2018

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Healthcare-Associated Infections in North Carolina

Reporting Period:

January 1, 2018—December 31, 2018

NC Department of Health and Human Services • Division of Public Health • Communicable Disease Branch • Medical Consultation Unit • Surveillance for Healthcare Associated and Resistant Pathogens Patient Safety (SHARPPS) Program • www.ncdhhs.gov/ • **NCDHHS is an equal opportunity employer and provider. • 0 copies of this public document were printed at a total cost of $0 or $0 each. • 09/2019**

Overview of Healthcare-Associated Infections in North Carolina

The U.S. Centers for Disease Control and Prevention (CDC) estimates that healthcare-associated infections (HAIs) affect one in 31 hospitalized patients, culminating in approximately 687,000 infections and 72,000 deaths each year[1] as well as $28–$33 billion in excess costs.[2] In North Carolina, HAIs result in approximate direct costs to facilities ranging from $124 million to $348 million annually.[3] In 2018, 4,173 HAIs were reported by NC acute care hospitals, resulting in at least $19,204,407* of excess cost.[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 in 2018.

Click here for fast facts about HAIs in North Carolina.

HAIs are infections caused by a variety of organisms, including bacteria and fungi, acquired while receiving medical care. Hospitals are required to report specific types of HAIs to the North Carolina Division of Public Health (NC DPH). This report focuses on five important types of HAIs that occurred while patients were hospitalized in Acute Care Hospitals during January 1, 2018 – December 31, 2018. 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 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 is a product of this collaboration and is prepared by the Surveillance for Healthcare-Associated and Resistant Pathogens Patient Safety (SHARPPS) Program located in the Communicable Disease Branch of the Epidemiology Section of NC DPH. Report definitions are provided (Appendix A). The report is meant to be a resource for healthcare providers and for the general public. This report is useful for anyone looking for information about state HAI prevention progress. Consumers can use this information to learn more about HAIs, and to take ownership of their healthcare by asking infection prevention questions when coming into contact with healthcare facilities. Providers can use this report to compare statewide and hospital-specific progress to the national experience and to learn from best practices highlighted in our Stories of Success in Elimination.

The NC SHARPPS Program mission is to work in partnerships to prevent, detect, and respond to events and outbreaks of healthcare-associated and antimicrobial resistant infections in North Carolina.

The SHARPPS Program has five key program areas to achieve this mission: infrastructure; surveillance, investigation, and response; prevention, education, and training; monitoring and evaluation; and communication. The Program works to eliminate preventable infections in healthcare settings by:

1. Conducting statewide surveillance for selected HAIs;
2. Providing useful, unbiased information to healthcare providers and consumers through public reports;
3. Promoting and coordinating prevention efforts;
4. Providing guidance, education, and training; and
5. Investigating and responding to outbreaks in healthcare settings.

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[1] Centers for Disease Control and Prevention. Healthcare Associated Infections (HAI) HAI Data Portal. Updated October 2018. Available at https://www.cdc.gov/hai/data/portal/index.html

[2] Scott R. *The Direct Medical Costs of Healthcare-Associated Infections in U.S. Hospitals and the Benefits of Prevention. Internal Report.* Division of Healthcare Quality Promotion, National Center for Preparedness, Detection, and Control of Infectious Diseases, Coordinating Center for Infectious Diseases, Centers for Disease Control and Prevention; February 2009. Available at https://www.cdc.gov/hai/pdfs/hai/scott_costpaper.pdf

[3] Anderson DJ, Pyatt DG, Weber DJ, Rutala WA; North Carolina Department of Public Health HAI Advisory Group. Statewide costs of health care-associated infections: Estimates for acute care hospitals in North Carolina. *Am J Infect Control.* 2013;41:764-8. doi: 10.1016/j.ajic.2012.11.022.

[4] APIC. APIC Cost of healthcare-associated Infections. May 2011 Available at https://apic.org/resources/cost-calculators. Accessed July 31, 2019.

*CLABSIs are not included in this cost estimate as APIC uses different criteria to measure these events. It is unclear how many CLABSIs meet that definition so they are left out of the cost calculation. This is true for the 2017 report as well and this will be true for future reports.

^in 2019, NHSN changed the nomenclature for *C. difficile* from *Clostridium* to *Clostridioides*. This report will use *Clostridium* as the data for this report was pulled in 2018. Moving forward, reports will use the *Clostridioides* nomenclature.

We welcome your feedback to improve the usefulness of future reports (nchai@dhhs.nc.gov).

For more information:

- For more information on HAIs and the NC SHARPPS Program, please visit http://epi.publichealth.nc.gov/cd/diseases/hai.
- To review background information on HAI surveillance in NC and details information on common statistics used: https://epi.dph.ncdhhs.gov/cd/hai/figures.html

Acknowledgements

We acknowledge the extensive time and effort that collectively stakeholders across North Carolina daily put into infection prevention. We at the NC Division of Public Health remain committed to our partners and dedicated to our common goal of patient safety.

The North Carolina SHARPPS Program would like to acknowledge and thank hospital infection preventionists across the state who work tirelessly to protect patients from infection. They provided the data used to create this report and worked with their hospital colleagues to identify and reconcile any potential problems with the data. The recent progress and successes in fighting healthcare-associated infections would not have been possible without their continuing efforts, dedication and collaboration.

The SHARPPS Program would also like to recognize the contributions of the Healthcare-Associated Infections Advisory Group members listed in Appendix C. In particular, the Program is grateful for their ongoing guidance and feedback on the presentation and content of NC 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 Healthcare Association (NCHA), the North Carolina Statewide Program for Infection Control and Epidemiology (NC SPICE), the North Carolina Chapter of the Association for Professionals in Infection Control and Epidemiology (APIC), Alliant Quality, and the Adult Care Licensure and Nursing Home Licensure and Certification sections of the North Carolina Division of Health Service Regulation.

Table of Contents

I. Highlights of Healthcare-Associated Infections Activities in 2018

A. NC Surveillance for Healthcare Associated and Resistant Pathogens Patient Safety Program

Key accomplishments and activities of the North Carolina Surveillance for Healthcare-Associated and Resistant Pathogens Patient Safety (SHARPPS) Program in 2018 include the following:

- ***Investigation and Response:*** In 2018, the SHARPPS Program led or participated in over 60 acute responses statewide, including outbreaks, bloodborne pathogen exposures, and sentinel events (a single event initiating response) investigations. Of these responses, 11 were outbreaks, only 2 of these outbreaks were in long term care facilities. The Communicable Disease Branch's outbreak response from January 1 – December 31, 2018 saw a total of 394 outbreaks were reported to the Communicable Disease Branch and 284 or 72% occurred in long term care settings. ***Program Infrastructure:*** The SHARPPS team consists of a program director, medical director, three epidemiologists, and a health educator. The SHARPPS team continued to work to increase communication and outreach to our stakeholders and customers, publishing newsletters and infographics, and launching the STewardship of Antimicrobial Resources (STAR) partners initiative in July. The SHARPPS team has given 3 webinars and 14 presentations focusing on infection prevention and the role of public health, outbreak investigation and response, and Multidrug Resistant Organisms, including Carbapenem Resistant Enterobacteriaceae and *Candida auris*.

- ***One and Only Safe Injection Practices Campaign****:* NC SHARPPS worked to improve safe injection practices through the One & Only injection safety campaign. We collaborated with our state licensing agency Division of Health Service Regulation (DHSR) and the NC Statewide Program for Infection Control and Epidemiology (NC SPICE) to educate over 700 healthcare workers statewide working in long-term care settings on safe injection practices and improved adherence to infection prevention and control policies and procedures. We have held eight trainings and presentations in addition to additional exhibits/educational events.

- ***Be Antibiotics Aware: Smart Use Best Care:*** NC SHARPPS continued to partner with the CDC's national educational effort to improve antibiotic prescribing use and combat antibiotic resistance. This campaign supports public and provider awareness about the dangers of unnecessary use of antibiotics. More information on this campaign can be found at https://epi.publichealth.nc.gov/cd/antibiotics/campaign.html.

- ***Antimicrobial Resistance:*** Antimicrobial resistance is an urgent public health threat and remains a priority for the SHARPPS Program. In conjunction with partners and the Commission for Public Health, we added specific carbapenemase-producing Carbapenem Resistant Enterobacteriaceae (CP-CRE) and *Candida auris* to the NC reportable diseases and conditions list (10A NCAC 41A .0101) on October 1, 2018. The SHARPPS Program collaborates with the NC State Laboratory of Public Health (NC SLPH), the Centers for Disease Control and Prevention (CDC's) Antibiotic Resistance Laboratory Network (ARLN) and Local Health Departments (LHDs) on CRE and *C. auris* containment efforts. NC SLPH provides support for the identification of CP-CRE to facilities statewide, ARLN funding provides infrastructure and laboratory capacity to screen for CRE and *C. auris*, and LHD staff provide onsite support for investigations. SHARPPS team members also updated and disseminated a MDRO toolkit (https://epi.dph.ncdhhs.gov/cd/docs/MDROToolkit_Jan2019.pdf).

  In a collaborative effort among SHARPPS, NC SLPH, and Clinical Microbiology experts from across NC we created a Laboratory Guide for CRE available on our website (https://epi.publichealth.nc.gov/cd/cre/CREGuidanceDocument2018.pdf). The guide aims to ensure personnel in NC laboratories are aware of appropriate CRE testing, reporting, and antimicrobial stewardship activities.

- ***Antimicrobial Stewardship***: The STewardship of Antimicrobial Resources (STAR) Partners initiative launched July 2018. This tiered, recognition-based incentive program encourages antimicrobial stewardship program development and addresses activities related to antimicrobial resistance and surveillance. The initiative encourages facilities who attain the highest tier to partner as mentors to facilities with less advanced stewardship programs. We plan to expand this initiative to include all healthcare settings in a stepwise fashion, with the initial expansion planned for Long Term Care. STAR Partners provides recognition through certificates, listing participating facilities on the NC SHARPPS website, receipt of the NC SHARPPS newsletter, as well as access to a mentorship program and educational offerings. For more information visit: https://epi.publichealth.nc.gov/cd/antibiotics/star_partners.html.

  NC DPH has also made a commitment to the U.S. Government's Antimicrobial Resistance (AMR) Challenge, a year-long effort to accelerate the fight against antimicrobial resistance across the globe. The AMR Challenge is a way for governments, private industries, and non-governmental organizations worldwide to make formal commitments to further the progress against antimicrobial resistance. The AMR Challenge launched in September 2018 and organizations can continue to make commitments until September 2019. The CDC will feature commitments throughout the year, and all commitments are posted on the AMR Challenge web page: https://www.cdc.gov/drugresistance/intl-activities/amr-challenge.html. Participants can make commitments in one or more of five areas including tracking and data; infection prevention and control; antibiotic use; environment and sanitation; and vaccines, therapeutics, and diagnostics. Ask if your facility has made a commitment to the AMR Challenge!

