HAI SURVEILLANCE AND DATA ANALYSIS FOR ACUTE CARE FACILITIES

Lacey Pavlovsky, MSN, RN, CIC, LTC-CIP, FAPIC

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What is Surveillance for an Infection Preventionist (IP)?

- Surveillance is an essential component of an effective infection prevention and control program[2] [3]
- Surveillance is a comprehensive method of
  - measuring outcomes and related processes of care
  - analyzing the data
  - providing information to members of the healthcare team to assist in improving those outcomes[1]

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Surveillance is Used to…

- Determine baseline and endemic rates of occurrences
- Detect and investigate clusters or outbreaks
- Assess the effectiveness of prevention & control measures
- Target & monitor performance improvement activities
- Observing practice to promote compliance with recommendations & standards [4]

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Why Do IP's Do Surveillance?

- Regulatory- CMS §483.80
- Part of a good Infection Control Program
- Monitor compliance to good infection control practices
- Trend infections
- Prevent Outbreaks
- Patient Safety

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Other Key Terms

- **Baseline:** The number or value used as the basis for comparison [4]
- **Endemic:** The usual presence of a disease or condition in a specific population or geographical area [4]
- **Epidemic:** An excess over the expected incidence of disease within a given geographical area during a particular time[4]
- **Pandemic:** A global outbreak of disease in humans that affects at least two continents and/or exceeds expected rates of morbidity and mortality[4]
- **Outbreak:** An increase in the occurrence of cases of infection or disease over what is expected in a defined setting or group in a specified time period. This is a synonym of epidemic but is used more often when limiting the geographic area. [4]
- **Cluster:** An aggregation of cases grouped by time and place that may be greater than the expected number, whether the expected number is known or not. This is also referred to as a small outbreak. [4]

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WHAT IS REQUIRED FOR SURVEILLANCE?

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CMS Medicare Requirements for Hospitals

- 482.42
- TAG: A-0747 §482.42 Condition of participation: Infection prevention and control and antibiotic stewardship programs.
- The hospital must have active hospital-wide programs for the surveillance, prevention, and control of HAIs and other infectious diseases, and for the optimization of antibiotic use through stewardship.
- The programs must demonstrate adherence to nationally recognized infection prevention and control guidelines, as well as to best practices for improving antibiotic use where applicable, and for reducing the development and transmission of HAIs and antibiotic-resistant organisms.
- Infection prevention and control problems and antibiotic use issues identified in the programs must be addressed in collaboration with the hospital-wide quality assessment and performance improvement (QAPI) program.

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CMS Medicare Requirements for Hospitals

- §482.42(c)(2)
- (2) The infection preventionist(s)/infection control professional(s) is responsible for:
  - §482.42(c)(2)(i) TAG: A-0772
    - (i) The development and implementation of hospital-wide infection surveillance, prevention, and control policies and procedures that adhere to nationally recognized guidelines.
  - §482.42(c)(2)(ii) TAG: A-0773
    - (ii) All documentation, written or electronic, of the infection prevention and control program and its surveillance, prevention, and control activities

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CMS Medicare Requirements for Hospitals

- §482.42(a) (a) Standard: Infection prevention and control program organization and policies. The hospital must demonstrate that:
- §482.42(a)(3)
  - TAG: A-0750
    - (3) The infection prevention and control program includes surveillance, prevention, and control of HAIs, including maintaining a clean and sanitary environment to avoid sources and transmission of infection, and addresses any infection control issues identified by public health authorities

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CMS Medicare Requirements for Hospitals

- §482.42(c)
- (c) Standard: Leadership responsibilities.
- §482.42(c)(1)
  - (1) The governing body must ensure all of the following:
  - §482.42(c)(1)(i)
    - TAG: A-0770
      - (i) Systems are in place and operational for the tracking of all infection surveillance, prevention, and control, and antibiotic use activities, in order to demonstrate the implementation, success, and sustainability of such activities

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Joint Commission Requirements

- IC.01.01.01: The hospital identifies the individual(s) responsible for the infection prevention and control program
  - EP 1: The hospital identifies the individual(s) with clinical authority over the infection prevention and control program.
  - EP 4: For hospitals that use Joint Commission accreditation for deemed status purposes: The individual with clinical authority over the infection prevention and control program is responsible for the following:
    - Developing and implementing hospitalwide infection surveillance, prevention, and control policies and procedures that adhere to nationally recognized guidelines
    - Documenting the infection prevention and control program surveillance, prevention, and control activities
    - Communicating and collaborating with the quality assessment and performance improvement program on infection prevention and control issues
    - Training and educating staff, including medical staff, on the practical applications of infection prevention and control guidelines, policies, and procedures
    - Preventing and controlling health care–associated infections, including auditing of adherence to infection prevention and control policies and procedures by hospital staff, including medical staff
    - Communicating and collaborating with the antibiotic stewardship program [17]

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Joint Commission Requirements

- IC.01.03.01: The hospital identifies risks for acquiring and transmitting infections.

- EP 3: The hospital identifies risks for acquiring and transmitting infections based on the following:
- Its geographic location, community, and population served
- The care, treatment, and services it provides
- The analysis of surveillance activities and other infection control data[17]

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Joint Commission Requirements

- IC.02.01.01
- EP 1: The hospital implements its infection prevention and control activities, including surveillance, to minimize, reduce, or eliminate the risk of infection.
- EP 8: The hospital reports infection surveillance, prevention, and control information to the appropriate staff within the hospital.
- EP 9: The hospital reports infection surveillance, prevention, and control information to local, state, and federal public health authorities in accordance with law and regulation. [17]

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TITLE 173 - COMMUNICABLE DISEASES[19]

TITLE 173 - COMMUNICABLE DISEASES

CHAPTER 1 - REPORTING AND CONTROL OF COMMUNICABLE DISEASES

1-001 SCOPE AND AUTHORITY: These regulations apply to the content, control, and reporting of communicable diseases, poisonings, and organisms pursuant to the provisions of Neb. Rev. Stat. §§ 71-501 to 71-514.05, 71-531 to 71-532, and 71-1626.

1-002 DEFINITIONS: When terms are used in 173 NAC 1, the following definitions apply:

Adult HIV Confidential Case Report Form means a CDC form for reporting HIV in adult patients to the Department. The form is available for download on the Department Website at http://dhhs.ne.gov/publichealth/epi/Pages/ReportableDiseases.aspx or by email request at dhhs.epi@nebraska.gov.

