Healthcare-Associated Infections (HAIs)

NOVEMBER 6, 2024

Current HAI Progress Report

2023 National and State Healthcare-Associated Infections Progress Report

AT A GLANCE

Information about national and state-level HAI data from 2023, measured using the standardized infection ratio (SIR).

Executive summary

The Centers for Disease Control and Prevention (CDC) is committed to protecting patients and healthcare personnel from adverse healthcare events and promoting safety, quality, and value in healthcare delivery. Preventing healthcare-associated infections (HAIs) is a top priority for CDC and its partners in public health and healthcare.

Facilities

The 2023 annual *National and State Healthcare-Associated Infections (HAI) Progress Report* provides a summary of select HAIs across four healthcare settings: acute care hospitals (ACHs), critical access hospitals (CAHs), inpatient rehabilitation facilities (IRFs) and long-term acute care hospitals (LTACHs). Data from CAHs are provided in the detailed technical tables but not in the report itself. The designation of CAH is assigned by the Centers for Medicare and Medicaid Services (CMS) to hospitals with 25 or fewer acute care inpatient beds and that maintain an annual average length of stay of 96 hours or less for acute care patients. IRFs include hospitals, or part of a hospital, that provide intensive rehabilitation services using an interdisciplinary team approach. LTACHs provide treatment for patients who are generally very sick and stay, on average, more than 25 days. To view HAI data from individual hospitals, LTACHs and IRFs, please see CMS Care Compare.

Content and details

This report, along with the detailed technical tables, provides national- and state-level data about HAI incidence during 2023. The report is designed to be accessible to many audiences. National and state HAI reports will be available for viewing, downloading, and printing from the Antimicrobial Resistance and Patient Safety Portal**.** For detailed methods, references, and definitions, please refer to the Technical Appendix and Glossary within this report. For more information, please visit CDC's Healthcare-Associated Infection Data Reports website.

Scope

CDC’s mission in healthcare safety includes tracking infections, responding to outbreaks, providing infection prevention expertise and guidance, implementing prevention interventions in collaboration with partners, spearheading prevention research, and serving as the nation’s gold standard microbiology laboratory for the pathogens most often implicated in HAIs. CDC’s National Healthcare Safety Network (NHSN), the nation’s most widely used HAI surveillance system, is a shared resource for HAI prevention. More than 38,000 active hospitals, long-term care facilities, and other healthcare facilities provide data to NHSN, which in turn is used for national- and state-level analyses, including for this HAI Report, and for targeted prevention initiatives by healthcare facilities, states, regions, quality groups, and national public health agencies, including CDC.

Pathogens and measures

The 2023 National and State HAI Progress Report provides data on central line-associated bloodstream infections (CLABSIs), catheter-associated urinary tract infections (CAUTIs), ventilator-associated events (VAEs), surgical site infections (SSIs), methicillin-resistant *Staphylococcus aureus* (MRSA) bloodstream events, and *Clostridioides difficile* (*C. difficile*) events. For each of the four healthcare settings, the report consists of detailed technical tables, which include additional statistics about HAIs, reporting mandates, and data validation efforts in each state and select US territories. The report includes infection-specific standardized infection ratios (SIRs), which measure progress in reducing HAIs compared to the 2015 baseline time period. The SIR is the ratio of the observed number of infections (events) to the number of predicted infections (events) for a summarized time period. In addition to the SIRs, the report includes the standardized utilization ratios (SURs), which measure device use by comparing the number of observed device days to the number of predicted device days. The SIR and SUR metrics are calculated using the 2015 national baseline and risk adjustment methodology. More information about these metrics can be found at:

- NHSN's Guide to the SIR PDF
- NHSN's Guide to the SUR PDF

This 2023 annual report includes national and state data for the following HAIs and facility types

Acute Care Hospitals (ACHs)

- CLABSI
- CAUTI
- VAE
- SSI*
- *C. difficile*
- MRSA bacteremia

Inpatient Rehabilitation Facilities (IRFs)

- CLABSI
- CAUTI
- *C. difficile*
- MRSA bacteremia

Long-Term Acute Care Hospitals (LTACHs)

- CLABSI
- CAUTI
- VAE
- *C. difficile*
- MRSA bacteremia

* National SSI data includes 39 inpatient surgical procedure categories reported to NHSN. For event and infection definition, see the HAI module specific NHSN protocols. PDF

NHSN recognizes that changes to the CMS payment policies and changes in state and local reporting mandates may impact the number and characteristics of healthcare facilities participating in NHSN.