- ***Data Validation:*** In 2018, the SHARPPS Program validated Central Line Associated Bloodstream Infections (CLABSIs) for July-December 2017 and *Clostridium difficile* LabID Events (CDI) for July-December 2017 and January-June 2018 data. Two validators conducted on-site CLABSI validation for 12 acute care hospitals. A single validator conducted CDI validation for 13 acute care hospitals, two long term acute care hospitals, and five inpatient rehab facilities for July-December 2017 data, and six acute care hospitals for January-June 2018 data. Very few discrepancies were identified, suggesting thorough understanding of CLABSI and CDI surveillance definitions.

- ***Data for action: Targeted Assessment for Prevention (TAP) Reports*:** In an effort to make HAI data in NC more actionable, NC SHARPPS began providing additional information to facilities identified as having a higher number of observed healthcare-associated infections than predicted by the 2015 national baseline. In addition to the monthly reconciliation reports and the public quarterly reports, facilities with elevated SIRs received additional outreach twice per year. This follow-up included providing summary data from the NHSN Targeted Assessment for Prevention (TAP) reports when available and includes a non-adjusted state ranking based upon the facilities' calculated Cumulative Attributable Difference (CAD) which estimates the number of infections the facility would have had to prevent in a certain time period to meet the 2020 HHS prevention goal. We identified 58 facilities that could potentially use the TAP assessment and held follow up calls with 24 of these facilities. We discussed the facility's data and how SHARPPS may assist with their HAI prevention goals. We used these calls as an opportunity to learn more about current challenges and successes, to provide resources and as an opportunity to receive feedback and learn more about unmet needs.

B. Healthcare-Associated Infections Partner Updates

North Carolina Statewide Program for Infection Control and Epidemiology (NC SPICE)

The NC Statewide Program for Infection Control and Epidemiology (SPICE) promotes prevention and control of healthcare-associated infections in North Carolina by providing evidence-based education and consultation across the healthcare spectrum. Activities for 2018 are summarized below.

Classroom Courses:

- In 2018, SPICE held four classroom courses targeting new infection preventionists (IPs) in acute and long-term care settings, training 483 healthcare professionals.
- Additionally, SPICE held a 2-day CBIC Exam Review course; attendance 45.

In-services/presentations:

- May 14th, In-service presentation to Division of Health Service Regulation (DHSR) surveyors in Raleigh
- May 21st, Attendance and presentation at the 2018 annual Division of Public Health's Communicable Disease conference in Wilmington, NC
- September 23-26: APIC NC Board meeting (SPICE Report); APIC NC Fall Conference and presentation, Durham NC
- November 8th, Talk in Southern Pines to the NC Environmental Health Supervisor's Association "Safer Healthcare Environment"
- November 14th, Webinar for Alliant Quality, the QIN-QIO for Georgia and NC "Infection Control Assessment and Response" findings in long-term care facilities (multiple states attended)
- December 13th, Webinar for Greater Greensboro Community; Alliant Quality, the QIN-QIO for Georgia and NC "Infection Control Assessment and Response: Findings in NC"

On Site Consultation/Meetings:

- 3/20/18: Consulting visit with NCDPH SHARPPS team to NC acute care facility to evaluate a novel case of CRE
- 5/4/18: Convened Public Health Institutional Task Force for discussion of current issues.
- 6/4/18: Infection Control Assessment at Long Term Care Facility; requested by NCDPH SHARPPS team
- 7/27/18 Assessment and evaluation of a Long-Term Care Facility – requested by NCDPH SHARPPS team
- 7/30/18 Assessment and evaluation of a Long-Term Care Facility – requested by NCDPH SHARPPS team

Enhanced Education of Infection Prevention in Nursing Homes:

- Free modules (DVD and on-line) covering Antibiotic Resistant Bacteria, Isolation Precautions, Injection Safety, Environment, *Clostridium difficile*, and UTIs. 319 modules completed.
- Coursera also houses these modules as a course. 770 learners enrolled in 2018.
- Outpatient, Dental and Home Health/Hospice Settings sessions continued to be taught via classroom, webinar and on-line formats. 2407 healthcare personnel completed this curriculum.

Phone and email consultations

- SPICE provided 1290 infection control consultations by phone or email in 2018.

Infection Control, Assessment, and Response (ICAR) Project

- The ICAR nurse consultants provided 18 separate classes of Infection Control in Outpatient Settings training 886 healthcare professionals.
- Nurse consultants organized a series of six webinars, primarily for the long-term care setting, with over 100 attendees completing each webinar.
- Three nurse consultants completed on-site infection control assessments bringing total facilities assessed to 277. Twenty-two follow up assessments were conducted. Nurse consultant work concluded on 10/30/18.
- Work continued the revision of the .0206 infection control course for outpatient, dental and home health / hospice settings for both classroom and on-line formats. Conducted video/photo shoots in outpatient and dental settings to provide current media for the course.

North Carolina Division of Health Service Regulation (DHSR)

In 2018, DHSR conducted or participated in the following:

1. Bi-annual training to approximately 300 nursing home and acute care surveyors in conjunction with NC SPICE and NC SHARPPS.
2. Dissemination of NC SPICE and NC SHARPPS newsletters and routine NC SHARPPS updates (including outbreaks reported in long-term care settings) to Long Term Care (LTC) and Acute Home Care Surveyors and nursing home administrators.
3. Centers for Medicaid and Medicare Services (CMS) mandatory training (conducted at time of hire) for all Long-Term Care (LTC) surveyors and Acute Home Care Surveyors on Infection Prevention and Control.
4. A series of three CMS Infection Control webinars mandatory for all Nursing Home surveyors. These webinars addressed Contact Precautions, multi-drug resistant organisms (MDROs), environmental hazards, and other Infection Control issues.
5. Dissemination of CDC updates and other alerts from the Nursing Home Licensure Section (NHLCS) Regional Office to surveyors and nursing home administrators.
6. Continued collaboration with NC SHARPPS on healthcare associated infections and other emerging issues, collaborating across NC on infection control issues in long-term care settings.

Alliant Quality, The Quality Innovation Network – Quality Improvement Organization for Georgia and North Carolina*

Collaborative Partners: North Carolina Area Health Education Centers (AHEC); North Carolina Department of Health & Human Services (NC DHHS); End Stage Renal Disease (ESRD) Network; University of North Carolina Chapel Hill – Statewide Program for Infection Control and Epidemiology (SPICE); North Carolina Healthcare Facilities Association (NCHCFA); North Carolina Healthcare Association (NCHA); University of North Carolina Wilmington- Center for Healthy Communities

- Technical Assistance provided for 50+ North Carolina Long Term Care Facilities currently reporting *Clostridium difficile* infection cases into the CDC's National Healthcare Safety Network (NHSN). Provide education and resources with a monthly call (Shop Talk) as well as planned Learning and Action Network events with peer-to-peer sharing and expert speakers.
- Support and education for the development, implementation and sustainment of Antibiotic Stewardship as defined by the CDC Core Elements of Outpatient Antibiotic Stewardship through newsletters, on-site and telephonic meetings, consultative conferences, and webinars.

- Collaboration with greater than 140 recruited providers in the outpatient settings of Emergency Services, Urgent Care, and Physician Practices representing Atrium, Cape Fear Valley, Caromont, Dosher, First Health, and Moses Cone Health Systems as well as numerous private practices, FQHCs, and public health departments.
- Serve as collaborative partners on efforts to reduce Healthcare Acquired Infections underway in dialysis centers.
- Serve on consultative workgroups for the Pneumonia Knockout program as well as the STAR Partner (Antibiotic Stewardship) program.

*This material was prepared by GMCF for Alliant Quality, the Medicare Quality Innovation Network – Quality Improvement Organization for Georgia and North Carolina, under contract with the Centers for Medicare & Medicaid Services (CMS), an agency of the U.S. Department of Health and Human Services. The contents presented do not necessarily reflect CMS policy. Publication No. 11SOW-GMCFQIN-NC-C10-18-01

II. Explanation of Statewide Healthcare-Associated Infections Data

The HAI Annual Report for 2018 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 long term acute care facilities, inpatient rehabilitation facilities, critical access hospitals, and specialty hospitals such as psychiatric facilities. Data for these additional facility types are provided in Quarterly Reports, available here: http://epi.publichealth.nc.gov/cd/hai/figures.html.

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 NC DPH using a free, web-based software system called the National Healthcare Safety Network (NHSN). The CDC and the NC SHARPPS 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, 2018 – December 31, 2018. These infection counts alone do not show how well a facility or North Carolina is doing in preventing HAIs. Therefore, the report also presents a key measure used to determine HAI progress, the standardized infection ratio (SIR). **The SIR is the number used to represent how well a facility did in preventing HAIs compared to similar facilities under the national average (i.e., national experience).** When presenting SIRs, the report data tables and figures show whether NC, a hospital-sized group, or location type had more HAIs ("worse"), fewer HAIs ("better"), or about the same number of HAIs ("same") compared to the national average based on previous years of reported data. The predicted value of the national average for each HAI is also called the "NHSN baseline". The SIR is considered a "best guess" or estimate of observed infections compared to the number of infections that would be predicted based on the NHSN baseline. The comparison made by the SIR between observed and 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.

More information on how the SIR is calculated can be found here: https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sir-guide.pdf.

SIRs are presented for the state overall and for each hospital size group; for some HAIs, SIR is also presented by location type (i.e., adult/pediatric units v. neonatal locations). The hospital size 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.

In 2015, NHSN updated the national baseline for all HAIs. The original national experience (NSHN baseline) was used in SHARPPS Program reports from 2012-2016. With the original baseline, each HAI used data from a different year or years to come up with this original predicted number of infections: CLABSIs and SSIs used data from 2006-2008; CAUTIs used data from 2009; MRSA and CDI LabID events used data from 2010-2011. When calculating the SIR based on the original baseline, the way differences in facilities (such as types of patients and procedures, or facility size) were accounted for varied by both HAI type and facility type. Starting in 2017, NC SHARPPS is presenting SIRs calculated on a new NHSN baseline. All HAIs will use data from 2015 to come up with their predicted baseline values. The 2015 baseline will serve as a new reference point for assessing progress. SIRs calculated under this new baseline cannot be compared to SIRs calculated using the original baselines. You can read more about the change in baseline here.

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

a. WHAT DO THE NUMBERS MEAN?

This report shows how the state performed during a single year (2018) and compares each hospital's performance to the national average or baseline experience.

In addition to presenting numbers, there are some more complicated calculations performed on the data. These calculations help ensure that any data guesses or estimates (i.e., for the SIR) are as accurate as possible. A larger number of data records will provide more accurate estimates than a smaller number. One of these calculations, the 95% confidence interval, gives a lower and higher range of values that we use when comparing the number of observed infections to the number of predicted infections; this range tells us whether the difference between the observed and predicted infections is statistically significant or not.

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

b. ORGANISMS IDENTIFIED FROM HAIs

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*, *Coagulase negative Staphylococci*, and two "other" categories – Other Gram-Positive Bacteria and Other Gram-Negative Bacteria. The first eight categories or organisms listed represent the national 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.

