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Healthcare-Associated Infections in North Carolina

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Healthcare Provider Version

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N.C. Healthcare-Associated Infections Prevention Program
N.C. Communicable Disease Branch
N.C. Division of Public Health
N.C. Department of Health and Human Services

N.C. Healthcare-Associated Infections Prevention Program

Overview of Healthcare-Associated Infections in North Carolina

The U.S. Centers for Disease Control and Prevention estimates that 4 percent of all hospital admissions result in a healthcare-associated infection (HAI), culminating in approximately 721,800 infections[1] and 99,000 deaths each year[2] as well as $28–$33 billion in excess costs.[3] In North Carolina, HAIs result in approximate direct costs to facilities ranging from $124 million to $348 million annually.[4] These numbers likely underestimate the true burden of HAIs because they include only a subset of acute care hospitals and healthcare-associated infections. This report is intended to provide an understanding of the burden of healthcare-associated infections in North Carolina.

HAIs are infections caused by a variety of organisms, including bacteria and fungi, while receiving medical care. Hospitals report specific types of HAIs to the North Carolina Division of Public Health (N.C. DPH). This report focuses on five important types of HAIs that occurred while patients were hospitalized during January 1, 2014 – December 31, 2014. These infections include:

1. Central line-associated bloodstream infections (CLABSI)
2. Catheter-associated urinary tract infections (CAUTI)
3. Surgical site infections (SSI) occurring after inpatient abdominal hysterectomies or colon surgeries
4. Laboratory-identified bloodstream infections caused by methicillin-resistant *Staphylococcus aureus* (MRSA)
5. Laboratory-identified bloodstream infections caused by *Clostridium difficile* (CDI)

The prevention of healthcare-associated infections is a public health priority in North Carolina and is a collaborative effort among the healthcare and public health communities. This report was a product of this collaboration prepared by the HAI Prevention Program located in the Communicable Disease Branch of the Epidemiology Section of the N.C. DPH. The N.C. HAI Prevention Program works to eliminate preventable infections in health care settings by:

1. Conducting statewide surveillance for selected HAIs;
2. Providing useful, unbiased information to health care providers* and consumers through public reports;
3. Promoting and coordinating prevention efforts; and
4. Responding to outbreaks in healthcare settings.

Report definitions are provided (Appendix A). Prevention tips on HAIs are also provided (Appendix C).

We welcome your feedback to improve the usefulness of future reports (nchai@dhhs.nc.gov). For more information on Healthcare-Associated Infections and the N.C. HAI Prevention Program, please visit http://epi.publichealth.nc.gov/cd/diseases/hai.

For more information:

- To learn more about each individual HAI please visit the N.C. Healthcare-Associated Infections website at **http://epi.publichealth.nc.gov/cd/diseases/hai.html**
- To review background information on HAI surveillance in N.C. and details information on common statistics used: **http://epi.publichealth.nc.gov/cd/hai/figures/hai_oct2012.pdf**

For consumers interested in reviewing 2014 N.C. HAI data in more detail, please refer to the *April 2015 Provider Report* on the N.C. HAI website at http://epi.publichealth.nc.gov/cd/hai/figures.html; past reports are also available.

- A more detailed overview of the HAI
- Rates and additional variable used to measure HAI progress are also included in the Provider Report.
- Further information on organisms and pathogen resistance data (i.e., Methicillin-resistant S*taphylococcus aureus*)
- Additional comparisons between years and hospitals size groups
- Other statistical interpretations

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The Healthcare-Associated Infection Prevention Program would also like to recognize the contributions of the Healthcare-Associated Infections Advisory Group members listed in Appendix D. In particular, the program is grateful to the Subgroup on Reporting and Surveillance for their thoughtful feedback on the presentation and content of N.C. DPH HAI reports.

Finally, the program would like to acknowledge our partners who have been important leaders and strong supporters of surveillance and prevention programs for healthcare-associated infections in North Carolina. These include the North Carolina Hospital Association, the North Carolina Statewide Program for Infection Control and Epidemiology, the North Carolina Chapter of the Association for Professionals in Infection Control and Epidemiology, and the Adult Care Licensure and Nursing Home Licensure and Certification sections of the North Carolina Division of Health Service Regulation.

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I. Highlights of Healthcare-Associated Infections Activities in 2014

A. N.C. Healthcare-Associated Infections Prevention Program

Key accomplishments and activities of the North Carolina Healthcare-Associated Infections Prevention Program (N.C. HAI Program) in 2014 include the following:

1. Released quarterly public reports disclosing hospital-specific healthcare-associated infection rates since January 2014.
2. Participated or consulted in responses to over 125 outbreaks in healthcare settings.
3. Developed a Legionellosis Prevention and Response Toolkit for use in facilities, in response to multiple cases and outbreaks of healthcare-associated legionellosis across North Carolina.
4. In response to the Ebola epidemic in West Africa, we created and disseminated education materials including guidance documents, webinars, and videos targeting inpatient and outpatient settings. In addition, we with worked with the Centers for Disease Control and other partners to coordinate and conduct hospital site visits to assess Ebola preparedness.
5. In 2014, North Carolina was invited to join the CDC campaign Get Smart: Know When Antibiotics Work. This Campaign aims to reduce the rate of rise of antibiotic resistance by promoting adherence to appropriate prescribing guidelines among providers, decreasing demand for antibiotics among health adults and parents of young children, and increasing adherence to prescribed antibiotics. To kick-off this campaign, we partnered with the North Carolina Quality Center and Capitol Broadcasting on a media campaign to promote appropriate use of antibiotics in North Carolina. The N.C. HAI Program is also working with partners to support antimicrobial stewardship efforts in acute care hospitals and improve training on antimicrobial stewardship and appropriate use for healthcare students in the state.
6. Worked to improve safe injection practices through the One & Only injection safety campaign. In 2014, 18 injection safety educational sessions were held, with over 7,600 healthcare providers trained and over 1,300 campaign materials disseminated. In addition, the NC One & Only Campaign trained 26 licensed healthcare professionals to provide safe injection educational sessions within their organizations and local communities.
7. Collaborated with the North Carolina Division of Health Service Regulation to promote safe injection practices education among over 800 unlicensed healthcare workers in licensed adult care homes.

B. 2014 Annual Report

Key points for the 2014 Annual Report include the following:

- CLABSI: North Carolina hospitals observed the least number of CLABSIs since reporting began in 2012. North Carolina performed BETTER than the 2006-2008 national experience. In 2014, North Carolina met the U.S. Department of Health and Human Services goal to reduce CLABSIs nationally by 50% from the 2006-2008 baseline experience.
- CAUTI: North Carolina hospitals observed the highest number of CAUTIs since reporting began in 2012; overall, North Carolina has had more infections than predicted each year. North Carolina performed WORSE than the 2009 national experience. North Carolina did not meet the U.S. Department of Health and Human Services goal to reduce CAUTIs nationally by 25% from the 2009 baseline experience. Nationally, there has been difficulty reducing CAUTIs.
- SSI (abdominal hysterectomy): North Carolina hospitals observed the highest number of abdominal hysterectomy infections since NC hospitals began reporting in 2012. North Carolina performed the SAME as the 2006-2008 national experience. The U.S. Department of Health and Human Services set a goal to reduce SSIs nationally by 25% from the baseline experience in 2006-2008; North Carolina met this goal in 2012 (not in 2014).
- SSI (colon): North Carolina hospitals observed about the same number of infections as in 2012. North Carolina performed BETTER than the 2006-2008 national experience. The U.S. Department of Health and Human Services set a goal to reduce SSIs nationally by 25% from the baseline experience in 2006-2008; North Carolina met this goal in 2012 (not in 2014).
- MRSA: North Carolina hospitals observed the highest number of infections reporting since began in 2013. North Carolina performed BETTER than the 2010-2011 national experience. The U.S. Department of Health and Human Services set a goal to reduce MRSA nationally by 25% from the baseline experience in 2010-2011; North Carolina has not yet been met this goal.

- CDI: North Carolina hospitals observed the highest number of infections since reporting began in 2013. North Carolina performed BETTER than the 2010-2011 national experience. The U.S. Department of Health and Human Services set a goal to reduce CDI nationally by 30% from the baseline experience in 2010-2011; North Carolina has not yet met this goal.

C. Healthcare-Associated Infections Partner Updates

North Carolina Statewide Program for Infection Control and Epidemiology (N.C. SPICE)

The North Carolina Statewide Program for Infection Control and Epidemiology (N.C. SPICE) promotes prevention and control of healthcare-associated infections in North Carolina and beyond by providing evidence-based education and consultation across the healthcare spectrum. In 2014, SPICE held four classroom courses targeting new infection preventionists (IPs) in acute and long-term care settings, training a total of 268 healthcare professionals. SPICE revised the curricula for infection control for dental and home health/hospice settings and launched the on-line version of the course in April and October 2014, respectively. As a result of these on-line courses, 185 outpatient, 64 dental, and 26 home health/hospice healthcare personnel were trained. Additionally in 2014, four modules for nursing homes were accessed via SPICEducation.unc.edu and completed 606 times; an additional 223 requests were received for these modules in DVD format to be used for on-site staff education. Two additional modules on prevention and treatment of UTIs and *Clostridium difficile* are scheduled for launch in 2015. In addition, SPICE provided 879 infection control consultations by phone or email in 2014.

North Carolina Division of Health Service Regulation (DHSR)

Adult Care Licensure Section (ACL)

Healthcare-associated infections can occur in any healthcare setting, including adult care homes such as assisted living facilities. The North Carolina Division of Health Service Regulation's (DHSR) Adult Care Licensure (ACL) Section is an important partner in ensuring infection prevention strategies are implemented in these types of healthcare settings.

General statute §131D-4.4 and 4.5 specifies provisions specific for adult care homes including written infection prevention guidelines in facility policies and procedures, infection prevention training requirements for adult care home staff, and the establishment of guidelines for reporting communicable disease outbreaks to the North Carolina Division of Public Health (DPH). As a result of this statute, ACL developed a state infection prevention course for adult care homes and in April 2012, provided state-wide training for care providers and county and state staff with regulatory responsibilities for adult care homes. Trainings were held at 7 different sites, with over 750 attendees.

Collaboration among ACL, DPH and the local health departments has continued to grow during 2013. During inspections of licensed adult care homes, the facility's compliance with infection prevention policies and procedures is reviewed. Noncompliance or breaches in infection prevention practices by facility staff when monitoring resident blood glucose levels are reported to the N.C. HAI Program, which shares information with the local health department. Guidelines for reporting and enhanced communication between DHSR and DPH have led to increased education of adult care providers, safe infection prevention practices, and appropriate testing of residents when potential exposures occur.

Nursing Home Licensure and Certification Section (NHLC)

The Nursing Home Licensure and Certification Section (NHLC) regulates more than 430 nursing homes. In 2014, training and education of NHLC staff was a priority to provide basic knowledge in infection prevention practices and appropriate corrective action if infection prevention practices were inadequately implemented. The Section participated in a N.C. HAI Program carbapenem-resistant Enterobacteriaceae (CRE) task force targeting identification in nursing homes. The following infection prevention educational sessions were provided:

1. Annual training to all nursing home and acute care surveyors in conjunction with N.C. SPICE;
2. Dissemination of N.C. SPICE newsletter and routine updates to surveyors and nursing home administrators;
3. Centers for Medicaid and Medicare Services webinar was made available to all surveyors;
4. N.C. HAI Program summary updates;
5. CDC updates and other alerts from NHLC Regional Office disseminated to surveyors and nursing home administrators.
6. In partnership with the Centers for Medicaid and Medicare Services and N.C. SPICE, created two additional modules to complete a DVD series on infection prevention. These new modules, safe injection practices and environmental disinfection, are available on-line and were provided on DVDs at no cost to all N.C. nursing homes. (The first two modules on antibiotic resistant bacteria and isolation precautions were also provided at no cost to all N.C. nursing homes.)

North Carolina Quality Center (NCQC)

The NC Quality Center (NCQC) is committed to partnering with healthcare providers and communities to provide safe, quality healthcare and to prevent HAIs. Towards this mission, the NCQC has engaged in the following HAI prevention activities:

North Carolina-Virginia Hospital Engagement Network Healthcare-associated Infections Learning Network (NoCVA)

This learning network supported the national Partnership for Patients' goals and addressed several areas of harm related to infections: CAUTI, CLABSI, ventilator-associated events such as pneumonia, and SSIs including colon surgery, abdominal hysterectomy and total joint replacement surgery for hips and knees. This initiative integrated patient and family engagement into HAI reduction and formed a patient/family advisory committee (PFAC) which included two former patients to assist in the development of patient education tools and guides for those undergoing total joint replacement surgery.

The aim of this three-year (2012 – 2014) campaign was to decrease the Standardized Infection Ratio (SIR) for each HAI by 40% by the end of December 2014. Final results indicate progress in these areas for the participating facilities, through December 2014:

- CAUTI: 38% increase
- CLABSI: 54% decrease
- SSI - Colon and Abdominal Hysterectomy: 48% decrease
- Ventilator-associated Pneumonia: 38% decrease

Data collection of SSI rates for hip and knee replacement surgeries began in 2014. Although these rates vary greatly based on small numbers of infections, overall there has been a decrease in SSI for both procedures.

Partners engaged to lead and deliver this project were: the Virginia Hospital and Healthcare Association, Virginia Department of Public Health, North Carolina Department of Public Health, The Carolinas Center for Medical Excellence, Virginia Health Quality Center, APIC-NC and APIC-VA

NC Get Smart: Antimicrobial Stewardship Campaign

The NC Quality Center, in conjunction with the NC Department of Public Health, is leading a statewide antimicrobial stewardship campaign. This campaign supports public and provider awareness about the dangers of unnecessary use of antibiotics. Through this campaign we have:

- Partnered with statewide stakeholders and media outlets to develop and air public service announcements
- Created a website with resources for the general public and health care providers
- Developed talking points that can be used for media and health professional communications about antibiotic resistance
- Facilitated the delivery of CDC developed educational materials to federally qualified health centers (FQHCs) and local health departments (LHDs) across the state.
- Conducted a statewide survey to assess the general public's attitudes and beliefs about the use of antibiotics

North Carolina Chapter of the Association for Professionals in Infection Control (APIC-NC)

The North Carolina Chapter of the Association for Professionals in Infection Control and Epidemiology (APIC-NC) is the leading professional association for infection preventionists (IP). Its mission is to create a safer world through the prevention of infections.

APIC-NC boasts more than 200 members consisting of nurses, physicians, public health professionals, epidemiologists, microbiologists or medical technologists. Many infection preventionists are employed within healthcare institutions and also serve as educators, researchers, consultants and clinical scientists.

APIC-NC serves two primary roles in regard to its membership. First, educational programs support the infection prevention activities of the many patient safety stakeholders. Second, APIC-NC collaborates with other professional associations, consumer groups, thought leaders, and regulatory and accrediting agencies to maximize the synergy of shared interests and resources with the goal of improving patient outcomes.

In 2014, APIC-NC offered two educational sessions that consisted of the latest infection prevention information. The first session focused NHSN HAI definitions and understanding statistics and evidence based literature. The second session provided strategies to assist IPs to achieve and maintain success in today's changing healthcare environment and incorporated the following relevant topics:

- outbreaks;
- epidemiologically important microorganisms;
- current guidelines governing environmental cleaning;
- infection prevention in specialized areas including cardiac catheter laboratories, pharmacy, and operating suites;
- regulatory requirements (OSHA, CMS, JCAHO) impacting healthcare organizations; and
- patient and family centered care.

D. Stories of Success in Eliminating and/or Reducing Healthcare-Associated Infections in North Carolina

Reducing Catheter Associated Urinary Tract Infections (CAUTI)
During 2012, Nash UNC Healthcare experienced an increase in CAUTI rates; this upward trend prompted efforts to decrease infection rates and catheter utilization. These initiatives have been implemented facility wide including BTAR (Blunt Thoracic Aortic Rupture) which is on campus as well as the facility's rehabilitation center.

The following goals were established:

- Reduce/eliminate catheter associated infections,
- Decrease device utilization,
- Decrease costs associated with catheter utilization.

Nash implemented an evidenced-based Foley Protocol in 2011, but protocol use and compliance was low. A team was created, made up of managers, shift supervisors, and staff nurses from different areas of the hospital. This team combined research and recommendations from accrediting organizations to modify the existing protocol based on updated guidelines and created an audit tool.

The newly modified Foley Protocol, implemented by the physician in the order set, was initiated when the orders were entered. A nurse (RN) must score the patient status (e.g., 1-10) based on weighted variables configured within the computer system. The following variables are assessed: hemodynamic monitoring; incontinence; medications; mobility; skin assessment; special circumstances; spin/orthopedics; urologic; voiding frequency; and mental status. If a score $\leq$ 6 is achieved, the Foley must be removed per protocol.

One additional change to the Protocol was that only nurses (RN or LPN, no unlicensed personnel) would be allowed to insert a foley catheter. In the ED, the "Foley Buddy" system, or the pairing of two nurses, was also instituted. This process supported proper foley utilization and ensured sterile procedure was followed during insertion.

Today, Nash nurses routinely audit use of catheters, receive extensive annual education and complete routine skills validation. Managers validate the necessity of each urinary catheter used. Leaders report catheter use during hospital-wide Daily Safety Huddles. Every urinary catheter indwelling longer than 5 days is reviewed at the Daily Safety Huddle. Infection Preventionists reinforce efforts by performing weekly audits for compliance and communicating results with the team.

Ongoing efforts:

- Foley Audits
- Managers remain involved in rounding
- Continue to incorporate new evidence
- Staff members perform Mini Root Cause Analyses and obtain additional information for all CAUTI's
- Update equipment: provide Foley trays that are easy to use (with step by step instructions)

Through these continued efforts, Nash Healthcare has achieved a reduction in overall CAUTI rate of 67% between 2013 and 2014. In addition, a decrease in overall catheter use of 12% has been observed.

Contact Chris Cherry, RN-BC, Nurse Manager, NASH UNC Healthcare, cmcherry@NHCS.ORG

II. Explanation of Statewide Healthcare-Associated Infections Data

The HAI Annual Report for 2014 includes data that have been combined from all reporting acute care hospitals in North Carolina. Other types of facilities also report HAI data to North Carolina, including rehabilitation wards within acute care hospitals, stand-alone rehabilitation facilities, long-term acute care hospitals, and specialty hospitals such as psychiatric facilities. Data for these additional facility types are provided in the Quarterly Report for all of 2014, available here: **http://epi.publichealth.nc.gov/cd/hai/figures.html.**

The following section describes information presented below in Section III.

A. WHAT IS THE PURPOSE OF THIS REPORT?

This report is meant to help patients who need inpatient medical treatment decide whether they should be concerned about healthcare-associated infections (HAIs) at the hospital they may choose. HAIs are infections patients can get while receiving medical treatment in a healthcare facility. Patients should know that these infections are unintended. Ideally, HAIs should never happen, but sometimes they do. Hospitals track and report HAIs for many reasons. In some cases they are required to do so—either by state public health authorities or by federal health agencies. In most cases, hospitals report numbers (data) about certain HAIs because they want to know how well they are doing in preventing them, and how they compare with other hospitals of similar size and with similar kinds of patients.

This report looks at five HAIs:

1. Central line-associated bloodstream infections (CLABSI)
2. Catheter-associated urinary tract infections (CAUTI)
3. Surgical site infections (SSI) following abdominal hysterectomies and colon surgeries
4. Positive laboratory results with methicillin-resistant *Staphylococcus aureus* (MRSA) bacteria found in the bloodstream
5. Positive laboratory results with *Clostridium difficile* (*C. difficile,* CDI) bacteria found in a stool (fecal) sample

Click here for "Fast Facts" about central lines, urinary catheters, and the HAIs discussed in this report.

Hospitals are required by law to report these five HAIs to the North Carolina Division of Public Health. More information about North Carolina's mandatory reporting can be found here: http://epi.publichealth.nc.gov/cd/hai/prevention/laws.html.

These measures do not represent all possible infections, but were selected because they give a good overview of how a hospital or state is doing in preventing healthcare-associated infections. These infections are largely preventable when healthcare providers use infection prevention steps recommended by the Centers for Disease Control and Prevention (CDC).

B. WHERE DO THE NUMBERS COME FROM?

Hospitals self-report their HAI data to the CDC and the North Carolina Division of Public Health using a free, web-based software system called the National Healthcare Safety Network (NHSN). CDC and the North Carolina HAI Prevention Program provide training to hospital staff on the appropriate use of this system and provide guidance on how to track infections in a standard way.

