Healthcare-Associated Infections: Reporting and Validating Data across the Nation

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Background:

Healthcare-associated infections (HAIs) pose a serious threat to healthcare consumers across the nation, both in terms of patient safety and increased cost of care. Amplified public awareness of HAIs has led to the creation of government initiatives at the state and federal level to address this concern. The Centers for Disease Control and Prevention (CDC) Division of Healthcare Quality Promotion (DHQP) created the National Healthcare Safety Network (NHSN) in 2005 as a way for healthcare facilities to actively report HAI data in a standardized, timely manner. The use of NHSN is completely voluntary, requires no fee for involvement, and was opened to all healthcare facilities in the United States beginning in 2008.[1] The data reported to NHSN can be tracked and utilized by state health agencies for a multitude of reasons (e.g. to validate reported data and share results with the general public). According to the CDC, 23 states currently require healthcare facilities to report HAI data to NHSN.[2]

Due to the complexity of HAI surveillance definitions many healthcare facilities have incorrectly reported HAI data in NHSN resulting in inaccurate infection rates. To ensure that facilities are reporting HAI information properly a number of states have passed laws requiring the validation of reported data. New York was the first state to perform a validation audit of their healthcare facilities with respect to the incidence of central line-associated bloodstream infections (CLABSIs). The results of New York's audit were confirmed by other states including Connecticut's validation study of CLABSI cases: there are discrepancies occurring in the reporting of CLABSIs in large part because of the misinterpretation of NHSN case definitions.[3] Numerous workshops and training sessions are currently available to help educate infection preventionists (IPs) and other infection control employees within a variety of healthcare facilities on the proper use of NHSN. However, it is necessary and important for state health departments to validate the reported HAI data in order to have meaningful information that can be disseminated to the public.

Texas is one of the 23 states currently requiring its healthcare facilities to report HAI data to NHSN. The law in Texas (Health and Safety Code, Chapter 98) requires general hospitals and ambulatory surgical centers to report surgical site infections (SSIs) related to the following procedures: colon surgeries, hip arthroplasties, knee arthroplasties, abdominal hysterectomies, vaginal hysterectomies, coronary artery bypass graft (CABG) surgery, and vascular procedures. The law also states that pediatric and adolescent hospitals are required to report SSIs associated with cardiac procedures, ventriculoperitoneal shunt procedures, and spinal surgeries. Furthermore, the law requires general hospitals to report the incidence of laboratory-confirmed CLABSIs in any special care setting as well as the incidence of respiratory syncytial virus (RSV) occurring in any pediatric inpatient unit.[4]

Health and Safety Code, Chapter 98 also requires that the Texas Department of State Health Services (DSHS) "review reporting activities of health care facilities to ensure the data provided are valid."[4] This report aims to: 1) summarize important information and lessons learned from other states that require HAI reporting; 2) review audit methodologies used by some of these

states; and 3) offer recommendations to the Texas DSHS regarding the methodology they might employ to validate the reported HAI data in Texas.

Methods:

The primary goal of this report is to have a comprehensive source of information from states that are required to report HAI data as well as those states that further require the auditing of HAI data. In order to achieve this goal, two different qualitative survey tools (one for states that only require the reporting of HAI data and another for states that require both the reporting and validation of HAI data) were constructed to extract essential information. This information can, in turn, be used by the Texas DSHS to create their own specific audit methodology based on the size and needs of the state.

The first step was to gain a basic understanding of HAI reporting and how this process works within states. In order to do this, I read the "First State-Specific Healthcare-Associated Infections Summary Data Report" published by the CDC's NHSN.[5] This document gave a brief overview of HAI reporting and standardized infection ratios (SIRs) and also provided detailed tables of the reporting status of specific states around the country.[5] Based on this document and discussions with DSHS staff, I identified specific questions to address with other states: the types of facilities required to report HAI data; the number and credentials of staff members working on reporting (and more specifically auditing) HAI data; and the specific methodology used by states to audit HAI data.

Next, I contacted subject matter experts to gain a better understanding of the complexity associated with validating HAI data. In addition, they were able to help us refine our question list for other states. In this first stage of conference calls we separately contacted Rachel Stricof, Mary Andrus, and Becky Heinsohn and Karen Vallejo. Ms. Stricof was the previous director of the Bureau of Healthcare-Associated Infections at the New York State Department of Health, and New York was a pioneering state in the subject of HAI validation. Ms. Andrus had experience working with the National Nosocomial Infections Surveillance (NNIS) System at the CDC. She also has a background with NHSN training for groups around the country. She is currently working for Surveillance Solutions Worldwide, Inc. which specializes in NHSN training. Ms. Heinsohn is currently the Director of Hospital Quality Improvement at TMF Health Quality Institute. She is involved in healthcare auditing activities for topics other than reported HAI data. Ms. Vallejo, who has been working on a pilot audit of SSIs and total knee arthroplasties, was also present on the conference call. Ms. Vallejo has been involved in onsite visits and is interested in how the data are collected, the tools and resources available to collect data, and the general knowledge base among staff. The conference calls with these subject matter experts provided a framework of information that was used to create and refine questions for the two qualitative surveys.

In addition, a wealth of state-specific information for HAI reporting is available through the CDC website[6] where many of the states include their specific state plans to address HAIs through the CDC. I reviewed these data to create various tables of information for states that are required by law to report HAI data to NHSN. The purpose was to extract as much information

as possible for each state in order to reduce the length of the surveys and time required to complete them.

After careful consideration of input from the subject matter experts, the details taken from the CDC website, the survey for reporting states that do not audit HAI data was constructed. This survey can be found in Appendix B. The main purpose of this survey was to determine if states that do not currently audit have plans of auditing in the future. If they did not plan to audit reported HAI data in the foreseeable future we wanted to know what led them to this decision.

We piloted the reporting survey with state contacts from Nevada, Alabama, and Illinois to identify any gaps in our questions and to be sure that our questions were easy to interpret. This pilot testing of the survey was done by a telephone conference call with the state contact, Dr. Felkner, Mr. Taylor, and me. The conversational method of the pilot test allowed us to ask any additional pertinent questions that were not originally included in the survey. Based upon these calls, we added a question to find out how many FTEs states have on staff to implement mandatory reporting of HAIs. We converted the survey into QuestionPro, an online survey software, which would allow state contacts to answer our short survey at their convenience.