Excluded organisms: Some organisms are rarely associated with HAIs or not known to cause HAIs. These organisms may be the causes of community-associated infections. For this reason, NHSN excludes organisms from the following genera from reporting: Blastomyces, Histoplasma, Coccidioides, Paracoccidioides, Cryptococcus, and Pneumocystis. Additional organism exclusions specific to a HAI can be found in the patient safety manual (https://www.cdc.gov/nhsn/pdfs/validation/2018/pcsmanual_2018-508.pdf).

c. THINGS TO CONSIDER WHEN LOOKING AT THE REPORT

A total of 116 North Carolina hospitals reported HAIs in 2018, including 94 short-term acute-care hospitals, nine long-term acute-care hospitals, seven inpatient rehabilitation facilities, and six specialty hospitals. This report includes data from the 92 short-term acute-care hospitals and six specialty hospitals. Facility-specific data for all of these hospital types can be found here: http://epi.publichealth.nc.gov/cd/hai/figures.html.

These reports cover data from January 1, 2018 - December 31, 2018. Data were downloaded from the National Healthcare Safety Network (NHSN) on March 19, 2019; 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 SHARPPS 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 additional 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 SHARPPS 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 SHARPPS Program chose not to present some data** 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.

5. **The North Carolina SHARPPS 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; 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 for calculating an SIR. In other words, there is not enough information to make a reliable conclusion about performance on this measure.

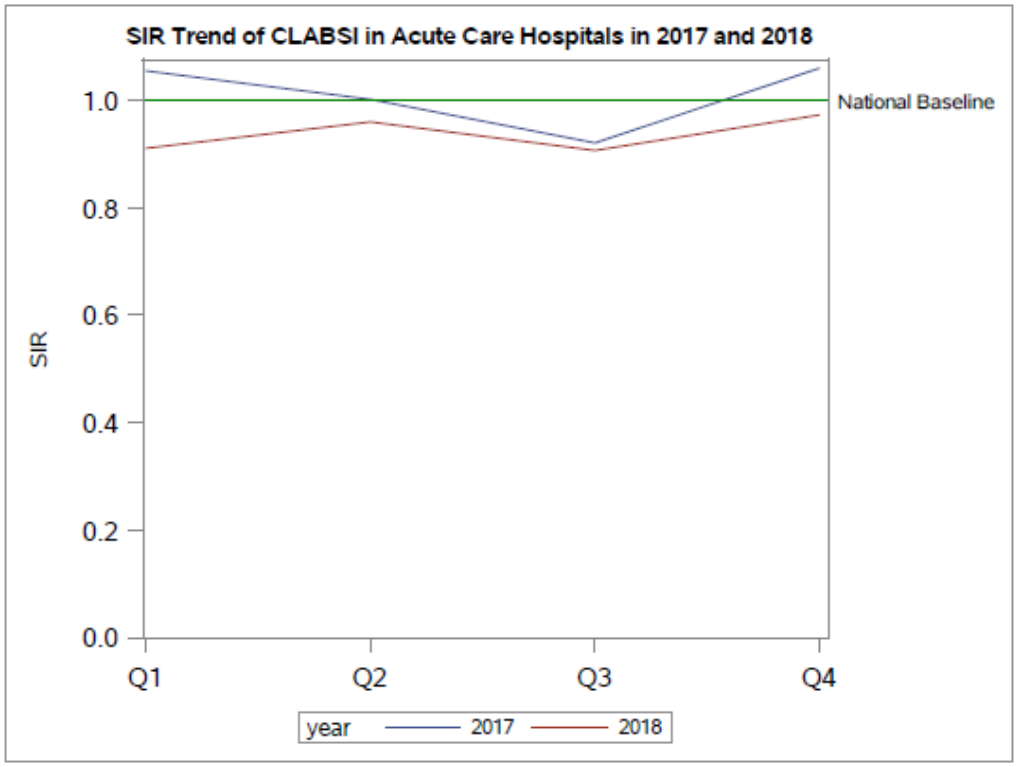
6. **Laboratory-Identified Events (LabID Events):** *Clostridium difficile* infections (CDI) and methicillin-resistant *Staphylococcus aureus* (MRSA) bacteremia (blood infection) LabID events rely on laboratory data. Patients did not have to be ill to have a positive result, and a positive result can be determined without requiring clinical information about the patient. This allows for a much less labor-intensive means to track CDI and MRSA infections. Only those LabID events that are acquired in the hospital are displayed in this report. The sensitivity of various testing methodologies, particularly for CDI may vary. NHSN makes risk adjustments to account for these differences when calculating SIRs for LabID CDI events.

As of 2018 Q1, CDI events will be risk adjusted for the last test performed if multiple tests were used. For example, if 'NAAT plus EIA, if NAAT positive' was performed, the event will be risk adjusted for EIA. More information can be found in the Guide to the SIR (https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sir-guide.pdf).

D. HEALTHCARE-ASSOCIATED INFECTIONS TRENDS FOR 2017 AND 2018

The SIR for both MRSA LabID events and CDI LabID events was below the national baseline for both 2017 and 2018. For all types of HAIs, there were some months/quarters that performed BETTER than the national experience. North Carolina facilities strive to bring the SIR down to below the national baseline and this effort is reflected in the data. See below for how the SIR tracks across the year for 2017 and 2018.

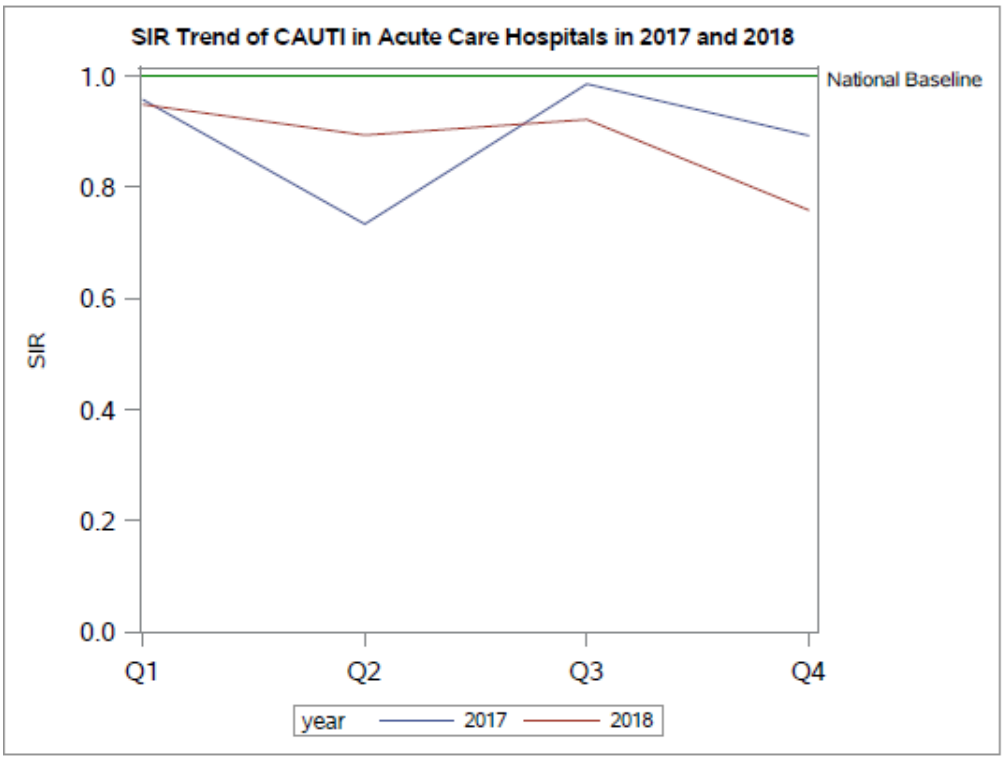
Figure 1:



How to Understand Figure 1:

- All Quarters in 2017 and 2018 reported about the same number of CLABSIs as predicted, performing the SAME as the national experience

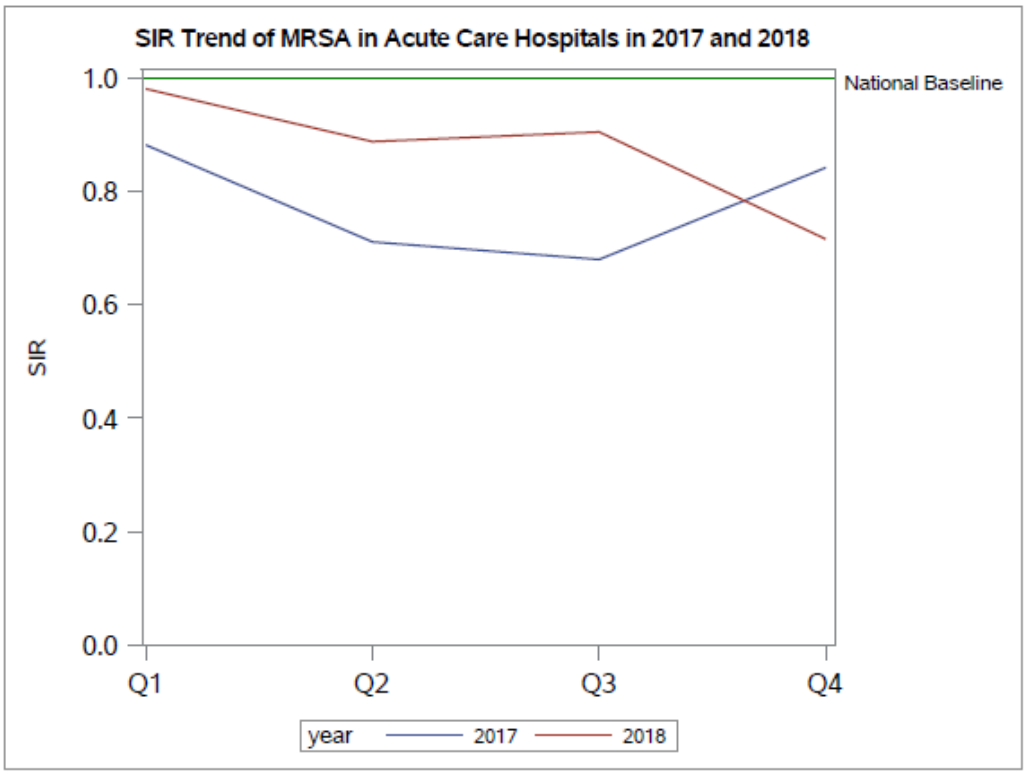
Figure 2:



How to Understand Figure 2:

- Quarter 2 of 2017 and Quarter 4 of 2018 experienced fewer CAUTIs than predicted, performing BETTER than the national experience