More information about NHSN can be found here: http://www.cdc.gov/nhsn/.

C. HOW DO I READ THE REPORT?

This report looks at how hospitals in this state performed in terms of infection prevention by displaying how many HAIs they reported during January 1, 2014 – December 31, 2014. There is one key measure used to determine HAI progress in North Carolina as well as nationally, this is referred to as the standardized infection ratios (SIR).

Standardized Infection Ratios (SIR): When presenting SIRs, the report data tables and figures show whether a hospital had more ("worse") HAIs, fewer ("better") HAIs, or about the same ("same") number of HAIs compared to the national average (i.e., national experience) based on previous years of reported data. The national baseline years differ for each HAI: CLABSIs and SSIs use data from 2006-2008; CAUTIs use data from 2009; MRSA and CDI LabID events use data from 2010-2011. The national average represents the number of infections predicted for each hospital/unit. Each SIR value has been statistically adjusted for a number of HAI risk factors; when the data are risk-adjusted, it makes it possible to fairly compare state and hospital performance. The SIR comparison of observed infections to predicted infections takes into account differences between hospitals such as types of patients and procedures, as well as other factors such as the hospital's size and whether it is affiliated with a medical school. HAI-specific adjustments are listed below.

CLABSI and CAUTI:

- Type of patient care location
- Hospital affiliation with a medical school
- Bed size of the patient care location

MRSA and CDI:

- Facility bed size
- Hospital affiliation with a medical school
- The number of patients admitted to the hospital who already have *C. difficile* or an MRSA bloodstream infection ("community-onset" cases)
- For hospital-onset *C. difficile*, the SIR also adjusts for the type of test the hospital laboratory uses to identify *C. difficile* from patient specimens.

SSI (abdominal hysterectomies and colon surgeries):

- Duration of surgery
- Surgical wound class
- Use of endoscopes
- Re-operation status
- Patient age
- Patient assessment at time of anesthesiology

SIRs are presented for the state overall and for each hospital size group; SIR is also presented by unit (i.e., ICU type) where there may be differences across types of hospital units. The hospital groups were categorized by total hospital bed counts: less than 100 beds, 100-199 beds, 200-399 beds, and 400+ beds. Hospitals that served as the primary location for medical schools were included in a separate category (primary medical school affiliation). A list of the reporting hospitals in each size category can be found in Appendix E.

Rates: When presenting rates, data tables for each HAI show an infection rate for each HAI by reporting year. An infection rate measures the number of new infections seen in a hospital during a given time frame for those patients at risk for infection. It gives you information about how often infections are occurring in a particular location within the hospital, and can identify the types of surgical procedures that may pose the highest risk for infection. **Rates presented in this report are estimated rates; this is because only a subset of all N.C. healthcare facilities is required to report HAIs.**

A rate is calculated for each infection type (CLABSI, CAUTI, SSI, MRSA, *C. difficile*) as the total number of infections or events reported during January 1, 2014 – December 31, 2014 divided by the total number of days that patients were in the hospital/location and at risk for that infection or event.

For example, a rate for surgical site infections (SSI) following abdominal hysterectomies is calculated as the total number of infections reported for surgical procedures during January 1, 2014 – December 31, 2014 divided by the total number of patients who underwent that type of procedure.

Click here for a "Reading Guide" that explains each element of the data tables and figures.

D. WHAT DO THE NUMBERS MEAN?

Numbers alone do not show how well a hospital or North Carolina is doing in preventing HAIs. This report shows how the state performed during a single year (2014), and compares each year's performance to the national average or baseline experience. Among all hospitals that report HAIs, larger hospitals that see more patients or do more surgeries may have more infections compared to smaller hospitals.

SIR values are presented in each table and plotted in each figure. Error bars representing the 95% confidence interval for the SIR are also included. The 95% confidence intervals help determine how precise the estimate of the SIR is; they also help determine whether the number of observed infections is statistically significantly different (lower or higher) compared to the number of predicted infections or not.

Click here for a "Numbers Guide" that explains any calculations for numbers in the data tables and figures.

E. PATHOGENS IDENTIFIED AND ANTIBIOTIC RESISTANCE

In NHSN, hospitals may report up to three organisms identified from one HAI. These organisms were categorized into one of ten groups, *Candida* & other yeasts/fungi, *Enterobacter*, *Enterococcus*, *Escherichia coli* (*E. coli*), *Klebsiella*, *Pseudomonas*, *Staphylococcus aureus*, *Staphylococcus* coagulase negative, and two "other" categories – Other Gram-Positive Bacteria and Other Gram-Negative Bacteria. The first eight categories or organisms listed represent the leading causes of HAIs. Many of these organisms are part of the normal flora contained within the human body, found on the skin, or in the gastrointestinal and/or urinary tract. Introduction of these organisms into other areas of the body can lead to infection.

Antibiotic-resistant organisms such as methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *Enterococcus* (VRE), and carbapenem-resistant Enterobacteriaceae (CRE) are organisms that have become resistant to certain antibiotics. In general, these antibiotic resistant organisms are most often detected in specialized healthcare settings, such as ICUs, where patients are hospitalized for extended periods of time, treated with multiple antibiotics and have weakened immune systems, therefore making them more vulnerable to infections. Facilities entered limited antibiotic susceptibility information into NHSN. Susceptibility testing results were entered as susceptible (S), intermediate (I), resistant (R), or not tested.

Antibiotic resistant organisms were classified according to NHSN guidance as follows:
1. **CRE**: any Enterobacteriaceae intermediate (I) or resistant (R) to imipenem, meropenem or doripenem;
2. **MRSA**: Staphylococcus aureus resistant (R) to oxacillin, cefoxitin, or methicillin; and
3. **VRE**: any Enterococcus species resistant (R) to vancomycin.

Currently, several laboratory methods exist for antibiotic susceptibility testing. Testing for antibiotic susceptibility may be routine at some hospitals while rarely performed at others. **A standardized approach to antibiotic susceptibility**

testing across clinical laboratories does not exist, and as a result data on antibiotic resistance organisms in this report should be interpreted with caution.

F. THINGS TO CONSIDER WHEN LOOKING AT THE REPORT

A total of 105 North Carolina hospitals reported HAIs in 2014, including 91 short-term acute-care hospitals, nine long-term acute-care hospitals, two inpatient rehabilitation facilities, and five specialty hospitals.

These reports cover data from January 1, 2014 - December 31, 2014, and the data were downloaded from the National Healthcare Safety Network (NHSN) on March 12, 2015. Any changes made to the data after this date are not reflected in this report. Before reviewing this report, a few clarifications about the data need to be made:

1. **The data within this report are preliminary.** Although efforts were made by hospitals and the North Carolina HAI Prevention Program to ensure that the data were accurate and complete, the data are self-reported and have not been formally "double-checked," or validated. Until data validation is completed, numbers should be interpreted with caution.

2. **There may be differences in reporting practices among hospitals.** Hospitals with more infection control personnel and resources may be able to identify and report more infections compared to a hospital with fewer infection control resources.

3. **There may be differences between results published by the North Carolina HAI Prevention Program and results published elsewhere** (e.g., CMS - Centers for Medicare and Medicaid Services Hospital Compare website). Results may differ due to using data from different time periods, different facility types, different patient populations, and/or different methods of analysis.

4. **The North Carolina HAI Prevention Program chose not to present some rates** for individual hospital units, procedures or hospitals that did not meet a threshold (minimum value) for the reporting period. The minimum threshold numbers are based on CDC recommendations for reporting healthcare-associated infection data.
    - Central line-associated bloodstream infections: 50 central line days;
    - Catheter-associated urinary tract infections: 50 catheter days; and
    - Surgical site infections: 20 surgeries

5. **Be cautious when interpreting crude (or cumulative) rates.** Some rates (unlike SIRs) presented in this report are NOT adjusted for all HAI risk factors. Such risk factors for which rates may not be adjusted include patient population, type of hospital (i.e., primary medical school affiliation), or testing mechanism (in the event of Clostridium difficile). Hospitals, locations, and individuals may have a higher risk for HAIs and as a result may have higher rates of infection. Although crude or cumulative CLABSI and CAUTI rates are provided for each hospital (as "YTD Total for Reporting ICUs" in the report), it is important to look closely at the location-specific rates as they reflect the different patient populations in each unit. Note that rates for SSI and LabID events are not risk-adjusted. More specifically, the Clostridium difficile testing method is not taken into account for rates (but is for SIRs).

6. **The North Carolina HAI Prevention Program does not calculate an SIR when the number of predicted infections is less than 1.** In these situations, the "How Does the State Compare to the National Experience" text says "No conclusion." This does not mean that hospitals failed to report data, or that hospitals did not report all necessary data; it only means that the number of patients, devices (central lines or urinary catheters), and/or procedures that were seen during this time period did not meet the established threshold (minimum value) for calculating an SIR. This minimum threshold is based on CDC recommendations. In other words, there is not enough information to make a reliable conclusion about the state's performance on this measure.

7. **Laboratory-Identified Events (LabID Events):** Methicillin-resistant *Staphylococcus aureus* (MRSA) bacteremia (blood infection) LabID events and *Clostridium difficile* (CDI) LabID events rely on laboratory data without requiring clinical information about the patient. This allows for a much less labor-intensive means to track MRSA and CDI infections. The N.C. HAI Prevention Program would like to highlight certain caveats in using and interpreting LabID event data. For example, experience in other states has shown that CDI infection rates tend to be higher when using LabID event data compared to a clinical case definition. Reasons for this may include differences in how individual facilities define and classify clinical disease and variations in hospital laboratory testing methods and practices. LabID events should be considered a 'proxy' measure to estimate the number of MRSA and CDI infections actually occurring. Despite these caveats, there are benefits to using LabID data. LabID events do not depend on clinical interpretation by providers and thus offer a more standardized and consistent method of collecting and reporting MRSA and CDI surveillance data. Moreover, LabID events are currently being used by CMS for surveillance of MRSA and CDI. Improving prevention practices as described in existing clinical guidelines should result in a decrease in the number of observed MRSA and CDI LabID events as well as a decrease in the number of clinical infections.

III. Statewide Healthcare-Associated Infections

A. Central Line-Associated Bloodstream Infections (CLABSI)

1. CLABSI in Adult and Pediatric Intensive Care Units

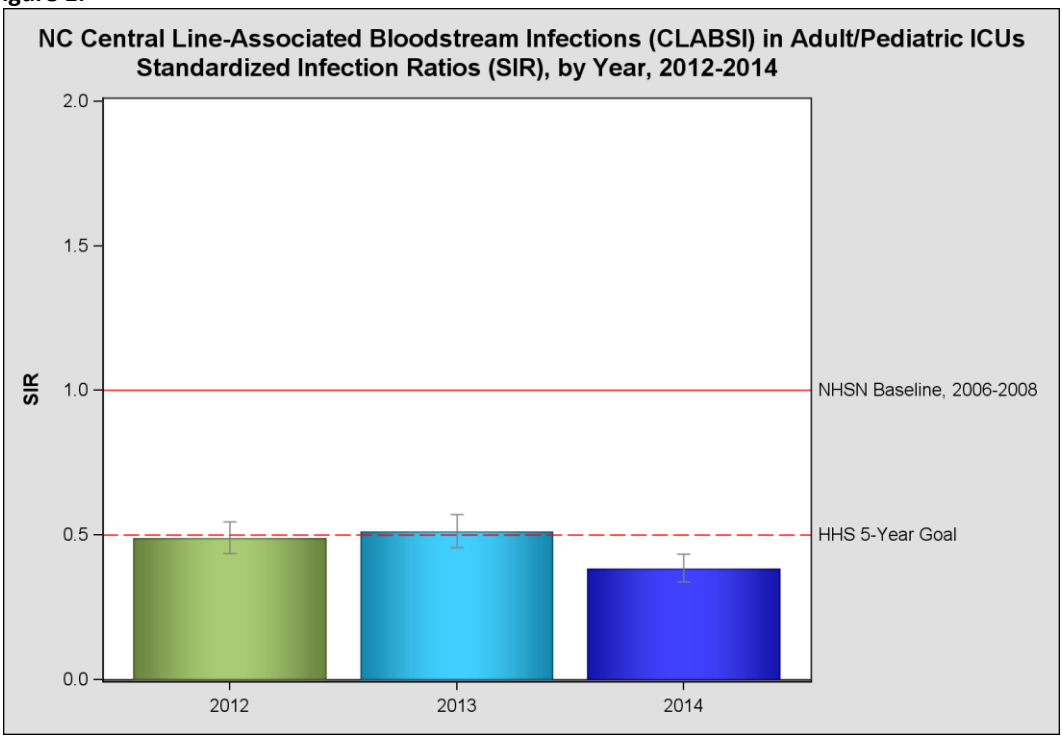
North Carolina 2014 CLABSI Highlights in Adult/Pediatric ICUs

- North Carolina hospitals observed 247 infections, compared to the predicted 643.60 infections.
  - This was better than the 2006-2008 national experience.
  - This was the least number of CLABSIs observed since NC hospitals began reporting in 2012.
- North Carolina met the U.S. Department of Health and Human Services goal to reduce CLABSIs nationally by 50% from the 2006-2008 baseline experience.
- The most commonly identified organisms from adult and pediatric CLABSI patients were *Enterococcus* and *Candida* and other yeasts/fungi.
- MRSA was the most commonly identified antibiotic-resistant pathogen identified

Table 1.

Year	# Observed	# Predicted	# Central Line Days	SIR	95% Confidence Interval	Rate	How Does North Carolina Compare to the National Experience?
2012	312	637.40	301952	0.49	(0.44, 0.55)	1.03	★Better: Fewer infections than were predicted (better than the national experience)
2013	314	612.70	296576	0.51	(0.46, 0.57)	1.06	★Better: Fewer infections than were predicted (better than the national experience)
2014	247	643.60	308872	0.38	(0.34, 0.43)	0.80	★Better: Fewer infections than were predicted (better than the national experience)

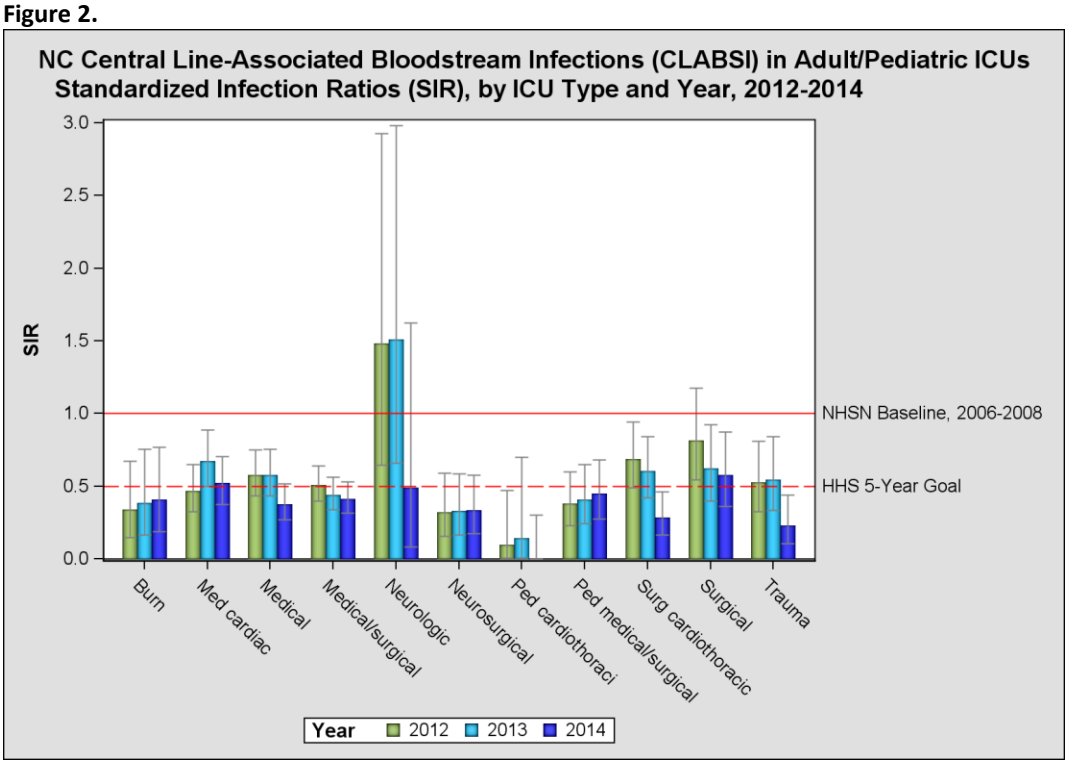
Figure 1.



How to Understand Figure 1:

- Overall (2012-2014), the number of observed CLABSI infections reported in North Carolina has been BETTER than predicted based on the national baseline
- The number of observed infections decreased after 2013, which was BETTER than the national baseline
- In 2014, NC achieved the HHS 5-year goal to reduce CLABSIs by 50% from the national baseline

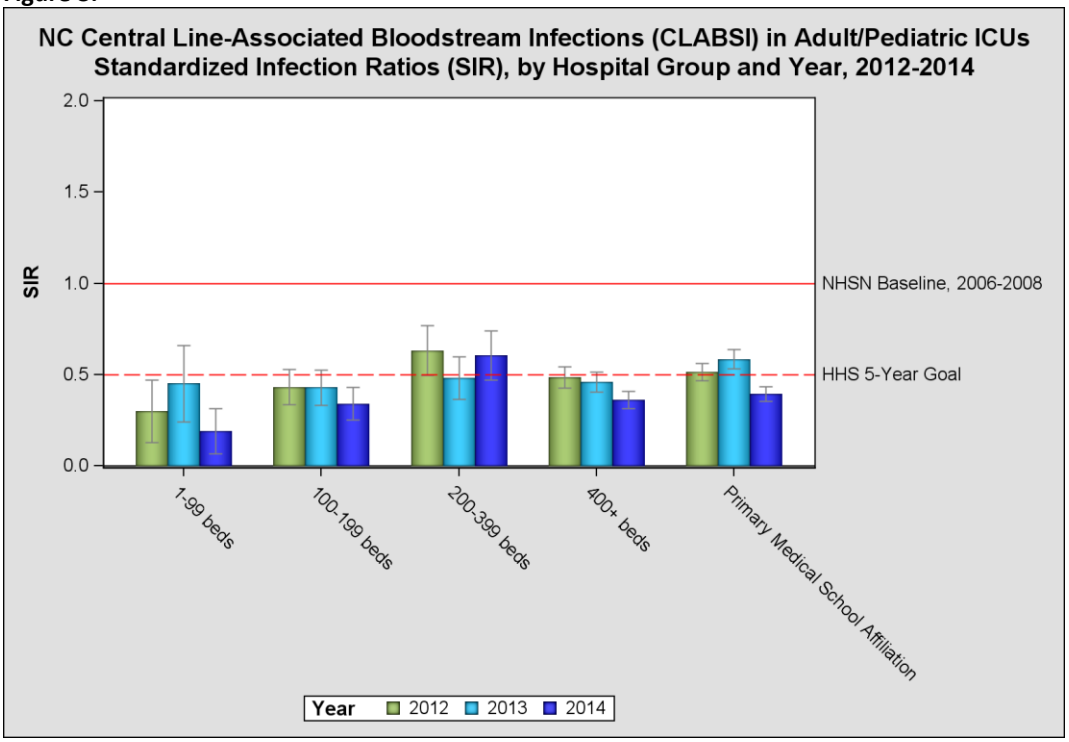
Figure 2.