The second survey, for states that have performed some type of HAI auditing, was created using the same methods as the previous survey. We identified states that have begun auditing HAI data using the CDC information and drafted our survey based on the conversations with the subject matter experts and group discussion with Mr. Taylor and Dr. Felkner. We were mainly interested in knowing the specific methodology used by states to perform their HAI audits. The survey for auditing states can be found in Appendix C. Connecticut, Maryland, New York (Rachel Stricof, MPH, CIC, email communication, April 2011), Washington (David Birnbaum, PhD, MPH, email communication, June 2011), and Pennsylvania (Zeenat Rahman, MBBS, MPH, email communication, June 2011) had documents available online that were used to preliminarily answer as many of the survey questions as possible.[3, 7] The audit methodology survey was administered via phone call and/or through email, depending on the availability of the state contacts. State contacts from Maryland and Washington chose to complete the survey at their convenience through email. Contacts for Connecticut, New York, Pennsylvania, and South Carolina completed the survey by phone.

Results:

Appendix A contains the state-specific tables with the following information: contact information, reporting status, reporting indicators, and facilities required to report. Texas is the only state that currently requires facilities to report on vascular procedures, ventriculoperitoneal shunt procedures, and spinal procedures. Therefore, these procedures were left off of the table for state required reporting indicators in Appendix A.

Preliminary Findings: Subject Matter Expert Summaries

Ms. Stricof (Rachel Stricof, MPH, CIC, oral communication, April 2011) emphasized the importance of using the standardized surveillance and infection definitions laid out by NHSN to allow for comparison of infection rates across facilities. It is crucial to understand how

healthcare staff members are capturing numerator and denominator data and to determine if they are correctly gathering the information necessary to calculate the risk adjustment. This information is normally gathered through an interactive interview approach during audits. This is a very significant step that creates accountability within the facilities. In addition, Ms. Stricof stressed the fact that state auditing plans depend heavily on the amount of resources (funding, staffing, etc.) available to use. This may seem obvious, but it is very important to create a validation methodology that can be used in the future with limited funding (as all ARRA funds expire at the end of calendar year 2011).

According to Ms. Andrus (Mary Andrus, BA, RN, CIC, oral communication, May 2011), small states may be able to sample all hospitals but larger states will have to take a sample of hospitals to audit. In Pennsylvania, SIRs were published by the CDC, and the health department selected a sample of outliers and non-outliers; they over-selected outliers. Most audits are not done based on the number of reported CLABSIs. Central line days are one of the most inconsistently measured and reported components used to determine SIRs. It is important to look at these measures as sources of potential process errors. Another issue is with secondary bloodstream infections (SBIs). Many reported CLABSIs are actually SBIs (and vice-versa). If an SSI rate is greater than 50% it usually reveals that states are not reporting all of their surgeries for the denominator of an SIR, which will inflate their rate. In regards to auditing SSIs, it might not be necessary to audit all procedures. Ms. Andrus suggests looking at the list of procedures done at each facility and picking every n^{th} procedure to audit. A take-home message is that despite creating a sample size determination for auditing records the bottom line is how many records can be audited in a given day. A sample size strategy might not be feasible due to limited available resources. To Ms. Andrus' knowledge, all states have used auditors from outside the state. This is because auditors from the state they are auditing are asked to audit their "friends" in facilities and can miss important issues. In many cases, the hospital IP is not transferring the NHSN reporting knowledge and definitions to the hospital staff (i.e. nurses). Most states view the auditing of facilities as both an educational opportunity as well as a regulatory opportunity. States can identify educational gaps when it receives the audit information from various facilities. It is vital that both the IP and the auditors know all of the NHSN definitions (CLABSI, VAP, SSI, etc.) to ensure that reported data as well as the audited data are correct. Most auditors are Certified in Infection Control (CIC) with 5 or more years of surveillance experience, and many are educators.

Ms. Heinsohn (Becky Heinsohn, RN, CPHQ, oral communication, May 2011) and Ms. Vallejo (Karen Vallejo, CIC, oral communication, May 2011) stated that an important lack of knowledge exists among some facilities regarding SIRs and risk adjustment. Furthermore, hospitals lack relevant information pertaining to infection control, especially in rural areas. There is an opportunity for collaboration between hospitals to stimulate this learning process and to share best practices. Ms. Vallejo believes in utilizing a multidisciplinary team to help facilities understand the components of their data. It is imperative to understand the processes that facilities use to capture data. What are their surveillance methods? Do they understand definitions of risk factors (such as cut time)? Issues exist in terms of over-reporting and underreporting HAIs. A variety of staff members can be involved in capturing the required data for SIRs (nurses, physicians, and others). It is vital to look at communication issues between these staff members regarding both numerator and denominator data. When in doubt, auditors

should query doctors, nurses, and perhaps even the medical director to learn about discrepancies and why they exist. Ms. Vallejo has noticed that more experienced IPs at hospitals consistently have more valid data. However, some IPs are more interested in certain HAI indicators and will put more focus on the ones they are interested in and disregard others. An IP with less experience generally does not have a thorough understanding of NHSN definitions. Both Ms. Vallejo and Ms. Heinsohn believe that DSHS needs to take more of a regulatory role to hold facilities accountable for their data and not so much of a coach mentality to take the time to train staff that report data. It is the hospital's job to report valid data. DSHS is there to motivate facilities to get the proper training to correctly report HAI data. Outside entities such as APIC can be utilized to train facilities in terms of NHSN definitions and reporting requirements.

Reporting Survey Results:

Utilizing the QuestionPro format, the reporting survey was sent to state contacts (taken from the information in Appendix A) in the following states: Arkansas, Delaware, District of Columbia, Minnesota, Montana, Nevada, New Jersey, Ohio, Rhode Island, and West Virginia. These states were selected for this survey because they (1) do not currently audit reported data to our knowledge, (2) do not have any plans to audit that we know of and (3) were not used to pilot test the survey. Due to the fact that the information taken from this survey was fairly sparse, only a summary of the results will be provided. (No data shown.) The information taken from our pilot phone call with Nevada, Alabama, and Illinois was taken into consideration as well. Of the states that were asked to participate in this survey only Minnesota failed to respond.

Of the states for which we found no published information on auditing procedures, only New Jersey is currently auditing HAI data. Of those states currently not auditing, Ohio, District of Columbia, Montana, Nevada, Alabama, and Illinois plan to begin auditing reported HAI data within the next six months. Rhode Island, Delaware, West Virginia and Arkansas have no plans to begin auditing their reported HAI data in the next six months. They all pointed to a lack of resources as the primary reason that led them to this decision. Furthermore, Delaware mentioned a lack of enthusiasm from healthcare facilities as a barrier to initiate auditing HAI data. To audit, Rhode Island needs increased funding and more staff. Delaware would require sufficient funds to contract out to complete audits because there is no internal capacity to complete them due to limited staff, not because of a lack of IP expertise. Arkansas needs more FTEs to complete an audit. West Virginia does not audit due to a lack of resources but did not indicate the specific resources that they lack. Rhode Island currently has less than one FTE to implement the mandatory HAI reporting. Both Delaware and Arkansas have one FTE for HAI reporting mandates. Delaware attempted to create a method for auditing their HAI reported data. Both Rhode Island and Arkansas have never created an audit methodology.