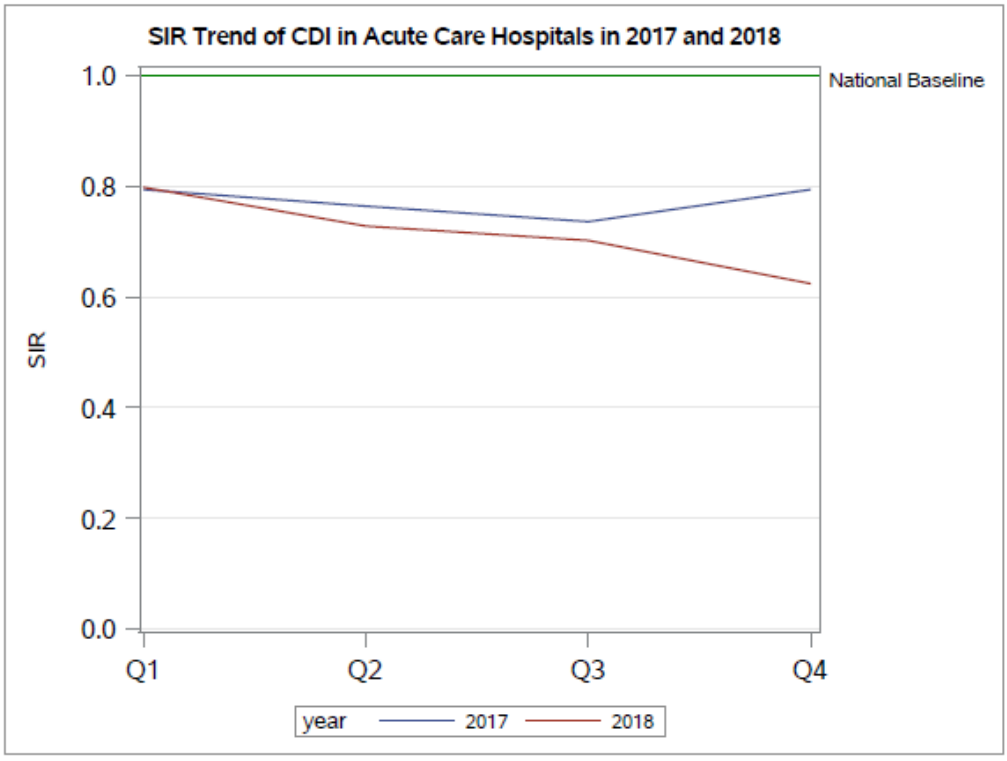
Figure 3:



How to Understand Figure 3:

- Quarter 2 and 3 of 2017 and Quarter 4 in 2018 had fewer than predicted MRSA LabID events, performing BETTER than the national experience
- Most location types reported about the same number of MRSA LabID events as predicted, performing the SAME as the national experience

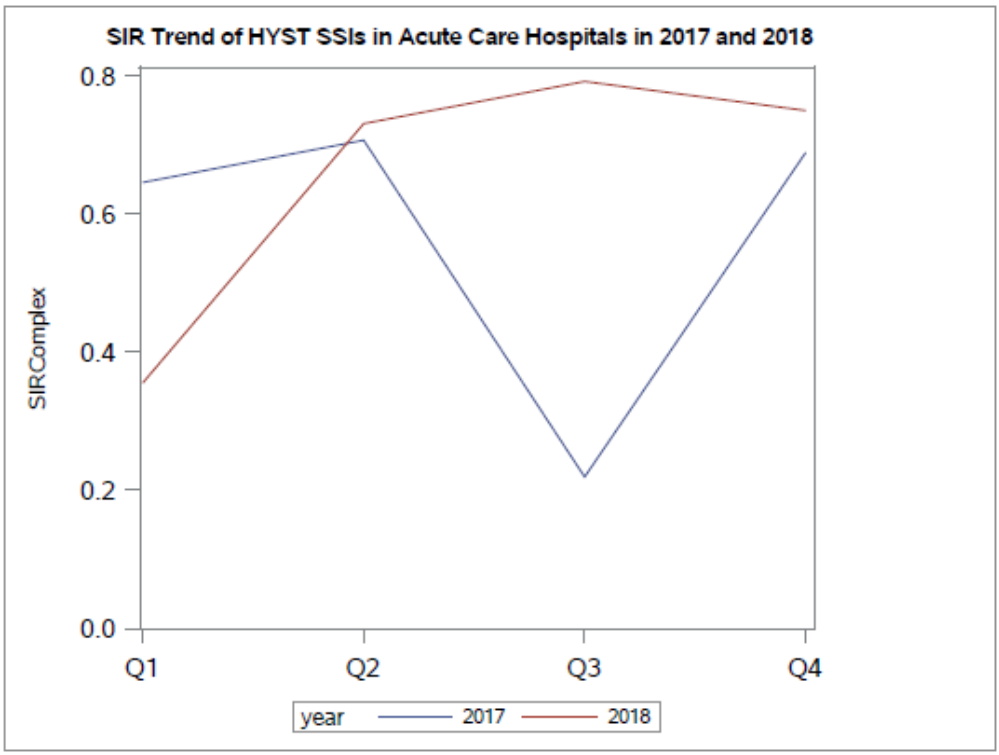
Figure 4:



How to Understand Figure 4:

- All Quarters had fewer than predicted CDI LabID events, performing BETTER than the national experience

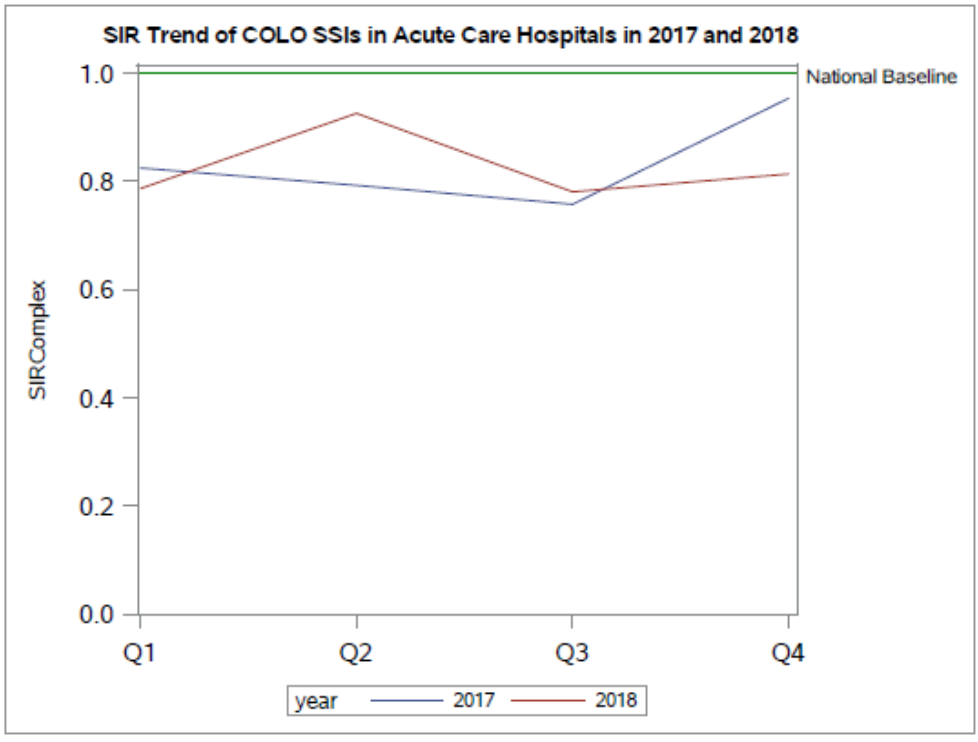
Figure 5:



How to Understand Figure 5:

- Quarter 3 of 2017 and Quarter 1 of 2018 experienced fewer HYST SSIs than predicted, performing BETTER than the national experience

Figure 6:



How to Understand Figure 6:

- Quarter 3 in 2017 experienced fewer COLO SSIs than predicted, performing BETTER than the national experience

III. Statewide Healthcare-Associated Infections

A. Central Line-Associated Bloodstream Infections (CLABSI)

1. CLABSI in Adult/Pediatric ICUs

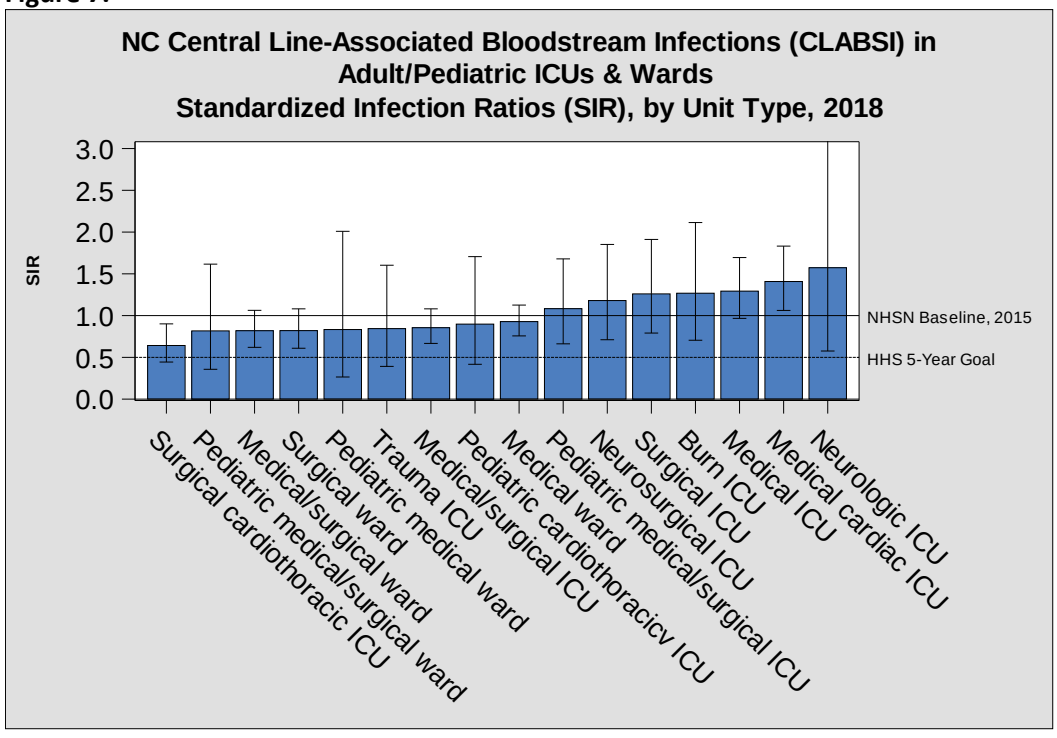
North Carolina 2018 CLABSI Highlights in Adult/Pediatric Medical, Surgical, and Medical/Surgical Wards & ICUs

- North Carolina hospitals reported 496 infections in Adult/Pediatric Medical, Surgical, and Medical/Surgical Wards nad ICUs, compared to the 520 infections predicted by the national experience; this was about the same as the 2015 national experience.
- In 2018, North Carolina did not meet the U.S. Department of Health and Human Services 2020 goal to reduce CLABSIs by 50% from the 2015 national baseline experience.
- The most commonly identified organisms from adult and pediatric CLABSI patients were *Candida* and other yeasts/fungi, followed by *Enterococcus* .