How to Understand Figure 2:

- In 2014, surgical ICUs had the highest number of observed infections compared to that predicted by the national baseline
- In 2014, all ICU units except neurologic had fewer observed infections than predicted and did BETTER when compared to the national baseline
- In 2014, medical cardiac and surgical units were the only two units that observed more infections than the targeted the HHS 5-year goal

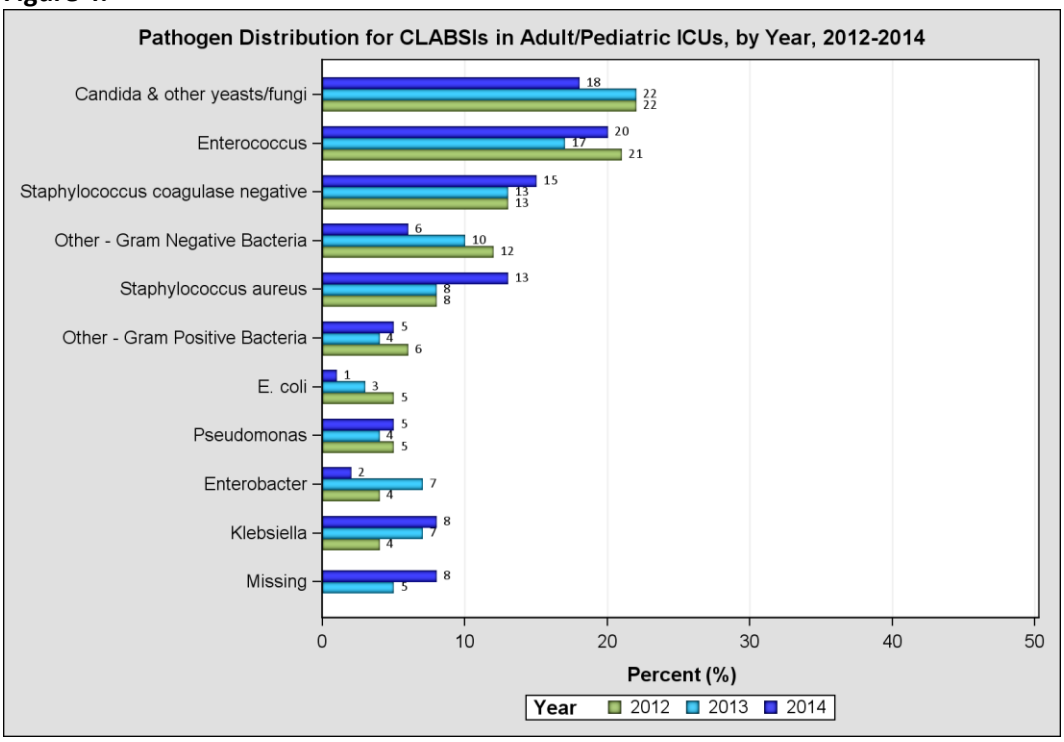
Figure 3.



How to Understand Figure 3:

- In 2014, hospitals with 200-399 beds had the highest number of observed infections compared to those predicted by the national baseline
- From 2012-2014, all hospital groups had fewer observed infections than predicted and did BETTER compared to the national baseline
- Hospitals with primary medical school affiliation met the targeted HHS 5-year goal for the first time in 2014

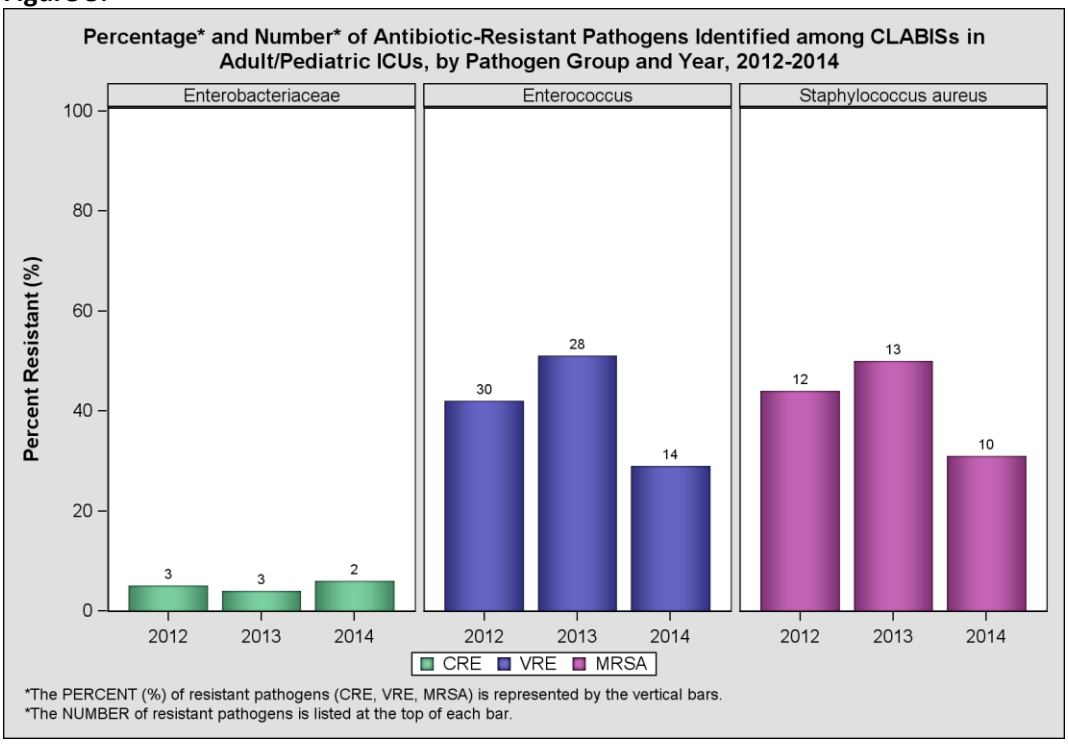
Figure 4.



How to Understand Figure 4:

- In 2014, *Enterococcus* (20%) and *Candida* and other yeasts/fungi (18%) were the most common pathogens identified from observed CLABSI infections
- These were also the two most common pathogens in 2012 and 2013

Figure 5.



How to Understand Figure 5:

- In 2014, 31% of all identified *Staphylococcus aureus* and 29% of all identified Enterococcus were antibiotic-resistant
- The percentage and number of antibiotic-resistant pathogens identified among CLABSIs in 2014 was similar to 2012 and 2013

2. CLABSI in Neonatal Intensive Care Units

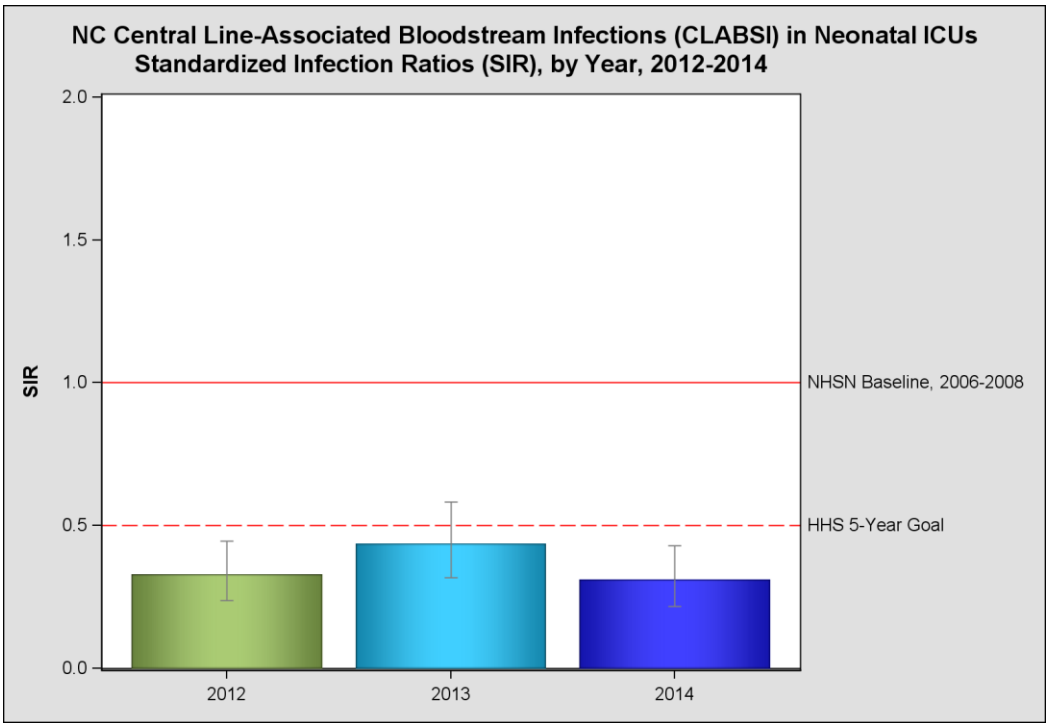
North Carolina 2014 CLABSI Highlights in NICUs

- In 2014, North Carolina hospitals observed 33 infections, compared to the 106.5 infections that were predicted
  - This was better than the 2006-2008 national experience.
- North Carolina continues to meet the U.S. Department of Health and Human Services goal to reduce CLABSIs nationally by 50% from the 2006-2008 baseline experience.
- The most commonly identified organisms from NICU CLABSI patients were *E. coli* and *Klebsiella*.

Table 2.

Year	# Observed	# Predicted	# Central Line Days	SIR	95% Confidence Interval	Rate	How Does North Carolina Compare to the National Experience?
2012	39	118.5	47018	0.33	(0.24, 0.45)	0.83	★Better: Fewer infections than were predicted (better than the national experience)
2013	42	96.33	38519	0.44	(0.32, 0.58)	1.09	★Better: Fewer infections than were predicted (better than the national experience)
2014	33	106.5	43567	0.31	(0.22, 0.43)	0.76	★Better: Fewer infections than were predicted (better than the national experience)

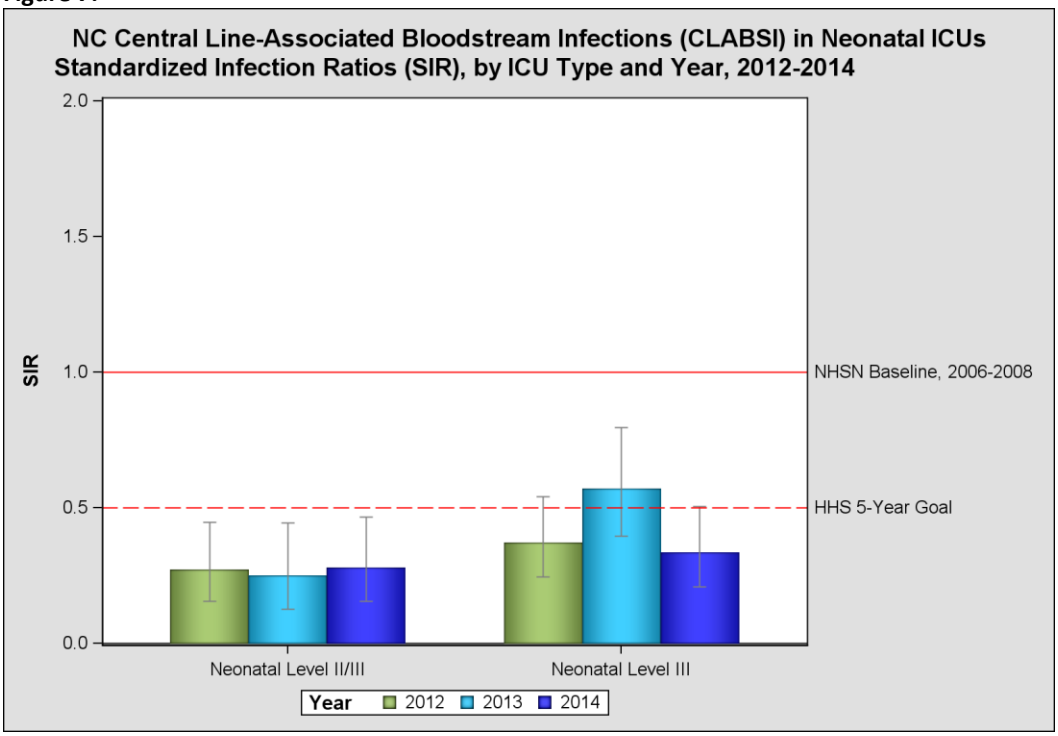
Figure 6.



How to Understand Figure 6:

- Since 2012, the observed number of CLABSI infections in neonatal ICUs is fewer than both the national baseline and the HHS 5-year goal
- CLABSIs in this setting are BETTER than predicted
- The HHS 5-year goal to reduce CLABSIs by 50% from the national baseline has been achieved in NC annually since 2012

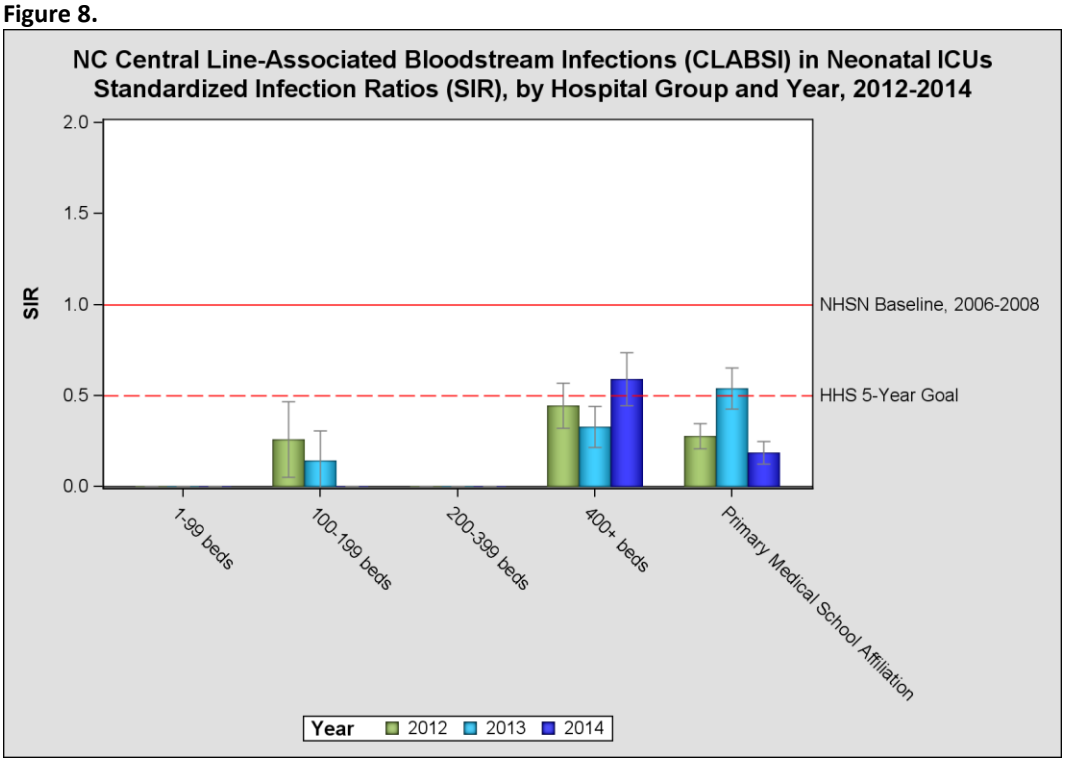
Figure 7.



How to Understand Figure 7:

- Since 2012, the observed CLABSI infections in all neonatal ICUs are below the national baseline and the HHS 5-year goal
- CLABSI SIR in both neonatal ICU types increased slightly between 2012 and 2013, but this was not significant
- The SIR in 2014 was similar to what was reported in 2012
- Both neonatal ICU types have met the HHS 5-year goal of a 50% reduction in 2012 and 2014; ICU level III but not meet the HHS goal in 2013

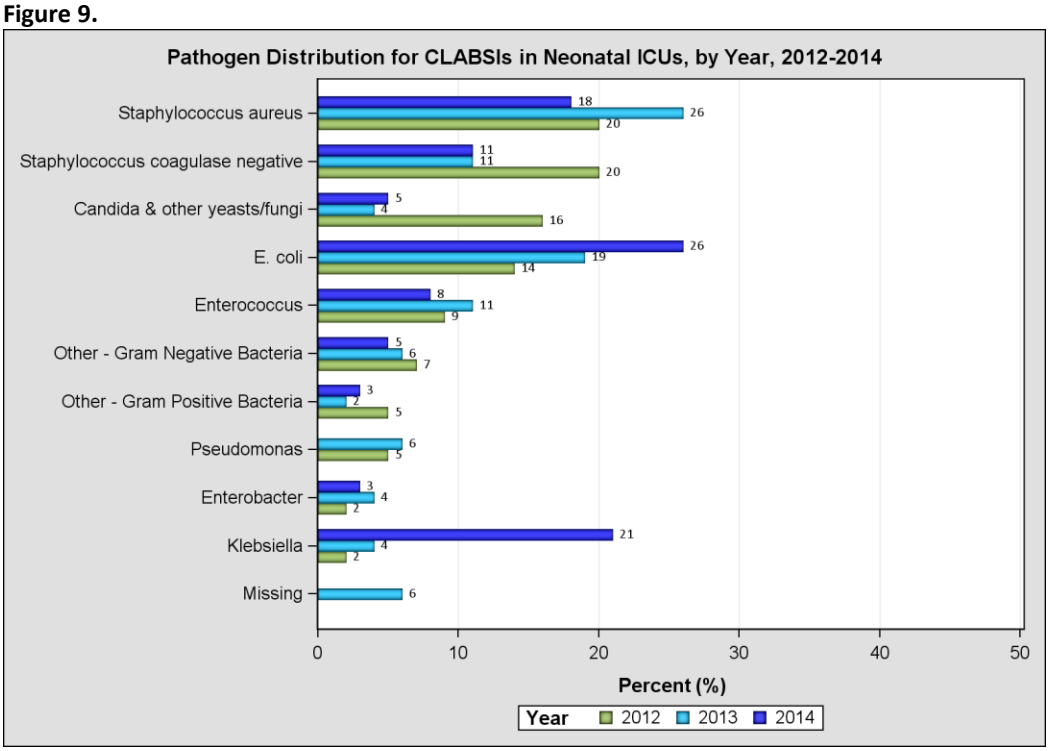
Figure 8.



How to Understand Figure 8:

- In 2014, only larger hospitals (400+ beds) and those with a primary medical school affiliation had neonatal ICUs
- Since 2012, observed CLABSIs in all hospitals groups with neonatal ICUs have been BETTER than predicted compared to the national baseline
- In 2014 hospitals with a medical school affiliation met the HHS 5-year goal for a 50% decrease in CLABSIs from baseline

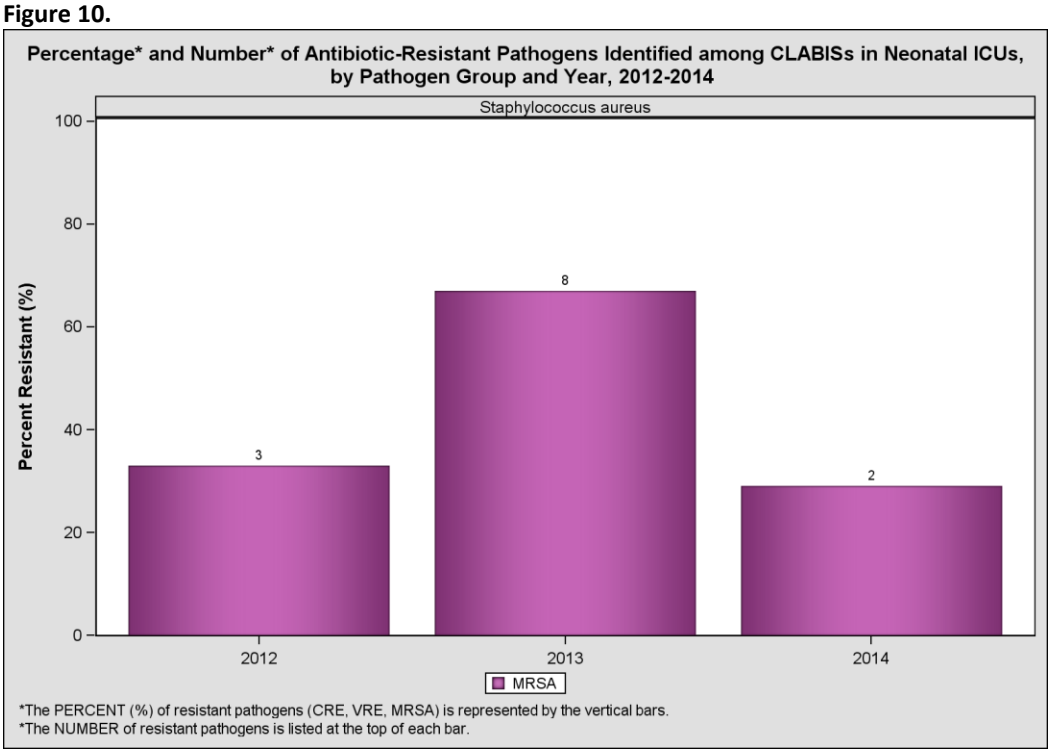
Figure 9.



How to Understand Figure 9:

- In 2014, *E. coli* (26%) and *Klebsiella* (21%) were the most common pathogens identified from CLABSIs
- *Staphylococcus aureus* was the most common identified organism in NICUs in 2012 and 2013

Figure 10.