Data highlights

Nationally, among acute care hospitals, the 2023 highlights in this report include

- Overall, CLABSI, CAUTI, VAE, MRSA, and CDI continue to decline in 2023 compared to 2022
  - CAUTI, MRSA, and CDI 2023 SIRs are below pre-pandemic (2019) SIRs
- Overall, about 15% decrease in CLABSI between 2022 and 2023
  - Decreases observed in all location settings – ICU (20%), NICU (13%), and Wards (8%)
- Overall, 11% decrease in CAUTI between 2022 and 2023
  - Decreases observed across ICU locations (16%) and Ward locations (8%)
- Overall, there was a 5% decrease in VAE between 2022 and 2023
  - A 5% decrease observed in ICU locations
  - However, a 9% increase observed in Ward locations
- Overall, there was a 3% increase in SSI combined SCIP procedures between 2022 and 2023
  - The 10 select procedures are Surgical Care Improvement Project (SCIP) procedures. Note: The initial set of acute care hospital targets and metrics included a measure on SCIP processes. That measure is no longer part of the HAI Action Plan because these processes are now widely accepted as standards of practice.
  - 8% increase in abdominal hysterectomy SSIs

    - No significant changes in colon surgery SSIs
- Observed a 16% decrease in hospital onset MRSA bacteremia between 2022 and 2023
- Observed a 13% decrease in hospital onset *C. difficile* infections between 2022 and 2023

On the state level compared to itself from 2022 to 2023

- 30 states performed better on at least two infection types
    - 21 states performed better on at least three infection types
    - 9 states performed better on at least four infection types
- 2 states performed worse on two or more infection types

Highlights of state performance compared to the 2015 baseline SIR of 1

- 49 states performed better on at least three infection types
    - 36 states performed better on at least four infection types
    - 20 states performed better on at least five infection types
- 4 states performed worse on at least two or more infection types

Highlights of state performance compared to 2023 national SIR

- 21 states performed better on at least two infection types
    - Of these, 10 states performed better on at least three infection types
    - Of these, 3 states performed better on at least four infection types
- 24 states performed worse on two or more infection types
    - Of these, 15 states performed worse on at least three infection types
    - Of these, 3 states performed worse on at least four infection types

The number of states and territories performing better than the 2015 national baseline, by infection and facility type

	Acute Care Hospitals (ACHs)	**Inpatient Rehabilitation Facilities (IRFs)**	**Long-Term Acute Care Hospitals (LTACHs)**
CLABSI	44 states	9 states	10 states
CAUTI	44 states	1 state	10 states
VAE	10 states	n/a	10 states
SSI, abdominal hysterectomy	2 states	n/a	n/a
SSI, colon surgery	22 states	n/a	n/a
MRSA bacteremia	39 states	1 state	7 states
C. difficile infections	52 states	42 states	25 states

The number of states and territories that performed worse than the 2015 national baseline, by infection and facility type

	Acute Care Hospitals (ACHs)	**Inpatient Rehabilitation Facilities (IRFs)**	**Long-Term Acute Care Hospitals (LTACHs)**
CLABSI	1 state	No state	1 state
CAUTI	No state	6 states	No state
VAE	23 states	n/a	1 state
SSI, abdominal hysterectomy	6 states	n/a	n/a
SSI, colon surgery	5 states	n/a	n/a
MRSA bacteremia	No state	1 state	No state
C. difficile infections	No state	No state	No state

Public health importance and next steps

Prevalence

Each day, approximately one in 31 U.S. patients and 1 in 43 nursing home residents contracts at least one infection in association with their healthcare, underscoring the need for improvements in patient care practices in U.S. healthcare facilities. While much progress has been made, more needs to be done to prevent healthcare-associated infections in a variety of settings.

