# 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 (DHQP) 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. Furthermore, some U.S. states use 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 HAIs, adherence to clinical practices known to prevent HAIs, 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 five components: Patient Safety, Healthcare Personnel Safety, Biovigilance, Dialysis, and Long-term Care Facility (Figure 1).

Figure 1: NHSN Components
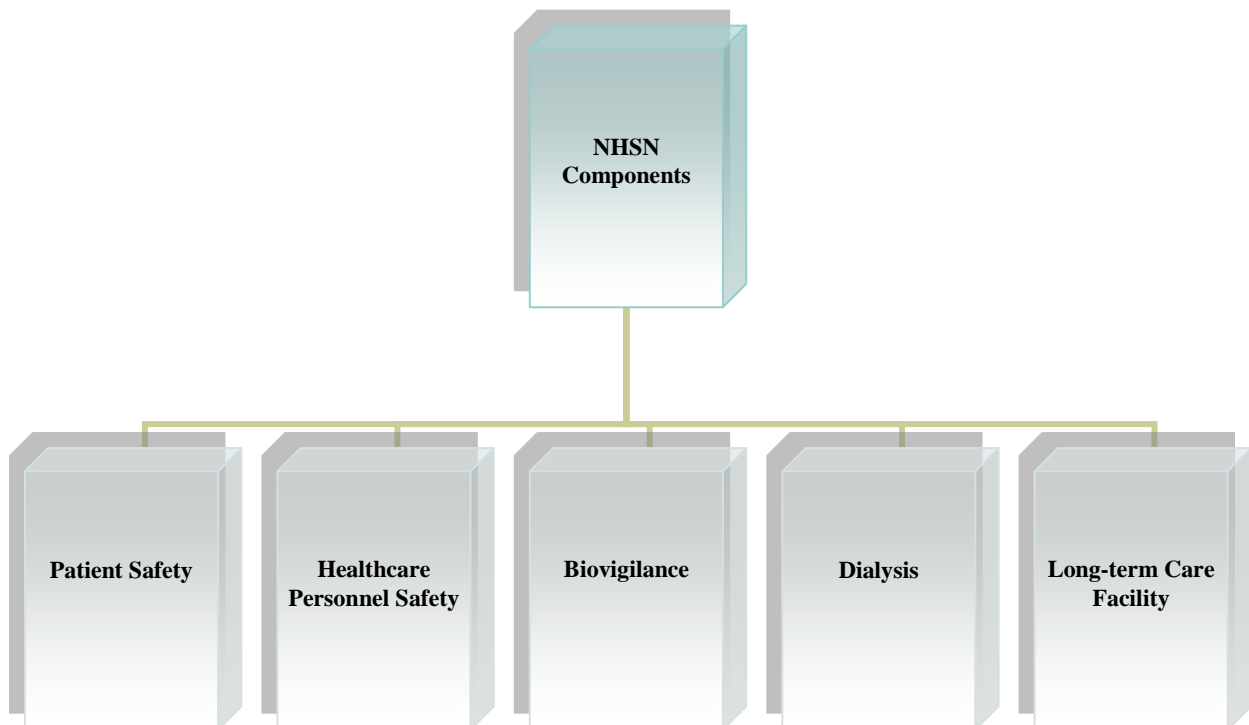
The **Patient Safety Component** includes four modules that focus on events associated with devices, procedures, antimicrobial agents used during healthcare, or multidrug resistant organisms.

- Device-associated Module:
    - o Bloodstream Infection (CLABSI – Central line-associated bloodstream infection)
    - o CLIP – Central line insertion practices adherence
    - o Urinary Tract Infection (CAUTI – Catheter-associated urinary tract infection)
    - o VAE – Ventilator-associated events (adult locations only)
    - o Pneumonia (VAP – Ventilator-associated pneumonia) - in pediatric locations (in-plan* or off-plan*), or NICU and adult locations (off-plan* only)
- Procedure-associated Module:
    - o SSI – Surgical site infection
- Antimicrobial Use and Resistance Module (AUR)
- Multidrug-Resistant Organism and *Clostridium difficile* Infection (MDRO/CDI) Module

*Note: "In-plan" surveillance means that the facility has committed to following the NHSN surveillance protocol, in its entirety, for that particular event, as shown in the facility's NHSN monthly reporting plan. "Off-plan" surveillance is surveillance that is done because a facility has decided to track a particular event for internal use. Data that are entered into NHSN "off-plan" are not included in NSHN annual reports or other NHSN publications. A facility makes no commitment to follow the NHSN protocol for "off-plan" events.

Instructions and standardized surveillance methods and definitions for each module of the Patient Safety Component are provided in this manual and on the NHSN website (www.cdc.gov/nhsn). Modules may be used singly or simultaneously.

Outpatient hemodialysis centers have several surveillance options tailored to their patients and setting in the Dialysis Component. Facilities that treat hemodialysis outpatients should refer to the Dialysis Component instructions and standardized surveillance methods and definitions at http://www.cdc.gov/nhsn/dialysis/index.html.

There are two modules in the Healthcare Personnel Safety (HPS) Component of NHSN: the Healthcare Personnel Exposure Module and the Healthcare Personnel Vaccination Module. 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/PDFs/HPS-manual/HPS_Manual-exp-plus-flu-portfolio.pdf.

The NHSN Biovigilance Component, Hemovigilance Module facilitates national surveillance of transfusion-related recipient adverse events. The Hemovigilance Module is designed for transfusion service staff to collect data on annual facility and transfusion service characteristics, individual reports on adverse transfusion reactions, errors or accidents associated with adverse reactions, and monthly counts of transfused or discarded components. The Hemovigilance Module surveillance protocol, training materials, data collection forms, instructions, and other supporting materials are provided on the Hemovigilance Module website: http://www.cdc.gov/nhsn/acute-care-hospital/bio-hemo/index.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 practices).

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 pre-discharge and post-discharge surveillance methods should be used to detect SSIs. Surveillance may include both inpatient and outpatient operative procedures. These methods include 1) direct examination of patients' wounds during hospitalization, or 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 applied.

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 Component for detailed instructions for Dialysis Event (DE) surveillance of hemodialysis outpatients (http://www.cdc.gov/nhsn/dialysis/index.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, or by weekly sampling methods for CLABSI and CAUTI surveillance (see the CLABSI and CAUTI protocols for guidance). 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 three 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 used 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 and reporting of microbiology and pharmacy data are the only available options for reporting data into 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 meet the needs of the facility. Laboratory-identified (LabID) Event and Infection Surveillance are available choices for participating NHSN facilities.

In addition, the following process measures are available: (1) adherence to hand hygiene; (2) adherence to contact precautions when caring for patients infected or colonized with an MDRO or *C. difficile;* and (3) adherence to active surveillance testing (AST) of MRSA and/or VRE. Active surveillance testing outcome measures is also available in locations where AST adherence is being performed, and enables facilities to use the results of AST to monitor the incidence and prevalence of positive MRSA and/or VRE cultures. See the MDRO/CDI protocol for detailed surveillance instructions.