Advanced practice registered nurse (APRN) means a registered nurse who holds a current APRN license as a Certified Nurse Midwife, Certified Registered Nurse Anesthetist, Clinical Nurse Specialist, or Nurse Practitioner.

Antibiotic susceptibility registry is the secured online database of susceptibilities of bacterial isolates to antimicrobial drugs reported to the state electronically by laboratories and stored in NEDSS (see NEDSS definition below).

Case means an instance of a suspected or confirmed disease or condition in a person or animal.

CDC means the Centers for Disease Control and Prevention.

CMS means Centers for Medicare and Medicaid

Communicable disease, illness, or poisoning means an illness due to an infectious or malignant agent, which is capable of being transmitted directly or indirectly to a person from an infected person or animal through the agency of an intermediate animal, host, or vector, or through the inanimate environment.

1-004 REPORTABLE DISEASES, POISONINGS, AND ORGANISMS: LISTS AND FREQUENCY OF REPORTS: The following diseases, poisonings, and organisms are declared to be communicable or dangerous or both to the public. Incidents of diseases, poisonings, and organisms must be reported as described in 173 NAC 1-004.01 through 1-004.03, 1-005, and 1-006.

1-004.01 Immediate Reports

1-004.01A The following diseases, poisonings, and organisms must be reported immediately:

Anthrax (Bacillus anthracis) *^

Botulism (Clostridium botulinum) *^

Brucellosis (Brucella abortus ^, B. melitensis ^, and B. suis ^*)

Carbapenamase-Resistant Enterobacteriaceae (suspected or confirmed) **^ (not to include Proteus or Providencia species or Morganella morganii)

Cholera (Vibrio cholerae) ^

Coccidiodomycosis (Coccidioides immitis/posodasii)

Diphtheria (Corynebacterium diphtheriae)

Eastern equine encephalitis (EEE virus) *^

Food poisoning, outbreak-associated

Glanders [Burkholderia (Pseudomonas) mallei *^

Haemophilus influenzae infection (invasive disease only) ^

Hantavirus pulmonary syndrome (Sin Nombre virus)

Hemolytic uremic syndrome (post-diarrheal illness)

Hepatitis A (IgM antibody-positive or clinically diagnosed during an outbreak)

Hepatitis B infection (positive surface antigen tests, e antigen tests, and all IgM core antibody tests, both positive and negative)

Hepatitis E

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DEPT. OF HEALTH AND HUMAN SERVICES

MEMO

Jim Pillen, Governor

To: Clinicians, Healthcare Facilities, & Laboratories

From: Tim Tesmer, M.D., Chief Medical Officer

Date: May 29, 2024

RE: Public Health Reporting Updates for Congenital CMV, Alpha-Gal Syndrome, & *Candida auris*

Reporting *Candida auris* in Nebraska: First identified in 2009, *Candida auris* (*C. auris*) poses a significant public health threat due to its emergence as an antimicrobial-resistant yeast. Its resistance to multiple classes of antifungal medicines leaves healthcare providers with limited or no options for treatment, particularly in immunocompromised patients who are more vulnerable to infections. The rapid progression of infections in these patients can lead to severe outcomes contributing to high morbidity and mortality rates. Additionally, *C. auris* demonstrates a unique ability to persist in healthcare environments and colonize patients' skin, facilitating rapid transmission within healthcare settings. This resilience and transmissibility can result in serious and prolonged outbreaks, underscoring the urgent need to make reporting of *Candida auris* mandatory. Such reporting would enable early detection, prompt intervention, and effective control measures to mitigate the spread and impact of this pathogenic fungus. Although still relatively rare in the United States, the incidence of *C. auris* has been steadily increasing nationwide, with 8,131 cases reported in 2022 compared with just 323 cases in 2018. Nebraska, traditionally considered a low-incidence state with no previous detection of *C. auris* transmission, has seen a notable shift in 2024. Nebraska has reported 5 cases of *C. auris* in 2024, indicating a concerning trend of emerging infections even in regions previously considered less affected by this pathogen.

C. auris DNA testing by NAAT (both positive and negative), C. auris isolation and culture, and C. auris antimicrobial susceptibility testing should be immediately reported to the Nebraska Department of Health and Human Services, Division of Public Health, within 24 hours of testing. All positives require reporting regardless of method of reporting. Please see Electronic Lab Reporting (ELR) in Nebraska for onboarding instructions for reporting.

Available at:
https://dhhs.ne.gov/epi%20docs/PHMEMO_5_29_24_MD.pdf

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TITLE 173 - COMMUNICABLE DISEASES[19]

1-004.06 Healthcare Associated Infections (HAIs): Healthcare Associated Infections (HAIs) that are reported by healthcare facilities to CDC's NHSN are reportable. If a healthcare facility provides access to NSHN Healthcare Associated Infection (HAI) data to the department and its local public health department and Healthcare Associated Infections (HAIs) are reported to NHSN on a quarterly basis aligning with the CMS Reporting Schedule, the physician is not required to make the Healthcare Associated Infection (HAI) report. Physicians remain obligated to report Healthcare Associated Infections (HAIs) when access to NHSN data is not provided to the department. In the event of an outbreak, the department has the authority to require Healthcare Associated Infection (HAI) data reports from facilities not currently reporting to NHSN.

NHSN NATIONAL HEALTHCARE SAFETY NETWORK

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Healthcare Facility HAI Reporting Requirements to CMS via NHSN-- Current or Proposed Requirements [9]

CMS Reporting Program	HAI Event	Reporting Specifications	Reporting Start Date
Hospital Inpatient Quality Reporting (IQR) Program	CLABSI	Adult, Pediatric, and Neonatal ICUs	January 2011
	CAUTI	Adult and Pediatric ICUs	January 2012
	SSI: COLO	Inpatient COLO Procedures	January 2012
	SSI: HYST	Inpatient HYST Procedures	January 2012
	MRSA Bacteremia LabID Event	FacWideIN	January 2013
	C. difficile LabID Event	FacWideIN	January 2013
	Healthcare Personnel Influenza Vaccination	All Inpatient Healthcare Personnel	January 2013
	Medicare Beneficiary Number	All Medicare Patients Reported into NHSN	July 2014
	CLABSI	Adult & Pediatric Medical, Surgical, & Medical/Surgical Wards	January 2015
	CAUTI	Adult & Pediatric Medical, Surgical, & Medical/Surgical Wards	January 2015
	Healthcare Personnel COVID-19 Vaccination	All Healthcare Personnel	October 2021
Hospital Outpatient Quality Reporting (OQR) Program	*Healthcare Personnel Influenza Vaccination*	*As of October 1, 2018, OQR no longer requires hospital outpatient departments to submit Healthcare Personnel Influenza Vaccination event data*	*October 2014*
	Healthcare Personnel COVID-19 Vaccination	All Healthcare Personnel	January 2022