Sustaining progress

Full engagement between local, state and federal public health agencies and their partners in the healthcare sector through initiatives such as prevention collaboratives is vital to sustaining and extending HAI surveillance and prevention progress. CDC will continue its prevention, tracking, lab, and applied research activities to push the country further toward the goal of eliminating HAIs.

Feedback

Any comments and suggestions that would improve the usefulness of future publications are appreciated and should be sent to the Division of Healthcare Quality Promotion, National Center for Emerging and Zoonotic Infectious Diseases, Centers for Disease Control and Prevention, 1600 Clifton Road, Mailstop H16-3; Atlanta, Georgia, 30333. E-mail can also be used: patientsafety@cdc.gov.

Explore the data

National and state HAI reports are available for viewing, downloading, and printing from the Antimicrobial Resistance and Patient Safety Portal.

A.R. & Patient Safety Portal

Data tables

2023 SIR data

Acute Care Hospitals SIR 2023 EXCEL	Download
Critical Access Hospitals SIR 2023 EXCEL	Download
Inpatient Rehabilitation Facilities SIR 2023 EXCEL	Download
Long-Term Acute Care Hospitals SIR 2023 EXCEL	Download
Pediatric and Oncology SIR 2023 EXCEL	Download

2023 SUR data

Acute Care Hospitals SUR 2023 EXCEL	Download
Critical Access Hospitals SUR 2023 EXCEL	Download
Inpatient Rehabilitation Facilities SUR 2023 EXCEL	Download
Long-Term Acute Care Hospitals SUR 2023 EXCEL	Download

Technical appendix

Data and data quality

The *2023 National and State Healthcare-Associated Infections Data Report* presents data reported to the National Healthcare Safety Network (NHSN) for the calendar year 2023. The healthcare-associated infection (HAI) data were reported in response to state or federal reporting

requirements (via the Centers for Medicare and Medicaid Services, CMS [1] [2] [3]) or were reported voluntarily from healthcare facilities in all 50 states, Washington, D.C., Virgin Islands, Guam, and Puerto Rico. Data included in the annual report use standard NHSN definitions for central line-associated bloodstream infections (CLABSIs), catheter-associated urinary tract infections (CAUTIs), ventilator-associated events (VAEs), surgical site infections (SSIs), laboratory-identified (LabID) methicillin-resistant *Staphylococcus aureus* (MRSA) bloodstream events, and LabID *Clostridioides difficile* (*C. difficile*) events. [4] [5] [6] [7] [8] To account for delays in reporting, 2023 data reported to NHSN through June 1, 2024, were included. The data used in preparing the report undergoes routine and rigorous data quality checks, which are part of NHSN's processes. Addressing data quality issues is integral to NHSN's ability to help facilities across the nation collect the data needed to identify areas needing prevention efforts, measure the progress of prevention efforts, monitor antibiotic use and resistance, and push toward HAI elimination. The NHSN Team routinely reviews the data reported to NHSN and will contact facilities to resolve confirmed and suspected data quality concerns. These data quality activities, which include data analyses and facility outreach, enhance the quality of the HAI data used in preparing this report.

National and state data included in this report are shown separately for acute care hospitals (ACHs), critical access hospitals (CAHs), long-term acute care hospitals (LTACHs), and inpatient rehabilitation facilities (IRFs, including CMS-certified IRF units within a hospital).

SIRs

The national and state standardized infection ratios (SIRs) published in this report compare the observed number of infections occurring in 2023 and reported to NHSN with the predicted number of infections based on the 2015 national baseline and risk adjustment calculations. The risk adjustment methodology PDF used to produce the CLABSI, CAUTI, VAE, SSI, MRSA bacteremia, and *C. difficile* SIRs for all facility types are summarized in NHSN's SIR Guide. [9] SSI data were risk adjusted using a logistic regression model (CDC's Complex Admission/Readmission model), and the device-associated (DA) and LabID event SIRs were risk adjusted using a negative binomial regression model.