Audit Survey Results:

The following states participated in completing the audit survey: Connecticut, Maryland, New York, Pennsylvania, South Carolina, and Washington. Tennessee was contacted multiple times, but was not able to complete the survey. The specific results from each state can be found in Appendix D of this report.

Connecticut, Maryland, and Washington only audit CLABSI procedures. New York and South Carolina audit both CLABSI and SSI procedures. New York audits SSIs for hip, colon, and CABG surgeries. South Carolina audits SSIs for hip, knee, CABG, and abdominal hysterectomy procedures in all facilities that perform any of these surgeries. Furthermore, South Carolina audits SSIs related to colon surgeries in facilities with less than 200 beds. Pennsylvania audits both CLABSI and catheter associated urinary tract infections (CAUTI) procedures.

Due to the limited number of facilities required to report, Connecticut (approximately 30 facilities) and Maryland (approximately 45 facilities) are able to audit all facilities in their states. New York has a plan in place to audit at least 90% (roughly 200) of the facilities reporting to NHSN in their state. They utilize their administrative database to perform regular checks and select facilities with red flags/outliers for first priority in their audits (facilities with the higher than predicted and lower than predicted SIRs based on previous annual reports). Due to limited resources, Pennsylvania is only able to audit 10% (24/250) of their facilities each year. Similar to New York, Pennsylvania selects facilities with higher than predicted and lower than predicted SIRs to audit. South Carolina initially audited all of the facilities in their state required to report to NHSN (roughly 65 facilities total). However, now they only audit about 60 out of a possible 75 facilities total (based on outliers and red flags). Washington uses a very different audit methodology. They require all facilities reporting to NHSN (62 facilities) to perform an internal validation program. The State of Washington Department of Health performs external audit verification for facilities with poor internal validation results and through random spot-checks.

Connecticut completes the audit of their facilities from January 1st through the end of April. Maryland completes the audit of their facilities from December to January. (For the audit study time period between July 1, 2008 and June 30, 2009, charts were audited from December 9, 2009 – January 8, 2010). New York takes one full calendar year to audit at least 90% of their facilities. The remaining facilities that were not audited the previous year get top priority for the next round of auditing. Pennsylvania plans to audit all of their facilities eventually, but they have no set time line for this to occur. Currently, they audit 24 (roughly 10%) facilities each year with a new 24 facilities audited each subsequent year. South Carolina audits 60 of their facilities each year. Washington requires all of their facilities to complete the internal audit protocol. Timing for the external validation verification in Washington is variable depending on the results from the internal audits.

Connecticut has only one auditor to complete all medical record reviews in all facilities reporting to NHSN. Maryland has contracted out with APIC Services, Inc. who has provided the state with five auditors to complete all facilities (~46). New York has divided their state into five regions with one auditor responsible for 35-39 facilities in each. Furthermore, the program director of HAI Reporting is responsible for auditing roughly 9 facilities in the capital region of New York. Pennsylvania has also contracted with APIC Services, Inc. and has four auditors to complete chart audits at 24 facilities. South Carolina has two auditors to complete their target of 60 facilities. At larger facilities (teaching hospitals for example), both auditors are present to complete chart audits. Washington currently has two auditors to complete validation verification in selected facilities. In addition, Washington is currently training a newly hired staff.

The following states utilize a blinded method when their auditors perform medical record reviews: Connecticut, Maryland, and Pennsylvania. New York auditors performed blinded audits in the first two years of auditing (2007 and 2008); they carried a sealed envelope with the NHSN reporting status of each of the records they reviewed. They did not open these results until they completed reviews of all selected medical records. Currently, they do not perform 100% blinded audits because they no longer use the sealed envelope method. However, due to the case-control nature of their auditing scheme and the fact that auditors do not carry results with them during the audit process, it is likely that they are blinded during the audit of facilities. Neither South Carolina nor Washington performs blinded audits.

The biggest differences between state auditing methodologies occur in terms of medical record selection. Connecticut performs chart audits on all positive blood cultures in ICUs reporting CLABSIs to the state health department. Maryland reviews five charts in ICUs in the top and bottom eleven (25^{th} percentile) facilities of their ranking list (based on CLABSI rates) and four charts in all other ICUs. A line list of NHSN CLABSIs was taken for each facility along with a laboratory list of positive ICU blood cultures for auditing CLABSIs in New York. They randomly select patient records from the most recent ICU positive blood cultures. Currently, they select a total of 20 records to audit. If a facility has only one type of ICU then they review all 20 records from that ICU. If a facility has two ICU types then they review 10 records from each ICU type, and if there are more than two ICU types they review at least 5 records from each. Pennsylvania uses a positive blood culture list for CLABSIs to select every 5^{th} record until 8 records were selected to audit for CLABSIs in 12 facilities. For CLABSIs, line lists were used to ensure that at least one of the selected records was reported to NHSN.

In New York, each SSI procedure (CABG, hip, and colon) was treated as a separate audit with 9-18 medical records selected for each procedure (the actual number of charts selected for the audit is based on the volume of procedures done at a specific facility). New York utilizes a case-control format when auditing SSIs. Cases are selected from NHSN and controls are selected from a variety of sources. For hip and colon procedures, controls are selected from the NY State Wide Planning and Research Cooperative System (SPARCS) that do not appear in NHSN. For CABG procedures, controls are selected from the Cardiac Surgical Reporting System (CSRS) that do not appear in NHSN. These registries contain surgeries that can be used as controls to audit in order to be sure that facilities understand and utilize the correct NHSN definitions. Moreover, controls can be randomly selected.

South Carolina does not have a specific methodology for selecting medical records to audit. Their selection is variable depending on the volume of procedures performed at each facility. Furthermore, the selection of medical records depends heavily on the number of charts an auditor can review in one day. Ideally, auditors in South Carolina attempt to review 20-30 records at each facility.

Washington requires each facility reporting to NHSN to complete their own internal validation based on 22 cases of CLABSI and 22 control procedures. External validation verification is done to ensure that this internal validation is performed correctly. They begin by auditing 20 randomly selected charts from any patient records in which the discharge abstract indicated central-line associated bloodstream infection. Based on the number of misclassifications

(specific protocol can be found in appendix D), they either stop the audit and record it as acceptable or continue auditing an additional 20 records. Washington has separate instructions for random spot-checks versus a follow-up due to poor internal validation.