NHSN NATIONAL HEALTHCARE SAFETY NETWORK

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Healthcare Facility HAI Reporting Requirements to CMS via NHSN-- Current or Proposed Requirements [9]

Long Term Care Hospital* Quality Reporting (LTCHQR) Program * Long Term Care Hospitals are called **Long Term Acute Care Hospitals** in NHSN	CLABSI	Adult & Pediatric LTAC ICUs & Wards	October 2012
	CAUTI	Adult & Pediatric LTAC ICUs & Wards	October 2012
	Healthcare Personnel COVID-19 Vaccination	All Healthcare Personnel	October 2021
	Healthcare Personnel Influenza Vaccination	All Inpatient Healthcare Personnel	October 2014
	MRSA Bacteremia LabID Event	*FacWideIN*	*January 2015*
		As of October 1, 2018, LTCHQR no longer requires LTACs to submit MRSA Bacteremia LabID event data	
	C. difficile LabID Event	FacWideIN	January 2015
	VAE	*Adult LTAC ICUs & Wards*	*January 2016*
		As of October 1, 2018, LTCHQR no longer requires LTACs to submit VAE event data	
Inpatient Rehabilitation Facility Quality Reporting (IRFQR) Program	CAUTI	Adult & Pediatric IRF Wards	October 2012
	Healthcare Personnel COVID-19 Vaccination	All Healthcare Personnel	October 2021
	Healthcare Personnel Influenza Vaccination	All Inpatient Healthcare Personnel	October 2014
	MRSA Bacteremia LabID Event	*FacWideIN*	*January 2015*
		As of October 1, 2018, IRFQR no longer requires IRFs to submit MRSA Bacteremia LabID event data	
	C. difficile LabID Event	FacWideIN	January 2015
PPS-Exempt Cancer Hospital Quality Reporting (PCHQR) Program	CLABSI	All Bedded Inpatient Locations	January 2013
	CAUTI	All Bedded Inpatient Locations	January 2013
	SSI: COLO	Inpatient COLO Procedures	January 2014
	SSI: HYST	Inpatient HYST Procedures	January 2014
	MRSA Bacteremia LabID Event	FacWideIN	January 2016
	C. difficile LabID Event	FacWideIN	January 2016
	Healthcare Personnel COVID-19 Vaccination	All Healthcare Personnel	October 2021
	Healthcare Personnel Influenza Vaccination	All Inpatient Healthcare Personnel	October 2016

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COMPONENTS OF SURVEILLANCE

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Components of Surveillance

- Surveillance Methods
- Collecting Relevant Data
- Managing Data
- Analyzing and Interpreting Data
- Communicating Result

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ELEMENTS OF AN EFFECTIVE SURVEILLANCE PROGRAM

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Elements of an Effective Surveillance Program

- Methodology (total vs. targeted vs a combination)
- Population to be served- who has the greatest risk for infection/adverse outcome
- Identify the Events to Monitor
- Define the Time Period (one quarter, 6 months, year, etc.)
- Case definitions [4]

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Surveillance Methods

Total (or Whole House) Surveillance:

- All HAIs are monitored in the entire population of a healthcare facility

Targeted

- Focuses on particular care units (e.g., a nursery or ICU)
- Infections related to medical devices (e.g., intravascular and urinary catheters), invasive procedures (e.g., surgery)
- Organisms of epidemiological significance (e.g., MRSA, C-diff, etc.)

Combination of both

- Use a combination of targeted and modified total house surveillance [4]

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Defining the Population to be Served

- Every facility should look at the population that it serves, as well identify those that have the greatest risk for infection or other adverse outcome [1] [6]
- Evaluate the patient population
  - Patient Types
    - Newborn
    - Pediatric
    - Adult
- Healthcare Services Provided
  - Medical/Surgical
  - Rehabilitation
  - Long-term Care (LTC)
  - Ambulatory Care
  - Long-term Acute Care (LTAC)
- Surgical/Invasive Procedures Performed
- Conditions/Diseases Present in the Population [4]

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Identify the Events to Monitor

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- It is common to monitor high-volume, high-risk events in a specific population
- An effort should be made to select events that have validated, nationally available benchmark data that can be used for meaningful comparison [4]
  - Examples:
    - NHSN [8]
    - The Vermont Oxford Network for monitoring the medical care of newborns [5]

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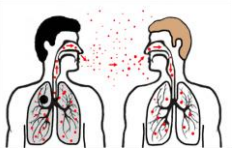
Identify the Events to Monitor

- Monitor events that have the potential to provide information that can be used to improve outcomes and infection prevention practices.
  - Examples:
    - HAIs (e.g., bloodstream, urinary tract, pneumonia, surgical site, conjunctivitis, upper respiratory tract, or local intravenous site)
    - Infection or colonization with a specific organism (e.g., *C. difficile*, MRSA, VRE, or other MDROs, respiratory syncytial virus [RSV] or rotavirus)
    - Employees out ill with communicable disease (e.g., COVID, Influenza, Norovirus, etc.)
    - Phlebitis related to peripheral intravascular therapy
    - Pyrogenic reaction or pus, redness, or increased swelling at a dialysis vascular access site in hemodialysis patients
    - Sharps injuries and communicable disease or blood/body fluid exposures in healthcare personnel
    - Tuberculin skin test conversion rates in healthcare personnel
    - Influenza immunization rates in personnel, residents, or patients
    - Hepatitis B immunization rates in personnel [4]



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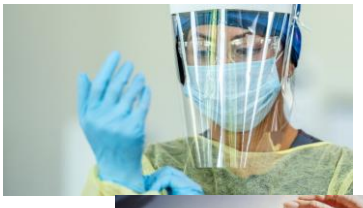
Identify the Events to Monitor continued