SURs

This report also includes national and state standardized utilization ratios (SURs) to measure device utilization for central lines, urinary catheters, and ventilators among the four main facility types. The SUR provides a summarized risk adjusted metric which allows organizations to compare device use to a national 2015 baseline. SURs are calculated by dividing the number of observed device days by the number of predicted device days; the number of predicted device days is calculated using a logistic regression model. General information about SUR calculation can be found in NHSN's Guide to the SUR PDF. [10]

Calculations

SIRs and SURs are produced when at least five healthcare facilities reported 2023 data for the specific stratum, and at least one infection or device day is predicted to occur. The state-specific SIRs and SURs were calculated for each HAI and device type, location category or surgical procedure by pooling 2023 data from all reporting facilities in the state. A complete list of risk factors used in the calculation of all SIRs and SURs can be found in the technical Data Tables associated with this report. SIRs and SURs were assessed for statistical significance using a mid-p exact test for the 95% confidence interval (CI). The 95% CI is used to determine statistical significance when the SIR or SUR is compared to the value of 1. The 95% CI is a statistical range of values for which we have a high degree of confidence that the true SIR or SUR lies within that range. If the CI does not include 1, then the SIR or SUR is significantly different than 1.0 (i.e., the number of observed infections is significantly different than the number predicted). In the instances where the current year's SIR or SUR is compared to the previous year's SIR or SUR, a two-tailed p-value is used to determine statistical significance of the percent differences. A *P*-value of less than 0.05 was considered a statistically significant result. A *P*-value was considered inestimable for the following scenarios:

- If the previous year's SIR or SUR is 0.000 and the current year's SIR or SUR does not equal 0.000. The percent change is listed as >>100.0%
- If both the previous year's SIR or SUR and the current year's SIR or SUR are 0.000. The percent change is listed as 0%
- Comparison to the previous year is not performed if SIR or SUR data is missing.

The CLABSI, CAUTI, and VAE data are inclusive of data reported from all eligible locations within healthcare facilities, however, the SIRs and SURs are also stratified by location type for critical care units (referred to as "ICUs"), neonatal critical care units (NICUs) (CLABSI only), and inpatient wards. For this report, "wards" included step-down units, mixed acuity units, and specialty care areas including hematology/oncology and bone marrow transplant units. The acute care hospital DA data are further stratified by specific CDC locations at the national level.

When sufficient data were available, national SSI SIRs were calculated for ACHs and CAHs for each of the 39 specific procedure categories defined by NHSN; the 10 select procedures that approximate the procedures included in the Centers for Medicare & Medicaid Services (CMS) Surgical Care Improvement Project (SCIP) are shown separately. National SIRs were stratified by adult and pediatric patients. State-level SSI SIRs were calculated for 15 select procedure types, including those within the SCIP and additional procedure categories with the highest volume of reported procedures. Due to insufficient pediatric SSI data at the state level, only adult SSI SIRs were calculated at the state level. Only deep incisional and organ/space SSIs, regardless of closure technique, detected during the same admission as the inpatient procedure or upon readmission to the same hospital that performed the inpatient procedure were included in the SSI SIRs; superficial incisional SSIs and those identified on post-discharge surveillance or upon readmission to another facility were excluded.

MRSA bacteremia and *C. difficile* LabID event SIRs included applicable specimens classified as hospital-onset (i.e., were collected on or after day 4 of admission) in which the specimen was collected from any inpatient location in the facility excluding CMS-certified inpatient psychiatric (IPF) units. *C. difficile* LabID event surveillance also excludes events from neonatal critical care units and well-baby units. Community-onset cases are reported to NHSN and are included in the risk adjustment of the LabID event SIRs.

National SIRs and SURs were calculated for all strata that met the inclusion criteria above. Each national metric was compared to the 2015 national baseline of 1 and was compared to the national metric from the prior year. Both comparisons provide information on a national level about the amount of device use and healthcare-associated infections in US hospitals.