How to Understand Figure 10:

- In 2014, 29% of all identified *Staphylococcus aureus* were antibiotic-resistant
- The percentage and number of MRSA identified among CLABSIs in 2014 is similar to 2012 and lower than 2013.

B. Catheter-Associated Urinary Tract Infections (CAUTI)

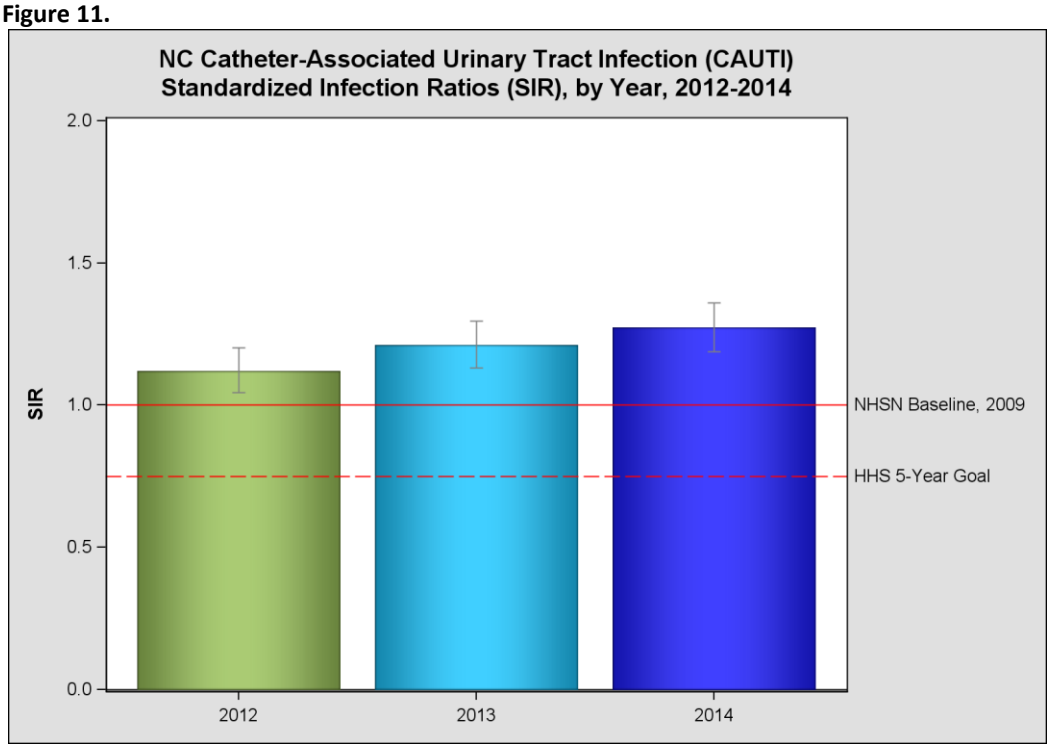
North Carolina 2014 CAUTI Highlights

- In 2014, North Carolina hospitals observed 861 infections, compared to the 676.90 infections that were predicted
  - This was worse than the 2009 national experience.
  - This was the highest number of CAUTIs observed since NC hospitals began reporting them in 2012; overall, North Carolina has had more infections than predicted each year.
- North Carolina did not meet the U.S. Department of Health and Human Services goal to reduce CAUTIs nationally by 25% from the 2009 baseline.
- Nationally, there has been difficulty reducing CAUTIs.
- The most commonly identified organisms from were *Candida* and other yeasts/fungi and *E. coli*.
- MRSA was the most commonly identified antibiotic-resistant pathogen.

Table 3.

Year	# Observed	# Predicted	# Catheter Days	SIR	95% Confidence Interval	Rate	How Does North Carolina Compare to the National Experience?
2012	793	707.10	341354	1.12	(1.05, 1.20)	2.32	**✖ Worse: More infections than were predicted (worse than the national experience)**
2013	831	686.30	332844	1.21	(1.13, 1.30)	2.50	**✖ Worse: More infections than were predicted (worse than the national experience)**
2014	861	676.90	326896	1.27	(1.19, 1.36)	2.63	**✖ Worse: More infections than were predicted (worse than the national experience)**

Figure 11.

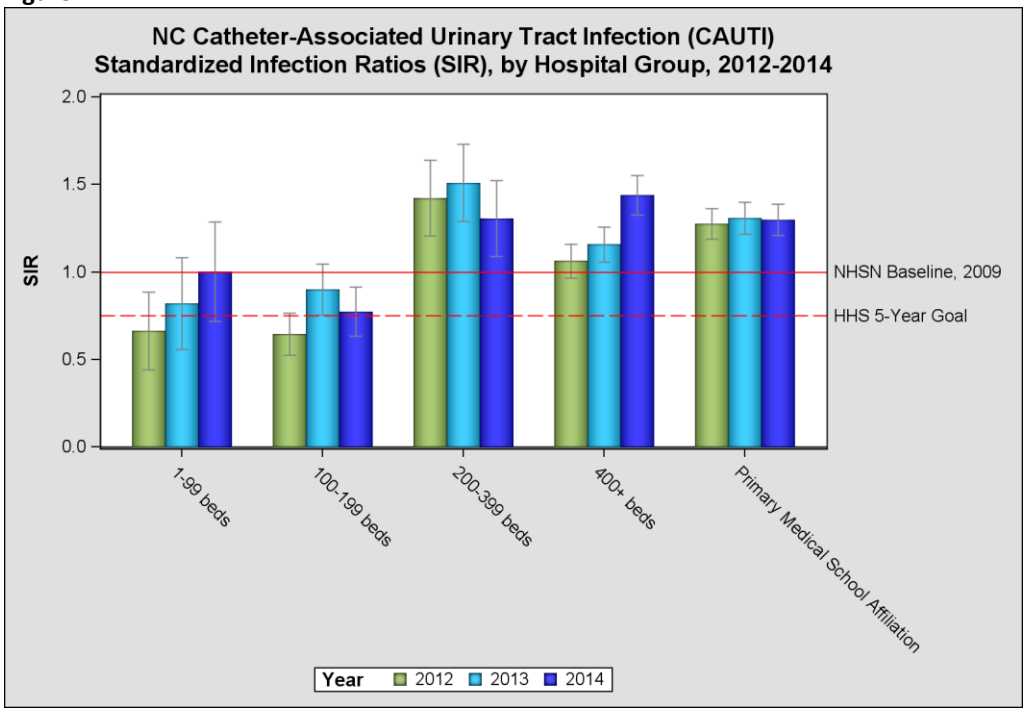


How to Understand Figure 11:

- Since 2012, North Carolina has observed more CAUTI infections compared to that predicted by the national baseline, (performing WORSE comparatively*)
- 2014 had the highest number of CAUTI infections since reporting began in 2012
- North Carolina has not met the HHS 5-year goal to decrease CAUTIs by 25%

*This is not just a trend seen in North Carolina, but other states and hospitals also report increases in observed CAUTI infections

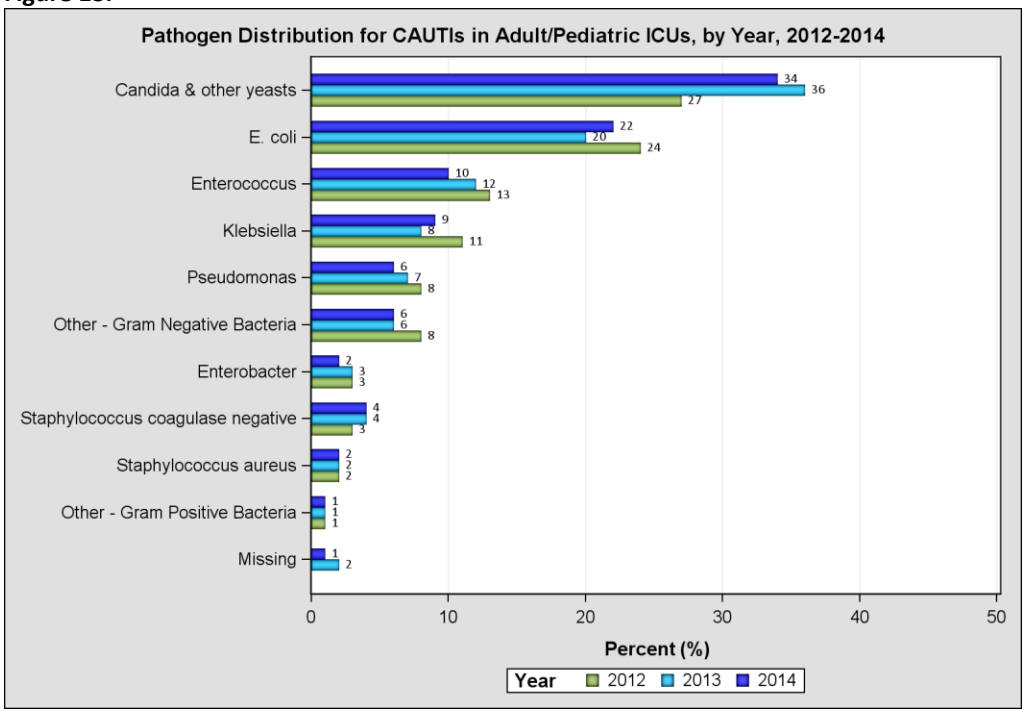
Figure 12.



How to Understand Figure 12:

- Hospitals with <100 beds observed about the same number of infections as predicted by the national baseline
- Hospitals with 100-199 beds reported fewer infections than predicted, performing BETTER than the national baseline; this is the only hospital group to meet the HHS 5-year goal of a 25% reduction in CAUTIs
- Hospitals with >200 beds and those with a primary medical school affiliation observed more infections than predicted, performing WORSE than the national baseline

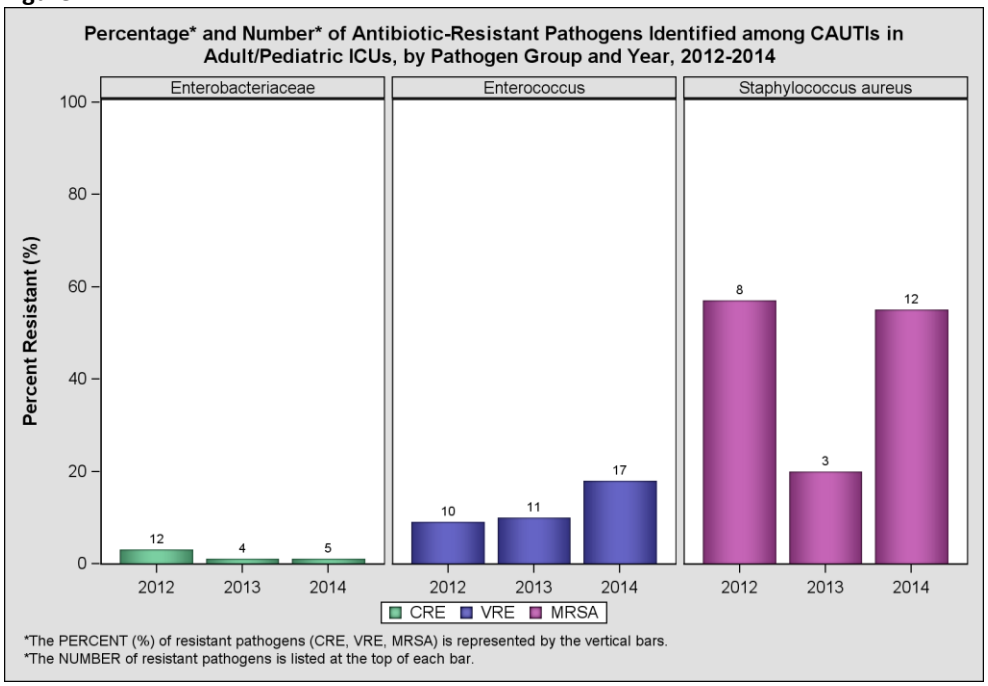
Figure 13.



How to Understand Figure 13:

- *Candida* and other yeasts/fungi (34%) and *E. coli* (22%) remain the most commonly identified pathogens (2012-2014)
- These organisms have accounted for more than 50% of identified pathogens among CAUTI infections each year from 2012-2014

Figure 14.



How to Understand Figure 14:

- In 2014, 55% of all identified *Staphylococcus aureus* were antibiotic-resistant
- MRSA was the most commonly identified antibiotic-resistant pathogens among CAUTI infections
- In 2014, 1% of Enterobacteriaceae were identified as CRE among CAUTIs. This is consistent with 2012 and 2013, where CRE were identified in 1% and 3% of Enterobacteriaceae respectively

C. Surgical Site Infections (SSI)

1. Abdominal Hysterectomies

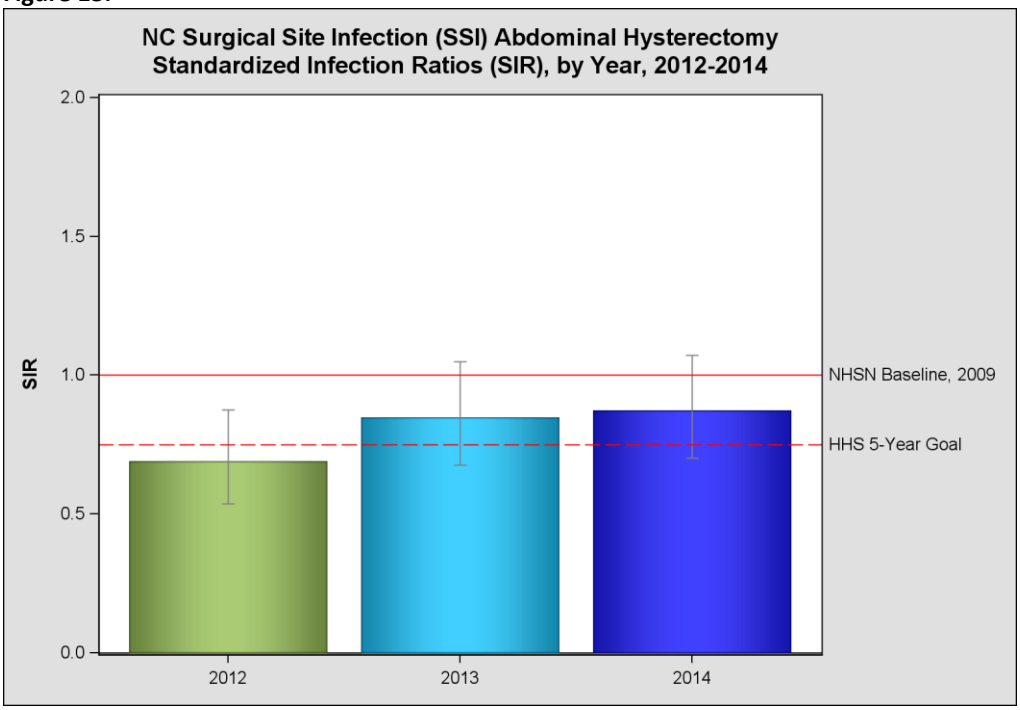
North Carolina 2014 SSI Highlights Post Abdominal Hysterectomy

- Among inpatient abdominal hysterectomies performed on adults ≥ 18 years in North Carolina acute care hospitals, North Carolina hospitals observed 85 infections, compared to the 97.51 infections which were predicted
  - This was the same as the 2006-2008 national experience.
  - This year had the highest number of infections observed since NC hospitals began reporting SSIs in 2012.
- The U.S. Department of Health and Human Services set a goal to reduce SSIs nationally by 25% from the baseline experience in 2006-2008; North Carolina met this goal in 2012.
- The most commonly identified organisms from adult and pediatric SSI patients were *Candida* and other yeasts/fungi and *Enterococcus*.
- Since 2012, approximately half of *Staphylococcus aureus* identified among abdominal hysterectomy SSI patients was MRSA.

Table 4.

Year	# Observed	# Predicted	# Procedures	SIR	95% Confidence Interval	Rate	How Does North Carolina Compare to the National Experience?
2012	65	94.07	9595	0.69	(0.54, 0.86)	0.68	★Better: Fewer infections than were predicted (better than the national experience)
2013	80	94.49	9553	0.85	(0.68, 1.05)	0.84	= Same: about the same number of infections as were predicted (same as the national experience)
2014	85	97.51	9701	0.87	(0.70, 1.07)	0.88	= Same: about the same number of infections as were predicted (same as the national experience)

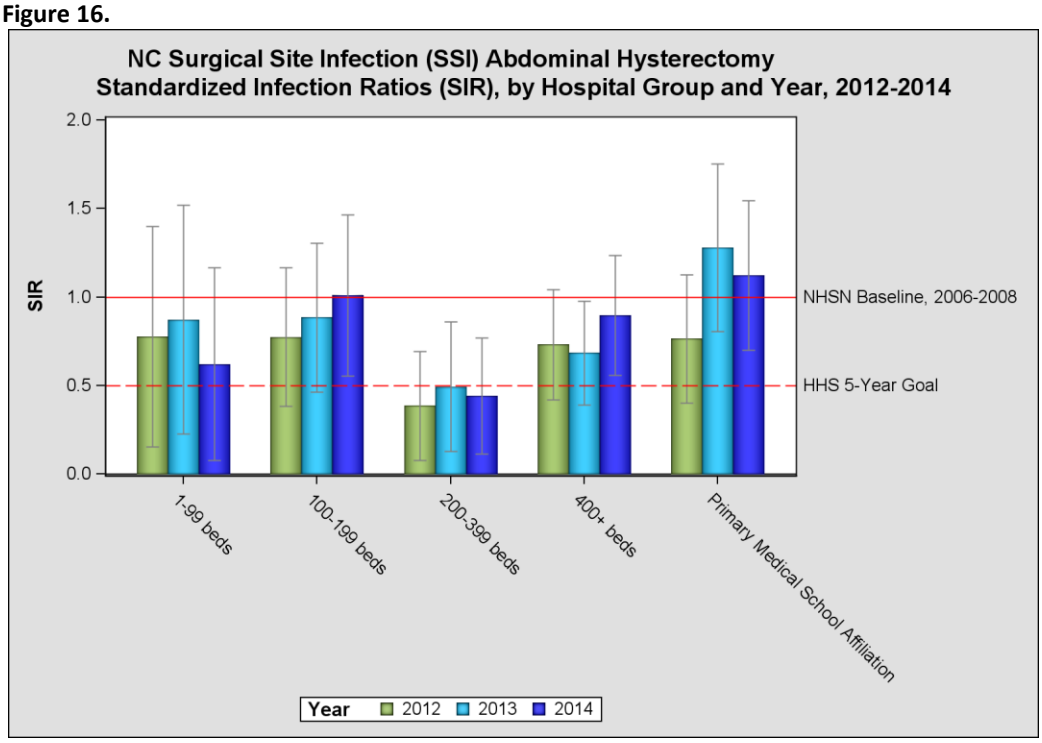
Figure 15.



How to Understand Figure 15:

- In 2012, the number of observed SSIs following abdominal hysterectomies was BETTER compared to the national baseline. In 2013 and 2014, observed SSIs have been approximately the SAME as the national baseline
- In 2012, North Carolina met the HHS 5-year goal to decrease SSIs by 25%

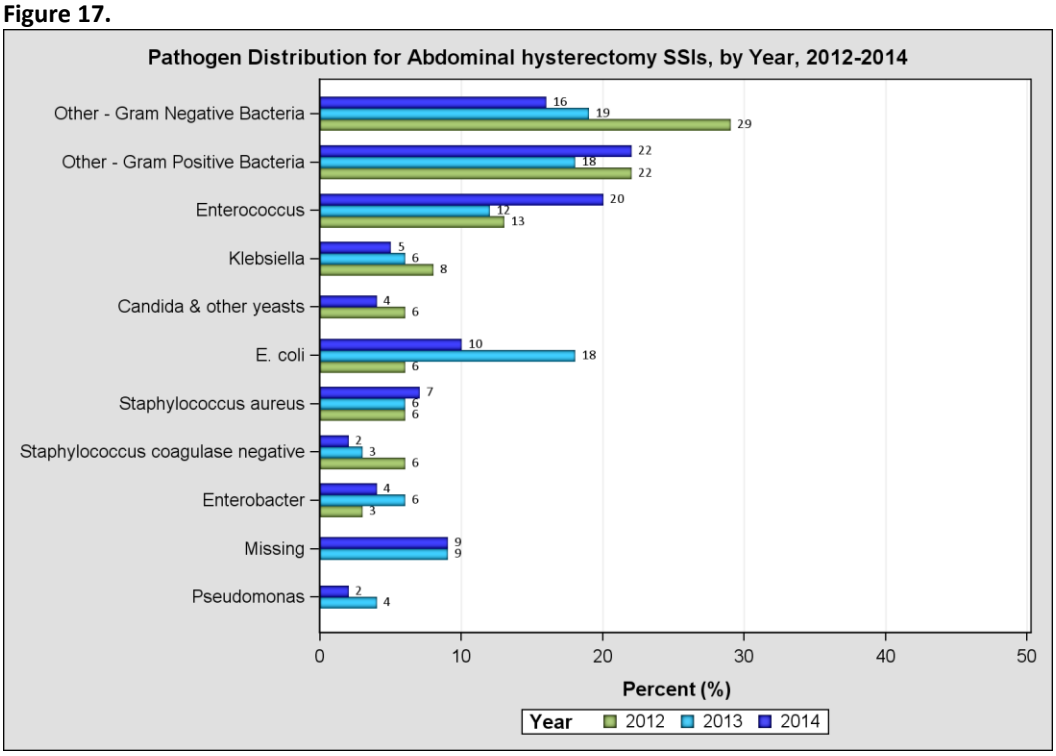
Figure 16.