It is very critical to understand what variables specifically alter the SIR for HAIs. Multiple states mentioned that facilities are clearly misinterpreting NHSN surveillance definitions. Ongoing training sessions are very valuable to help alleviate this issue. Connecticut mentioned that there were several CLABSI rules that were unclear to hospital IPs: minimum time period (there is no minimum time that a central line must be in place for a blood stream infection to be central line associated), patient transfer (if a patient develops a central line infection within 48 hours of transfer from one location to another then the CLABSI is attributed to the first location), and two or more blood cultures drawn on separate occasion rule (LCBI criterion 1 definition versus criterion 2 definition). Misinterpreting these rules as well as case definitions can drastically influence the SIRs for specific facilities. New York stated that wound class, procedure duration, and ASA score were the most common errors in terms of SSIs. South Carolina echoed these issues and also mentioned that there were problems when classifying surgeries as clean versus clean-contaminated. These appear to be the most common variables that are missed by facilities. It is vital that Texas auditors are cognizant of these issues when they review medical records at facilities.

Conclusions:

It is important to take into consideration how other states have designed their HAI data validation programs. However, Texas has vastly larger numbers of facilities without proportionally larger resources. Therefore, it is imperative to create an efficient methodology to validate the reported HAI data in Texas. Multiple states that are currently validating HAI data are small enough to audit all of the facilities required to report. Other states are able to validate data in a large proportion of the facilities that are required to report. Texas will have a much harder time selecting the number of facilities to audit. It could be wise for Texas to create a plan that would eventually allow all facilities to be audited within (x) number of years. Pennsylvania plans to eventually audit all facilities required to report in their state, but they have no set timeline to complete this. Similar to Pennsylvania, Texas could initially audit facilities based on infection rates (selecting facilities with the highest and lowest infection rates for priority).

Maryland and Pennsylvania, states that contract with APIC for auditing, have very detailed methodologies for selecting specific medical records to audit. Other states have developed their validation processes based on expediency, the number of charts they can review in one day, rather than statistical sampling. The precise methods implemented in Texas must be conducive to the goals laid out by the state as well as the resources available to achieve those goals.

Appendix A: State-Specific HAI Information

Table 1. State Contact Information

State	Contact Information	Weblinks
Alabama	Sharon Thompson, BSN, RN, Infection Control Officer Sharon.Thompson@adph.state.al.us	http://www.cdc.gov/HAI/stateplans/state-hai-plans/al.html
Arkansas	Megan Berley megan.berley@arkansas.gov	http://www.cdc.gov/HAI/stateplans/state-hai-plans/ar.html
California	Lynn Janssen, MS, CIC Coordinator, HAI Liaison Program (ARRA Grant) lynn.janssen@cdph.ca.gov	http://www.cdc.gov/HAI/stateplans/state-hai-plans/ca.html
Colorado	Sara M. Reese, PhD Patient Safety Program Epidemiologist Health Facilities and Emergency Medical Services Division Sreese@smtpgate.dphe.state.co.us	http://www.cdc.gov/HAI/stateplans/state-hai-plans/co.html
Connecticut	Richard Melchreit, MD Coordinator, healthcare-associated Infections Program Richard.Melchreit@ct.gov	http://www.cdc.gov/HAI/stateplans/state-hai-plans/ct.html
Delaware	Marjorie Shannon, MS, LNHA State Epidemiologist Marjorie.Shannon@state.de.us	http://www.cdc.gov/HAI/stateplans/state-hai-plans/de.html
District of Columbia	Lujain Said Lujain.said@dc.gov	http://www.cdc.gov/HAI/stateplans/state-hai-plans/dc.html
Illinois	Mary Driscoll, RN, MPH Division Chief, Patient Safety and Quality Policy Issues mary.driscoll@illinois.gov	http://www.cdc.gov/HAI/stateplans/state-hai-plans/il.html
Maine	Peg Shore HAI Prevention Coordinator Peg.shore@maine.gov	http://www.cdc.gov/HAI/stateplans/state-hai-plans/me.html

Maryland	Katherine Feldman, DVM, MPH KFeldman@dhmh.state.md.us Lucy E. Wilson, MD, Sc.M lewilson@dhmh.state.md.us Pamela W. Barclay pbarclay@mhcc.state.md.us	http://www.cdc.gov/HAI/stateplans/state-hai-plans/md.html
Massachusetts	Eileen McHale Patient Safety Ombudsman Eileen.mchale@state.ma.us	http://www.cdc.gov/HAI/stateplans/state-hai-plans/ma.html
Minnesota	Jane Harper, BSN, MS, CIC jane.harper@state.mn.us	http://www.cdc.gov/HAI/stateplans/state-hai-plans/mn.html
Montana	Bonnie M. Barnard, MPH, CIC Epidemiologist, Section Supervisor bbarnard@mt.gov	http://www.cdc.gov/HAI/stateplans/state-hai-plans/mt.html
Nevada	Giovanna Santovito-Carducci RN, CIC Nevada HAI coordinator gcarducci@health.nv.gov	http://www.cdc.gov/HAI/stateplans/state-hai-plans/nv.html
New Hampshire	Katrina E. Hansen, M.P.H. Healthcare-Associated Infections Program Coordinator Katrina.Hansen@dhhs.state.nh.us	http://www.cdc.gov/HAI/stateplans/state-hai-plans/nh.html
New Jersey	Emmanuel Noggoh Director, Office of Healthcare Quality Assessment emmanuel.noggoh@doh.state.nj.us	http://www.cdc.gov/HAI/stateplans/state-hai-plans/nj.html
New Mexico	Joan Baumbach, MD, MPH Infectious Disease Epidemiology Bureau Chief joan.baumbach@state.nm.us	http://www.cdc.gov/HAI/stateplans/state-hai-plans/nm.html
New York	Carole Van Antwerpen, RN,BSN,CIC Program Director Hospital Acquired Infection Reporting clv02@health.state.ny.us	http://www.cdc.gov/HAI/stateplans/state-hai-plans/ny.html