Facility-specific SIRs and SURs were calculated if the facility had at least one predicted HAI (SIR) or device day (SUR). These facility-specific SIRs and SURs were used to create percentile distributions for each infection and device type if at least 20 facilities had sufficient data to calculate an SIR or SUR. Percentile distributions among the national data are shown in increments of 5, from 5-95%; key percentiles were calculated for state-level data (10%, 25%, 50%, 75%, 90%). Additionally, the facility-specific SIRs or SURs were compared to the nominal value equal to that of the same year's National SIR, for each infection and device type, if at least 10 facilities in each category had sufficient data to calculate the metric, the percent of facilities with an SIR or SUR significantly higher or lower than the national value was calculated both nationally and by state.

Each state's 2023 SIR was compared against three benchmarks to assess progress in HAI prevention: the current 2023 national SIR, the state's SIR from 2022, and the 2015 national baseline (i.e., compared to a value of 1). The 2023 national SIR was re-calculated for each state-to-national comparison with that state's data removed from the 2023 national SIR to ensure independence. This comparison was used to determine how the state's SIR compared to that from the rest of the nation. A comparison between the state's 2023 and 2022 SIRs provided information about HAIs in the state during 2023 and how this compared to the same state's SIR from the prior year. The final comparison assesses the state's 2023 SIR against the national 2015 baseline of 1. Together, the three benchmarks provide a complete assessment of each state's progress in HAI prevention.

For all comparisons, a *P*-value less than 0.05 was considered statistically significantly different than the hypothesized value (e.g., 1 for comparison to the 2015 baseline); while two-tailed *P*-values were used for these comparisons and are more conservative than one-tailed *P*-values, significant results were interpreted as a directional change of "increase" or "decrease" based on the actual SIR values in the comparison. The three comparisons listed above were also performed and interpreted in the same manner for state-specific SURs.

Most healthcare facilities in the US were required to report select HAI data to NHSN in 2023 for participation in various CMS Quality Reporting Programs (QRPs) and Pay for Performance Programs.[11] The table below provides additional details on these requirements:

2023 required data elements for participation in CMS programs, by facility type

HAI Type	Acute Care Hospitals	LTACHs	IRFs
CLABSI	ICUs, NICUs, select wards	ICUs and Wards	n/a
CAUTI	ICUs and select wards	ICUs and Wards	Wards
VAE	n/a	n/a	n/a
SSI	SSI data following adult inpatient colon surgeries and abdominal hysterectomies	n/a	n/a
MRSA bacteremia & *C. difficile* LabID Event	Facility-wide inpatient (FacWideIN) (includes reporting from Emergency Departments and 24-hour observation units)	Facility-wide inpatient (FacWideIN), *C. difficile only*	Facility-wide inpatient (FacWideIN) or CMS-certified IRF unit, *C. difficile only*

2023 Required Data Elements for Participation in CMS QRPs, by Facility Type

In addition to the NHSN data used to produce the SIRs in this report, the factsheets and the detailed technical tables, several external data sources were used to provide additional metrics. Several state health department HAI programs voluntarily provided CDC with the status and specific requirements of state HAI reporting mandates to NHSN and efforts to validate 2023 HAI data. An indicator for a state mandate was provided for mandates enacted by either the state health department or the state's hospital association. Validation efforts were classified into two categories for each HAI type – data checked for quality and additional in-depth data review. The following criteria were used to assign credit to states that performed data quality checks: state health department had access to 2023 NHSN data, performed regular data cleaning/quality checks on at least 6 months of 2023 data prior to June 1, 2024, and contacted hospitals if data errors, outliers, or missing information were found. A state received credit for additional in-depth data review if the state performed an audit of their hospitals' medical or laboratory records prior to June 1, 2024, meaning the state health department reviewed hospital records to confirm proper case ascertainment and data entry into NHSN. Validation efforts should be considered when evaluating an individual state's performance. States that perform more vigorous data validation activities are more likely to find hospital records of infections, and therefore these states may have higher SIRs compared to states that do not perform validation. Data validation efforts were self-reported by state health departments to CDC and may vary between states.