- Examples of Process Events include the following:
  - Personnel compliance with infection prevention protocols, such as:
    - Standard precautions
    - Isolation precautions
    - Central line insertion, maintenance, and removal
    - Urinary catheter insertion, care, and removal
    - Safe injection and medication handling practices
    - Tuberculin skin testing
    - Hand hygiene
    - Instrument processing
    - Sterilization quality assurance testing
    - Environmental cleaning and disinfection
    - Communicable disease reporting
    - Antimicrobial prescribing and administration
    - Installing and maintaining barriers during construction and renovation projects [4]



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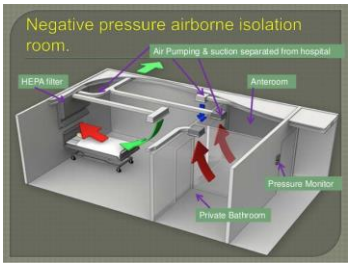
Identify the Events to Monitor continued



- Examples of other events of significance that may be monitored include the following:
  - Occurrence of reportable diseases and conditions
  - Communicable and potentially communicable diseases in personnel
  - Organisms, test results, or syndromes indicative of a widespread outbreak, pandemic or bioterrorist event
  - Results of quality assurance testing (e.g., monitoring of negative airflow in airborne infection isolation rooms, biological monitoring of sterilizers, and testing of high-level disinfectants)
  - Admission of a patient or resident known to be infected or colonized with an MDRO [4]

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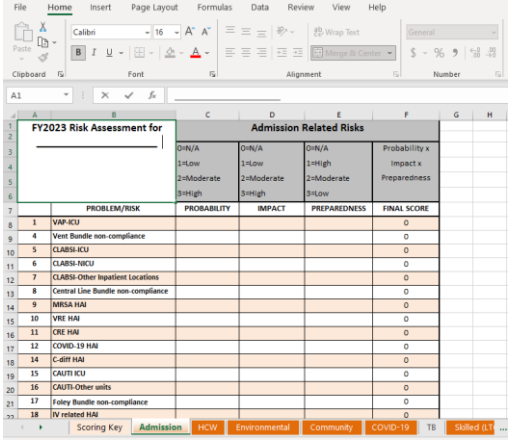
Identify the Events to Monitor continued

- Determine what is required to monitor for your organization
  - Example: CMS requires that hospitals report CLABSI, CAUTI, SSI: COLO, SSI HYST, MRSA Bacteremia, C. Diff, and Healthcare Personnel Influenza Vaccination to NHSN
- Add events that are a higher-risk as determined by your risk assessment



FY2023 Risk Assessment for _____

		Admission Related Risks			
		0=N/A 1=Low 2=Moderate 3=High	0=N/A 1=Low 2=Moderate 3=High	0=N/A 1=High 2=Moderate 3=Low	Probability x Impact x Preparedness
	PROBLEM/RISK	PROBABILITY	IMPACT	PREPAREDNESS	FINAL SCORE
1	VAP-ICU				0
4	Vent Bundle non-compliance				0
5	CLABSI-ICU				0
6	CLABSI-NICU				0
7	CLABSI-Other Inpatient Locations				0
8	Central Line Bundle non-compliance				0
9	MRSA HAI				0
10	VRE HAI				0
11	CRE HAI				0
12	COVID-19 HAI				0
14	C-diff HAI				0
15	CAUTI ICU				0
16	CAUTI-Other units				0
17	Foley Bundle non-compliance				0
18	IV related HAI				0

Scoring Key | Admission | HCW | Environmental | Community | COVID-19 | TB | Skilled (LT

Risk assessment template courtesy of CHI Health Infection Prevention

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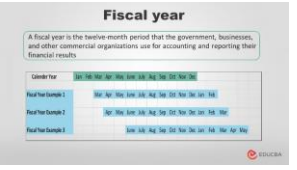
Define the Time Period

- Time periods can be any of the following:
  - Yearly/Annually
    - Calendar Year (January to December)
    - Fiscal Year (July 1 to June 30th)
    - Other Performance Period defined by your organization
  - Quarterly
  - Monthly
- Surveillance data needs to consistently collected
- It is difficult to interpret rates for events that rarely occur and procedures that are infrequently performed. [4]



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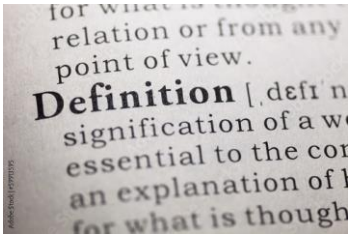
Case Definition



- To accurately trend surveillance data over time within a facility, or compare rates between facilities, surveillance criteria (i.e., case definitions) must be consistently used to determine the presence of an HAI, occurrence of an event, or compliance with a process.
- If a case definition is changed, this should be noted in the surveillance report because the number of cases identified will likely change and the rate will be affected. [4]

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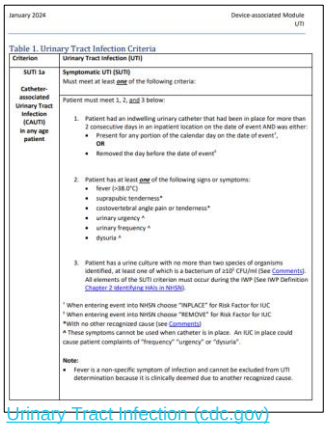
Case Definition continued

- Use criteria that reflect generally accepted definitions of the disease or event being monitored.
- Criteria have been published for defining HAIs in a variety of healthcare settings, including:
  - Hospitals
    - NHSN Acute Care / Critical Access Hospitals (ACH) [9]
  - Public Health
    - National Notifiable Diseases Surveillance System (NNDSS) [18]
  - LTC
    - NHSN Long-term Care Facilities (LTCF) Component [10]
    - Surveillance definitions of infections in long-term care facilities: revisiting the McGeer criteria [12]



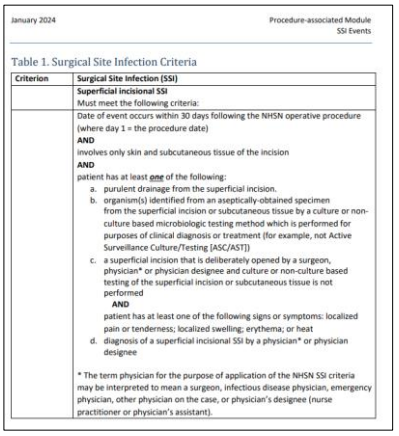
January 2024 — Device-associated Module — UTI