Table 1. NC Central Line Associated Bloodstream Infections (CLABSI) in Adult/Pediatric Medical, Surgical and Medical/Surgical Wards & ICUs, 2018

Year	# Observed Infections	# Predicted Infections	How Does North Carolina Compare to the National Experience?
2018	496	520.06	= Same: about the same number of infections as were predicted (same as the national experience)

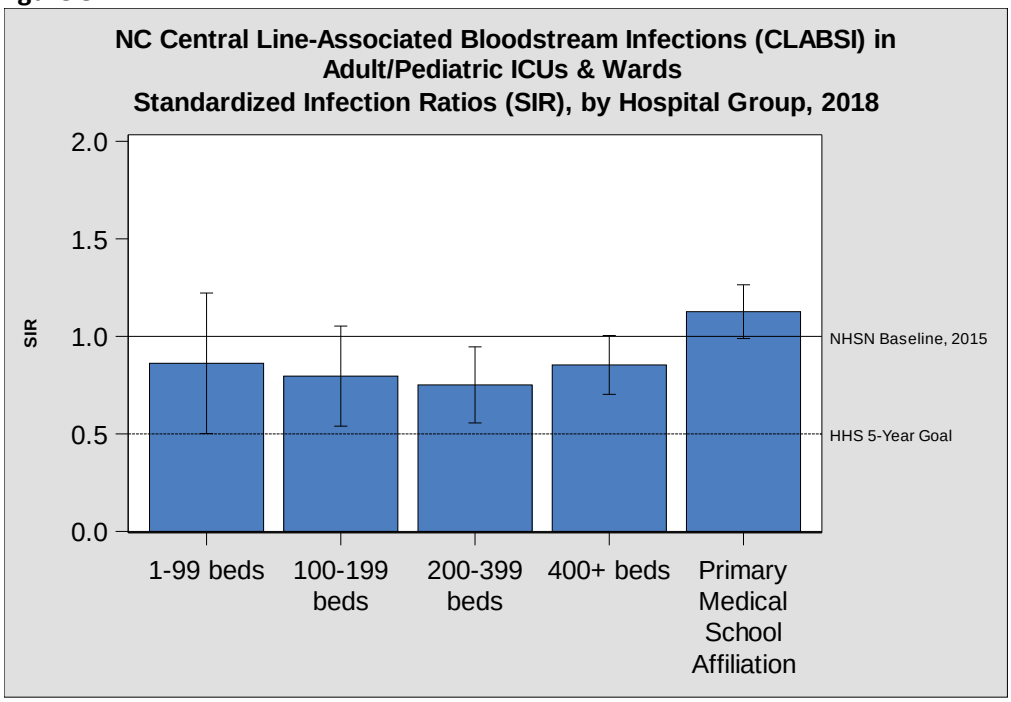
Figure 7.



How to Understand Figure 7:

- Most location types reported about the same number of CLABSIs as predicted, performing the SAME as the national experience
- In 2018, medical cardiac ICUs reported more infections than predicted, performing WORSE than the national experience
- In 2018, Surgical cardiothoracic ICUs reported fewer infections than predicted, performing BETTER than the national experience

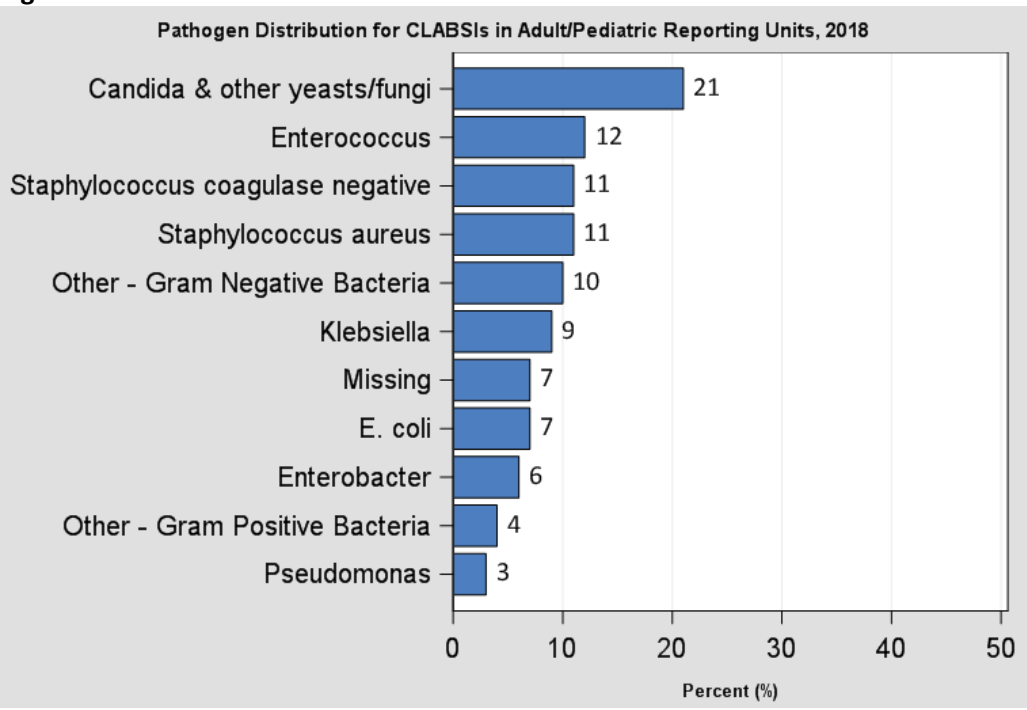
Figure 8.



How to Understand Figure 8:

- In 2018, hospitals with 200-399 beds observed fewer CLABSIs than predicted, performing BETTER than the national experience
- All other hospitals observed about the same number of CLABSIs as predicted, performing the SAME as the national experience

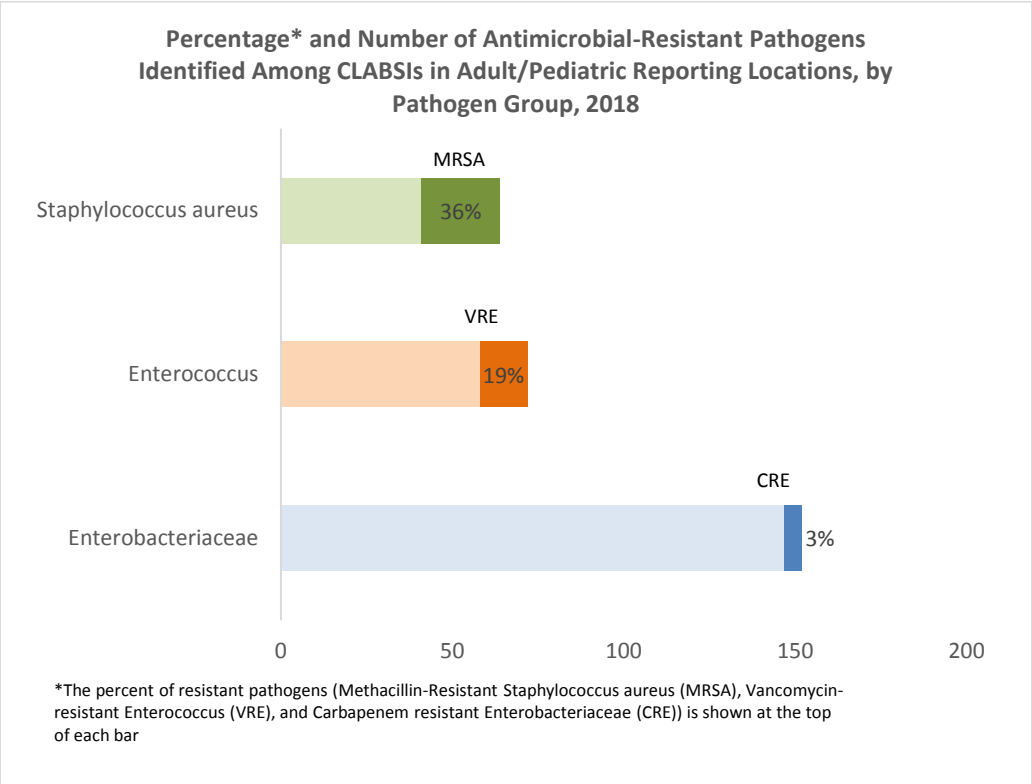
Figure 9.



How to Understand Figure 9:

- The most commonly identified organisms from adult and pediatric CLABSI patients were *Candida* and other yeasts/fungi, followed by *Enterococcus*

Figure 10.



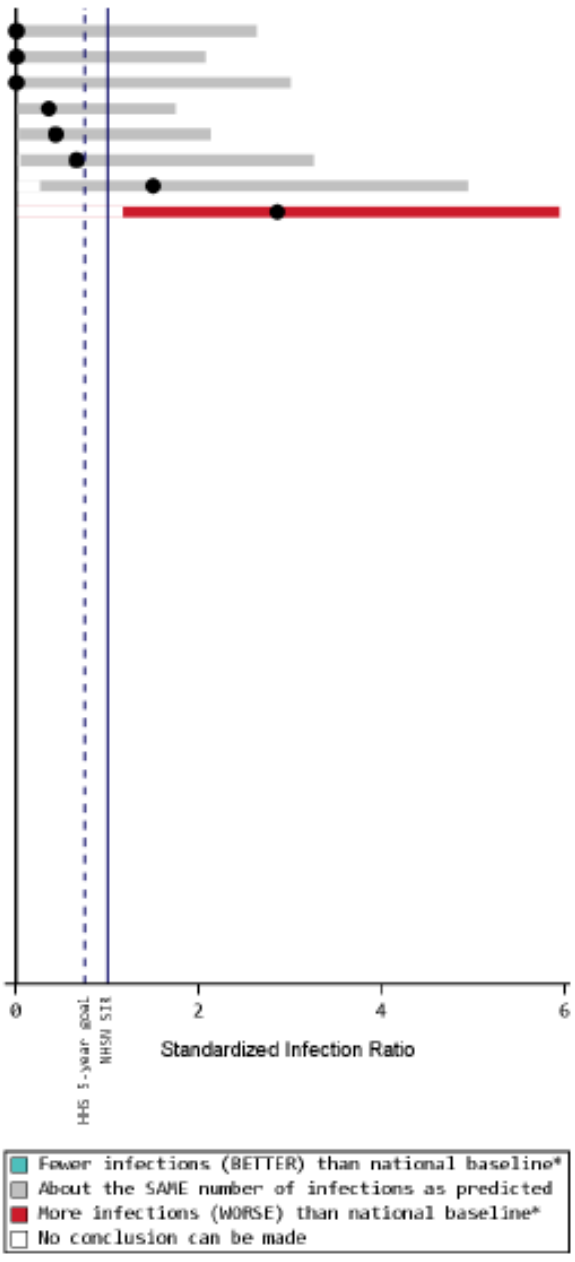
How to Understand Figure 10:

- In 2018, 36% of *Staphylococcus aureus* identified among adult/pediatric CLABSIs were resistant to methicillin.
- 19% of *Enterococcus* identified among adult/pediatric CLABSIs were resistant to vancomycin.
- The percentage of *Enterobacteriaceae* identified among adult/pediatric CLABSIs resistant to carbapenems is low (3%).

