



Business Case for National Healthcare Safety Network (NHSN) Infection Surveillance Database

Executive Summary

All hospitals understand the value of preventing healthcare-associated infections (HAIs) and have created infection control programs to track, manage and reduce them. Despite these efforts, HAIs remain a major cause of morbidity and mortality and excess medical cost in the United States. An estimated five to ten percent of all hospital admissions are complicated by HAIs.

The Centers for Disease Control and Prevention (CDC) provides a set of surveillance definitions and a database called the National Healthcare Safety Network (NHSN) for collecting healthcare-associated infection surveillance data at no charge to hospitals. Efforts are underway at the CDC to strengthen and extend capacity for HAI surveillance and prevention by encouraging hospitals to use NHSN as their HAI infection surveillance data collection system.

The CDC's Division of Healthcare Quality Promotion is administering a federal-state cooperative agreement program, funded by the American Recovery and Reinvestment Act (ARRA), which is designed to improve surveillance and prevention efforts. The ARRA funds provided to the Wisconsin Division of Public Health (DPH) have created new resources to provide training and technical assistance to help Wisconsin hospitals with the adoption of NHSN for HAI data collection.

The state-specific and national-level HAI surveillance data are vital for quantifying the prevalence of HAIs, identifying prevention priorities and evaluating the impact of prevention efforts. It is assumed that these definitions will need to be used in a standardized way by all hospitals in the US at some point in the future. Currently 21 of 30 states with mandatory reporting of healthcare-associated infections require the use of the CDC NHSN system to compile information on these infections and are able to use the reporting function to track trends and for benchmarking. With the assistance now available from the Wisconsin DPH, hospitals in the state have an opportunity to transition to the NHSN HAI surveillance system which will provide the ability to report on HAI quality measures that may be required by the Centers for Medicare & Medicaid Services (CMS), The Joint Commission and other government bodies now and in the future.

In addition to the reporting referenced above, NHSN provides:

- Free system with a more automated approach to surveillance
- Standardized surveillance with consistent case definitions
- Benchmarking: National, state, local
- Real-time analytics within system
- Local support for training and technical assistance
- Protocols for each module
- Detailed tables of instruction
- Data collection forms to help you collect what you need throughout your monthly surveillance
- Help functionality incorporated into system to provide case definition answers as you enter data.



Business Case for National Healthcare Safety Network (NHSN) Infection Surveillance Database

Project Description

The project is to implement the NHSN infection surveillance database as the method for compiling HAI surveillance data collected by infection preventionists (IPs) in hospitals. The data compiled will be used for measuring rates of HAIs in the hospital, tracking HAI trends, and will allow for risk-adjusted comparisons to national benchmarks.

Business Need

There is a business need for hospitals to prepare for how they will demonstrate their performance on HAI quality measures. Currently there is no federal HAI reporting mandate, but on March 23, President Obama signed HR 3590, the Patient Protection and Affordable Care Act, which includes several infection prevention provisions, such as:

- Hospital value-based purchasing program that includes certain HAIs as quality measures
- One-percent payment penalty for hospitals in the top quartile for hospital-acquired condition rates
- Payment bundling pilot program that includes HAI incidence and reducing hospital readmissions among quality measures.

In addition, the proposed expansion plan for CMS's Reporting Hospital Quality Data Annual Payment Update (RHQDAPU) program for prospective payment system (PPS) hospitals (non-critical access) that was published in the Federal Register on May 4, 2010, includes HAI-related quality measures for FY 2013 payment determinations. The proposal is that hospitals use the NHSN infrastructure to report measures for central line-associated bloodstream infections and surgical site infections for use in their payment determination and for public reporting purposes.

The WI DPH was funded by the 2009 American Recovery and Reinvestment Act for 2010-2011 to provide technical assistance to hospitals adopting the NHSN and to expand prevention collaboratives for hospitals to support their HAI reduction and prevention efforts. Data collected in the NHSN system will be used to track these Wisconsin improvement initiatives, and will meet the future reporting requirements of the federal government.

Goal/Scope

The goal of the project is to collect infection surveillance data according to the standardized definitions and enter them into NHSN for monitoring HAI incidence and prevalence data. Once data is entered, the system will provide reports for infection control committees, physician peer review and other quality management functions. The data are primarily acquired through active surveillance, including microbiology report review and chart review by IPs in hospitals and by direct observation of hospital practices – it cannot be obtained from coding.

NHSN Components

Hospitals may select their level of participation from the following NHSN modules for collecting HAI surveillance data.