Table 1. Urinary Tract Infection Criteria

Criterion	Urinary Tract Infection (UTI)
SUTI 1a Catheter-associated Urinary Tract Infection (CAUTI) in any age patient	**Symptomatic UTI (SUTI)** Must meet at least one of the following criteria: Patient must meet 1, 2, and 3 below: 1. Patient had an indwelling urinary catheter that had been in place for more than 2 consecutive days in an inpatient location on the date of event AND was either: • Present for any portion of the calendar day on the date of event[^], OR • Removed the day before the date of event[^] 2. Patient has at least one of the following signs or symptoms: • fever (>38.0°C) • suprapubic tenderness* • costovertebral angle pain or tenderness* • urinary urgency ^ • urinary frequency ^ • dysuria ^ 3. Patient has a urine culture with no more than two species of organisms identified, at least one of which is a bacterium of ≥10⁵ CFU/ml (See Comments). All elements of the SUTI criterion must occur during the IWP (See IWP Definition Chapter 2 Identifying HAIs in NHSN). [^] When entering event into NHSN choose "INPLACE" for Risk Factor for IUC [^] When entering event into NHSN choose "REMOVE" for Risk Factor for IUC *With no other recognized cause (see Comments) ^ These symptoms cannot be used when catheter is in place. An IUC in place could cause patient complaints of "frequency" "urgency" or "dysuria". **Note:** • Fever is a non-specific symptom of infection and cannot be excluded from UTI determination because it is clinically deemed due to another recognized cause.

Urinary Tract Infection (cdc.gov)

Case Definition continued



January 2024 — Procedure-associated Module — SSI Events

Table 1. Surgical Site Infection Criteria

Criterion	Surgical Site Infection (SSI)
	Superficial incisional SSI Must meet the following criteria:
	Date of event occurs within 30 days following the NHSN operative procedure (where day 1 = the procedure date) **AND** involves only skin and subcutaneous tissue of the incision **AND** patient has at least one of the following: a. purulent drainage from the superficial incision. b. organism(s) identified from an aseptically-obtained specimen from the superficial incision or subcutaneous tissue by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment (for example, not Active Surveillance Culture/Testing [ASC/AST]) c. a superficial incision that is deliberately opened by a surgeon, physician* or physician designee and culture or non-culture based testing of the superficial incision or subcutaneous tissue is not performed **AND** patient has at least one of the following signs or symptoms: localized pain or tenderness; localized swelling; erythema; or heat d. diagnosis of a superficial incisional SSI by a physician* or physician designee * The term physician for the purpose of application of the NHSN SSI criteria may be interpreted to mean a surgeon, infectious disease physician, emergency physician, other physician on the case, or physician's designee (nurse practitioner or physician's assistant).

Surgical Site Infection (cdc.gov)

- Individuals who conduct surveillance activities and identify HAI cases must apply surveillance criteria precisely.
- Criteria used to define a case for surveillance purposes may be different than criteria used clinically for diagnosis and treatment.
- Surveillance definitions, such as those used in the NHSN, were developed for epidemiologic surveillance and not for clinical diagnosis.
  - Example:
    - NHSN SSI definitions versus physician diagnosis of an SSI
    - NHSN CLABSI definitions versus the clinical criteria used to diagnose and treat a catheter-related bloodstream infection [4]

DATA COLLECTION

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How to Collect the Data Elements

- The data elements that should be collected depend on the event being monitored and the statistical measures used to analyze the data.
- To use time and personnel resources efficiently, data collection should be limited only to those elements that are needed to identify a case and determine whether the case criteria are met for the condition or event being studied. [4]

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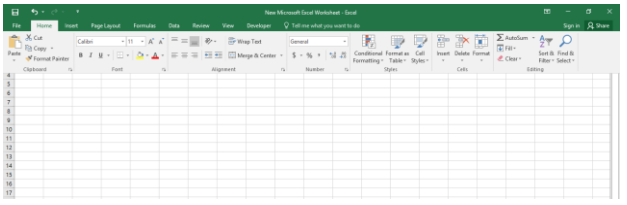
How to Collect the Data Elements

- Ensure that personnel who are responsible for collecting and managing surveillance data have adequate training in:
  - reviewing medical records
  - interpreting clinical notes
  - applying standardized criteria for identifying cases
  - using appropriate statistical and risk adjustment methods
- Personnel should also be proficient in using computer tools and technology (especially electronic records, spreadsheets, and databases) to collect, enter, store, manage, and analyze data [1] [2] [3]



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Data Elements to Collect

Case Information:

- Case name
- Sex
- Age
- Unique identifier (e.g.; medical record or account number)
- Unit or location in the facility
- Physician name and service
- Date of admission
- Date of onset of infection
- Type of infection
- Date of discharge, transfer, or death [4]

Case Definition Information:

- Results of laboratory and diagnostic tests specified in the case definition
- Dates lab or diagnostic test performed
- Sites and dates cultured, and organisms isolated;
- Antibiotic susceptibility of significant isolates
- Clinical signs and symptoms specific for the infection being monitored [4]

Risk Factors Being Monitored

- Host factors such as underlying conditions and diseases
- surgical procedure and date performed
- Surgeon
- Use of intravascular catheters
  - date of insertion
  - duration of use (vascular catheter-days)
  - catheter type and body site;
- Use of a urinary catheter
  - date of insertion
  - duration of use (urinary catheter-days)
- Mechanical ventilation and dates and duration of use (ventilator-days) [4]

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Determine Methods for Data Collection and Management

- Data may be collected **concurrently** (while a person is still under the care of the organization) or retrospectively (closed-record review after discharge). [6]

Advantages of Concurrent Surveillance

- May interview caregivers or observe the patient/resident if the chart does not include the information needed to fulfill the case criteria
- Immediate prevention and control measures, such as isolation precautions, may be instituted
- Clusters and outbreaks can be detected in a timely manner
- Infection prevention personnel are available to identify and correct potential problems and provide education to personnel, visitors, and patients or residents. [4]

Disadvantages of Concurrent Surveillance

- Time involved in locating records on a medical care unit (if paper records are being used)
- Incomplete medical records

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Determine Methods for Data Collection and Management continued

- Data may be collected concurrently (while a person is still under the care of the organization) or **retrospectively** (closed-record review after discharge). [6]

Advantage of Retrospective Review

- The medical record is more complete.
- The disadvantage of retrospective surveillance is that important findings, such as the identification of an outbreak, may be delayed and missing information ma y not be obtainable after discharged review after discharge. [4]