Ohio	Jane Carmean, BSN, RN, CIC Infectious Disease Control Consultant Jane.Carmean@odh.ohio.gov	http://www.cdc.gov/HAI/stateplans/state-hai-plans/oh.html
Oklahoma	Vonnie Meritt, RN, MPH Director of Quality Initiatives VonnieM@health.ok.gov	http://www.cdc.gov/HAI/stateplans/state-hai-plans/ok.html
Oregon	Ann R. Thomas, MD, MPH Emerging Infections Program ann.thomas@state.or.us	http://www.cdc.gov/HAI/stateplans/state-hai-plans/or.html
Pennsylvania	Stephen Ostroff, MD Acting, Physician General sostroff@state.pa.us	http://www.cdc.gov/HAI/stateplans/state-hai-plans/pa.html
Rhode Island	Rosa Baier, MPH Senior Scientist Quality Partners of Rhode Island rbaier@riqio.sdps.org	http://www.cdc.gov/HAI/stateplans/state-hai-plans/ri.html
South Carolina	Dixie F. Roberts, MPH, RN Director Division of Acute Disease Epidemiology Healthcare-Associated Infections Section robertdf@dhec.sc.gov	http://www.cdc.gov/HAI/stateplans/state-hai-plans/sc.html
Tennessee	Marion A. Kainer MD, MPH, FRACP Medical Epidemiologist/ Infectious Diseases Physician Director Hospital Infections and Antimicrobial Resistance Program marion.kainer@tn.gov	http://www.cdc.gov/HAI/stateplans/state-hai-plans/tn.html
Vermont	Carol Wood-Koob RN , CIC HAI Prevention Coordinator carol.wood-koob@ahs.state.vt.us	http://www.cdc.gov/HAI/stateplans/state-hai-plans/vt.html

Virginia	Andrea Alvarez, MPH Healthcare-Associated Infections Epidemiologist Andrea.Alvarez@vdh.virginia.gov	http://www.cdc.gov/HAI/stateplans/state-hai-plans/va.html
Washington	Pamela Lovinger Sr. Advisor for Policy and Business Practices Epidemiology Health Statistics and Public Health Laboratories Pamela.lovinger@doh.wa.gov	http://www.cdc.gov/HAI/stateplans/state-hai-plans/wa.html
West Virginia	Thein Shwe, MS, MPH Healthcare Associated Infections (HAI) Coordinator Division of Infectious Disease Epidemiology thein.shwe@wv.gov	http://www.cdc.gov/HAI/stateplans/state-hai-plans/wv.html

Table 2. State Reporting Status

State	Mandatory Reporting	Mandatory NHSN Reporter	Planning Audits	Performing Audits
Alabama	Yes	Yes	Yes	
Arkansas	Yes			
California	Yes	Yes	Yes	
Colorado	Yes	Yes	Yes	
Connecticut	Yes	Yes		Yes
Delaware	Yes	Yes		
District of Columbia	Yes	Yes	Yes	
Illinois	Yes	Yes	Yes	
Maine	Yes		Yes	
Maryland	Yes	Yes		Yes
Massachusetts	Yes	Yes	Yes	
Minnesota	Yes			
Montana	Yes		Yes	
Nevada	Yes	Yes	Yes	
New Hampshire	Yes	Yes	Yes	
New Jersey	Yes	Yes		Yes
New Mexico	Yes		Yes	
New York	Yes	Yes		Yes
Ohio	Yes		Yes	
Oklahoma	Yes	Yes	Yes	
Oregon	Yes	Yes	Yes	
Pennsylvania	Yes	Yes		Yes
Rhode Island	Yes			
South Carolina	Yes	Yes		Yes
Tennessee	Yes	Yes		Yes
Vermont	Yes	Yes	Yes	
Virginia	Yes	Yes	Yes	
Washington	Yes	Yes		Yes

State	Mandatory Reporting	Mandatory NHSN Reporter	Planning Audits	Performing Audits
West Virginia	Yes	Yes		

Table 3. State Reporting Indicators

	Reporting Indicators									
	SSI								CLABSI	Other
State	SSI (Generic)	Colon	Hip	Knee	Abdominal Hysterectomies	Vaginal Hysterectomies	CABG	Cardiac Procedures		
Alabama	Yes	Yes			Yes				Yes	Yes
Arkansas			Yes	Yes			Yes		Yes	Yes
California	Yes		Yes				Yes		Yes	Yes
Colorado	Yes								Yes	Yes
Connecticut									Yes	Yes
Delaware	Yes		Yes	Yes					Yes	
District of Columbia	Planning								Yes	Yes
Illinois				Yes			Yes		Yes	Yes
Maine	Yes								Yes	Yes
Maryland			Yes	Yes			Yes		Yes	Yes
Massachusetts	Yes								Yes	Yes
Minnesota	Yes								Yes	
Montana	Yes								Yes	Yes
Nevada	Yes		Yes	Yes			Yes		Yes	Yes
New Hampshire		Yes		Yes			Yes		Yes	
New Jersey				Yes	Yes		Yes		Yes	Yes
New Mexico									Yes	
New York		Yes	Yes				Yes		Yes	Yes
Ohio										Yes
Oklahoma									Yes	Yes
Oregon	Yes								Yes	Yes
Pennsylvania			Yes	Yes	Yes			Yes	Yes	Yes
Rhode Island	Yes								Yes	Yes
South Carolina			Yes	Yes			Yes		Yes	

	Reporting Indicators									
	SSI								CLABSI	Other
State	SSI (Generic)	Colon	Hip	Knee	Abdominal Hysterectomies	Vaginal Hysterectomies	CABG	Cardiac Procedures		
Tennessee			Yes				Yes		Yes	Yes
Vermont			Yes	Yes	Yes				Yes	Yes
Virginia	Pilot Testing								Yes	Pilot
Washington	Yes		Yes	Yes	Yes	Yes	Yes		Yes	Yes
West Virginia									Yes	

Table 4. Facilities Required to Report

State	Acute Care Hospitals	Pediatric Hospitals	ASCs	Other (LTC, Dialysis, etc.)	General Hospitals	Not specified
Alabama					Yes	
Arkansas				Yes	Yes	
California	Yes					
Colorado	Yes		Yes	Yes		
Connecticut	Yes			Yes		
Delaware	Yes					
District of Columbia						Yes
Illinois					Yes	
Maine						Yes
Maryland					Yes	
Massachusetts	Yes		Yes	Yes		
Minnesota						Yes
Montana	Yes		Yes			
Nevada	Yes		Yes			
New Hampshire	Yes					
New Jersey					All hospitals report	
New Mexico						Yes
New York					Yes	
Ohio						Yes
Oklahoma	Yes					
Oregon			Yes	Yes	Yes	
Pennsylvania					All hospitals report	
Rhode Island					Yes	
South Carolina	Yes					
Tennessee	Yes			Yes		
Vermont	Yes					

State	Acute Care Hospitals	Pediatric Hospitals	ASCs	Other (LTC, Dialysis, etc.)	General Hospitals	Not specified
Virginia	Yes					

Washington					Yes	
West Virginia					Yes	

Appendix B: Survey for Non-Auditing States

1. Do you currently audit HAI reporting in your state?

2. If you do audit, may we contact you again later to discuss more specifics about this proposed audit methodology?

3. Do you plan to audit any of the reported HAI data in the next six months?

4. May we contact you again later to discuss more specifics about this proposed audit methodology?

5. If you do not plan to audit in the next six months, what led you to this decision?

6. If you are not auditing due to lack of resources, what resources would you need (e.g. more FTEs, staff with infection prevention experience, travel funds, etc.)?