The following SIR plots summarize CLABSI infection data among Adult/Pediatric locations for North Carolina hospitals by hospital groups (Appendix E).

CLABSI in Adult/Pediatric Medical, Surgical, and Medical/Surgical Wards and ICUs
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with less than 100 Beds

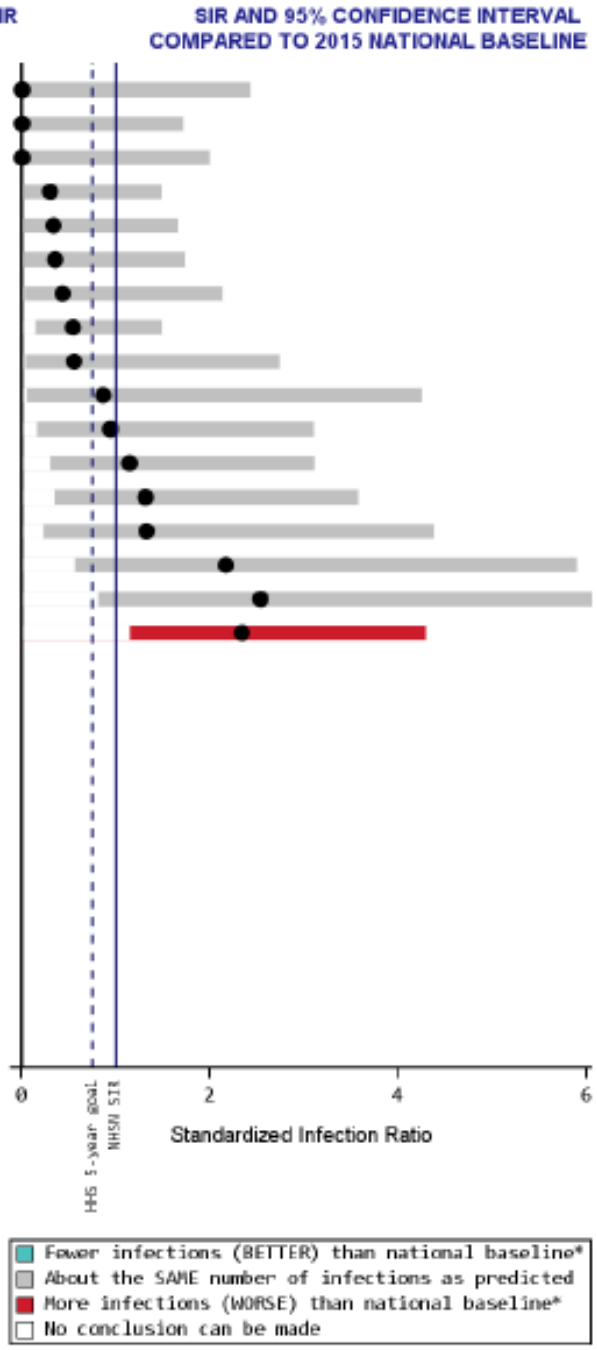
HOSPITAL	OBS	PRED	PROC	SIR
Dlp - Harris Regional Hospital	0	1.1	1859	0.0
Haywood Regional Medical Center	0	1.5	1804	0.0
Central Carolina Hospital	0	1.0	1641	0.0
Caldwell Memorial Hospital	1	2.8	4085	0.4
Catawba Valley Medical Center	1	2.3	3770	0.4
Maria Parham Medical Center	1	1.5	2139	0.7
Columbus Regional Healthcare System	2	1.3	2184	1.5
Novant Health Huntersville	6	2.1	3035	2.9
McDowell Hospital	0	0.4	628	NC
Cherokee Indian Hospital	0	0.3	495	NC
Sentara Albemarle Medical Center	0	0.9	1387	NC
Martin General Hospital	0	0.1	127	NC
Randolph Hospital Dba Randolph Health	1	0.7	1118	NC
Vidant Beaufort Hospital	0	0.7	1081	NC
Scotland Memorial Hospital	0	0.2	282	NC
Granville Medical Center	3	0.4	734	NC
Carteret General Hospital	1	0.8	1400	NC
Novant Health Brunswick Medical Center	0	0.6	917	NC
Vidant Duplin Hospital	0	0.6	847	NC
Kings Mountain Hospital	1	0.1	102	NC
Person Memorial Hospital	0	0.1	222	NC
Wake Forest Baptist Health-Lexington	1	0.7	894	NC
Halifax Regional Medical Center	2	0.9	1542	NC
Novant Health Medical Park Hospital	0	0.2	345	NC
Betsy Johnson Hospital	1	0.7	1011	NC
Hugh Chatham Memorial Hospital	0	0.7	1192	NC
Carolinas Healthcare System Anson	NA	NA	N	NC
Annie Penn Hospital	1	0.9	1389	NC
North Carolina Specialty Hospital	0	0.1	135	NC
Wake Forest Baptist Health-Davie Medical	0	0.2	263	NC
Johnston Health Clayton	0	0.2	294	NC
Firsthealth Moore Regional-Hoke	0	0.1	110	NC
Firsthealth Moore Regional-Richmond	0	0.4	615	NC
Cape Fear Valley Hoke Hospital	0	0.2	314	NC
Novant Health Kernersville Medical Cente	0	0.4	768	NC
Central Harnett Hospital	0	0.2	319	NC
Novant Health Clemmons Medical Center	0	0.0	69	NC



Data reported as of October 15, 2019 .
OBS = # infections observed
PRED = # infections statistically 'predicted' by national baseline
PROC = # procedures
SIR = Standardized infection ratio (OBS/PRED # of infections)
NA = Data not shown for hospitals with <20 procedures
NC = SIR not calculated for hospitals with <1 predicted infection
*Significantly different than 2015 national baseline

CLABSI in Adult/Pediatric Medical, Surgical, and Medical/Surgical Wards and ICUs
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with 100 to 199 Beds

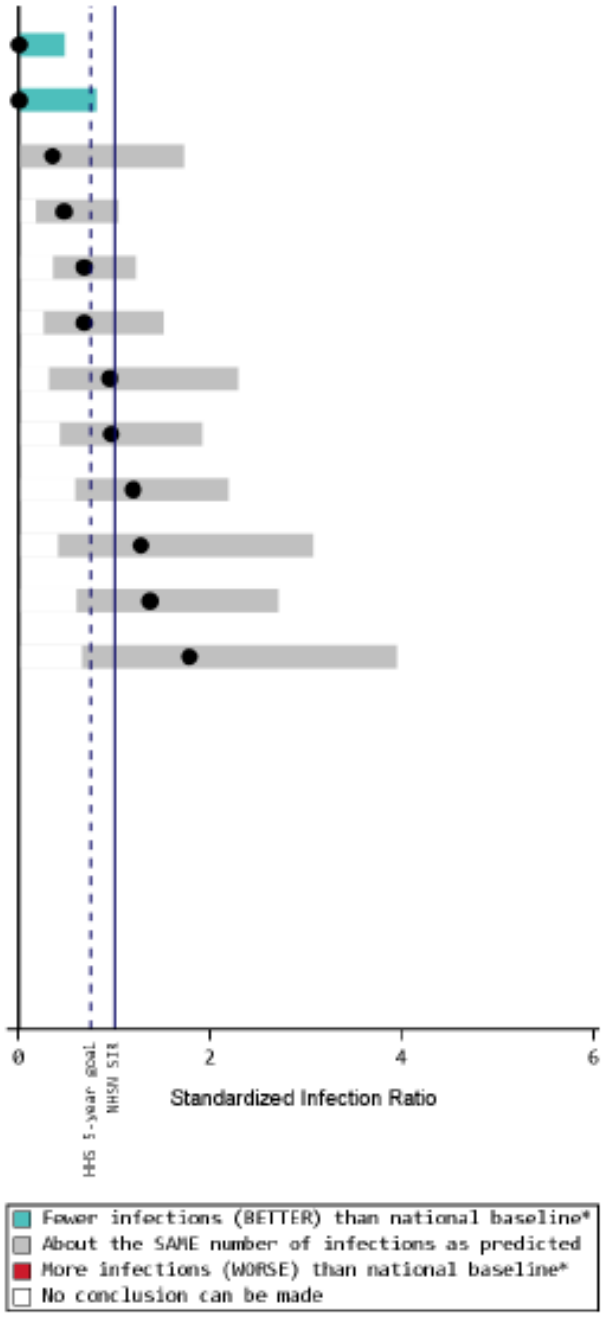
HOSPITAL	OBS	PRED	PROC	SIR
Lake Norman Regional Medical Center	0	1.2	1800	0.0
Novant Health Matthews Medical Center	0	1.8	2596	0.0
Carolinas Healthcare System Lincoln	0	1.5	2232	0.0
Nash Health Care Systems	1	3.4	4844	0.3
Vidant Edgecombe Hospital	1	3.0	3720	0.3
Wesley Long Hospital	1	2.8	4115	0.4
Iredell Memorial Hospital	1	2.3	3365	0.4
Duke Raleigh Hospital	3	5.5	6267	0.5
Johnston Health	1	1.8	2679	0.6
Carolinas Healthcare System Blue Ridge	1	1.2	1298	0.9
Carolinas Medical Center-Union	2	2.1	3011	0.9
WakeMed Cary Hospital	3	2.6	3297	1.1
Lenoir Memorial Hospital	3	2.3	3393	1.3
Carolinas Medical Center-University	2	1.5	1877	1.3
Wilson Medical Center	3	1.4	2127	2.2
Pardee Hospital	4	1.6	1997	2.5
Frye Regional Medical Center	9	3.9	4145	2.3
Rutherford Regional Medical Center	0	0.8	1112	NC
Advent Health Hendersonville	1	0.4	608	NC
ARHS-Watauga Medical Center	1	0.4	575	NC
Davis Regional Medical Center	0	0.4	637	NC
Vidant Roanoke Chowan Hospital	0	0.5	740	NC
Novant Health Thomasville Medical Center	0	0.4	567	NC
Sampson Regional Medical Center	0	0.5	613	NC
Northern Regional Hospital	0	0.3	469	NC
Onslow Memorial Hospital	0	0.8	1033	NC
Stanly Regional Medical Center	0	0.7	991	NC
UNC Rockingham Health	0	0.5	758	NC
Wake Forest Baptist Health Wilkes Medica	0	0.8	1235	NC



Data reported as of October 15, 2019 .
OBS = # infections observed
PRED = # infections statistically 'predicted' by national baseline
PROC = # procedures
SIR = Standardized infection ratio (OBS/PRED # of infections)
NA = Data not shown for hospitals with <20 procedures
NC = SIR not calculated for hospitals with <1 predicted infection
*Significantly different than 2015 national baseline