Disadvantage of Retrospective Review

- important findings, such as the identification of an outbreak, may be delayed and missing information may not be obtainable after discharged review after discharge. [4]

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Sources of Surveillance Data

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DATA ANALYSIS

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Determine Methods Data Analysis

- Before data collection is initiated, the statistical measures that will be used to analyze the data must be determined so the requisite data can be collected.
- If rates or ratios will be calculated, the values corresponding to each numerator and denominator must be defined
  - the appropriate data needed to calculate each rate or ratio must be collected.
- Whenever possible, data should be expressed as rates or ratios that are calculated using the same methodology as a nationally validated surveillance system. This allows an organization to compare its rates with another organization or a recognized benchmark.
  - Example: NHSN benchmarks [14]

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Rates and Ratios

- **Rate:** an expression of the frequency with which an event occurs in a defined population per unit of time
  - In healthcare surveillance, it is often used more casually to refer to proportions that are not truly rates (e.g., attack rate or incidence density rate)
- **Ratio:** the value obtained by dividing one quantity by another [14]

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Example: Device-Related Rate

The CAUTI rate per 1000 urinary catheter days is calculated by dividing the number of CAUTIs by the number of catheter days and multiplying the result by 1000. [14]

$$\text{CAUTI Rate} = \frac{No.\ of\ CAUTIs}{No.of\ Catheter\ Days} * 1000$$

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Example: Device Utilization Ratio

The Urinary Catheter Utilization Ratio is calculated by dividing the number of urinary catheter days by the number of patient days. [14]

$$\text{DUR} = \frac{No.\ of\ Urinary\ Catheter\ Days}{No.\ of\ Patient\ Days}$$

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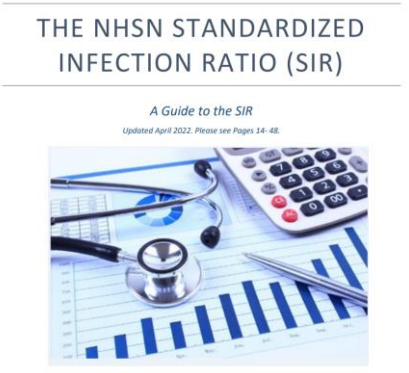
Standardized Infection Ratio (SIR)

- The Standardized Infection Ratio (SIR) is a summary measure used to track HAIs at a national, state, or local level over time.
- The SIR adjusts for various facility and/or patient-level factors that contribute to HAI risk within each facility.
- In HAI data analysis, the SIR compares the actual number of HAIs reported to the number that would be predicted, given the standard population (i.e., NHSN baseline), adjusting for several risk factors that have been found to be significantly associated with differences in infection incidence.
- The number of predicted infections is calculated using probabilities from negative binomial regression models constructed from 2015 NHSN data. [14]



https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sir-guide.pdf

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Standardized Infection Ratio

$$\text{SIR} = \frac{Observed\ (O)HAIs}{Predicted\ (P)HAIs}$$

- SIR > 1.0 = more HAIs were observed than predicted
- SIR < 1.0 = fewer HAIs were observed than predicted [14]

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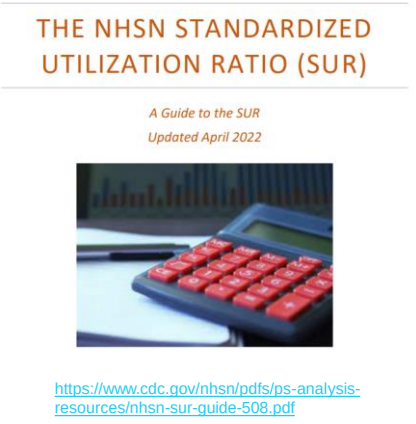
Standardized Utilization Ratio (SUR)

- The SUR, or Standardized Utilization Ratio is a summary measure used to track device use at a national, state, or local, or facility level over time.
- The SUR adjusts for various facility and/or location-level factors that contribute to device use.
- The method of calculating an SUR is similar to the method used to calculate the Standardized Infection Ratio (SIR), a summary statistic used in NHSN to track healthcare-associated infections (HAIs).
- In device-associated HAI data analysis, the SUR compares the actual number of device days reported to what would be predicted, given the standard population (specifically, the NHSN baseline), adjusting for several factors that have been found to be significantly associated with differences in device utilization.[14]



https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sur-guide-508.pdf

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Standardized Utilization Ratio (SUR)

$$\text{SUR} = \frac{\textit{Observed (O) Catheter Days}}{\textit{Predicted (P) Catheter Days}}$$

- SUR > 1.0 = more devices were observed than predicted
- SUR < 1.0 = fewer devices were observed than predicted [14]

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INTERPRETING AND COMMUNICATING DATA

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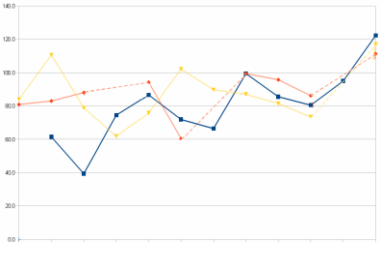
What Do You Do With the Data?

- Look for trends
- Communicate Data
- Identify Gaps in Practice
  - Compare Practice to National Standards or Guidelines
  - PDSA cycle
- Implement Changes
- Monitor, Track and Report Effect of Interventions



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Interpreting Data

- A high rate does not necessarily indicate a problem.
  - intensity of surveillance
  - intrinsic risk uncontrolled
  - small denominator
    - Sample Size usually not less than 25
    - surgical procedures or devices at least 50

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Communicating Data

- What to Report
- How to Report
  - Line List
  - Chart
    - Pie Chart
  - Graph
    - Line Graph
    - Control Chart
  - Bar Graph

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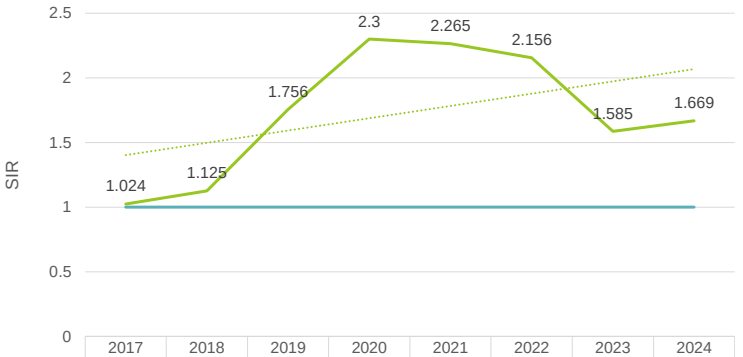
Example CAUTI SIR by Year