How to Understand Figure 16:

- Since 2012, hospitals with 200-399 beds have performed BETTER than the national baseline for SSIs following abdominal hysterectomies
- All other groups reported about the same number of infections as predicted
- To date, the HHS 5-year goal to decrease SSIs by 25% has only been met by hospitals with 200-399 beds

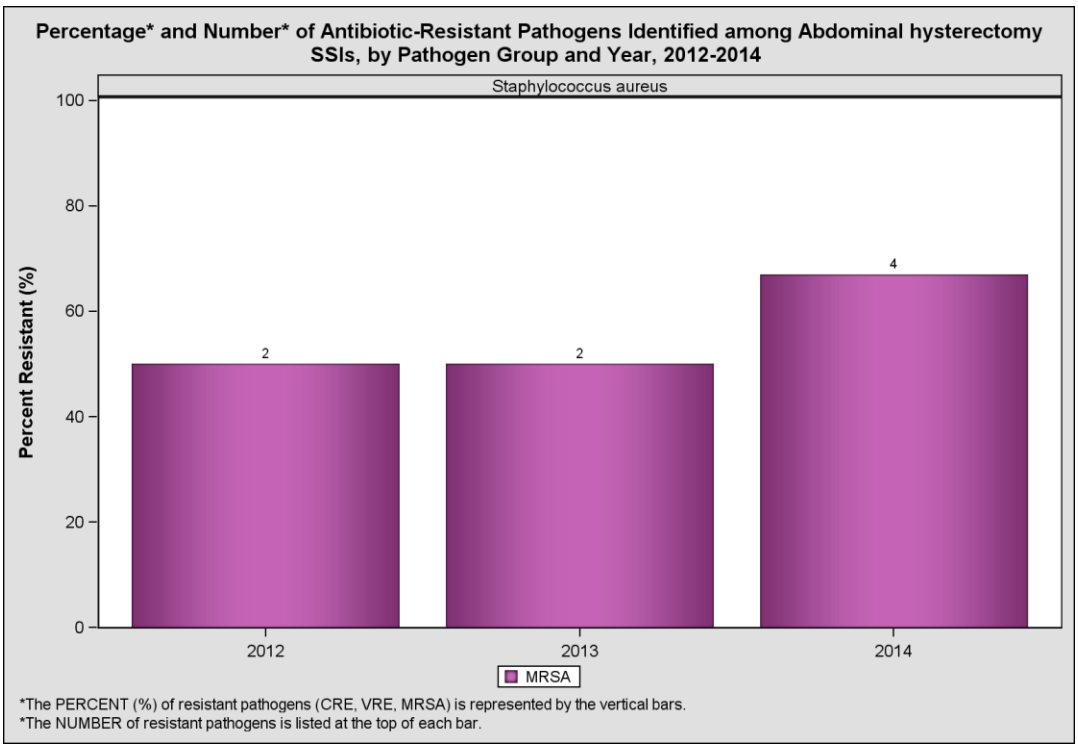
Figure 17.



How to Understand Figure 17:

- In 2014, other Gram positive bacteria (22%) were the most commonly reported pathogen among SSIs following abdominal hysterectomies
- In 2014, *Enterococcus* organisms were the 2nd most common, accounting for 20% of reported pathogens
- Other Gram positive bacteria, *Enterococcus, E.coli* and other Gram negative bacteria remain among the most commonly reported pathogens among SSIs following abdominal hysterectomies from 2012-2014.

Figure 18.



How to Understand Figure 18:

- In 2014, 54% of *Staphylococcus aureus* identified among abdominal hysterectomy SSIs were MRSA.
- This is consistent with 2012 and 2013, during which 50% of Staphylococcus *aureus* were identified as MRSA.

2. Colon Surgeries

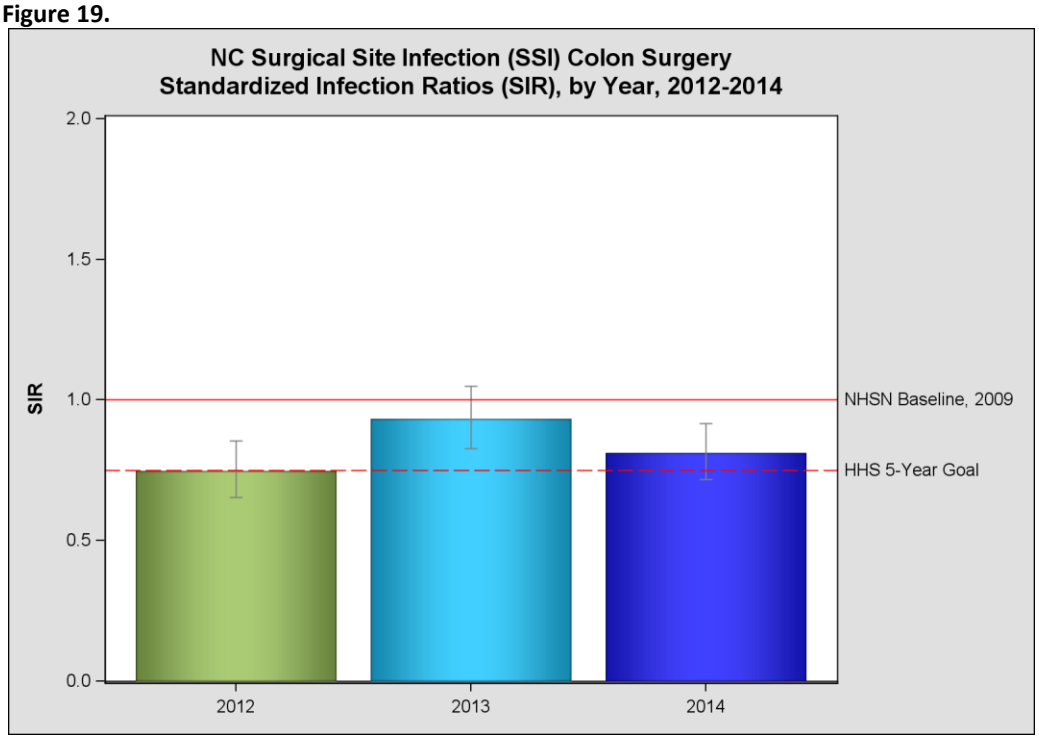
North Carolina 2014 SSI Highlights Post Colon Surgery

- Among inpatient surgeries performed on adults ≥ 18 years in North Carolina acute care hospitals, North Carolina hospitals observed 255 infections, compared to the 314.10 infections which were predicted
  - This was better than the 2006-2008 national experience.
  - This year had about the same number of infections observed as 2012 compared to the national experience.
- The U.S. Department of Health and Human Services set a goal to reduce SSIs nationally by 25% from the baseline experience in 2006-2008; North Carolina met this goal in 2012.
- The most commonly identified organisms from colon surgery SSI patients were *E. coli* and *Enterococcus*.
- In 2014, MRSA was the most commonly identified antibiotic-resistant pathogen among colon surgery SSI patients.

Table 5.

Year	# Observed	# Predicted	# Procedures	SIR	95% Confidence Interval	Rate	How Does North Carolina Compare to the National Experience?
2012	213	284.60	8719	0.75	(0.65, 0.85)	2.44	★Better: Fewer infections than were predicted (better than the national experience)
2013	277	296.80	9051	0.93	(0.83, 1.05)	3.06	= Same: about the same number of infections as were predicted (same as the national experience)
2014	255	314.10	9544	0.81	(0.72, 0.92)	2.67	★Better: Fewer infections than were predicted (better than the national experience)

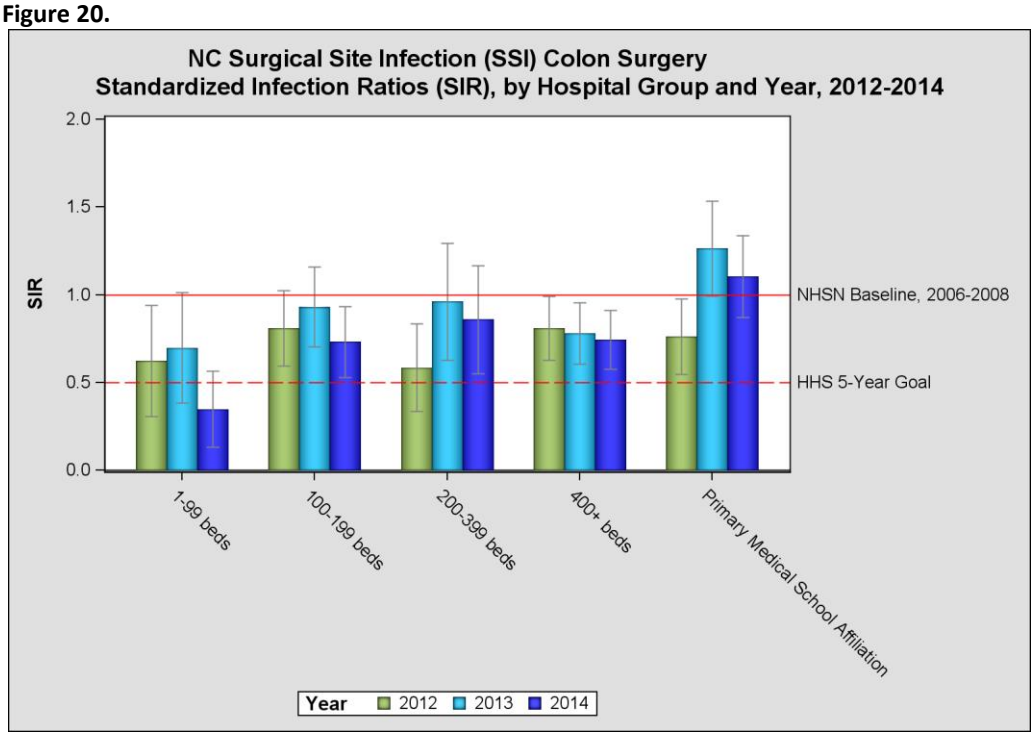
Figure 19.



How to Understand Figure 19:

- The number of observed SSI following colon surgeries was about the same in 2012 and 2014, and has been BETTER compared to the national baseline in those years
- The number of observed SSIs following colon surgeries was about the SAME as the national baseline in 2013
- North Carolina met the HHS 5-year goal to decrease SSIs following colon surgeries by 25% in 2012

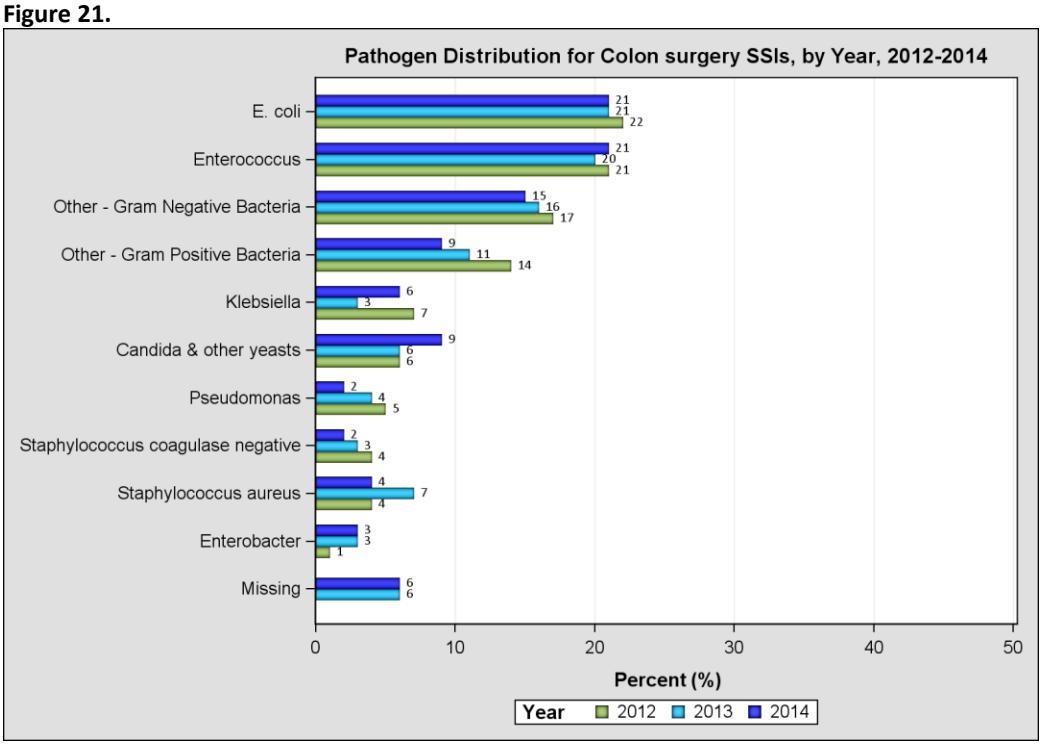
Figure 20.



How to Understand Figure 20:

- In 2014, all hospital groups except those with a Primary medical school affiliation performed BETTER than the national baseline for SSIs following colon surgeries
- Hospitals with a medical school affiliation reported about the same number of infections as predicted in 2014
- The HHS 5-year goal to decrease SSIs by 25% was not met by any group in 2012 or 2013 and was only met by hospitals with <100 beds in 2014

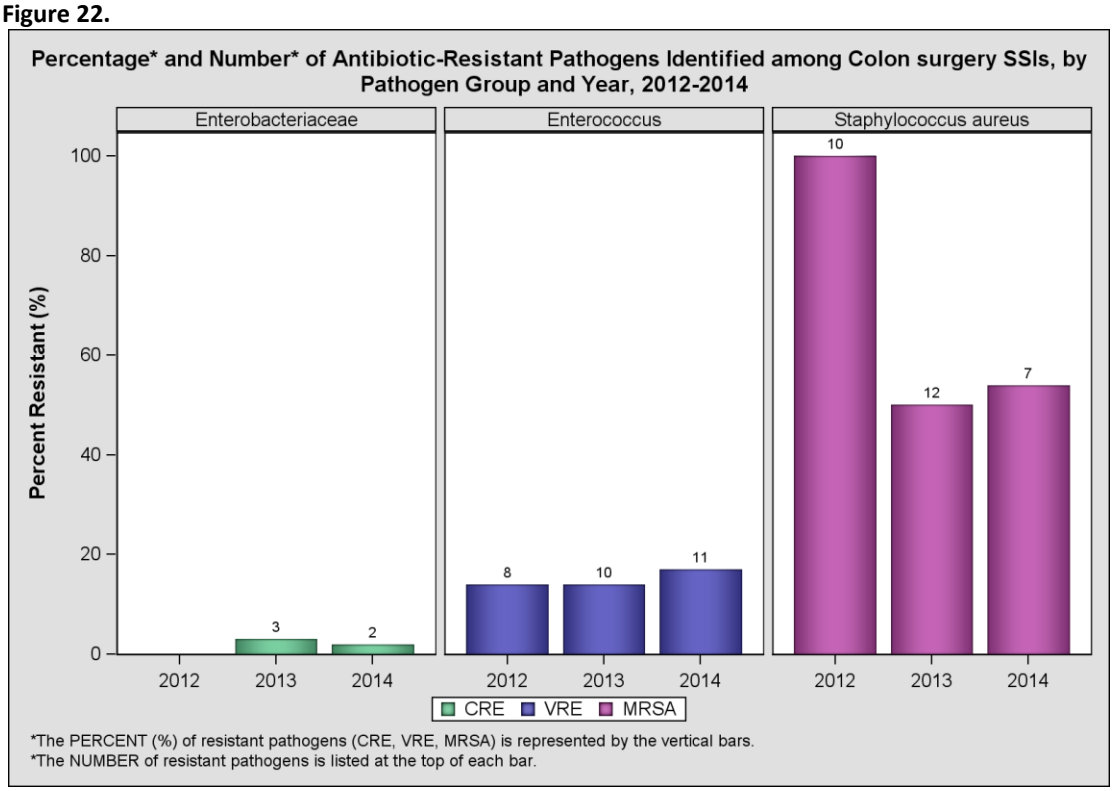
Figure 21.



How to Understand Figure 21:

- *E. coli* and *Enterococcus* were the most commonly reported pathogen among SSIs following colon surgeries, each accounting for 21% of infections in 2014

Figure 22.



How to Understand Figure 22:

- In 2014, 54% of all identified *Staphylococcus aureus* were antibiotic-resistant
- MRSA was the most commonly identified antibiotic-resistant pathogens among SSIs following colon surgery
- In 2014, 2% of Enterobacteriaceae were identified as CRE among SSIs following colon surgery. This is similar to 2013

D. Methicillin-Resistant *Staphylococcus aureus* Laboratory-Identified Events (MRSA LabID)

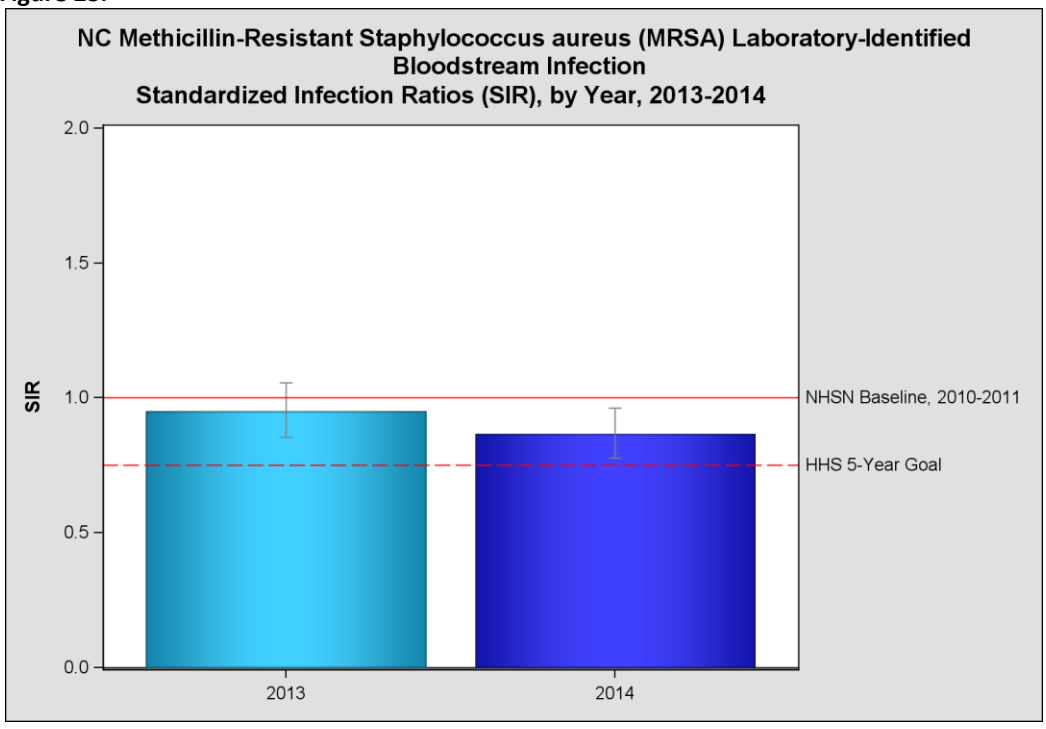
North Carolina 2014 MRSA LabID Highlights

- North Carolina hospitals observed 335 infections, compared to the 386.69 infections which were predicted
  - This was better than the 2010-2011 national experience
  - This year had the highest number of infections observed since NC hospitals began reporting MRSA in 2013.
- The U.S. Department of Health and Human Services set a goal to reduce MRSA nationally by 25% from the baseline experience in 2010-2011; North Carolina has not yet been met this goal.