Acknowledgements

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Glossary

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Organizations and hospitals

Acute care hospital (ACH): a hospital is an institution that mainly provides diagnostic and therapeutic services to inpatients, including medical diagnosis, treatment, and care. The Centers for Medicare & Medicaid Services requires that all patients in hospitals be under the care of a physician and provided 24-hour nursing assistance.

Centers for Disease Control and Prevention (CDC): Housed within U.S. Department of Health and Human Services, CDC is charged with protecting the public health of the nation by providing leadership and direction in the prevention and control of diseases and other preventable conditions and responding to public health emergencies. CDC works 24/7 to protect America from health, safety, and security threats, both foreign and in the U.S.

Emerging Infections Program (EIP): A national resource utilized for surveillance, prevention, and control of emerging infectious diseases. EIP is a network of state health departments and their collaborators with local health departments, academic institutions, other federal agencies, public health and clinical laboratories, infection preventionists, and healthcare providers.

CMS Care Compare: A consumer-oriented website that provides information about the quality of care of various provider types such as doctors and clinicians, hospitals, nursing homes including rehab services, home health services, hospice care, IRFs, LTACHs, and dialysis facilities. CMS Care Compare was created through the efforts of the Centers for Medicare & Medicaid Services (CMS) in collaboration with organizations representing consumers, hospitals, doctors, employers, accrediting organizations, and other federal agencies. Hospitals participating in the CMS quality reporting program submit healthcare-associated infection data to CDC's National Healthcare Safety Network (NHSN). NHSN shares these data with CMS for fulfillment of their Programs, including sharing data on CMS Care Compare to help consumers make informed decisions about their healthcare.

Inpatient rehabilitation facilities (IRF): Hospitals, or parts of a hospital that provide intensive rehabilitation services using an interdisciplinary team approach. Admission to an IRF is appropriate for patients with complex nursing, medical management, and rehabilitative needs. Data in this report are reported from free-standing IRFs and CMS-certified IRF units within other hospitals.

Long-term acute care hospital (LTACH): Acute care hospitals that provide treatment for patients who are generally very sick and stay, on average, more than 25 days. Services include comprehensive rehabilitation, respiratory therapy, head trauma treatment, and pain management. Most patients are transferred from an intensive or critical care unit.

National Healthcare Safety Network (NHSN): CDC's NHSN is the nation's most widely used healthcare-associated (HAI) infection tracking system. NHSN provides facilities, states, regions, and the nation with data needed to identify problem areas, measure progress of prevention efforts, and ultimately eliminate HAIs. In addition, NHSN allows healthcare facilities to track blood safety errors and important healthcare process measures such as healthcare personnel influenza vaccine status and infection control adherence rates.

Infections reported

Catheter-associated urinary tract infection (CAUTI): A urinary tract infection (UTI) is an infection involving any part of the urinary system, including urethra, bladder, ureters, and kidney. When a urinary catheter is not put in correctly, not kept clean, or left in a patient for too long, germs can travel through the catheter and infect the bladder and kidneys. *In this report*, the CAUTI data include all infections reported to National Healthcare Safety Network from all applicable locations, including intensive care units and wards.

Central line-associated bloodstream infection (CLABSI): When a tube is placed in a large vein and not put in correctly or kept clean, it can become a way for germs to enter the body and cause deadly infections in the blood. *In this report*, the CLABSI data include all infections reported to National Healthcare Safety Network from all applicable locations, including intensive care units, neonatal intensive care unit, and wards.

***Clostridioides difficile* (*C. difficile*):** When a person takes antibiotics, good bacteria that protect against infection are destroyed for several months. During this time, patients can get sick from *C. difficile*, bacteria that can cause life-threatening diarrhea. Often, *C. difficile* infections occur in hospitalized or recently hospitalized patients. *In this report*, the *C. difficile* data include all laboratory identified hospital-onset infections reported to National Healthcare Safety Network from all inpatient locations in the facility, except for the neonatal intensive care units and well-baby locations.