- Patient safety
 - Device-associated module
 - Central line-associated bloodstream infection (CLABSI)
 - Central line insertion practices adherence (CLIP)
 - Ventilator-associated pneumonia (VAP)
 - Catheter-associated urinary tract infection (CAUTI)
 - Dialysis event (DE)
 - Procedure-associated module
 - Surgical site infection (SSI)
 - Post-procedure pneumonia (PPP)
 - Medication-associated module (currently being revised)
 - Antimicrobial use and resistance options (AUR)
 - MDRO/CDAC module
 - Multidrug-resistant organisms/*C. difficile*-associated disease
 - High risk inpatient influenza vaccination
- Healthcare personnel safety
 - Staff influenza vaccination
 - Blood and body fluids exposure
- Biovigilance
 - Hemovigilance

Reporting Requirements

- Submit a monthly reporting plan to inform CDC which modules, if any, will be reported that month
- Submit data for at least one module for at least six months each calendar year
- Complete an annual facility survey
- Follow the data collection protocols for selected modules exactly, reporting complete and timely data
- Agree to report outbreaks identified by the surveillance system to the state health department if contacted by CDC

Resources and Commitment Required

Building the data collection systems for loading the appropriate information into this database can require an investment in vendor software interfaces, IT staff time and computer hardware, plus active data collection by trained IPs who will do the analysis and reporting. Data entry into NHSN can be done by administrative staff, but will require time for those staff members to complete required online training modules and enrollment into the system.

Criteria for NHSN Use

- Be a bona fide healthcare facility in the United States
- Have email addresses for NHSN users and high-speed Internet access on the computers
- Be willing to follow the selected NHSN component protocols and report complete and accurate data in a timely manner
- Be willing to share such data with CDC
- Be able to provide written consent for participation in the NHSN by a member of the facility's chief executive leadership (e.g., Chief Executive Officer)

Minimum System Requirements

- 1 GHz equivalent or greater Intel Pentium III processor
- 128 MB of RAM
- Windows 98
- Email account
- High-speed internet access (greater than 200 Kbs)
- 500 MB available disk space
- Microsoft Internet Explorer 6 or higher

Staffing Considerations

- Infection Preventionists trained in infection surveillance to lead case finding efforts, train others who will help collect data (e.g., device days for CLABSI), be a local expert in NHSN definitions and surveillance methods, enter case information as needed, run reports and analyze resulting NHSN data outputs. Most of these activities are part of any IP's surveillance responsibilities, but using NHSN may expand the time commitment. A 2009 article by Stone et al on infection control program structure in the *American Journal of Infection Control* indicated based on a nationwide survey of NHSN users that infection preventionists spend about fifty percent of their time performing infection surveillance activities.
- Administrative support staff can help with the entry of infection numerator and denominator information. The system is intuitive and data entry can be accomplished by someone other than a trained IP as staffing models allow. This frees an IP up to be able to focus on infection surveillance, education and prevention activities.
- IT support staff are a valuable resource for NHSN users, assisting in loading each user's digital certificate and creating backup copies, translating IP software needs with vendor application builders, and building custom reports to help with NHSN interfaces.

Training

Staff training on NHSN surveillance methodology, definitions and data entry is provided free via a hybrid of CDC-archived webcasts and standalone slidesets that are available in real-time from any computer. Required courses include the majority of the available modules in order to give users a well-rounded understanding of the system. Estimated training time for completing all of the required modules is 10 to 14 hours.

Local resources to support NHSN are available through the Wisconsin Division of Public Health, including:

- A dedicated staff position;
- Enrollment, training and technical assistance; and
- Teleconferences, webinars, shared desktops and on-site visits.

Data Entry

We estimate between five and 15 minutes to enter each numerator, although this depends on the specific module being used, patient volume, the presence of a direct electronic interface and how easily accessible the required data elements are within various hospital systems. The device-associated module denominators consist of daily collection of patient days and device days, with only the monthly total entered into the NHSN system. The procedure-associated module requires that every procedure performed for that particular month that is under surveillance (e.g., all hip arthroplasties) be entered, including more detailed operation information fields, which will take more of a data entry time commitment. If a report can be easily translated into an Excel standard file format, possibly with help from an IT staff member, the procedures for denominators can be imported quickly and easily.

Data Output

The NHSN system has a built-in data analysis tool package, allowing for real-time analytics using CDC's canned reports (rate tables, frequency tables, control charts, etc.). Once the data is entered into NHSN, any NHSN user can run reports, using CDC's set configurations or modifying them to include filters or custom results. To begin the process, an IP should be involved in evaluating which reports are most useful, but after that point, administrative staff who perform data entry could also be used to help run the reports and prepare them for meetings and presentations. This data can also be exported into Excel, SAS and Access if an in-house analyst would like to perform more in-depth analytics.