Table 6.

Year	# Observed	# Predicted	# Patient Days	SIR	SIR 95% Confidence Interval	Rate	How Does North Carolina Compare to the National Experience?
2013	341	358.73	5069321	0.95	(0.85, 1.06)	0.07	= Same: about the same number of infections as were predicted (same as the national experience)
2014	335	386.69	5110505	0.87	(0.78, 0.96)	0.07	★Better: Fewer infections than were predicted (better than the national experience)

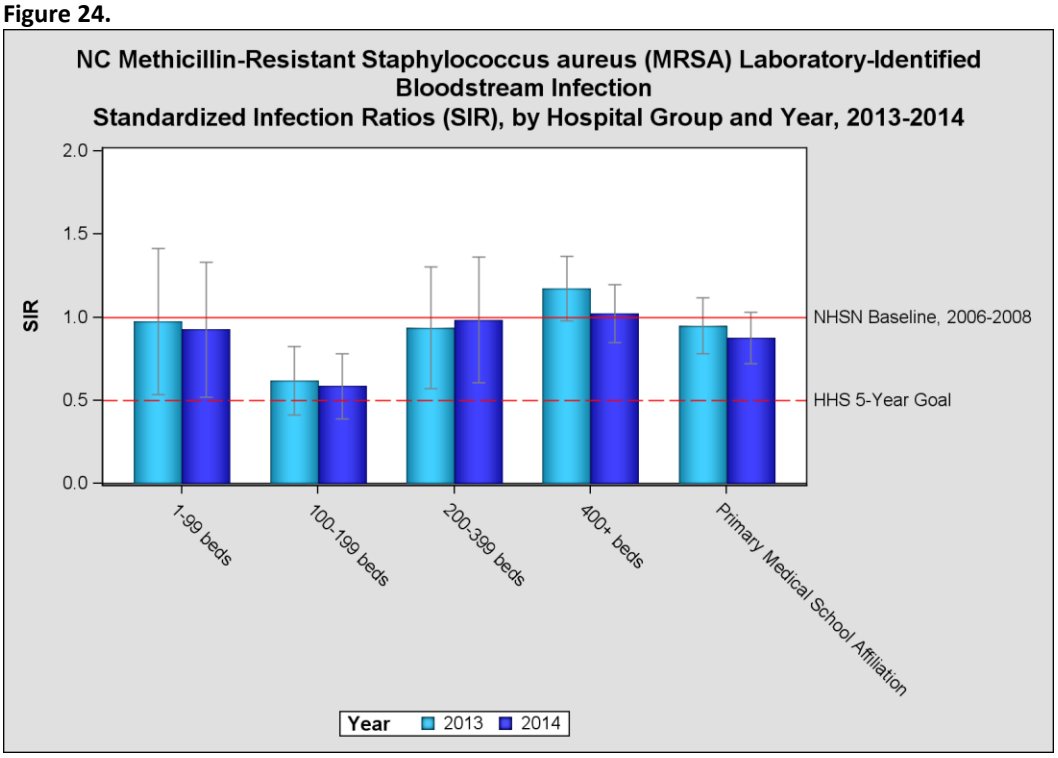
Figure 23.



How to Understand Figure 23:

- In 2014, North Carolina reported fewer MRSA infections than predicted compared to the national baseline; observed infections in 2013 were about the same as predicted
- There were fewer observed infections in 2014 than 2013
- The HHS 5-year goal to reduce MRSA infections by 25% has not yet been met in North Carolina

Figure 24.



How to Understand Figure 24:

- Hospitals with 100-199 beds performed BETTER than the national baseline, with fewer observed infections than predicted in 2013 and 2014.
- Hospitals with 100-199 beds had the best performance in 2014 and is the only group to be close to meeting the HHS 5-year goal to reduce MRSA by 25%
- All other hospital groups reported about the same number of observed infections as predicted by the national baseline in 2013 and in 2014.

E. *Clostridium difficile* Laboratory-Identified Events (CDI LabID)

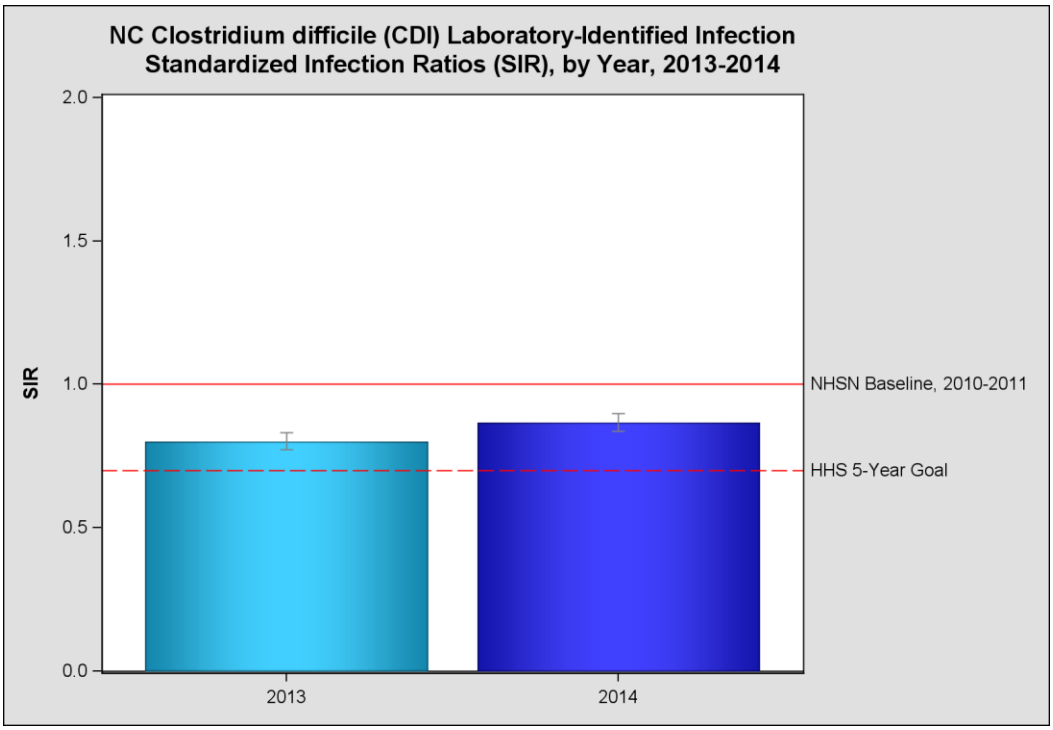
North Carolina 2014 CDI LabID Highlights

- North Carolina hospitals observed 3040 infections, compared to the 3506.09 infections which were predicted
  - This was better than the 2010-2011 national experience
  - This year had the highest number of infections observed since NC hospitals began reporting CDIs in 2013.
- The U.S. Department of Health and Human Services set a goal to reduce CDI nationally by 30% from the baseline experience in 2010-2011; North Carolina has not yet met this goal.

Table 7.

Year	# Observed	# Predicted	# Patient Days	SIR	SIR 95% Confidence Interval	Rate	How Does North Carolina Compare to the National Experience?
2013	2853	3561.25	4741351	0.80	(0.77, 0.83)	6.02	★Better: Fewer infections than were predicted (better than the national experience)
2014	3040	3506.09	4680799	0.87	(0.84, 0.90)	6.49	★Better: Fewer infections than were predicted (better than the national experience)

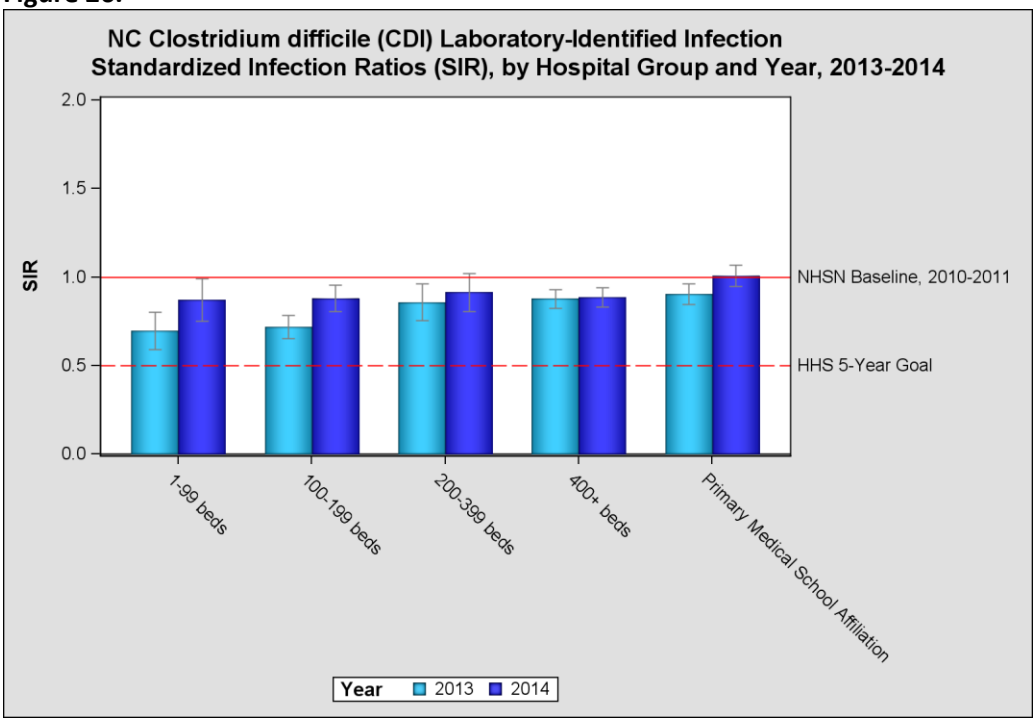
Figure 25.



How to Understand Figure 25:

- North Carolina reported fewer CDI infections than predicted by the national baseline in both 2013 and 2014
- There was an increase in the number of observed infections in 2014 from 2013
- The HHS 5-year goal to reduce CDI infections by 30% has not yet been met in North Carolina

Figure 26.



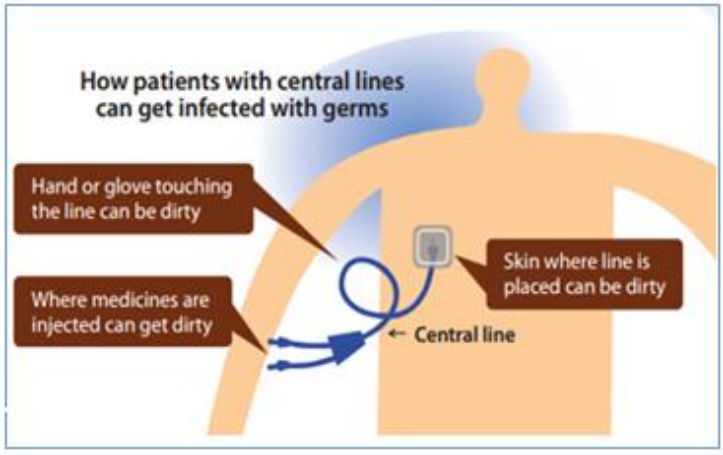
How to Understand Figure 26:

- Hospitals with 100-199 beds and those with 400+ beds performed BETTER than the national baseline for CDI, with fewer infections than predicted in 2013 and 2014
- Hospitals with <100 beds, 200-399 beds, and those with a medical school affiliation reported approximately the same number of observed infections as predicted in 2013 and 2014
- None of the individual hospital groups met the HHS 5-year goal in either 2013 or 2014

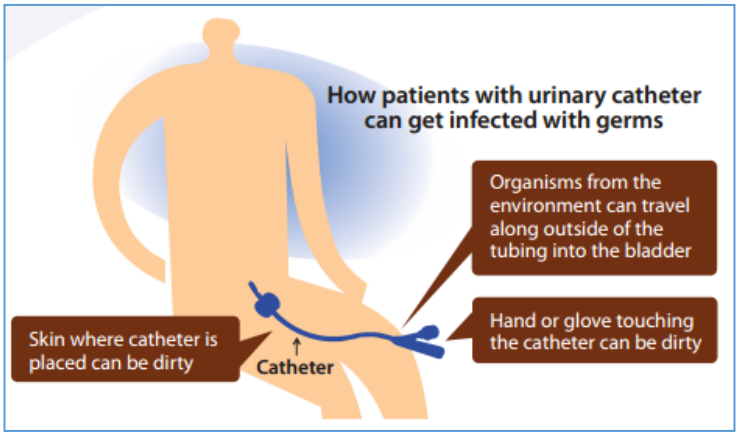
FAST FACTS: What You Need to Know About Healthcare-Associated Infections

Device-Associated HAIs

Sometimes, patients have medical devices inserted into their bodies to provide necessary medical care. These devices are called "invasive devices" and patients with these devices have a higher chance of getting an infection. Here is what you need to know about invasive devices and what kinds of infections they can be associated with:



- A **central line** is a tube placed in a large vein to allow access to the bloodstream and provide the patient with important medicine. A **central line-associated bloodstream infection (CLABSI)** can occur when bacteria or other germs travel along a central line and enter the blood. When not put in correctly or kept clean, central lines can become a pathway for germs to enter the body and cause serious bloodstream infections.



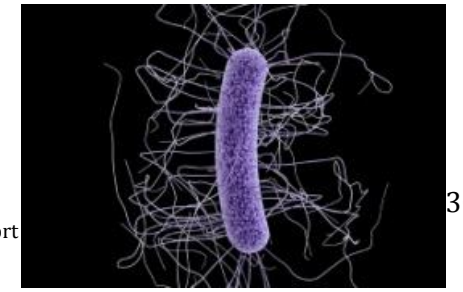
- A **urinary catheter** is a tube placed in the bladder to drain urine. A **catheter-associated urinary tract infection (CAUTI)** can occur when bacteria or other germs travel along a urinary catheter, resulting in an infection in your bladder or your kidney.

Other HAIs

- A **surgical site infection (SSI)** occurs after surgery in the part of the body where the surgery took place. These infections may involve only the skin or may be more serious and involve tissue under the skin or organs. SSIs sometimes take days or months after surgery to develop. Symptoms may include fever, redness or pain around the surgical site, or drainage of fluid from the wound.

- **Methicillin-resistant *Staphylococcus aureus* (MRSA)** infections are caused by bacteria that are resistant to certain types of drugs. MRSA can cause skin or wound infections. Sometimes, MRSA can infect the blood and cause serious illness and even death. Only bloodstream infections are shown in this report.

- ***Clostridium difficile* (*C. difficile*)** is a type of bacteria that causes severe diarrhea and can be deadly. *C. difficile* infections usually occur in people who have recently taken antibiotics and been under medical care.



READING GUIDE: Explanation of Each Variable in the Tables and Figures

Below is a list of all variables shown in the data tables and figures:

- **Title**: The title of the table gives you information about the infection type, time period, facility unit(s)/group(s) included in the table.

- **Procedure Type:** This is the specific type of surgery for which the surgical site infection (SSI) data are presented (e.g., abdominal hysterectomy, colon surgery).

- **Unit/Unit Type:** This is the specific unit/type of unit in the hospital from which the data was collected. Hospitals have distinct locations, or units, within the facility that are designated for certain types of patients. For example: "Med/Surg ICU" represents the intensive care unit (ICU) for very sick patients needing medical or surgical care.

- **Number of Central Line Days:** This is the total number of days which patients had central lines inserted during January 1, 2014 – December 31, 2014.

- **Number of Catheter Days:** This is the total number of days which patients had a urinary catheter inserted during January 1, 2014 – December 31, 2014.

- **Number of Procedures:** This is the total number of surgeries performed by a facility during January 1, 2014 to December 31, 2014.

- **Observed Infections (or Observed Events):** This is the number of infections (or events, for LabID measures) that was reported by the facility.

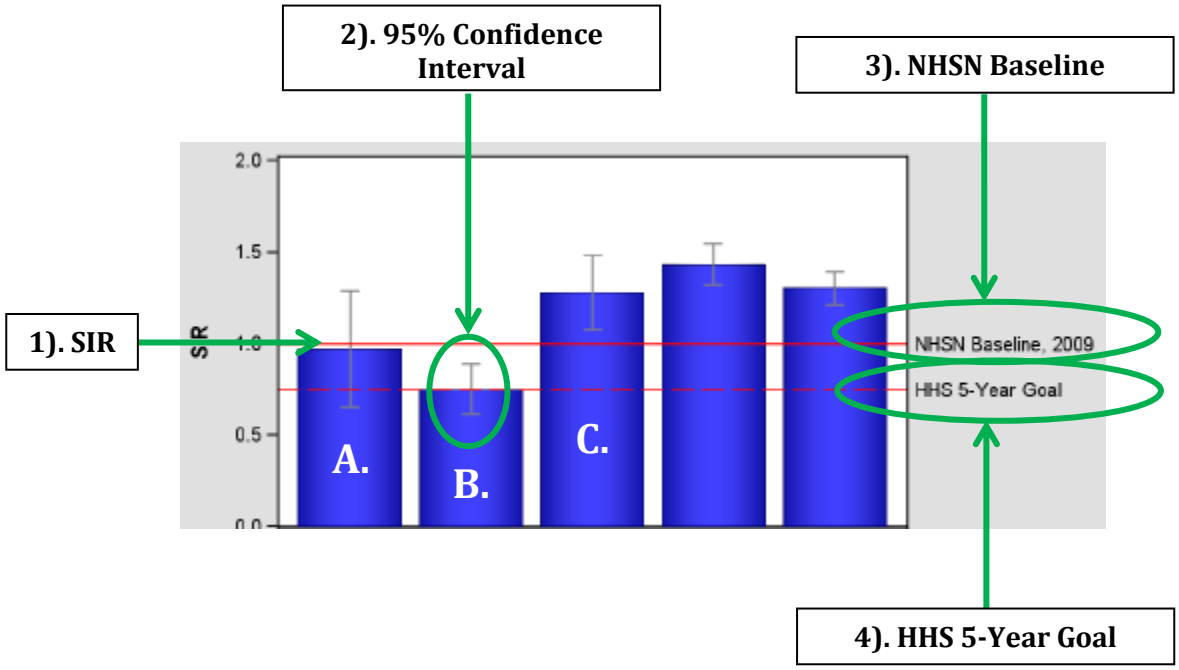
- **Predicted Infections (or Predicted Events):** This is a calculated value that reflects the number of infections (or events, for LabID measures) that we have "predicted" to occur in this facility, based on the national experience.

- **"How Does North Carolina Compare to the National Experience?"** Colors and symbols are used to help you quickly understand and interpret the hospital's data. This is the "take-home message" about healthcare-associated infections in this facility.

  ★ Indicates that North Carolina had fewer infections than were predicted (better than the national experience)
  = Indicates that North Carolina had about the same number of infections as were predicted (same as the national experience)
  ✖ Indicates that North Carolina had more infections than were predicted (worse than the national experience)
  No Conclusion: Indicates that North Carolina reported data, but there was not enough information to make a reliable comparison to the national experience (# of predicted infections was less than 1).

NUMBERS GUIDE: Explanation of Numbers and Data Calculations

Below is an explanation of numbers and data calculations used in the figures:



1). SIR - Represented by the colored bars in each figure.

- SIR = number of *observed* infections / number of *predicted* infections based on the national baseline experience

SIR Category	# Observed Infections	# Predicted Infections	SIR Calculation	SIR Value
SIR of 1.0 (**A** in figure above)	4	4	4/4	1.0
SIR less than 1.0 (**B** in figure above)	2	4	2/4	0.5
SIR greater than 1.0 (**C** in figure above)	6	4	6/4	1.5

2). 95% confidence intervals for the SIR – Represented by the skinny gray error in each figure.

Interpretation of the 95% confidence intervals:

- If the value of 1.0 is included between the lower and upper limit, there is NO significant difference between the number of observed and predicted infections.
- If the value of 1.0 is NOT included between the lower and upper limit, there IS a significant difference between the number of observed and predicted infections.

SIR Category	# Observed Infections	# Predicted Infections	SIR Calculation	SIR Value	95% Confidence Interval: Lower Limit	95% Confidence Interval: Upper Limit
SIR of 1.0 (**A** in figure above)	4	4	4/4	1.0	(0.70	1.3)
SIR less than 1.0 (**B** in figure above)	2	4	2/4	0.5	(0.65	0.99)
SIR greater than 1.0 (**C** in figure above)	6	4	6/4	1.5	(1.09	1.48)

3). NHSN Baseline (i.e., national experience) – Represented by the solid red line in each figure.

