

HAI SURVEILLANCE AND DATA ANALYSIS FOR ACUTE CARE FACILITIES

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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 outcomes¹



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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 time⁴
- **Pandemic:** A global outbreak of disease in humans that affects at least two continents and/or exceeds expected rates of morbidity and mortality⁴
- **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



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- 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



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- §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



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CMS Medicare Requirements for Hospitals



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- §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



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- §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



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- 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 data¹⁷



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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 DISEASES¹⁹

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* **)
- Carbapenemase-Resistant Enterobacteriaceae (suspected or confirmed) ** ^ (not to include *Proteus* or *Providencia* species or *Morganella morganii*)
- Cholera (*Vibrio cholerae*) ^
- Coccidioidomycosis (*Coccidioides immitis/posadasii*)
- 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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NEBRASKA

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DEPT. OF HEALTH AND HUMAN SERVICES

MEMO



Jims 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/PHMEM_0_5_29_24_MD.pdf

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TITLE 173 - COMMUNICABLE DISEASES¹⁹

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.



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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
	<i>C. difficile</i> 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	<i>As of October 1, 2018, OQR no longer requires hospital outpatient departments to submit Healthcare Personnel Influenza Vaccination event data</i>	October 2014
	Healthcare Personnel COVID-19 Vaccination	All Healthcare Personnel	January 2022



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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	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
* Long Term Care Hospitals are called Long Term Acute Care Hospitals in NHSN	MRSA Bacteremia LabID Event	FacWideIN	January 2015
		<i>As of October 1, 2018, LTCHQR no longer requires LTACs to submit MRSA Bacteremia LabID event data</i>	
	C. difficile LabID Event	FacWideIN	January 2015
		<i>Adult LTAC ICUs & Wards</i>	
	VAE	<i>As of October 1, 2018, LTCHQR no longer requires LTACs to submit VAE event data</i>	
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
		<i>As of October 1, 2018, IRFQR no longer requires IRFs to submit MRSA Bacteremia LabID event data</i>	
	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

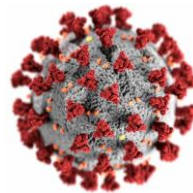


- It is common to monitor high-volume, high-risk events in a specific population
- An effort should be made to select events that have validated, nationally available benchmark data that can be used for meaningful comparison ⁴
 - Examples:
 - NHSN ⁸
 - The Vermont Oxford Network for monitoring the medical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

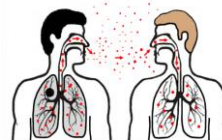
26

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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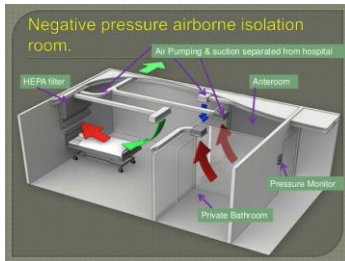
Identify the Events to Monitor continued

- 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-Other				0
7	CAUTI-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	CAUTI-HAI				0
15	CAUTI-ICU				0
16	CAUTI-Other units				0
21	Foley Bundle non-compliance				0
18	IV related HAI				0

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

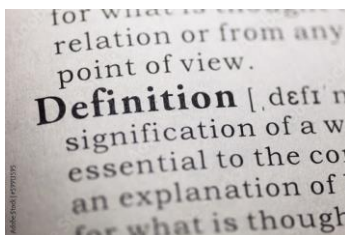


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Case Definition



- 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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DATA COLLECTION

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How to Collect the Data Elements

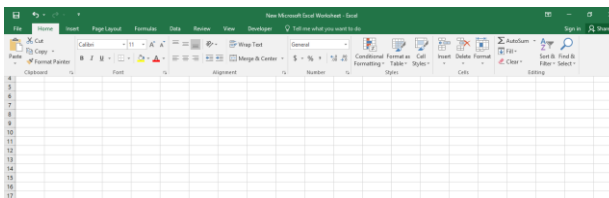


- The data elements that should be collected depend on the event being monitored and the statistical measures used to analyze the data.
- To use time and personnel resources efficiently, data collection should be limited only to those elements that are needed to identify a case and determine whether 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 may 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

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

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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

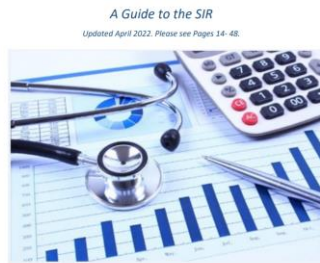
$$\text{DUR} = \frac{\text{No. of Urinary Catheter Days}}{\text{No. of Patient Days}}$$