Healthcare-associated infection (HAI): Infection patients can get while receiving medical treatment in hospitals, outpatient clinics, nursing homes, and other facilities where people receive care.

Hospital-onset HAI: For reporting to National Healthcare Safety Network, a LabID event is considered hospital-onset if the patient begins to show infection symptoms on or after the fourth day of admission. For other HAIs, an infection is considered hospital-onset if the patient begins to show infection symptoms on or after the third day of admission.

Laboratory identified (LabID) Event: For reporting to National Healthcare Safety Network, an infection is considered laboratory identified when a patient sample is tested and confirmed by laboratory test only (i.e., clinical evaluation of the patient is not required).

Methicillin-resistant *Staphylococcus aureus* (MRSA): A type of staph bacteria that is resistant to many antibiotics. *In this report*, the MRSA data include all laboratory identified hospital-onset MRSA bacteremia (bloodstream infections) reported to National Healthcare Safety Network from all inpatient locations in the facility.

Surgical site infection (SSI): When germs get into an area where surgery is or was performed, patients can get a surgical site infection. Sometimes these infections involve only the skin. Other SSIs can involve tissues under the skin, organs, or implanted material (an object or material inserted or grafted into the body, such as prosthetic joints).

Prevention collaboratives

Antibiotic stewardship: Coordinated efforts and programs to improve the use of antimicrobials in healthcare settings to ensure that hospitalized patients receive the right antibiotic, at the right dose, at the right time, and for the right duration.

Antimicrobial resistance: Antimicrobial resistance is the result of bacteria and fungi changing in ways that reduce or eliminate the effectiveness of antibiotics.

Carbapenem-resistant Enterobacteriaceae (CRE) infections: A family of germs that is difficult to treat because they have high levels of resistance to antibiotics. CRE infections are most seen in people with exposure to healthcare settings, like hospitals and long-term care facilities.

Hand hygiene: The practice of cleaning hands to prevent the spread of disease-causing germs.

Healthcare personnel influenza vaccination: Influenza, or the flu, is a mild to severe respiratory illness caused by a virus. The contagious illness can easily spread from person to person, including from healthcare workers to patients. Vaccination is the best way to prevent getting and spreading the flu.

Long-term care facilities (LTCF): Nursing homes, skilled nursing facilities, and assisted living facilities (collectively known as long-term care facilities) provide a variety of services, both medical and personal care, to people who are unable to manage independently in the community.

Multidrug-resistant organism (MDRO) infections: An infection caused by germs that are resistant to multiple classes of antimicrobials. In some cases, the germs have become so resistant that no available antibiotics are effective against them.

Prevention collaboratives: Prevention projects that consist of multiple healthcare facilities within a state or region to target an infection as a team, implement prevention strategies, share experiences between facilities, measure progress as a group, and provide feedback to clinicians and staff.

Targeted Assessment for Prevention (TAP) strategy: A quality improvement framework developed by the Centers for Disease Control and Prevention (CDC) to use data for action to prevent healthcare-associated infections (HAIs). The TAP Strategy targets healthcare facilities and specific units within facilities with a disproportionate burden of HAIs to identify and address infection prevention gaps.

Ventilator-associated events (VAE): A ventilator is a machine used to help a patient breathe by giving oxygen through a tube placed in a patient's mouth or nose, or through a hole in the front of the neck. An infection may occur if germs enter a patient through the tube, such as pneumonia or bacterial infections in the blood.

Calculations

National baseline: Aggregated data reported to the National Healthcare Safety Network (NHSN) by all facilities during a baseline period that is used to "predict" the number of infections expected to occur in a hospital, state, or in the country. *In this report*, the number of predicted infections is an estimate based on infections reported to NHSN during the 2015 national baseline for all facility types.