Note on Staffing Resources

The national Association for Professionals in Infection Control and Epidemiology (APIC) recently developed an *IP Program Evaluation Tool* in a CD-rom format to evaluate the resources needed to support a hospital infection prevention program. It was made available to APIC members in the spring 2010 edition of *The Prevention Strategist*.

Data Protection

NHSN is a secure, Internet-based surveillance system. CDC's confidentiality protections are summarized as follows: "The information obtained in this surveillance system that would permit identification of any individual or institution is collected with a guarantee that it will be held in strict confidence, will be used only for the purposes stated, and will not be disclosed or released without the consent of the individual, or the institution in accordance with Section 304, 306, and 308(d) of the Public Health Service Act (42 USC 242b, 242k, and 242m(d))."

The Wisconsin DPH Bureau of Communicable Diseases and Emergency Response (BCDER) Data Use and Confidentiality Agreement will protect data that is shared with the State when conferring rights in NHSN. The agreement provides for hospital-level information contained in NHSN or other infection surveillance data systems to be shared with BCDER for the infection prevention purposes of the Healthcare-Associated Infections Prevention Project

Business Impact

According to NHSN users, advantages to participating in NHSN include:

- You have the backing of the CDC.
- Your rates can be risk stratified by infection type, hospital type, unit type, unit size and procedure type so comparisons are made "apples to apples" with other like hospitals around the country.
- Provides clear definitions with detailed surveillance instructions and applicable flowcharts to guide classification so you have evidence to show why you are classifying an infection an infection. These definitions can be shared with committees and providers who have questions about how surveillance is being done and whether certain cases meet criteria.
- It is much easier to identify a problem when you have national rates and a p-value for comparison.
- An infection rate that is statistically significant sends a clear message to physicians and hospital staff.

Quotes from Hospitals Participating in NHSN

- "The benefit of the system is the ability to have comparative data from other facilities which can be used to gauge facility progress."
- "The ability to have risk-adjusted comparative rates has been very helpful for all stakeholders"
- "The use of statistical analysis and comparative rates has been extremely useful in the identification of problems, evaluating actions and to demonstrate success of interventions."

Benefits According to CDC

Data collected in NHSN are used for improving patient safety at the local and national levels. In aggregate, CDC analyzes and publishes surveillance data to estimate and characterize the national burden of healthcare-associated infections. At the local level, the data analysis features of NHSN that are available to participating facilities range from rate tables and graphs to statistical analysis that compares the healthcare facility's rates with national aggregate metrics.

Alternative Analysis

Infection surveillance data collected in hospitals using the NHSN definitions can be uploaded to the NHSN database through various methods. Costs and risks associated with these alternatives include investment in vendor software that may or may not be supported in the future or have NHSN interfaces.

Interfaces – Electronic Health Records and Commercial Infection Surveillance Software

Design of electronic health records and commercial infection surveillance software applications can include data interfaces with the NHSN system (several have already been built) to allow data fields to be populated automatically.

In 2009, CDC released an HL7 implementation guide to specify a standard format for electronic submission of HAI data to the NHSN. Since that time, multiple vendors and institutions have begun using that format to submit

HAI data directly to the CDC using this standard. At this time, only limited data can be submitted directly, including bloodstream infection events, procedures and denominator data, and SSI events. CDC is working to build additional capacity for accepting data for other modules. The vendors who participated in the 2007-2008 pilot activities for BSI and SSI reporting include MedMined™ from Cardinal Health, EpiQuest, ICPA (now BD Diagnostics), Premier, TheraDoc and Vecna Technologies.

Several of the proposed CMS Clinical Quality Measures for electronic submission by eligible hospitals (meaningful use certification requirements) can be captured in NHSN. These include:

- NQF 0140 – Ventilator-associated pneumonia for ICU and high-risk nursery patients
- NQF 0138 – Urinary catheter-associated infection for ICU patients
- NQF 0139 – Central line catheter-associated bloodstream infection rates for ICU and high-risk nursery patients

Note on Vendor Selection

APIC developed an *Infection Prevention and Control Surveillance Technology Assessment Tool* (March 2007), which provides questions and items to consider when shopping for an infection surveillance software vendor. This tool is available on APIC's website at

http://www.apic.org/AM/Template.cfm?Section=Search§ion=Educational_Tools&template=/CM/ContentDisplay.cfm&ContentFileID=7816.