	2017	2018	2019	2020	2021	2022	2023	2024
SIR	1.024	1.125	1.756	2.3	2.265	2.156	1.585	1.669
Goal	1	1	1	1	1	1	1	1

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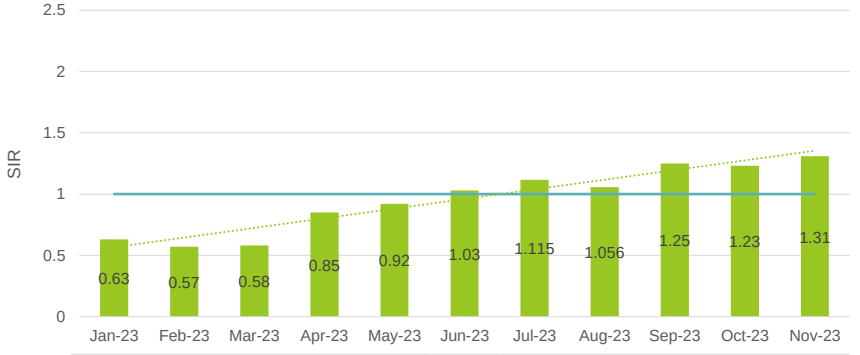
Example: Central Line SUR by Month 2023



	Jan-23	Feb-23	Mar-23	Apr-23	May-23	Jun-23	Jul-23	Aug-23	Sep-23	Oct-23	Nov-23
SUR	0.63	0.57	0.58	0.85	0.92	1.03	1.115	1.056	1.25	1.23	1.31
Goal	1	1	1	1	1	1	1	1	1	1	1

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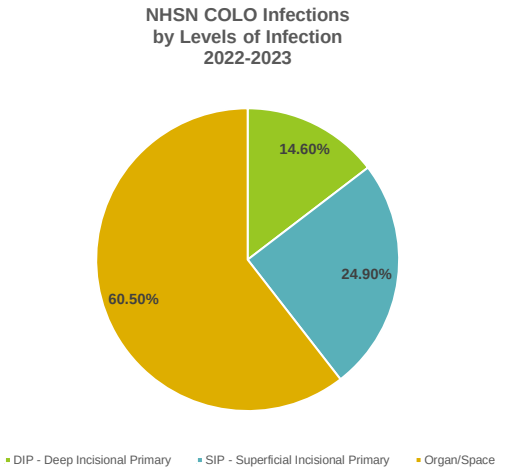
Example: SSI Type of Infections by Level



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Example Chart: Healthcare Facility Onset Incidence Rate by Department

Hospital A Healthcare-Onset CDI Rates 2023			
location	**HO-CDI Cases**	**Patient Days**	**CDI Rate**
2ICU	3	5549	5.41
3PCU	1	3587	2.79
4Rehab	0	2548	0.00
5ORTHO	1	4879	2.05
6Surgical	2	7894	2.53
7Medical	4	8997	4.45
8Peds	1	2546	3.93

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Example: Year End Summary

Surveillance event	2022	Desired goal 2023	2023	Goal Met	Continuing 2024	New goal
Hand Hygiene	85%	90%	90%	Yes	Yes	95%
Isolation compliance	76%	90%	80%	No	Yes	85%
CLABSI	SIR 0.85	SIR 0.56	0.76	No	Yes	0.56
Employee flu vaccination	95%	98%	99%	Yes	Yes	100%

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Summary

- Keep it Stable
  - Data must be comparable
- Calculate rates and statistical tests that are understood
- Internal and External Comparisons
  - Differences between units, surgeons, years, other hospitals, national rates
- Keep Graphs and Diagrams Simple
  - They are a tool, not the goal
- Know when to intervene- do we have a cluster or an outbreak

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NHSN RESOURCES

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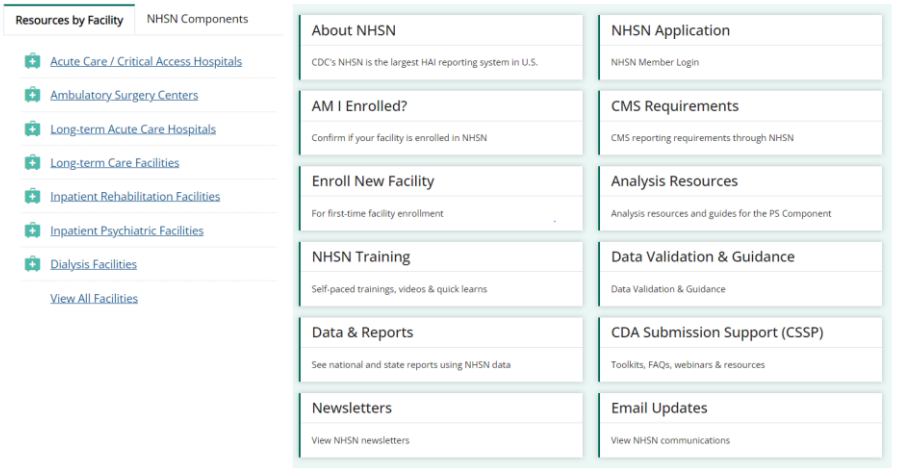
NHSN



https://www.cdc.gov/nhsn/index.html

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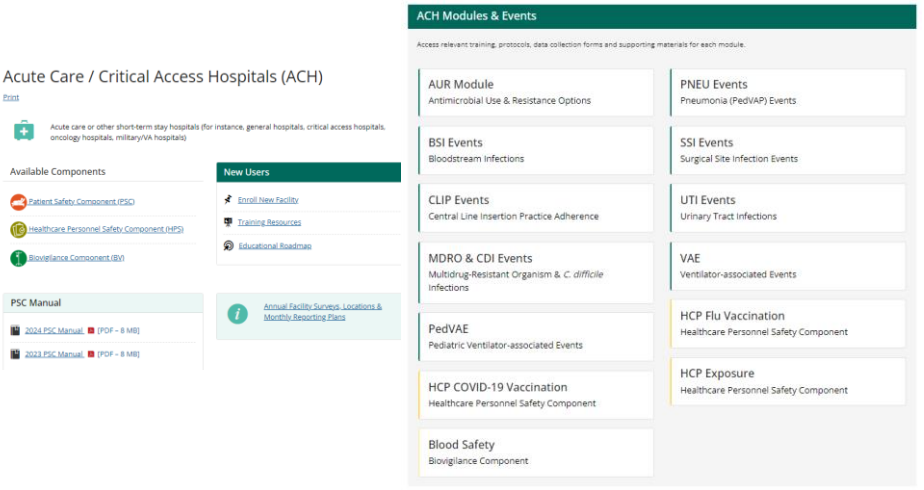
Manuel for NHSN Criteria