Statistical significance: Term used in the context of a statistical hypothesis test to determine if a finding is unlikely to have occurred by chance alone. A statistically significant test result means it is unlikely that the two groups sampled are different simply by chance alone (suggesting that the two populations sampled are, in fact, different). *In this report*, statistical hypothesis testing is used to compare a calculated Standardized Infection Ratio value (see **SIR**) to the value of 1.0. A statistically significant result from this test means there is statistical evidence that the calculated SIR is different than what would be predicted from the national data. *In this report*, statistical hypothesis testing is also used to compare two SIRs to each other.

Standardized Infection Ratio (SIR) PDF: A summary statistic that can be used to track healthcare-associated infection (HAI) prevention progress over time; lower SIRs are better. The SIR compares the number of infections in a facility or state to the number of infections that were "predicted" to have occurred, based on previous years of reported data (see **National baseline**). The SIR is not calculated when the number of predicted infections is less than 1. *In this report*, the SIRs compare the observed number of infections reported to the National Healthcare Safety Network (NHSN) during 2023 to the predicted number of infections based on the 2015 referent period, adjusting for key risk factors.

Risk adjustment: A process used to level the playing field by adjusting for the differences in risk. When the data are risk-adjusted, it makes it possible to fairly compare hospital performance. *In this report*, the SIRs are adjusted for risk factors that may impact the number of infections reported by a hospital, such as type of patient care location, bed size of the hospital, patient age, and other factors.

National 2023 SIR: A summary statistic calculated from all reported HAIs that occurred in the country in 2023. It was calculated as the total number of observed infections in the country, divided by the total number of predicted infections in the country in 2023.

State 2023 SIR: A summary statistic calculated from all reported HAIs that occurred in an individual state in 2023. It was calculated as the total number of observed infections from all hospitals in the state, divided by the total number of predicted infections in the state in 2023.

Standardized Utilization Ratio (SUR) PDF: A summary statistic that can be used to track device utilization over time; lower SURs are better. The SUR compares the number of device days (central lines, urinary catheters, ventilators) in a facility or state to the number of device days that were "predicted" to have occurred, based on previous years of reported data (see **National baseline**). The SUR is not calculated when the number of predicted device days is less than 1. *In this report*, the SURs compare the observed number of device days reported to the National Healthcare Safety Network (NHSN) during 2023 to the predicted number of device days based on the 2015 referent period, adjusting for key risk factors.

State mandate (for data reporting): A state legislative or regulatory requirement (enacted by the state's government or promulgated by a state agency) requiring hospitals (and other healthcare facilities) in the state's jurisdiction to report healthcare-associated infections to the National Healthcare Safety Network.

Validation: Double-checking, or confirming, healthcare-associated infection (HAI) data reported to the National Healthcare Safety Network (NHSN). This generally involves an assessment to ensure all relevant infections were captured in the system. It may also involve checking the accuracy, or quality, of the submitted data. Currently, state health departments may use different methods to validate the HAI data that hospitals submit to NHSN. For example, some states only validate data from one facility while other states validate more widely. Validation efforts should be considered when evaluating an individual state's performance. States that validate data or use advanced tools to detect HAIs may find and report more infections than states that do not validate.

In this report, state validation efforts are specified and classified into two categories for each HAI type: data checked for quality and additional in-depth data review.

Data Quality: State health departments may assess a hospital's overall reported HAI data for data entry errors, outliers, or missing information. This does not involve reviewing medical records.

In this report, the following criteria were used to assign credit to states that performed data quality checks:

- State health department had access to 2023 data from NHSN.
- State health department performed quality checks on at least 6 months of 2023 NHSN data prior to June 1, 2024.
- State health department contacted hospitals when data errors, outliers, or missing information were found.

"Additional In-depth Data Review": State health departments may perform a review, or "audit", of a hospital's medical records to ensure the hospital defined and reported all appropriate HAIs to NHSN. The auditing process may identify more HAIs in a hospital than originally reported. As such, states that perform data audits may have a higher SIR when compared to states that do not perform data audits. *In this report*, credit is given to states that performed any type of audit of their hospitals' 2023 medical or laboratory records prior to June 1, 2024.

SOURCES

CONTENT SOURCE:
National Center for Emerging and Zoonotic Infectious Diseases (NCEZID)

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