7. How many FTEs do you currently have to implement mandatory reporting?

8. Did your state ever attempt to create a method for auditing facilities to validate reported data?

Appendix C: Survey for Auditing States

1. How do you select facilities to be audited?

2. How do you select procedures to be audited?

3. How do you select medical records to be audited?

4. What is the timing cycle of the audit (Do you visit every facility every year, every three years, variable depending on findings)?

5. What is the ratio of auditors to facilities?

6. Is the audit performed blinded?

7. What is the actual number of charts you review per as many units of time as they can tell you (e.g. per visit, per facility, per day, per year…)?

8. What are the error rates that you have found for specific variables?

Appendix D: Survey for Auditing States Results

Connecticut[3]

(Lauren Backman, RN, MHS, oral communication, June 2011)

1. How do you select facilities to be audited?

All acute care hospitals with adult ICUs and/or pediatric ICUs are audited each year.

2. How do you select procedures to be audited?

CLABSIs are the only procedure being audited.

3. How do you select medical records to be audited?

Due to the small number of facilities, the auditor completes chart audits on all patients with positive blood cultures in the ICUs reporting CLABSIs to the state health department. A list of eligible patients within each qualifying ICU was determined by obtaining microbiology laboratory records of those ICU patients who had a culture positive for a bloodstream infection during the study period, October 1, 2008 – December 31, 2008. The second audit occurred in the same fashion, during the study period of October 1, 2009 – December 31, 2009.

4. What is the timing cycle of the audit (Do you visit every facility every year, every three years, variable depending on findings)?

All facilities are audited from January through April.

5. What is the ratio of auditors to facilities?

One reviewer is present for all on-site audits at all facilities. This person is an NHSN-trained nurse microbiologist with 9 years of experience in infection control surveillance in National Nosocomial Infection Surveillance System hospitals.

6. Is the audit performed blinded?

The audit was performed using a blinded retrospective review of medical records.

7. What is the actual number of charts you review per as many units of time as they can tell you (e.g. per visit, per facility, per day, per year…)?

As mentioned in question 3, all patients with positive blood cultures in the ICUs reporting CLABSIs to the state health department are reviewed.

8. What are the error rates that you have found for specific variables?

Hospital IPs had difficulty interpreting NHSN case definitions for CLABSIs. They had issues differentiating between a primary CLABSI and a secondary bloodstream infection. IPs had issues with the positive microbial culture and identification of LCBI 1 (recognized pathogen) and LCBI 2 (skin contaminant). Additional issues included a category of CLABSI rules such as minimum time period rule, patient transfer rule, the location of attribution rule, the two or more blood cultures drawn on separate occasion rule, the sameness of organism rule, and the 80% rule.

Maryland[7]

(Pam Barclay, M.A, email communication, June 2011)

1. How do you select facilities to be audited?

They audit all hospitals in the state.

2. How do you select procedures to be audited?

They only audit CLABSIs.

3. How do you select medical records to be audited?

They review 5 charts in ICUs falling in the top and bottom 11 (25th percentile) of their ranking list and 4 charts in all other ICUs. No more than one ICU per facility should be selected. For each selected ICU, a positive blood culture list was submitted for patients between July 1, 2008 and June 30, 2009.

4. What is the timing cycle of the audit (Do you visit every facility every year, every three years, variable depending on findings)?

The audit occurred from December 9, 2009 – January 8, 2010 and all hospitals were audited in this time.

5. What is the ratio of auditors to facilities?

A total of 5 IPs were used as auditors, but only 1 auditor was present at each facility.

6. Is the audit performed blinded?

Yes, the audit was blinded. The auditors did not know which cases were reported to NHSN.

7. What is the actual number of charts you review per as many units of time as they can tell you (e.g. per visit, per facility, per day, per year…)?

They review 5 charts in ICUs falling in the top and bottom 11 (25th percentile) of the ranking list and 4 charts in all other ICUs. No more than one ICU per facility should be selected.

8. What are the error rates that you have found for specific variables?

They did not find any specific trends in the audit. The sample size was extremely small –only 200 cases.

New York

(Carole Van Antwerpen, RN, BSN, CIC, oral communication, June 2011)

1. How do you select facilities to be audited?

All facilities are eventually audited (maybe not all done in one year). At least 90% of hospitals are audited each year. They utilize their administrative database to check for red flags at certain facilities and those are given priority. Also, facilities with high rates of HAI and low rates of HAI are selected with priority for auditing. A high rate means any rate that is higher than the average state rate. For example, if a Medical ICU state rate is 2.3 and a hospital rate is 6.3 (and is statistically higher than the state rate), that hospital will be placed in the priority group for the audit cycle. Low is the same process. Any facility that is statistically lower than state average will be placed in the priority group for the audit. Furthermore, facilities that are not audited the year before are at the top of the list for the next year.

2. How do you select procedures to be audited?

CLABSIs and SSIs (CABG, Hip, and Colon) were selected to be audited.

3. How do you select medical records to be audited?

Each SSI procedure (CABG, Hip, and Colon) is treated as a separate audit. Facilities selected for audit that perform any of these procedures will have an audit done on each. 9-18 records for each procedure are selected based on volume of procedures performed. Cases of SSI are selected from NHSN and controls are selected through the following methods: hip replacement/colon SSI in NY State Wide Planning and Research Cooperative System (SPARCS) not in NHSN, CABG SSI in Cardiac Surgical Reporting System (CSRS) not in NHSN, and random selection.

A line list of NHSN CLABSI was taken for each facility along with a laboratory list of positive ICU blood cultures. A minimum of 5 records per ICU were checked (additional records if low reporting or % of ICU beds) based on patient records for the most recent ICU positive bloods. There was more under reporting in ICUs than over reporting based on audit results.

Each facility is given a time frame to report their line list and positive blood culture list for their ICU(s). This time frame depends on the size of the facility (larger facilities need smaller time frame because they have larger numbers, but smaller facilities may need a larger time frame to have enough data to audit). For 2010, they increased the number of medical records to be audited to 20. If a facility has only one type of ICU then they review 20 records. If a facility has two ICU types then they review 10 records from each ICU type and if there are more than two ICU types they review 5 records from each.