Acute Care / Critical Access Hospitals (ACH) | NHSN | CDC

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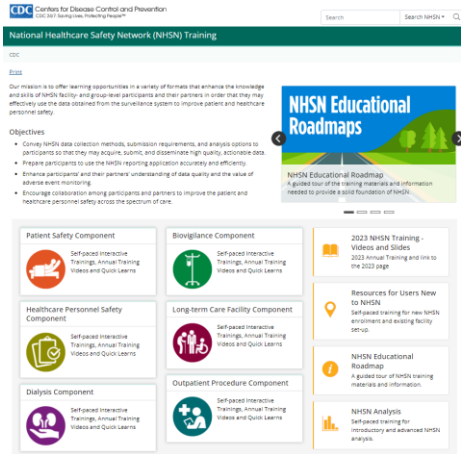
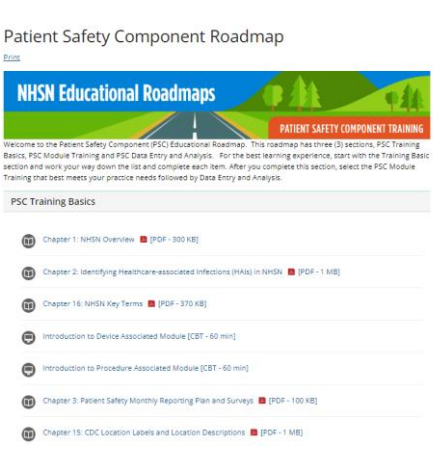
How Do I learn all this?





Training | NHSN | CDC

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Frequently Asked Questions

- Does anyone check this data?
- What are my resources if I cannot tell an infection?
- What happens if I am wrong?

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REFERENCES

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References

1. Lee TB, Montgomery OG, Marx J, et al. Recommended practices for surveillance: Association for Professionals in Infection Control and Epidemiology (APIC), Inc. *Am J Infect Control* 2007 Sep;35(7):427– 440.
2. Scheckler WE, Brimhall D, Buck AS, et al. Requirements for infrastructure and essential activities of infection control and epidemiology in hospitals: a consensus panel report. Society for Healthcare Epidemiology of America. *Am J Infect Control* 1998 Feb;26(1):47–60.
3. Friedman C, Barnette M, Buck AS, et al. Requirements for infrastructure and essential activities of infection control and epidemiology in out-of-hospital settings: a Consensus Panel report. *Am J Infect Control* 1999 Oct;27(5):418–430.
4. Arias, K. M. (2014, October 2). *Surveillance*. APIC Text. Retrieved September 12, 2022, from https://text.apic.org/toc/epidemiology-surveillance-performance-and-patient-safety-measures/surveillance (Revised September 20, 2020)
5. Gaynes RP, Culver DH, Emori TG, et al. The National Nosocomial Infections Surveillance System: plans for the 1990s and beyond. Am J Med 1991 Sep 16;91(3B):116S–120S.
6. Dudeck MA, Horan TC, Peterson KD, et al. National Healthcare Safety Network (NHSN) report, data summary for 2011, device- associated module. Am J Infect Control 2013 Apr; 41(4):286–300.
7. Murphy DM. From expert data collectors to interventionists: changing the focus for infection control professionals. Am J Infect Control 2002 Apr;30(2):120–132.
8. Pottinger JM, Herwaldt LA, Perl TM. Basics of surveillance—an overview. Infect Control Hosp Epidemiol 1997 Jul;18(7):513–527.
9. Healthcare facility HAI reporting requirements to CMS via NHSN current ... NHSN. (n.d.). Retrieved September 6, 2024, from https://www.cdc.gov/nhsn/pdfs/cms/cms-reporting-requirements.pdf
10. Centers for Disease Control and Prevention (CDC). CDC/NHSN Surveillance Definitions for Specific Types of Infections. CDC website. 2022. Available at: http://www.cdc.gov/nhsn/PDFs/pscManual/17pscNosInfDef_current.pdf .

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References

11. Centers for Disease Control and Prevention (CDC). Acute Care / Critical Access Hospitals (ACH). CDC website. 2021. Available at: https://www.cdc.gov/nhsn/acute-care-hospital/index.html
12. Centers for Disease Control and Prevention (CDC). Long-term Care Facilities (LTCF) Component. CDC website. 2021. Available at: https://www.cdc.gov/nhsn/ltc/index.html
13. Mu Y, Edwards JR, Horan TC, et al. Improving risk-adjusted measures of surgical site infection for the national healthcare safety network. Infect Control Hosp Epidemiol 2011 Oct;32(10):970–986.
14. Stone ND, Ashraf MS, Calder J, et al. Surveillance definitions of infections in long-term care facilities: revisiting the McGeer criteria. Infect Control Hosp Epidemiol 2012 Oct;33(10):965–977.
15. Association for Professional in Infection Control and Epidemiology (APIC). APIC-HICPAC Surveillance definitions for home health care and home hospice infections. APIC website. 2008. Available at: http://www.apic.org/Resource_/TinyMceFileManager/Practice_Guidance/HH-Surv-Def.pdf.
16. Centers for Disease Control and Prevention (CDC). National Healthcare Safety Network (NHSN) Patient Safety Component Manual. January 2022. Available at: https://www.cdc.gov/nhsn/pdfs/pscmanual/pcsmanual_current.pdf
17. The Joint Commission E-dition (2024, January 14). *Program: Hospital. Chapter: Infection Prevention and Control.* https://e-dition.jcrinc.com/MainContent.aspx
18. Centers for Disease Control and Prevention. (2022, October 4). Surveillance case definitions for current and historical conditions. Centers for Disease Control and Prevention. https://ndc.services.cdc.gov/
19. Nebraska Secretary of State. (2017, January 1). TITLE 173 - COMMUNICABLE DISEASES; CHAPTER 1 - REPORTING AND CONTROL OF COMMUNICABLE DISEASES https://rules.nebraska.gov/rules?agencyId=37&titleId=102

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