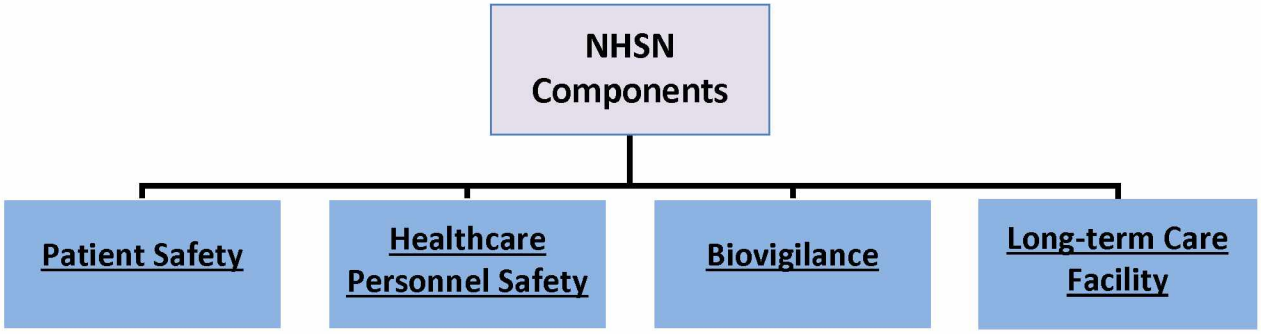
National Healthcare Safety Network (NHSN) Overview

The NHSN is a secure, Internet-based surveillance system that expands and integrates patient and healthcare personnel safety surveillance systems managed by the Division of Healthcare Quality Promotion at the Centers for Disease Control and Prevention. In addition, facilities that participate in certain reporting programs operated by the Centers for Medicare and Medicaid Services (CMS) can do so through use of NHSN. Some U.S. states utilize NHSN as a means for healthcare facilities to submit data on healthcare-associated infections (HAIs) mandated through their specific state legislation.

NHSN enables healthcare facilities to collect and use data about healthcare-associated infections, adherence to clinical practices known to prevent healthcare-associated infections, the incidence or prevalence of multidrug-resistant organisms within their organizations, trends and coverage of healthcare personnel safety and vaccination, and adverse events related to the transfusion of blood and blood products.

The NHSN includes four components: Patient Safety, Healthcare Personnel Safety, Biovigilance, and Long-term Care Facility (Figure).

Figure: NHSN Components



The Patient Safety Component includes 5 modules that focus on events associated with devices, procedures, or antimicrobial agents used during healthcare:

- Device-associated Module:
  - CLABSI – Central line-associated bloodstream infection
  - CLIP – Central line insertion practices adherence
  - CAUTI – Catheter-associated urinary tract infection
  - VAE – Ventilator-associated events (≥18 year old only)
  - VAP – Ventilator-associated pneumonia (<18 year old only)
  - DE – Dialysis Event
- Procedure-associated Module: SSI – Surgical site infection
- Antimicrobial Use and Resistance Module
- Multidrug-Resistant Organism and *Clostridium difficile* Infection (MDRO/CDI) Module
- Vaccination Module

Instructions and standardized surveillance methods and definitions for each module of the Patient Safety Component are provided in this manual, except Dialysis Event, and on the NHSN website (www.cdc.gov/nhsn). Modules may be used singly or simultaneously and each module has its own minimum time period for required participation (see individual protocols for details). Information on Dialysis Event surveillance is provided at http://www.cdc.gov/nhsn/psc_da_de.html.

There are two modules in the Healthcare Personnel Safety (HPS) Component of NHSN: Blood/Body Fluid Exposure Modules With or Without Exposure Management and the Influenza Vaccination and Exposure Management Modules. These modules may be used separately or simultaneously. Instructions and standardized surveillance methods and definitions for each module are provided in the NHSN Manual: HPS Component Protocol http://www.cdc.gov/nhsn/TOC_HPS_Manual.html .

The Biovigilance Component of NHSN was developed in collaboration with the transfusion and transplant communities. Biovigilance includes the collection of adverse event data to improve outcomes in the use of blood products, organs, tissues, and cellular therapies. The Hemovigilance Module is the first part of the Biovigilance Component to be developed in NHSN. This module is designed for staff in healthcare facility transfusion services to track adverse events, including recipient adverse reactions and quality control incidents, related to blood transfusion. Instructions and standardized surveillance method and definitions for this module are provided in the NHSN Manual: https://www.cdc.gov/nhsn/TOC-BIOManual.html.