4. What is the timing cycle of the audit (Do you visit every facility every year, every three years, variable depending on findings)?

At least 90% of hospitals were audited each year. External Data Procedure Chart Review process began in 2007 and is done annually to perform on-site hospital audits.

5. What is the ratio of auditors to facilities?

In addition to Carole, 5 IPs were used as auditors, but only 1 auditor was present at each facility. Each of the 5 IPs is responsible for 35-39 hospitals in a specific region of the state and must coordinate audits and resolve internal data discrepancies. Carole is responsible for roughly 9 facilities in the capital region of the state.

6. Is the audit performed blinded?

For 2007 and 2008 audits, the auditors were completely blind and carried an envelope that had the results (they checked their results with the envelope after the audits were completed). Now, they are not completely blinded but Carole said each auditor probably doesn't know the results because of the case-control style. The auditors are not printing out the results and checking it that way.

7. What is the actual number of charts you review per as many units of time as they can tell you (e.g. per visit, per facility, per day, per year…)?

Anywhere from 9-18 charts are reviewed at each facility for SSI procedures (depending on volume of procedures done) and 20 charts are reviewed at each facility for CLABSIs.

8. What are the error rates that you have found for specific variables?

In 2007, the most prevalent error rates for SSIs were for wound class (18%) and procedure duration (53%). ASA score had an associated error rate of 9% in 2007. In adult and pediatric ICUs in 2008, surgical ICU types had the highest associated percent of underreporting at 7.5% (6/80).

Pennsylvania

(Zeenat Rahman, MBBS, MPH, oral communication, June 2011)

1. How do you select facilities to be audited?

Only 24 of roughly 250 acute care hospitals could be selected (about 10%) due to resource issues (money). The selection of these facilities was based on reports of SIRs. Those facilities with the highest and lowest SIRs were audited.

2. How do you select procedures to be audited?

Only CLABSIs and CAUTIs were selected to be audited.

3. How do you select medical records to be audited?

A total of 12 hospitals were audited for CAUTI and another 12 hospitals were audited for CLABSI. They selected 8 charts to be audited at each setting.

CLABSIs: A list of positive blood cultures during a specified study frame (calendar year 2009) was used to select every 5th record until 8 records were selected for the audit. This target list was cross-referenced against the CLABSI line list (which was sent by the facility to the state health department) to be sure that at least one patient on the target list was reported to NHSN. If none of the 8 records from the target list was reported to NHSN they crossed off that record and used the 5th patient following that one until at least one patient on the target list was reported to NHSN by the hospital.

CAUTIs: A list of positive urine cultures during calendar year 2009 was used to select every 5th record until 8 records were selected for the audit. This target list was cross-referenced against the CAUTI line list (which was sent by each facility to the state health department) to be sure that at least one patient on the target list was reported to NHSN. If none of the 8 records from the target list was reported to NHSN they crossed off that record and used the 5th patient following that one until at least one patient on the target list was reported to NHSN by the hospital.

4. What is the timing cycle of the audit (Do you visit every facility every year, every three years, variable depending on findings)?

They do plan to eventually audit each of the facilities, but there is no set time line for this to occur. They plan to have another round of data validation through their consultants (APIC) this fall (2011). Again, it will be 24 hospitals but not the same hospitals from the previous round. In addition, staff members from their Quality Assurance office are performing chart audits as an on-going process.

5. What is the ratio of auditors to facilities?

They contracted with APIC who brought in 4 CIC IP auditors from out of the state. They were divided up so that only 1 auditor went to a facility at a time.

6. Is the audit performed blinded?

Yes, the auditors only knew whether or not they were auditing CLABSIs or CAUTIs, but they did not know if the cases they were auditing were reported to NHSN. They had a sealed envelope with the reporting status of the cases, but they did not open this until completion of the audit.

7. What is the actual number of charts you review per as many units of time as they can tell you (e.g. per visit, per facility, per day, per year…)?

They could only audit 8 charts per facility (that is the amount of records the auditor could do in one day).

8. What are the error rates that you have found for specific variables?

A total of 192 patient records (96 of each HAI type) were examined. One CAUTI excluded due to a clerical error. Among examined CLABSIs reported to NHSN, 27% did not meet NHSN surveillance criteria; for examined CAUTIs the percentage was 37%. Among charts examined from patients with positive cultures but not reported to NHSN, 3% of bloodstream infections met criteria for CLABSI and 7% of urinary tract infections met criteria for CAUTI. The overall agreement of chart audits with data entered into NHSN was 86%.

South Carolina

(Lisa Smith, RN, BSN, CIC, Infection Preventionist and Stanley Ostrawski RN, MS, MT (ASCP), Infection Preventionist, oral communication, June 2011)

1. How do you select facilities to be audited?

Initially all facilities were audited (which was roughly 65), now they audit 60/75 current hospitals per year (achievable goal based on resources). With the 60, they want to look at facilities with outliers/red flags (if a facility has done 100 procedures with no SSIs, for example). They want to leave out the small facilities that only have performed a few procedures.

2. How do you select procedures to be audited?

SSIs (hip, knee, CABG and abdominal hysterectomies in all hospitals and colon surgeries for facilities with less than 200 beds) and CLABSIs were selected to be audited.

3. How do you select medical records to be audited?

The facility should fax a list of medical records to be pulled for each procedure. The SSI and CLABSI cases should be pulled for easy access (the control records should be pulled as well). ICD-9 codes can be searched within the medical records to ensure you are viewing records from the specified time frame of interest. For CLABSIs, all positive blood cultures from the time period should be available.

The medical records selected to be audited depends heavily on how many procedures a facility does in study time period. If a hospital only does 20 procedures then they will audit all 20 of these charts. However, large teaching hospitals will require 2-3 days of auditing. Small hospitals can take half a day to one full day to complete an audit. The total number of charts selected is variable from facility to facility and depends heavily on what the auditor can get done in a day (can run into issues at a facility that can take extra time).

If there are a large number of charts, they use a stratified random method to select charts to audit. First, they run a line listing of the procedures performed during the validation period by using the NHSN analysis package. Once they decide on the total number of charts to review, they pick a random number (n) and use that as the starting point on the list, and pick every n^{th} chart for review. For example, if 100 procedures were done, and 10 charts are to be reviewed, they would pick every 10^{th} chart (100/10). So they pick a random number from 1-10 (computer generated or manually picked) and go down the list.

4. What is the timing cycle of the audit (Do you visit every facility every year, every three years, variable depending on findings)?