- The NHSN baseline is the number of predicted infections based on the national experience
- The CLABSI and SSI baseline experiences uses data from 2006-2008
- The CAUTI baseline experience uses data from 2009
- The MRSA and CDI LabID baseline experiences use data from 2010-2011

4). HHS 5-Year Goal – Represented by the dotted red line in each figure.

- Health and Human Services established a 5-year goal to reduce each HAI by a certain percentage
- The CLABSI the 5-year goal is a 25% reduction, so the 5-year goal SIR will be 0.75 (or 1.0-.25). The goal is considered met when the SIR estimate is at or below this dotted red line.

5). How can I use the SIR, 95% Confidence Interval, and the NHSN Baseline to know how North Carolina did compared to the national experience? - To understand each figure, you will need to look at all three of these numbers.

Determine whether the SIR falls around 1.0, less than 1.0 or greater than 1.0 and whether the 95% Confidence Interval contains the value of 1.0.

SIR Category	# Observed Infections	# Predicted Infections	SIR Calc	SIR Value	95% Confidence Interval: Lower Limit	95% Confidence Interval: Upper Limit	How Does North Carolina Compare to the National Experience?
SIR of 1.0 (**A** in figure above)	4	4	4/4	1.0	(0.70	1.3)	= Same
SIR less than 1.0 (**B** in figure above)	2	4	2/4	0.5	(0.65	0.99)	★Better
SIR greater than 1.0 (**C** in figure above)	6	4	6/4	1.5	(1.12	1.48)	✖ Worse
--	2	0.9*	2/0.9	2.2	(1.8	2.3)	**No Conclusion**

*Or any value <1.0.

APPENDICES

APPENDIX A. Definitions

Term	Definition
Aggregate data	Sum or total data. For example, aggregate N.C. HAI data refers to the sum, or total, of all hospital HAI data in N.C.
ASA Class	Anesthesiologist's pre-operative assessment of the patient's physical condition, using the American Society of Anesthesiologists' (ASA) Classification of Physical Status. 1. Normally healthy patient 2. Patient with mild systemic disease 3. Patient with severe systemic disease that is not incapacitating 4. Patient with an incapacitating systemic disease, constant threat to life 5. Patient not expected to survive for 24 hours with or without the operation
Beds	The number of staffed beds in a facility or patient care location. This may be different from the number of licensed beds.
Catheter days	A daily count of the number of patients with an indwelling urinary catheter. For example, one patient with an indwelling catheter in place for two days or two patients with indwelling catheters in place for one day each would both result in two catheter days. This number is used when presenting rates of catheter-associated urinary tract infections.
Catheter-associated urinary tract infection	Urinary tract infection (UTI) that occurs in a patient who had an indwelling urinary catheter in place within the 48-hour period before the onset of the UTI.
Central line	A catheter (tube) that doctors place in a large vein in the neck, chest, or groin ending in a large vein near the heart. It is used to give medication or fluids or to collect blood for medical tests. Also known as a central venous catheter.
Central line-associated bloodstream infection	A bloodstream infection (BSI) that occurs in a patient who had a central line within the 48-hour period before the onset of the BSI and is not related to an infection at another site.
Central line days	A daily count of the number of patients with a central line. For example, one patient with a central line in place for two days or two patients with central lines in place for one day each would both result in two central line days. This number is used when presenting rates of central line-associated bloodstream infections.
Device days	A daily count of the number of patients with a specific device (e.g., central line, umbilical catheter, or urinary catheter) in the patient care location. For example, one patient with a device in place for two days or two patients with devices in place for one day each would both result in two device days. This number is used when presenting rates of infections associated with the use of devices.
Full-time equivalent	The equivalent of one person working full time for one year: 8 hour per day at 5 days per week for 52 weeks per year = 2080 hours per year
Hand hygiene	A general term that applies to routine hand washing, antiseptic hand wash, antiseptic hand rub, or surgical hand antisepsis. *Routine hand washing* is the use of clean water and non-antimicrobial soap to remove germs, soil and other debris from the hands. *Antiseptic hand washing* is the use of water and antimicrobial soap to remove or kill germs on the hands.

Term	Definition
	Antiseptic hand rub is the use of alcohol-based hand rubs to remove or destroy germs from the hands. Antiseptic hand rubs are less effective when hands are visibly dirty. *Surgical hand antisepsis* is the use of water and antimicrobial soap to remove or kill germs and takes 2-6 minutes to complete as both hands and forearms are cleaned. Water and non-antimicrobial soap can also be used but must be followed with an alcohol-based surgical hand scrub.
Healthcare-associated infections	Healthcare-associated infections (HAI) are infections caused by a wide variety of common and unusual bacteria, fungi, and viruses during the course of receiving medical care.
Intensive care unit	A nursing care area that provides intensive observation, diagnosis, and therapeutic procedures for adults and/or children who are critically ill. Also referred to as critical care unit.
Medical affiliation	Affiliation with a medical school. There are four categories*:* *Major teaching* – Hospital is an important part of the teaching program of a medical school and the majority of medical students rotate through multiple clinical services. *Graduat*e – Hospital used by the medical school for graduate training programs only (i.e., residency and/or fellowships). *Limited* – Hospital used in the medical school's teaching program to a limited extent. *No* – Hospital not affiliated with a medical school.
Patient days	A daily count of the number of patients in the patient care location during a specified time period.
Rate	Describes the speed with which disease or events occur. The number of diseases or events per unit of time.
Standardized infection ratio	A ratio of observed to expected (or predicted) numbers of events that is adjusted for selected risk factors.
Surgical site infection	Infection that occurs after surgery, in the part of the body where the surgery took place.
Umbilical catheter	Long, thin plastic tubes that travel from the stump of a newborn baby's umbilical cord into the large vessels near the heart
Urinary catheter	A drainage tube that is inserted into the urinary bladder through the urethra, is left in place, and is connected to a closed collection system.
Validity (data)	The extent to which reported cases of a disease or event correspond accurately to cases of a disease event that actually occurred.

APPENDIX B. Acronyms

ACH	Acute care hospital (short-term)
ACL	Adult Care Licensure
APIC-NC	Association for Professionals in Infection Control and Epidemiology, N.C. Chapter
ASA	American Society of Anesthesiologists
BSI	Bloodstream infection
CAUTI	Catheter-associated urinary tract infection
CCME	Carolinas Center for Medical Excellence
CCU	Critical care unit
CDB	Communicable Disease Branch
CDC	Centers for Disease Control and Prevention
C. diff	*Clostridium difficile*
CDI	*Clostridium difficile* infection
CI	Confidence interval
CMS	Centers for Medicare and Medicaid Services
CLABSI	Central line-associated bloodstream infections
CRE	Carbapenem-resistant Enterobacteriaceae
CUSP	Comprehensive Unit-based Safety Program
DHHS	Department of Health and Human Services
DHSR	Division of Health Services Regulation
DPH	Division of Public Health
ED	Emergency department
FTE	Full-time equivalent
G.S.	General statute
HAI	Healthcare-associated Infections
HRET	American Hospital Associations' Health Research and Trust
ICU	Intensive care unit
IPs	Infection preventionists
IRF	Inpatient rehabilitation facility
LTAC	Long-term acute care hospital
MRSA	Methicillin resistant *Staphylococcus aureus*
NCHA	North Carolina Hospital Association
N.C. SPICE	North Carolina Statewide Program for Infection Control and Epidemiology
NCQC	North Carolina Quality Center
NHLC	Nursing Home Licensure and Certification

APPENDIX B. Acronyms (continued)

NHSN	National Healthcare Safety Network
NICU	Neonatal intensive (critical) care unit
QIO	Quality improvement organization
SIR	Standardized infection ratio
SSI	Surgical site infection
VAST	Vascular Access Safety Team
VRE	Vancomycin-resistant *Enterococcus*

APPENDIX C. Healthcare-Associated Infections Prevention Tips

Appendix C1. Catheter (Central Line)-Associated Bloodstream Infections

Appendix C2. Catheter-Associated Urinary Tract Infections

Appendix C3. Surgical Site Infections

Appendix C4. Methicillin-Resistant *Staphylococcus aureus* LabID Events

Appendix C5. *Clostridium difficile* LabID Events

APPENDICES

APPENDIX A. Definitions

Term	Definition
Acute care hospital	A hospital that provides acute medical care due to illness, injury or following surgery to patients hospitalized for a brief period of time.
ASA Class	Anesthesiologist's pre-operative assessment of the patient's physical condition, using the American Society of Anesthesiologists' (ASA) Classification of Physical Status. 1. Normally healthy patient 2. Patient with mild systemic disease 3. Patient with severe systemic disease that is not incapacitating 4. Patient with an incapacitating systemic disease, constant threat to life 5. Patient not expected to survive for 24 hours with or without the operation
Bacteremia	Bloodstream infection (BSI).
Beds	The number of staffed beds in a facility or patient care location. This may be different from licensed beds.
Catheter days	A daily count of the number of patients with an indwelling urinary catheter. For example, one patient with an indwelling catheter in place for two days or two patients with indwelling catheters in place for one day each would both result in two catheter days. This number is used when presenting rates of catheter-associated urinary tract infections.
Catheter-associated urinary tract infection	Urinary tract infection (UTI) that occurs in a patient who had an indwelling urinary catheter in place within the 48-hour period before the onset of the UTI.
Central line	A catheter (tube) that doctors place in a large vein in the neck, chest, or groin that ends near the heart. It is used to give medication or fluids or to collect blood for medical tests. Also known as a central venous catheter.
Central line-associated bloodstream infection	A bloodstream infection (BSI) that occurs in a patient who had a central line within the 48-hour period before the onset of the BSI and is not related to an infection at another site.
Central line days	A daily count of the number of patients with a central line. For example, one patient with a central line in place for two days or two patients with central lines in place for one day each would both result in two central line days. This number is used when presenting rates of central line-associated bloodstream infections.
Device days	A daily count of the number of patients with a specific device (*e.g.,* central line, umbilical catheter, ventilator, or urinary catheter) in the patient care location. For example, one patient with a device in place for two days or two patients with devices in place for one day each would both result in two device days. This number is used when presenting rates of infections associated with devices.
Full-time equivalent	The equivalent of one person working full time for one year: 8 hour per day at 5 days per week for 52 weeks per year = 2080 hours per year
Hand hygiene	A general term that applies to routine hand washing, antiseptic hand wash, antiseptic hand rub, or surgical hand antisepsis. *Routine hand washing* is the use of clean water and non-antimicrobial soap to remove germs, soil and other debris from the hands. *Antiseptic hand washing* is the use of water and antimicrobial soap to remove or kill germs on the hands.
Hand hygiene (cont)	*Antiseptic hand rub* is the use of alcohol-based hand rubs to remove or destroy susceptible

Term	Definition
	germs from the hands. Antiseptic hand rubs are less effective when hands are visibly dirty and against some viruses. *Surgical hand antisepsis* is the use of water, antimicrobial soap, and a brush to remove or kill germs and takes 2-6 minutes to complete as both hands and forearms are cleaned. Water and non-antimicrobial soap can also be used but must be followed with an alcohol-based surgical hand scrub.
Healthcare-associated infections	Healthcare-associated infections (HAI) are infections caused by a wide variety of common and unusual bacteria, fungi, and viruses that occur during the course of receiving medical care.
Inpatient rehabilitation facility	A facility that provides rehabilitation services after injury, illness, or surgery. These may be free-standing facilities or specialized units within a hospital.
Intensive care unit	A nursing care area that provides intensive observation, diagnosis, and therapeutic procedures for adults and/or children who are critically ill. Also referred to as critical care unit.
Laboratory-identified *Clostridium difficile*	A positive laboratory test result for *Clostridium difficile.*
Laboratory-identified Methicillin-resistant *Staphylococcus aureus* (MRSA) bacteremia	*Staphylococcus aureus* cultured from blood specimens that is oxacillin-resistant, cefoxitin-resistant, or methicillin-resistant by standard susceptibility testing methods, or by a laboratory test that is FDA-approved for MRSA detection from isolated colonies.
Long term acute care hospital	A hospital that provides acute medical care due to illness, injury or following surgery but the average length of patient stay is greater than 25 days.
Medical affiliation	Affiliation with a medical school. There are four categories: *Major* - Facility has a program for medical students and post-graduate medical training. *Graduate* - Facility has a program for post-graduate medical training (i.e., residency and/or fellowships). *Undergraduate* - Facility has a program for medical students only. *No* – Hospital not affiliated with a medical school.
Patient days	A daily count of the number of patients in the patient care location during a specified time period.
Rate	Describes the speed with which disease or events occur. The number of diseases or events per unit of time.
Standardized infection ratio	A ratio of observed to expected (or predicted) numbers of events that is adjusted for selected risk factors.
Surgical site infection	Infection that occurs after surgery, in the part of the body where the surgery took place.
Umbilical catheter	Long, thin plastic tubes that travel from the stump of a newborn baby's umbilical cord into the large vessels near the heart.
Urinary catheter	A drainage tube that is inserted into the urinary bladder through the urethra, is left in place, and is connected to a closed collection system.
Validity (data)	The extent to which reported cases of a disease or event correspond accurately to cases of a disease or event that actually occurred.

APPENDIX B. Acronyms

ACH	Acute care hospital (short-term)
ASA	American Society of Anesthesiologists
CAUTI	Catheter-associated urinary tract infection
CCME	Carolinas Center for Medical Excellence
CCU	Critical care unit
CDB	Communicable Disease Branch
CDC	Centers for Disease Control and Prevention
CDI, *C. diff*	*Clostridium difficile*
CI	Confidence interval
CMS	Centers for Medicare and Medicaid Services
CLABSI	Central line-associated bloodstream infection
CRE	Carbapenem-resistant Enterobacteriaceae
DHHS	Department of Health and Human Services
DPH	Division of Public Health
HAI	Healthcare-associated Infections
ICU	Intensive care unit
IPs	Infection preventionists
IRF	Inpatient rehabilitation facility
LTAC	Long-term acute care hospital
MRSA	Methicillin resistant *Staphylococcus aureus*
NCHA	North Carolina Hospital Association
NHSN	National Healthcare Safety Network
NICU	Neonatal intensive (critical) care unit
SIR	Standardized infection ratio
SSI	Surgical site infection
VRE	Vancomycin-resistant *Enterococcus*

APPENDIX C. Healthcare-Associated Infections Prevention Tips

Appendix C1. Catheter (Central Line)-Associated Bloodstream Infections
Appendix C2. Catheter-Associated Urinary Tract Infections
Appendix C3. Surgical Site Infections
Appendix C4. Methicillin Resistant *Staphylococcus aureus*
Appendix C5. *Clostridium difficile*

FAQs
(frequently asked questions)

about

"Catheter-Associated Bloodstream Infections"

(also known as "Central Line-Associated Bloodstream Infections")

What is a catheter-associated bloodstream infection?

A "central line" or "central catheter" is a tube that is placed into a patient's large vein, usually in the neck, chest, arm, or groin. The catheter is often used to draw blood, or give fluids or medications. It may be left in place for several weeks. A bloodstream infection can occur when bacteria or other germs travel down a "central line" and enter the blood. If you develop a catheter-associated bloodstream infection you may become ill with fevers and chills or the skin around the catheter may become sore and red.

Can a catheter-related bloodstream infection be treated?

A catheter-associated bloodstream infection is serious, but often can be successfully treated with antibiotics. The catheter might need to be removed if you develop an infection.

What are some of the things that hospitals are doing to prevent catheter-associated bloodstream infections?

To prevent catheter-associated bloodstream infections doctors and nurses will:

- Choose a vein where the catheter can be safely inserted and where the risk for infection is small.
- Clean their hands with soap and water or an alcohol-based hand rub before putting in the catheter.
- Wear a mask, cap, sterile gown, and sterile gloves when putting in the catheter to keep it sterile. The patient will be covered with a sterile sheet.
- Clean the patient's skin with an antiseptic cleanser before putting in the catheter.
- Clean their hands, wear gloves, and clean the catheter opening with an antiseptic solution before using the catheter to draw blood or give medications. Healthcare providers also clean their hands and wear gloves when changing the bandage that covers the area where the catheter enters the skin.
- Decide every day if the patient still needs to have the catheter. The catheter will be removed as soon as it is no longer needed.
- Carefully handle medications and fluids that are given through the catheter.

What can I do to help prevent a catheter-associated bloodstream infection?

- Ask your doctors and nurses to explain why you need the catheter and how long you will have it.
- Ask your doctors and nurses if they will be using all of the prevention methods discussed above.
- Make sure that all doctors and nurses caring for you clean their hands with soap and water or an alcohol-based hand rub before and after caring for you.

If you do not see your providers clean their hands, please ask them to do so.

- If the bandage comes off or becomes wet or dirty, tell your nurse or doctor immediately.
- Inform your nurse or doctor if the area around your catheter is sore or red.
- Do not let family and friends who visit touch the catheter or the tubing.
- Make sure family and friends clean their hands with soap and water or an alcohol-based hand rub before and after visiting you.

What do I need to do when I go home from the hospital?

Some patients are sent home from the hospital with a catheter in order to continue their treatment. If you go home with a catheter, your doctors and nurses will explain everything you need to know about taking care of your catheter.

- Make sure you understand how to care for the catheter before leaving the hospital. For example, ask for instructions on showering or bathing with the catheter and how to change the catheter dressing.
- Make sure you know who to contact if you have questions or problems after you get home.
- Make sure you wash your hands with soap and water or an alcohol-based hand rub before handling your catheter.
- Watch for the signs and symptoms of catheter-associated bloodstream infection, such as soreness or redness at the catheter site or fever, and call your healthcare provider immediately if any occur.

If you have additional questions, please ask your doctor or nurse.

Co-sponsored by:

SHEA The Society for Healthcare Epidemiology of America
IDSA
American Hospital Association
APIC Spreading knowledge. Preventing infection.
CDC Centers for Disease Control and Prevention
The Joint Commission

FAQs
(frequently asked questions)

about
"Catheter-Associated Urinary Tract Infection"

What is "catheter-associated urinary tract infection"?

A urinary tract infection (also called "UTI") is an infection in the urinary system, which includes the bladder (which stores the urine) and the kidneys (which filter the blood to make urine). Germs (for example, bacteria or yeasts) do not normally live in these areas; but if germs are introduced, an infection can occur.

If you have a urinary catheter, germs can travel along the catheter and cause an infection in your bladder or your kidney; in that case it is called a catheter-associated urinary tract infection (or "CA-UTI").

What is a urinary catheter?

A urinary catheter is a thin tube placed in the bladder to drain urine. Urine drains through the tube into a bag that collects the urine. A urinary catheter may be used:

- If you are not able to urinate on your own
- To measure the amount of urine that you make, for example, during intensive care
- During and after some types of surgery
- During some tests of the kidneys and bladder

People with urinary catheters have a much higher chance of getting a urinary tract infection than people who don't have a catheter.

How do I get a catheter-associated urinary tract infection (CA-UTI)?

If germs enter the urinary tract, they may cause an infection. Many of the germs that cause a catheter-associated urinary tract infection are common germs found in your intestines that do not usually cause an infection there. Germs can enter the urinary tract when the catheter is being put in or while the catheter remains in the bladder.

What are the symptoms of a urinary tract infection?

Some of the common symptoms of a urinary tract infection are:

- Burning or pain in the lower abdomen (that is, below the stomach)
- Fever
- Bloody urine may be a sign of infection, but is also caused by other problems
- Burning during urination or an increase in the frequency of urination after the catheter is removed.

Sometimes people with catheter-associated urinary tract infections do not have these symptoms of infection.

Can catheter-associated urinary tract infections be treated?

Yes, most catheter-associated urinary tract infections can be treated with antibiotics and removal or change of the catheter. Your doctor will determine which antibiotic is best for you.

What are some of the things that hospitals are doing to prevent catheter-associated urinary tract infections?

To prevent urinary tract infections, doctors and nurses take the following actions.

Catheter insertion

- o Catheters are put in only when necessary and they are removed as soon as possible.
- o Only properly trained persons insert catheters using sterile ("clean") technique.
- o The skin in the area where the catheter will be inserted is cleaned before inserting the catheter.
- o Other methods to drain the urine are sometimes used, such as
- External catheters in men (these look like condoms and are placed over the penis rather than into the penis)
- Putting a temporary catheter in to drain the urine and removing it right away. This is called intermittent urethral catheterization.