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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

THE NHSN STANDARDIZED INFECTION RATIO (SIR)



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

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Standardized Infection Ratio

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

- SIR > 1.0 = more HAIs were observed than predicted
- SIR < 1.0 = fewer HAIs were observed than predicted¹⁴

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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

THE NHSN STANDARDIZED UTILIZATION RATIO (SUR)

*A Guide to the SUR
Updated April 2022*



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

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Standardized Utilization Ratio (SUR)

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

- SUR > 1.0 = more devices were observed than predicted
- SUR < 1.0 = fewer devices were observed than predicted¹⁴

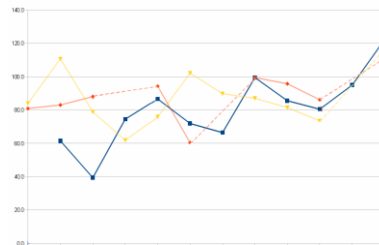
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INTERPRETING AND COMMUNICATING DATA

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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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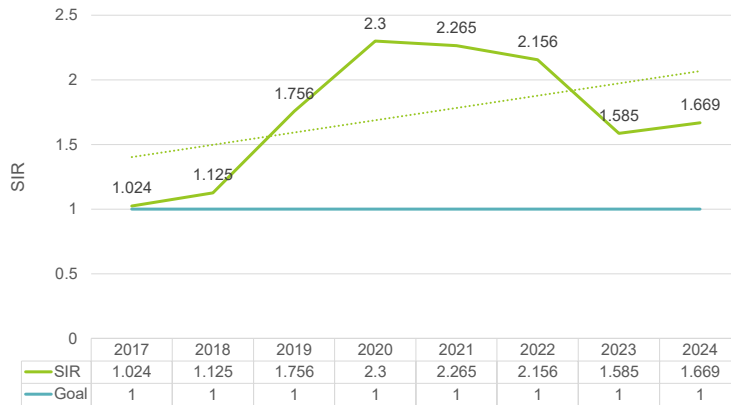
Communicating Data

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



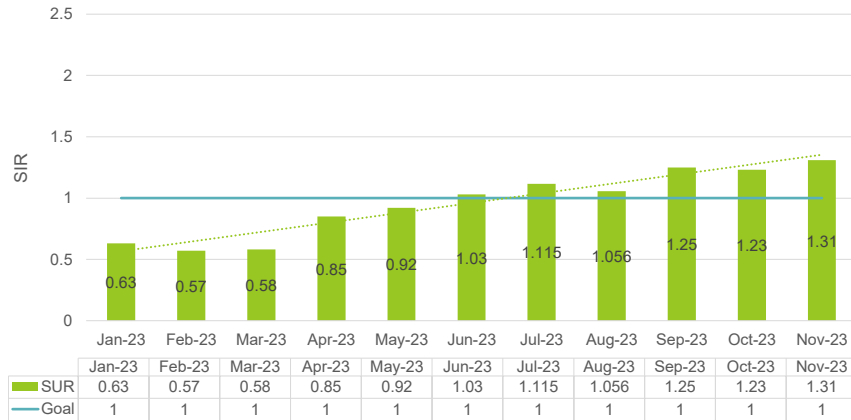
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Example CAUTI SIR by Year



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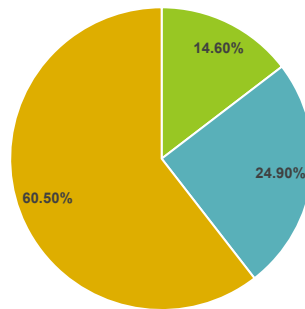
Example: Central Line SUR by Month 2023



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Example: SSI Type of Infections by Level

NHSN COLO Infections
by Levels of Infection
2022-2023



• DIP - Deep Incisional Primary • SIP - Superficial Incisional Primary • Organ/Space

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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

Resources by Facility	NHSN Components	
Acute Care / Critical Access Hospitals	About NHSN CDC's NHSN is the largest HAI reporting system in U.S.	NHSN Application NHSN Member Login
Ambulatory Surgery Centers	AM I Enrolled? Confirm if your facility is enrolled in NHSN	CMS Requirements CMS reporting requirements through NHSN
Long-term Acute Care Hospitals	Enroll New Facility For first-time facility enrollment	Analysis Resources Analysis resources and guides for the PS Component
Long-term Care Facilities	NHSN Training Self-paced trainings, videos & quick learns	Data Validation & Guidance Data Validation & Guidance
Inpatient Rehabilitation Facilities	Data & Reports See national and state reports using NHSN data	CDA Submission Support (CSSP) Toolkits, FAQs, webinars & resources
Inpatient Psychiatric Facilities	Newsletters View NHSN newsletters	Email Updates View NHSN communications
Dialysis Facilities		
View All Facilities		