The target of 60 hospitals is to be completed by the end of one year.

5. What is the ratio of auditors to facilities?

Two auditors are used to complete all 60 facilities. If the facility is small only one of the two will perform the audit. However, if the hospital is large (greater than 500 beds) both auditors will visit the facility to perform the audit.

6. Is the audit performed blinded?

No, they don't have enough resources (time and staff) to set that up.

7. What is the actual number of charts you review per as many units of time as they can tell you (e.g. per visit, per facility, per day, per year…)?

Roughly 20-30 charts are audited per visit, but it is variable depending on the size of the facilities and the number of procedures done at each facility.

8. What are the error rates that you have found for specific variables?

There are no specific error rates, but they did mention a few variables that raised issues: duration time, wound class, SSIs clean vs. clean-contaminated, ASA scores.

Washington

(David Birnbaum, PhD, MPH, email communication, June 2011)

1. How do you select facilities to be audited?

The annual internal validation component (performed by each hospital using the instructions provided by the Washington State Health Department's Healthcare Associated Infections Program) is done to determine if cases that should be reviewed are being reviewed. The Washington State Health Department's Healthcare Associated Infections Program will confirm the internal (hospital) validation through external validation verification for poor internal validation results or by random spot-checks. This is done to determine if NHSN definitions are applied correctly by the hospitals. The internal validation verification visit is done by selecting facilities with problematic results from the internal assessment and selecting others randomly for spot checks. They do not call these audits, since they want to promote a collaborative quality improvement relationship rather than regulate per se.

2. How do you select procedures to be audited?

Only CLABSIs are currently audited. Their reporting mandate currently covers CLABSIs and VAP but there is no way to audit VAP procedures. They intend to develop an SSI component later this year and introduce it in 2012-2013.

3. How do you select medical records to be audited?

For internal validation: select 22 cases that meet CLABSI criteria and 22 cases that do not meet CLABSI criteria and audit. Hospitals pass if 17 or more of the 22 cases are true positives. Hospitals fail if only 15 or fewer cases are true positives. Hospitals are not failed but will need to be verified by a site visit if they correctly recognize 16 of the 22 cases. Furthermore, hospitals pass if their specificity determination shows no more than 1 case misidentified as a false positive; fail if 3 or more are incorrectly identified; and are not failed but need to be verified by an on-site visit if they misidentify 2 cases as false positives.

External validation is done for random spot checking or because of poor internal validation.

External Validation:

Facility needs to provide:

1. A list from their laboratory of every consecutive patient who had any blood culture positive for any organism, for a total of 40 patients fitting that hospital's surveillance program profile (could be positive blood cultures from all patients, all in-patients, all ICU patients… depends on each individual hospital's surveillance practices – use the

same filter criteria that the hospital applied to define the group of patients from which they pulled their sample for the internal validation process), starting with two months ago and moving backward in time. If the requisite number of cases cannot be achieved within a 24 month span, limit the list to 24 months and include every patient with positive blood culture.

2. A list from medical records of all patients with central-line-associated bloodstream infection noted in their discharge abstract, starting with patients discharged two months ago and moving backward in time as long as necessary to match the time period defined.

On the day of the verification visit:

a. Review the clinical record for any patient records in which the discharge abstract indicated central-line associated bloodstream infection (ICD9 code 999.31). Make a list of those that would satisfy NHSN criteria versus those that would not.

b. Review the clinical record for the 40 patients the laboratory has identified as having a positive blood culture. Decide which of those records satisfy NHSN criteria to code as a central-line associated bloodstream infection.

i. If this is a spot-check and there have been no indications of problems, then start with 20 randomly selected charts, initially drawing from among the records in (a); if no specificity (false-positive misclassification) errors and no more than 5 sensitivity (false-negative misclassification) are revealed upon comparing your list with the infection surveillance program's line-list, stop there and record the result as acceptable (the program appears to achieve the 85% sensitivity and 98% specificity expected). If 3 or more specificity errors, or 9 or more sensitivity errors were detected, stop and record the result as unacceptable. For anything in between, continue with another 20 records. If 3 or fewer specificity and 12 or fewer sensitivity errors are found among the 40 records, record the result as acceptable; if 4 or more specificity or 13 or more sensitivity errors are found among the 40, record the result as unacceptable.

ii. If this is a follow-up due to results of an internal validation result or prior validation verification visit, then start with 20 randomly selected charts, initially drawing from among the records in (a); if no specificity (false-positive misclassification) errors and no more than 3 sensitivity (false-negative misclassification) are revealed upon comparing your list with the infection surveillance program's line-list, stop there and record the result as acceptable (the program appears to achieve the 85% sensitivity & 98% specificity expected). If 2 or more specificity errors, or 7 or more sensitivity errors were detected, stop and record the result as unacceptable. For anything in between continue with another 20 records. If 1 or fewer specificity and 11 or fewer sensitivity errors are found among the 40 records, record the result as acceptable; if 2 or more specificity or 12 or more sensitivity errors are found among the 40, record the result as unacceptable.

Compare the lists created in (a) and (b) with the infection events that were reported through NHSN (reported according to our NHSN data listing) in order to check for discrepancies.

4. What is the timing cycle of the audit (Do you visit every facility every year, every three years, variable depending on findings)?

Every facility is required to perform internal validation every year. Timing for validation verification visits is variable depending on findings.

5. What is the ratio of auditors to facilities?

There are currently 62 hospitals reporting CLABSIs and the internal validation component takes less than 6 hours to complete per year. It takes 1 day per year to complete the validation verification visit. This process is done by one experienced ICP to be able to read and abstract charts reliably. There is one such person in Washington (in addition to David) who can do this and they have another new hire shadowing this person to gain experience.

6. Is the audit performed blinded?

Auditors bring a line list of all cases reported to NHSN by the hospital they visit. After reviewing each chart and drawing their own conclusion, there are places on Worksheet A and Worksheet B to indicate whether they found that particular case on the ICP's line list (or other internal documentation) as proof they did review that case, and whether they found that particular case on the NHSN line list as a CLABSI event they reported. Therefore, it is somewhat vague as to whether or not the audit is blinded because the auditor doesn't look at whether a record was reported to NHSN as a CLABSI event until after they review the charts and draw their own conclusions. However, they do know this information during the visit albeit after they make their own decision.

7. What is the actual number of charts you review per as many units of time as they can tell you (e.g. per visit, per facility, per day, per year…)?

See detailed response to #3 for specific number of charts reviewed per facility.

8. What are the error rates that you have found for specific variables?

They cannot give out error rates because of confidentiality provisions in the state law and the quality improvement nature of this activity.

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