution.

The act of acknowledgement and agreement signifies a clear understanding of the NHSN Rules of Behavior document and that the signer will conform to the rules provided therein.

I acknowledge receipt of, understand my responsibilities, and will comply with the rules of behavior for NHSN.

Signature

Date



Defining Best Practices for HAI Surveillance

- Current efforts:
 - State-based validation studies: as of May 2011, at least 15 states have conducted audit/validation activities; published findings from 2 of these states, Connecticut and Maryland, revealed issues with sensitivity and misinterpretation of case definition criteria
 - NHSN activities
 - Development of web-based training modules available at <http://www.cdc.gov/nhsn/training.html>
 - Training sessions for IPs at national meetings
 - Consultative services to assist with difficult cases
 - Collaborative working groups to review/revise the ventilator-associated pneumonia, CLABSI, and SSI definitions to ensure clinical credibility
 - Intensive 2-day trainings on surveillance methodology and application of infection definitions

CLABSI Reporting Through NHSN: Tips, Tricks, and Best Practices *(and what we know about SSI reporting for IPPS)*

Katherine Allen-Bridson, RN, BSN, CIC
Nurse Consultant
Centers for Disease Control and Prevention

July 14, 2011

Healthcare-associated Infections Studies Project: *An American Journal of Infection Control* and National Healthcare Safety Network Data Quality Collaboration

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Evanston, Illinois; Baltimore, Maryland; and Atlanta, Georgia

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(Am J Infect Control 2010;38:416-8.)*

- A series of case studies for IPs to test their knowledge about applying the NHSN definitions



Collaborative Objectives

- To present challenging case scenarios that will provide rationale and clarity in the use of the NHSN surveillance definitions,
- To provide an opportunity for personal competency assessment as well as for assessment of consistency between IPs within a facility,
- To provide an additional means of training infection preventionists responsible for HAI surveillance



Assessment of Findings

- Assess competency in the application of NHSN case definition criteria among respondents participating in the first four case studies
 - Open book
 - Compare results from respondents in states with mandatory public reporting through NHSN to respondent results from states without this requirement
- Identify areas of difficulty with interpretation of case definition criteria
 - Improve the training of NHSN participants
 - Clarify/revise the criteria



Methods

- Initial drafts written by authors and circulated among coauthors for review/revision
 - Based on clinical scenarios encountered routinely by IPs
 - Emphasize scenarios presented to NHSN staff for clarification
- Circulated among NHSN/DHQP/CDC staff for review, revision and approval
- Case studies developed in SurveyMonkey online survey tool maintained by the authors
- Sent to AJIC Editorial Staff for publication



Methods

- Online anonymous surveys opened prior to publication and remained open for 3-5 months
- After taking the survey, answers with explanations and references were provided
- After closing the survey, site visitors were instructed to contact one of the authors to obtain copy of questions and answers
- Demographic data was voluntary

Case Study	NHSN Event Criterion	Participants	Number of Questions	Overall Correct	Areas of Difficulty
1	Central-line associated bloodstream infection (CLABSI)	811	4	(2208/3244) or 68.1%	a) No minimum central line duration b) Concurrent infections can be independent events
2	Central-line associated bloodstream infection due to skin colonizer (CLABSI)	807	3	(1947/2421) or 80.4%	a) Concurrent infections can be independent events b) Tendency to disregard common skin contaminants
3	Ventilator associated pneumonia (VAP)	524	2	(636/1048) or 60.7%	a) No minimum duration for the ventilator b) Can't use sputum as a minimally contaminated specimen
4	Central-line associated bloodstream infection (CLABSI) and symptomatic urinary tract infection (SUTI)	705	4	(1578/2820) or 56.0%	a) Fever requirement of >38 degrees does not include 38.0 b) Recognized pathogens do not require symptoms

- 2,847 individuals participated in the first 4 cases
- Overall, there were 6,369 correct responses among 9,533 answers (66.8% correct)



Mandated State Reporting – Any Difference?

- States with mandated NHSN participation might differ from non-mandated states
 - All respondents from mandated states would have undergone initial NHSN training whereas some unknown proportion of respondents may not have received the same training in non-mandated states
 - Cases 2 and 4 (CLABSI) used to compare mandated vs non-mandated performance (CLABSI reporting universal for mandated states)



Mandated State Reporting – Any Difference?

- AL CA CO CT DC DE IL MA MD NH NJ NY NV OK OR PA SC TN TX VT VA WA WV versus all other respondents (includes international)
- Mandated states = 64.0% correct; Non-mandated states = 60.5% correct (RR 95% CI: 1.01 > 1.06 > 1.11 p=0.02)
- Participants from states with mandatory reporting are 6 times more likely to be accurate with responses than participants from states without the reporting requirement



Conclusions

- Approximately two-thirds of the time, respondents answered the questions associated with each clinical scenario correctly
- Respondents from states with mandatory NHSN reporting appear to answer correctly more often than their colleagues in states without this requirement
- Opportunities for further training and education among NHSN participants include:
 - Concurrent infections can be independent events
 - No minimum duration for devices prior to infection
 - Symptoms associated with case definition criteria



What's Next

- Case 6 (SSI) is in AJIC August 2011 issue
 - <http://www.surveymonkey.com/s/AJIC-NHSN-Case6>
- Cases 7 (pediatric case) to be published soon
- Supplement issue of AJIC consisting of ***ten*** case studies is in final review and will allow participants to receive continuing education units (CEUs)



Summary

- Outcome reporting of quality performance metrics, such as HAIs, is a developing science
- Without clear operational surveillance methods, inter-institutional variability of surveillance techniques exist
- Inconsistencies in the interpretation of HAI case identification criteria and the process of surveillance impact the validity of publicly reported HAI data
- Continued funding of state validation studies, the expansion of qualitative research to further assess inter-rater bias, and the endorsement of IP education are all necessary to ensure a valid national HAI surveillance system with the associated goal of patient safety through HAI reduction/elimination