Catheter care

- o Healthcare providers clean their hands by washing them with soap and water or using an alcohol-based hand rub before and after touching your catheter.

  If you do not see your providers clean their hands, please ask them to do so.
- o Avoid disconnecting the catheter and drain tube. This helps to prevent germs from getting into the catheter tube.
- o The catheter is secured to the leg to prevent pulling on the catheter.
- o Avoid twisting or kinking the catheter.
- o Keep the bag lower than the bladder to prevent urine from backflowing to the bladder.
- o Empty the bag regularly. The drainage spout should not touch anything while emptying the bag.

What can I do to help prevent catheter-associated urinary tract infections if I have a catheter?

- Always clean your hands before and after doing catheter care.
- Always keep your urine bag below the level of your bladder.
- Do not tug or pull on the tubing.
- Do not twist or kink the catheter tubing.
- Ask your healthcare provider each day if you still need the catheter.

What do I need to do when I go home from the hospital?

- If you will be going home with a catheter, your doctor or nurse should explain everything you need to know about taking care of the catheter. Make sure you understand how to care for it before you leave the hospital.
- If you develop any of the symptoms of a urinary tract infection, such as burning or pain in the lower abdomen, fever, or an increase in the frequency of urination, contact your doctor or nurse immediately.
- Before you go home, make sure you know who to contact if you have questions or problems after you get home.

If you have questions, please ask your doctor or nurse.

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FAQs
(frequently asked questions)

about
"Surgical Site Infections"

What is a Surgical Site Infection (SSI)?

A surgical site infection is an infection that occurs after surgery in the part of the body where the surgery took place. Most patients who have surgery do not develop an infection. However, infections develop in about 1 to 3 out of every 100 patients who have surgery.

Some of the common symptoms of a surgical site infection are:

- Redness and pain around the area where you had surgery
- Drainage of cloudy fluid from your surgical wound
- Fever

Can SSIs be treated?

Yes. Most surgical site infections can be treated with antibiotics. The antibiotic given to you depends on the bacteria (germs) causing the infection. Sometimes patients with SSIs also need another surgery to treat the infection.

What are some of the things that hospitals are doing to prevent SSIs?

To prevent SSIs, doctors, nurses, and other healthcare providers:

- Clean their hands and arms up to their elbows with an antiseptic agent just before the surgery.
- Clean their hands with soap and water or an alcohol-based hand rub before and after caring for each patient.
- May remove some of your hair immediately before your surgery using electric clippers if the hair is in the same area where the procedure will occur. They should not shave you with a razor.
- Wear special hair covers, masks, gowns, and gloves during surgery to keep the surgery area clean.
- Give you antibiotics before your surgery starts. In most cases, you should get antibiotics within 60 minutes before the surgery starts and the antibiotics should be stopped within 24 hours after surgery.
- Clean the skin at the site of your surgery with a special soap that kills germs.

What can I do to help prevent SSIs?

Before your surgery:

- Tell your doctor about other medical problems you may have. Health problems such as allergies, diabetes, and obesity could affect your surgery and your treatment.
- Quit smoking. Patients who smoke get more infections. Talk to your doctor about how you can quit before your surgery.
- Do not shave near where you will have surgery. Shaving with a razor can irritate your skin and make it easier to develop an infection.

At the time of your surgery:

- Speak up if someone tries to shave you with a razor before surgery. Ask why you need to be shaved and talk with your surgeon if you have any concerns.
- Ask if you will get antibiotics before surgery.

After your surgery:

- Make sure that your healthcare providers clean their hands before examining you, either with soap and water or an alcohol-based hand rub.

  If you do not see your providers clean their hands, please ask them to do so.

- Family and friends who visit you should not touch the surgical wound or dressings.
- Family and friends should clean their hands with soap and water or an alcohol-based hand rub before and after visiting you. If you do not see them clean their hands, ask them to clean their hands.

What do I need to do when I go home from the hospital?

- Before you go home, your doctor or nurse should explain everything you need to know about taking care of your wound. Make sure you understand how to care for your wound before you leave the hospital.
- Always clean your hands before and after caring for your wound.
- Before you go home, make sure you know who to contact if you have questions or problems after you get home.
- If you have any symptoms of an infection, such as redness and pain at the surgery site, drainage, or fever, call your doctor immediately.

If you have additional questions, please ask your doctor or nurse.

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FAQs
(frequently asked questions)

about

"MRSA"
(Methicillin-Resistant *Staphylococcus aureus*)

What is MRSA?

Staphylococcus aureus (pronounced staff-ill-oh-KOK-us AW-ree-us), or *"Staph"* is a very common germ that about 1 out of every 3 people have on their skin or in their nose. This germ does not cause any problems for most people who have it on their skin. But sometimes it can cause serious infections such as skin or wound infections, pneumonia, or infections of the blood.

Antibiotics are given to kill Staph germs when they cause infections. Some *Staph* are resistant, meaning they cannot be killed by some antibiotics. *"Methicillin-resistant Staphylococcus aureus"* or "MRSA" is a type of *Staph* that is resistant to some of the antibiotics that are often used to treat *Staph* infections.

Who is most likely to get an MRSA infection?

In the hospital, people who are more likely to get an MRSA infection are people who:

- have other health conditions making them sick
- have been in the hospital or a nursing home
- have been treated with antibiotics.

People who are healthy and who have not been in the hospital or a nursing home can also get MRSA infections. These infections usually involve the skin. More information about this type of MRSA infection, known as "community-associated MRSA" infection, is available from the Centers for Disease Control and Prevention (CDC). http://www.cdc.gov/mrsa

How do I get an MRSA infection?

People who have MRSA germs on their skin or who are infected with MRSA may be able to spread the germ to other people. MRSA can be passed on to bed linens, bed rails, bathroom fixtures, and medical equipment. It can spread to other people on contaminated equipment and on the hands of doctors, nurses, other healthcare providers and visitors.

Can MRSA infections be treated?

Yes, there are antibiotics that can kill MRSA germs. Some patients with MRSA abscesses may need surgery to drain the infection. Your healthcare provider will determine which treatments are best for you.

What are some of the things that hospitals are doing to prevent MRSA infections?

To prevent MRSA infections, doctors, nurses, and other healthcare providers:

- **Clean their hands** with soap and water or an alcohol-based hand rub before and after caring for every patient.
- Carefully **clean hospital rooms and medical equipment**.
- Use **Contact Precautions** when caring for patients with MRSA. Contact Precautions mean:
  - Whenever possible, patients with MRSA will have a single room or will share a room only with someone else who also has MRSA.
  - Healthcare providers will put on gloves and wear a gown over their clothing while taking care of patients with MRSA.
  - Visitors may also be asked to wear a gown and gloves.
  - When leaving the room, hospital providers and visitors remove their gown and gloves and clean their hands.
  - Patients on Contact Precautions are asked to stay in their hospital rooms as much as possible. They should not go to common areas, such as the gift shop or cafeteria. They may go to other areas of the hospital for treatments and tests.
- **May test** some patients to see if they have MRSA on their skin. This test involves rubbing a cotton-tipped swab in the patient's nostrils or on the skin.

What can I do to help prevent MRSA infections?

In the hospital

- Make sure that all doctors, nurses, and other healthcare providers clean their hands with soap and water or an alcohol-based hand rub before and after caring for you.

  If you do not see your providers clean their hands, please ask them to do so.

When you go home

- If you have wounds or an intravascular device (such as a catheter or dialysis port) make sure that you know how to take care of them.

Can my friends and family get MRSA when they visit me?

The chance of getting MRSA while visiting a person who has MRSA is very low. To decrease the chance of getting MRSA your family and friends should:

- Clean their hands before they enter your room and when they leave.
- Ask a healthcare provider if they need to wear protective gowns and gloves when they visit you.

What do I need to do when I go home from the hospital?

To prevent another MRSA infection and to prevent spreading MRSA to others:

- Keep taking any antibiotics prescribed by your doctor. Don't take half-doses or stop before you complete your prescribed course.
- Clean your hands often, especially before and after changing your wound dressing or bandage.
- People who live with you should clean their hands often as well.
- Keep any wounds clean and change bandages as instructed until healed.
- Avoid sharing personal items such as towels or razors.
- Wash and dry your clothes and bed linens in the warmest temperatures recommended on the labels.
- Tell your healthcare providers that you have MRSA. This includes home health nurses and aides, therapists, and personnel in doctors' offices.
- Your doctor may have more instructions for you.

If you have questions, please ask your doctor or nurse.

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FAQs
(frequently asked questions)

about
"Clostridium Difficile"

What is Clostridium difficile infection?

Clostridium difficile [pronounced Klo-STRID-ee-um dif-uh-SEEL], also known as "*C. diff*" [See-dif], is a germ that can cause diarrhea. Most cases of *C. diff* infection occur in patients taking antibiotics. The most common symptoms of a *C. diff* infection include:

- Watery diarrhea
- Fever
- Loss of appetite
- Nausea
- Belly pain and tenderness

Who is most likely to get C. diff infection?

The elderly and people with certain medical problems have the greatest chance of getting *C. diff. C. diff* spores can live outside the human body for a very long time and may be found on things in the environment such as bed linens, bed rails, bathroom fixtures, and medical equipment. *C. diff* infection can spread from person-to-person on contaminated equipment and on the hands of doctors, nurses, other healthcare providers and visitors.

Can C. diff infection be treated?

Yes, there are antibiotics that can be used to treat *C. diff.* In some severe cases, a person might have to have surgery to remove the infected part of the intestines. This surgery is needed in only 1 or 2 out of every 100 persons with *C. diff.*

What are some of the things that hospitals are doing to prevent C. diff infections?

To prevent *C. diff.* infections, doctors, nurses, and other healthcare providers:

- Clean their hands with soap and water or an alcohol-based hand rub before and after caring for every patient. This can prevent *C. diff* and other germs from being passed from one patient to another on their hands.
- Carefully clean hospital rooms and medical equipment that have been used for patients with *C. diff*.
- Use Contact Precautions to prevent *C. diff* from spreading to other patients. Contact Precautions mean:
  - Whenever possible, patients with *C. diff* will have a single room or share a room only with someone else who also has *C. diff*.
  - Healthcare providers will put on gloves and wear a gown over their clothing while taking care of patients with *C. diff*.
  - Visitors may also be asked to wear a gown and gloves.
  - When leaving the room, hospital providers and visitors remove their gown and gloves and clean their hands.
  - Patients on Contact Precautions are asked to stay in their hospital rooms as much as possible. They should not go to common areas, such as the gift shop or cafeteria. They can go to other areas of the hospital for treatments and tests.
- Only give patients antibiotics when it is necessary.

What can I do to help prevent C. diff infections?

- Make sure that all doctors, nurses, and other healthcare providers clean their hands with soap and water or an alcohol-based hand rub before and after caring for you.

If you do not see your providers clean their hands, please ask them to do so.

- Only take antibiotics as prescribed by your doctor.
- Be sure to clean your own hands often, especially after using the bathroom and before eating.

Can my friends and family get C. diff when they visit me?

C. diff infection usually does not occur in persons who are not taking antibiotics. Visitors are not likely to get *C. diff*. Still, to make it safer for visitors, they should:

- Clean their hands before they enter your room and as they leave your room
- Ask the nurse if they need to wear protective gowns and gloves when they visit you.

What do I need to do when I go home from the hospital?

Once you are back at home, you can return to your normal routine. Often, the diarrhea will be better or completely gone before you go home. This makes giving *C. diff* to other people much less likely. There are a few things you should do, however, to lower the chances of developing *C. diff* infection again or of spreading it to others.

- If you are given a prescription to treat *C. diff,* take the medicine exactly as prescribed by your doctor and pharmacist. Do not take half-doses or stop before you run out.
- Wash your hands often, especially after going to the bathroom and before preparing food.
- People who live with you should wash their hands often as well.
- If you develop more diarrhea after you get home, tell your doctor immediately.
- Your doctor may give you additional instructions.

If you have questions, please ask your doctor or nurse.

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APPENDIX D. Healthcare-Associated Infections (HAI) Advisory Group, January 2015

Deverick Anderson, MD, MPH
Duke Infection Control Outreach Network
Duke University Medical Center

Margaret A. Comin, RN, BSN, MPA
Division of Medical Assistance

Evelyn Cook, RN, CIC
APIC – N.C.
Duke Infection Control Outreach Network

Megan Davies, MD (Chair)
N.C. Division of Public Health

Chris DeRienzo, MD, MPP
Duke University Medical Center
Durham-Orange County Medical Society

Heather Dubendris
N.C. Division of Public Health

Evelyn Foust, MPH, CPM
N.C. Division of Public Health

Robert M. Gabel, MD, MSc, FACOEM
Womack Army Medical Center

Teresa M. Gilbert, MT (AMT), CIC
Womack Army Medical Center

Dorothea Handron, APRN, EdD
Consumer/patient advocate

Millie R. Harding, CPA
North Carolina Hospital Association

Debbie S. Holloman, CSSBB
Consumer/patient advocate

G. Mark Holmes, PhD
UNC Gillings School of Global Public Health

Kirk Huslage, RN, BSN, MSPH, CIC
N.C. Statewide Program for Infection Control and Epidemiology

Representative Verla Insko (Orange County)
N.C. House of Representatives

Carol Koeble, MD, MS, CPE
N.C. Center for Hospital Quality and Patient Safety

James Lederer, MD
Novant Health Systems

Jennifer MacFarquhar, RN, MPH, CIC
N.C. Division of Public Health

Jean-Marie Maillard, MD, MSc
N.C. Division of Public Health

MJ McCaffrey, MD, CAPT USN (Ret)
Perinatal Quality Collaborative of North Carolina
UNC School of Medicine

Tresor Medju
N.C. Division of Public Health

Catherine Moore, RN, MSN
North Carolina Nurses Association

Zack Moore, MD, MPH
N.C. Division of Public Health

Tammra Morrison, RN BSN
N.C. Division of Public Health

John Morrow, MD
N.C. Association of Local Health Directors
Pitt County Health Department

Vivek Nanda
Blue Cross and Blue Shield of North Carolina

Katie Passaretti, MD
Carolinas Metro Facilities

Sylvia I. Pegg, RN, BSN, CIC
Wake Forest Baptist Health

Charles Riddick, CEO
The Carolinas Center for Medical Excellence

William A. Rutala, PhD, MPH
N.C. Statewide Program in Infection Control and Epidemiology
UNC Health Care System

Megan Sanza, MPH
N.C. Division of Public Health

Robert L. Sautter, PhD, HCLD (ABB)
N.C. Laboratory Response Forum
Carolinas Pathology Group

Daniel J. Sexton, MD
Duke Infection Control Outreach Network
Duke University Health System

Michael E. Toedt, MD, FAAFP
Cherokee Indian Hospital

Christopher W. Woods, MD, MPH
Duke University Health System
Durham VAMC

APPENDIX E. Healthcare Facility Groupings, 2014 National Healthcare Safety Network Annual Hospital Survey

Appendix E1. Healthcare Facility Group: Short-term Acute Care Hospitals

Hospital Groups	Hospital Name	Number of Beds
1-99 beds	Angel Medical Center	25
	Angel Medical Center	25
	Angel Medical Center	25
	Blue Ridge Regional Hospital	25
	Caldwell Memorial Hospital	85
	Carolinas Healthcare System Anson	30
	Carolinas Medical Center-University	94
	Cherokee Indian Hospital	18
	Columbus Regional Healthcare System	81
	Dlp - Harris Regional Hospital	86
	Dlp - Swain County Hospital	25
	Dosher Memorial Hospital	25
	Granville Medical Center	62
	Highlands Cashiers Hospital	24
	Hugh Chatham Memorial Hospital	81
	Kings Mountain Hospital	59
	Martin General Hospital	50
	Mcdowell Hospital	45
	Murphy Medical Center	43
	North Carolina Specialty Hospital	18
	Novant Health Brunswick Medical Center	74
	Novant Health Charlotte Orthopedic Hospital	80
	Novant Health Franklin Medical Center	64
	Novant Health Huntersville Medical Center	73
	Novant Health Medical Park Hospital	22
	Park Ridge Health	98
	Person Memorial Hospital	38
	Sandhills Regional Medical Center	64
	Sentara Albemarle Medical Center	88
	St Lukes Hospital	35
	The Outer Banks Hospital	21
	Transylvania Regional Hospital	38
	Vidant Beaufort Hospital	83
	Vidant Bertie Hospital	6
	Vidant Chowan Hospital	25
	Vidant Chowan Hospital	25
	Vidant Duplin Hospital	72
	Vidant Roanoke Chowan Hospital	90
	Wake Forest Baptist Health-Davie Medical Center	20
	Wake Forest Baptist Health-Lexington Medical Center	85
100-199 beds	ARHS-Watauga Medical Center	117
	Annie Penn Hospital	110
	Betsy Johnson Regional	135
	Blue Ridge Healthcare Hospitals-Valdese	131
	Carolinas Healthcare System Blue Ridge	184

APPENDIX E. Healthcare Facility Groupings, 2014 National Healthcare Safety Network Annual Hospital Survey

Appendix E1. Healthcare Facility Group: Short-term Acute Care Hospitals

Hospital Groups	Hospital Name	Number of Beds
	Carolinas Medical Center-Lincoln	101
	Carolinas Medical Center-Mercy	160
	Carolinas Medical Center-Union	182
	Carteret General Hospital	135
	Catawba Valley Medical Center	190
	Central Carolina Hospital	116
	Cherry Hospital	197
	Davis Regional Medical Center	130
	Duke Raleigh Hospital	148
	Halifax Regional Medical Center	114
	Haywood Regional Medical Center	100
	Iredell Memorial Hospital	199
	Johnston Health	199
	Lake Norman Regional Medical Center	123
	Lenoir Memorial Hospital	167
	Maria Parham Medical Center	102
	Morehead Memorial Hospital	108
	Nash Health Care Systems	177
	Northern Hospital Of Surry County	100
	Novant Health Matthews Medical Center	137
	Novant Health Thomasville Medical Center	149
	Onslow Memorial Hospital	162
	Pardee Hospital	138
	Randolph Hospital	102
	Rutherford Regional Medical Center	120
	Sampson Regional Medical Center	116
	Scotland Memorial Hospital	104
	Stanly Regional Medical Center	109
	Vidant Edgecombe Hospital	117
	WakeMed Cary Hospital	176
	Wesley Long Hospital	175
	Wilkes Regional Medical Center	130
	Wilson Medical Center	145
	Women's Hospital	134
200-399 beds	Alamance Regional Medical Center	238
	Broughton Hospital	297
	CarolinaEast Medical Center	350
	Carolinas Healthcare System Cleveland	241
	Carolinas Medical Center-Pineville	206
	Duke Regional Hospital	219
	Frye Regional Medical Center	355
	High Point Regional Health System	348
	Novant Health Rowan Medical Center	268
	Southeastern Regional Medical Center	319
	Wayne Memorial Hospital	284
400+ beds	Cape Fear Valley Health System	602

APPENDIX E. Healthcare Facility Groupings, 2014 National Healthcare Safety Network Annual Hospital Survey

Appendix E1. Healthcare Facility Group: Short-term Acute Care Hospitals

Hospital Groups	Hospital Name	Number of Beds
	Carolinas Medical Center- Northeast	457
	Central Regional Hospital	405
	FirstHealth Moore Regional Hospital	457
	Gaston Memorial Hospital	402
	Mission Hospital	716
	Moses Cone Hospital	536
	New Hanover Regional Medical Center	652
	Novant Health Forsyth Medical Center	972
	Novant Health Presbyterian Medical Center	702
	Rex Healthcare	660
	WakeMed	626
Primary Medical School Affiliation	Carolinas Medical Center	880
	Duke University Hospital	850
	UNC Health Care	860
	Vidant Medical Center	909
	Wake Forest University Baptist Medical Center	885
	Wake Forest University Baptist Medical Center	885
	Wake Forest University Baptist Medical Center	885

APPENDIX E. Healthcare Facility Groupings, 2014 National Healthcare Safety Network Annual Hospital Survey

Appendix E2. Healthcare Facility Group: Long-term Acute Care Hospitals

Hospital Name
Asheville Specialty Hospital
Carolinas Specialty Hospital
Crawley Memorial Hospital
Highsmith Rainey Specialty Hospital
Kindred Hospital-Greensboro
Lifecare Hospitals Of North Carolina
Select Specialty Hospital-Durham
Select Specialty Hospital-Greensboro
Select Specialty Hospital-Winston Salem