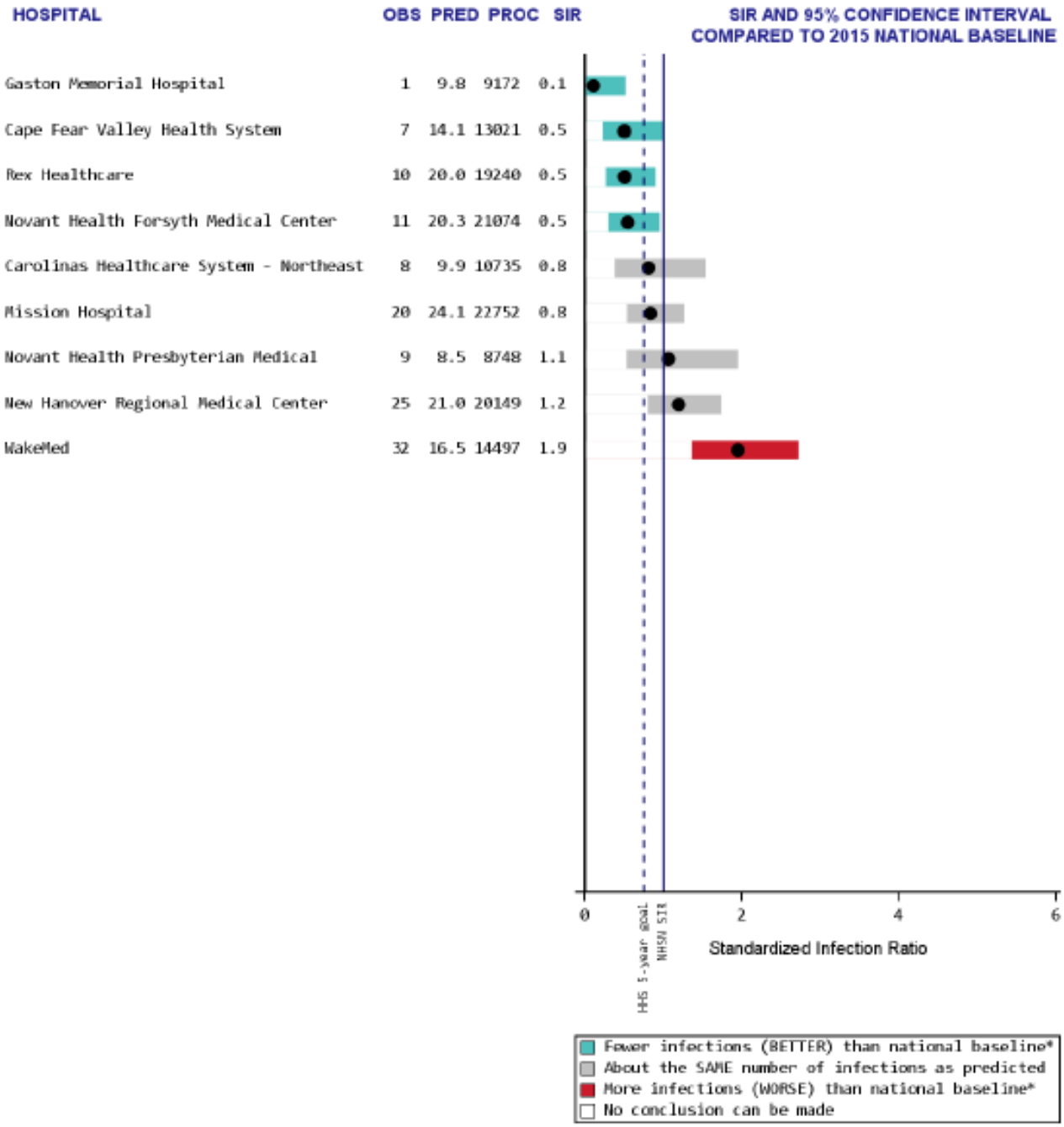
CLABSI in Adult/Pediatric Medical, Surgical, and Medical/Surgical Wards and ICUs
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with 200 to 399 Beds

HOSPITAL	OBS	PRED	PROC	SIR
CarolinaEast Medical Center	0	6.4	8059	0.0
Alamance Regional Medical Center	0	3.7	3543	0.0
Novant Health Rowan Medical Center	1	2.9	3596	0.3
FirstHealth Moore Regional Hospital	5	10.7	13431	0.5
Moses Cone Hospital	10	14.7	13689	0.7
Duke Regional Hospital	5	7.3	8211	0.7
Southeastern Regional Medical Center	4	4.2	4518	0.9
High Point Regional Health System	7	7.3	7029	1.0
Wayne Memorial Hospital	9	7.6	8091	1.2
Carolinas Healthcare System Cleveland	4	3.2	3878	1.3
Carolinas Medical Center-Pineville	7	5.1	6336	1.4
Carolinas Medical Center-Mercy	5	2.8	3568	1.8



Data reported as of October 15, 2019 .
OBS = # infections observed
PRED = # infections statistically 'predicted' by national baseline
PROC = # procedures
SIR = Standardized infection ratio (OBS/PRED # of infections)
NA = Data not shown for hospitals with <20 procedures
NC = SIR not calculated for hospitals with <1 predicted infection
*Significantly different than 2015 national baseline

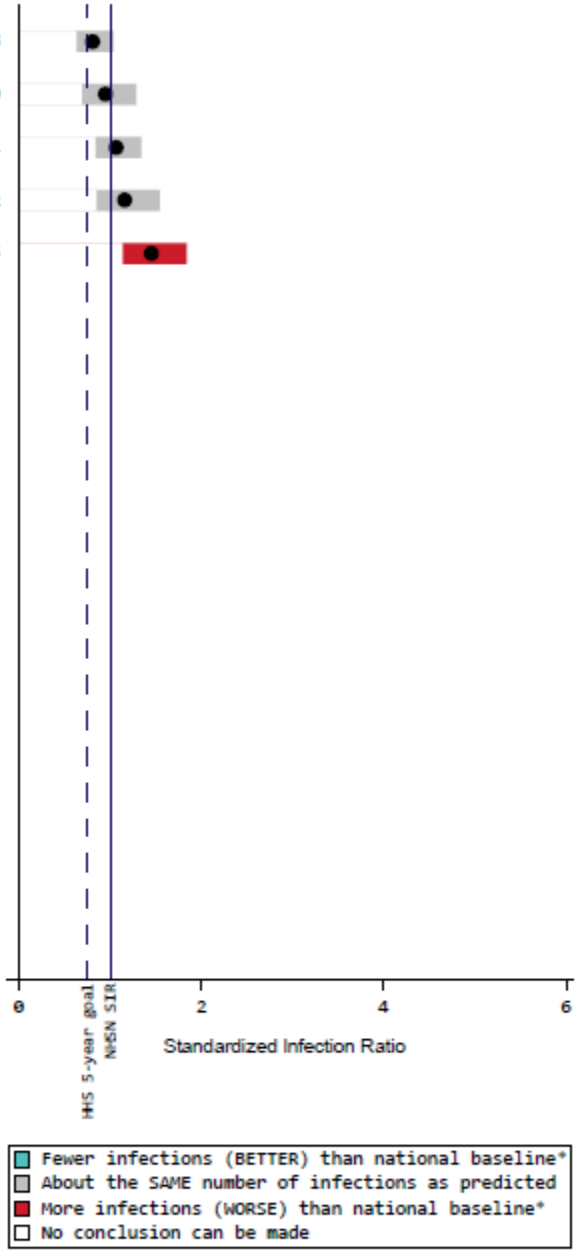
CLABSI in Adult/Pediatric Medical, Surgical, and Medical/Surgical Wards and ICUs
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with 400 or More Beds



Data reported as of October 15, 2019 .
OBS = # infections observed
PRED = # infections statistically 'predicted' by national baseline
PROC = # procedures
SIR = Standardized infection ratio (OBS/PRED # of infections)
NA = Data not shown for hospitals with <20 procedures
NC = SIR not calculated for hospitals with <1 predicted infection
*Significantly different than 2015 national baseline

CLABSI in Adult/Pediatric Medical, Surgical, and Medical/Surgical Wards and ICUs
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with Primary Medical School Affiliation

HOSPITAL	OBS	PRED	PROC	SIR
Duke University Hospital	62	76.7	67613	0.8
Carolinas Medical Center	39	41.1	33896	0.9
UNC Health Care	70	65.8	54019	1.1
Vidant Medical Center	43	37.3	34303	1.2
Wake Forest University Baptist Medical	66	45.5	39806	1.5



Data reported as of March 19, 2019 .
OBS = # infections observed
PRED = # infections statistically 'predicted' by national baseline
PROC = # procedures
SIR = Standardized infection ratio (OBS/PRED # of infections)
NA = Data not shown for hospitals with <20 procedures
NC = SIR not calculated for hospitals with <1 predicted infection
*Significantly different than 2015 national baseline

2. CLABSI in Neonatal Intensive Care Units

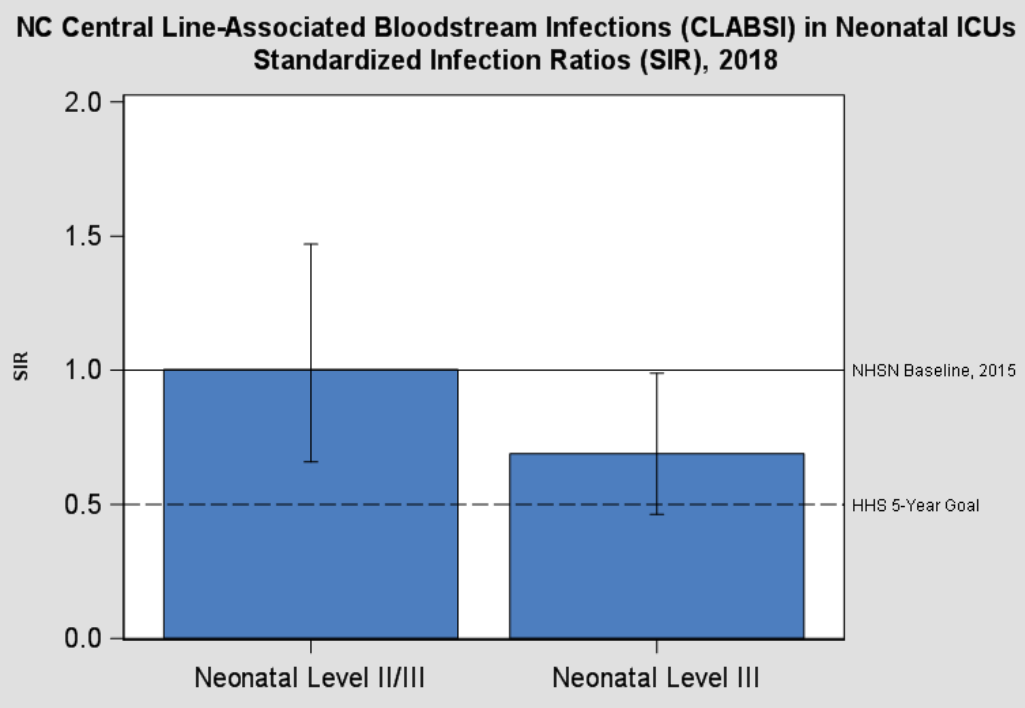
North Carolina 2018 CLABSI Highlights in NICUs

- In 2018, North Carolina hospitals reported 51 infections in neonatal ICUs, compared to the 63 infections that were predicted. This was about the same as the 2015 national experience.
- In 2018, North Carolina did not meet the U.S. Department of Health and Human Services 2020 goal to reduce CLABSIs by 50% from the 2015 national baseline experience.
- The most commonly identified organism from NICU CLABSI patients was *Enterococcus*.