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

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Manuel for NHSN Criteria

Acute Care / Critical Access Hospitals (ACH)

ACH

Acute care or other short-term stay hospitals (for instance, general hospitals, critical access hospitals, oncology hospitals, military/VA hospitals)

Available Components

- Patient Safety Component (PSC)
- Healthcare Personnel Safety Component (HPS)
- Biovigilance Component (BY)

New Users

- Enroll New Facility
- Training Resources
- Educational Roadmap

PSC Manual

- 2024 PSC Manual (PDF - 8 MB)
- 2023 PSC Manual (PDF - 8 MB)

Annual Facility-Survey Locations & Monthly Reporting Plans

ACH Modules & Events

Access relevant training, protocols, data collection forms and supporting materials for each module.

AUR Module Antimicrobial Use & Resistance Options	PNEU Events Pneumonia (PedVAP) Events
BSI Events Bloodstream Infections	SSI Events Surgical Site Infection Events
CLIP Events Central Line Insertion Practice Adherence	UTI Events Urinary Tract Infections
MDRO & CDI Events Multidrug-Resistant Organism & <i>C. difficile</i> Infections	VAE Ventilator-associated Events
PedVAE Pediatric Ventilator-associated Events	HCP Flu Vaccination Healthcare Personnel Safety Component
HCP COVID-19 Vaccination Healthcare Personnel Safety Component	HCP Exposure Healthcare Personnel Safety Component
Blood Safety Biovigilance Component	

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

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How Do I learn all this?

CDC Centers for Disease Control and Prevention

National Healthcare Safety Network (NHSN) Training

Objectives

- Convey NHSN data collection methods, submission requirements, and analysis options to participants so that they may acquire, submit, and disseminate high-quality, accurate data.
- Prepare participants to use the NHSN reporting application accurately and efficiently.
- Enhance participant and their partners' understanding of data quality and the value of accurate event monitoring.
- Encourage collaboration among participants and partners to improve the patient and healthcare personnel safety across the spectrum of care.

NHSN Educational Roadmaps

A guided tour of the training materials and information needed to provide a solid foundation of NHSN.

Patient Safety Component Self-paced interactive training, Annual Training Videos and Quizzes	Biovigilance Component Self-paced interactive training, Annual Training Videos and Quizzes	2023 NHSN Training - Videos and Slides 2023 Annual Training and link to the 2023 page
Healthcare Personnel Safety Component Self-paced interactive training, Annual Training Videos and Quizzes	Long-term Care Facility Component Self-paced interactive training, Annual Training Videos and Quizzes	Resources for Users New to NHSN Self-paced training for new NHSN environment and existing facility setup
Dialysis Component Self-paced interactive training, Annual Training Videos and Quizzes	Outpatient Procedure Component Self-paced interactive training, Annual Training Videos and Quizzes	NHSN Educational Roadmap A guided tour of NHSN training materials and information
		NHSN Analysis Self-paced training for introductory and advanced NHSN analysis

Patient Safety Component Roadmap

NHSN Educational Roadmaps

PATIENT SAFETY COMPONENT TRAINING

Welcome to the Patient Safety Component (PSC) Educational Roadmap. This roadmap has three (3) sections, PSC Training Basics, PSC Module Training and PSC Data Entry and Analysis. For the best learning experience, start with the Training Basics section and work your way down the list and complete each item. After you complete this section, select the PSC Module Training that best meets your practice needs followed by Data Entry and Analysis.

PSC Training Basics

- Chapter 1: NHSN Overview (PDF - 300 KB)
- Chapter 2: Identifying Healthcare-associated Infections (HAIs) in NHSN (PDF - 1 MB)
- Chapter 16: NHSN Key Terms (PDF - 370 KB)
- Introduction to Device Associated Module (CBT - 60 min)
- Introduction to Procedure Associated Module (CBT - 60 min)
- Chapter 3: Patient Safety Monthly Reporting Plan and Surveys (PDF - 100 KB)
- Chapter 15: CDC Location Labels and Location Descriptions (PDF - 1 MB)

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, Barnett 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/pscmanual_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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