Surveillance Techniques

Some of the options in the following modules require active, patient-based, prospective surveillance of events and their corresponding denominator data by a trained Infection Preventionist (IP). This means that the IP shall seek out infections during a patient's stay by screening a variety of data sources, such as laboratory, pharmacy, admission/discharge/transfer, radiology/imaging, and pathology databases, as well as patient charts, including history and physical exam notes, nurses/physicians notes, temperature charts, etc. Others may be trained to screen data sources for these infections, but the IP must make the final determination. Laboratory-based surveillance should not be used alone, unless all possible criteria for identifying an infection are solely determined by laboratory evidence (e.g., LabID event detection in the MDRO/CDI Module). Retrospective chart reviews should be used only when patients are discharged before all information can be gathered. NHSN forms should be used to collect all required data, using the NHSN definitions of each data field. To minimize the IP's data collection burden, others may be trained to collect the denominator data and process of care data (e.g., central line insertion and inpatient influenza vaccination information).

Procedure-Associated Module

Surgical site infection (SSI) monitoring is offered through a protocol in this module. This protocol requires active, patient-based, prospective surveillance (see Surveillance Techniques above). To minimize IPs' workload of collecting denominator data, operating room data may be downloaded (see file specifications at: http://www.cdc.gov/nhsn/PDFs/ImportingProcedureData_current.pdf).

Both post-discharge and ante-discharge surveillance methods should be used to detect SSIs following in- and outpatient operative procedures. These methods include 1) direct examination of patients' wounds during follow-up visits to either surgery clinics or physicians' offices, 2) review of medical records or surgery clinic patient records, 3) surgeon surveys by mail or telephone, and 4) patient surveys by mail or telephone (though patients may have a difficult time assessing their infections). Any combination of these methods is acceptable for use; however, CDC criteria for SSI must be used.

Device-Associated Module

Medical instrumentation increases the risk of development of an HAI and most patients admitted for health care are exposed to some kind of medical device in the course of their treatment. Such devices include, but are not limited to, venous and urinary catheters, and ventilators. NHSN enables facilities to monitor infectious complications associated with the use of these devices and also to monitor processes related to their use which might increase infection risk. Specifically, surveillance of central line-associated bloodstream infection (CLABSI), catheter-associated urinary tract infection (CAUTI), ventilator-associated events (VAE), and/or ventilator-associated pneumonia (VAP) is possible using

the NHSN. See Dialysis Event Protocol for detailed instructions for Dialysis Event (DE) surveillance (http://www.cdc.gov/nhsn/psc_da_de.html). In addition, central line insertion practices (CLIP) can be monitored to inform facilities of the appropriateness of their processes and how they may relate to HAI development.

Device-associated denominator data should be collected at the same time each day. When denominator data are available from electronic databases (e.g., ventilator days from respiratory therapy), these sources may be used as long as the counts are not substantially different (+/- 5%) from manually-collected counts that have been validated for a minimum of 3 months.

See the respective device-associated event protocols for detailed surveillance instructions.

Antimicrobial Use and Resistance (AUR) Module

The use of antimicrobial agents has a direct effect on antimicrobial resistance patterns of pathogens. The observed increase in multidrug resistance is in part due to inappropriate prescription of, as well as incomplete completion of, courses of antibiotics.

The AUR Module allows facilities to collect information on the amount of antimicrobials that are utilized for patient care within their systems, as well as to collect data on the prevalence of drug-resistant organisms in their inpatient and outpatient areas. Electronic capture of microbiology and pharmacy data is the available option for this module.

See the Antimicrobial Use and Resistance protocol for detailed surveillance instructions.

Multidrug-resistant Organism and *Clostridium difficile* Infection *(MDRO/CDI)* Module

The NHSN MDRO/CDI Module offers a means for facilities to meet criteria and metrics that are outlined in several organizational guidelines to control and measure the spread of MDROs and CDI within their healthcare system. The module has both required and optional surveillance activities that can be tailored to the needs of the facility. Infection surveillance and monitoring of proxy infection measures are choices available to facilities choosing to participate in this program within NHSN.

In addition, process measures related to adherence to contact precautions when caring for patients infected or colonized with an MDRO or *C. difficile*, and/or active surveillance testing for such organisms, or outcome measurements of incidence and prevalence of positive cultures of these organisms in patients can be undertaken.

See the MDRO/CDI protocol for detailed surveillance instructions.

Vaccination Module

Influenza continues to be associated with increased morbidity and mortality in certain patient populations including the very young, elderly, immunocompromised, and pregnant women. Hospitalization has been identified as a potential opportunity to provide influenza immunization not only to these at-risk individuals, but also to any patient.

The NHSN Vaccination module was **not updated for the 2012-2013** influenza season. However, the module will be available for use through 2013 as a means for facilities to track the success of capitalizing on influenza vaccination opportunities. Two options are available related to patient susceptibility and adherence to vaccination recommendations.

See the Vaccination protocol for detailed surveillance instructions.