Table 3. NC Central Line Associated Bloodstream Infections (CLABSI) in neonatal ICUs, 2018

Year	# Observed Infections	# Predicted Infections	How Does North Carolina Compare to the National Experience?
2018	**51**	**63.12**	**= Same: about the same number of infections as were predicted (same as the national experience)**

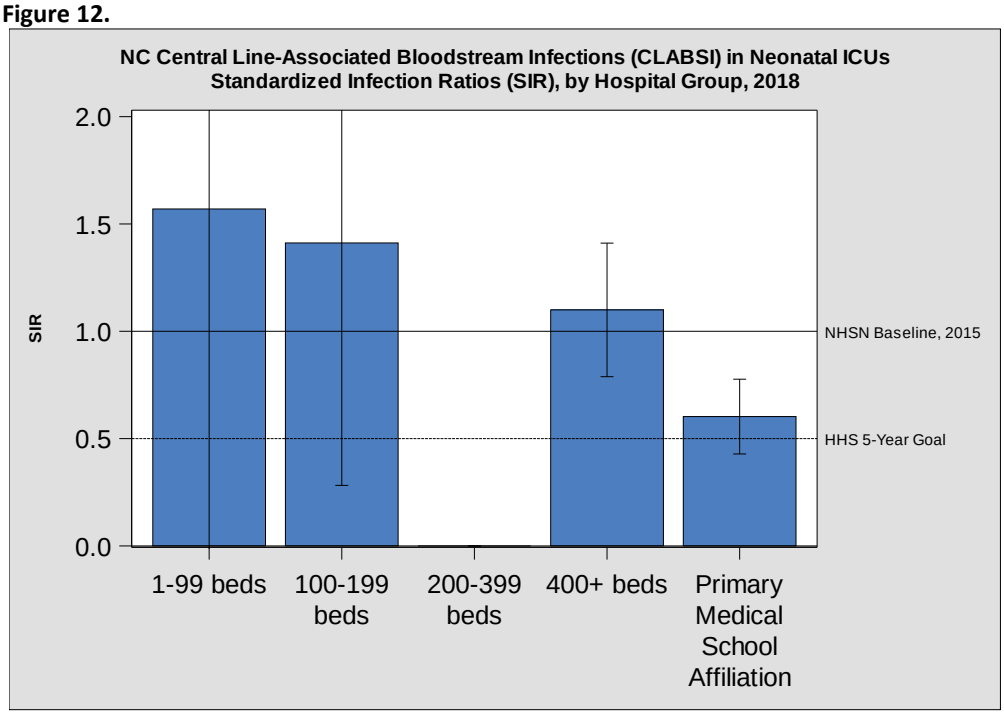
Figure 11.



How to Understand Figure 11:

- In 2018, level II/III Neonatal ICUs observed the same number of CLABSIs as predicted, performing the SAME as the 2015 national experience
- Neonatal level III ICUs reported fewer CLABSIs as predicted, performing BETTER than the 2015 national experience.
- Neither neonatal ICU II/III nor neonatal III locations met the HHS 5-year goal

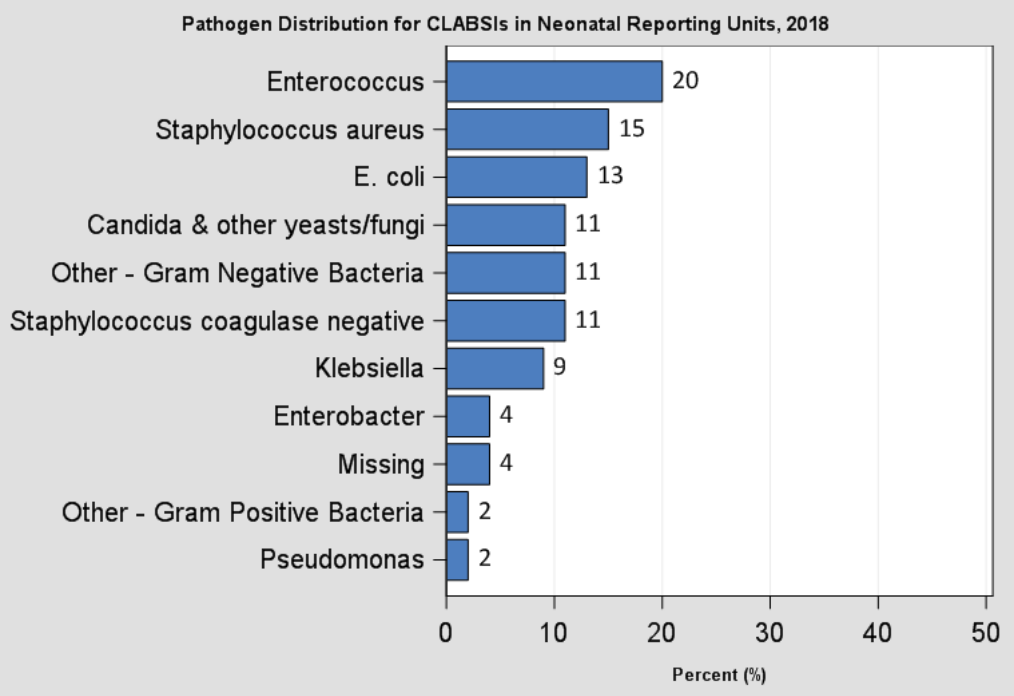
Figure 12.



How to Understand Figure 12:

- Not all hospital size groups have NICU locations
- Hospitals with 1-99 beds, 100-199 beds, and 400+ beds reported the same number of CLABSIs as predicted, performing the SAME as the national experience
- Hospitals with a primary medical school affiliation reported fewer CLABSIs in NICUs than predicted, performing BETTER than the national experience

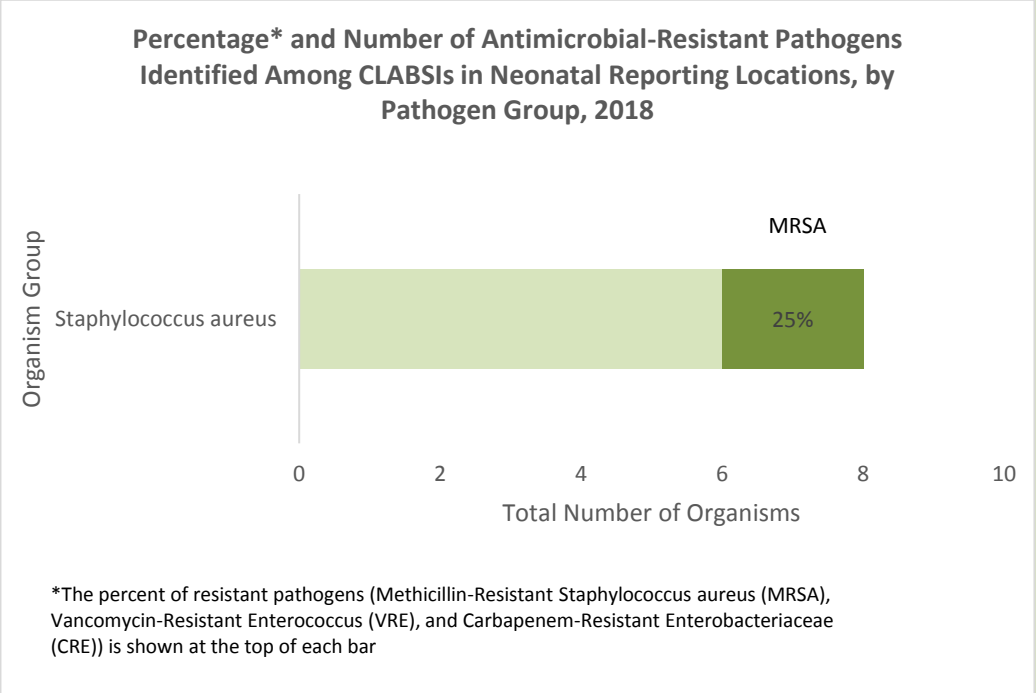
Figure 13.



How to Understand Figure 13:

- In 2018, *Enterococcus* (20%), was the most common pathogen identified from CLABSIs in NICU locations
- The most common pathogen identified from CLABSIs in NICU locations differs from the most common pathogen from CLABSIs in adult/pediatric locations

Figure 14.



How to Understand Figure 14:

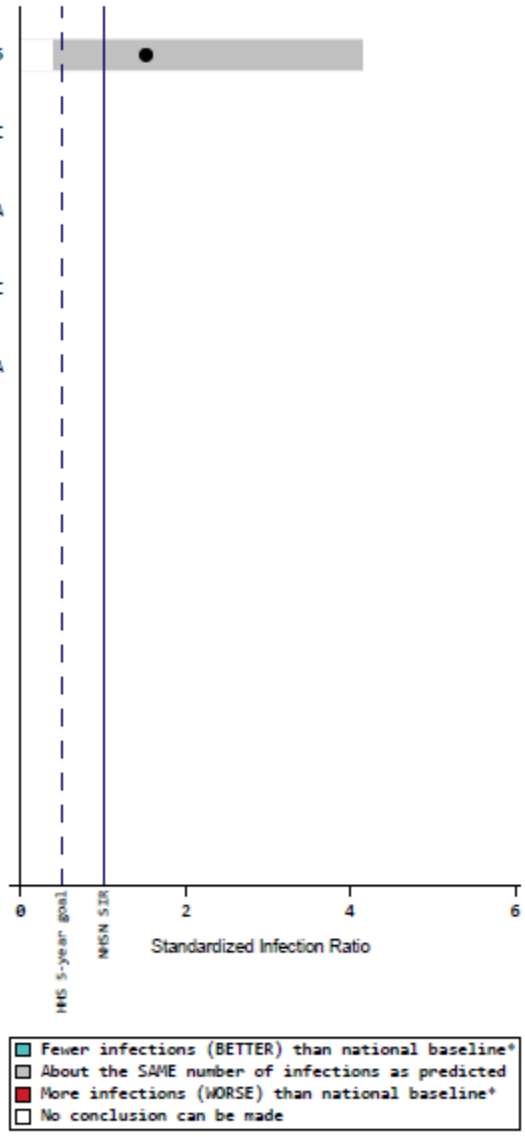
- In 2018, two of 8 (25%) CLABSIs identified *Staphylococcus aureus* in NICUs and were resistant to methicillin

The following SIR plots summarize CLABSI infection data among NICUs in North Carolina hospitals by hospital groups (Appendix E).

CLABSI in Neonatal ICUs

Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with 100 to 199 Beds

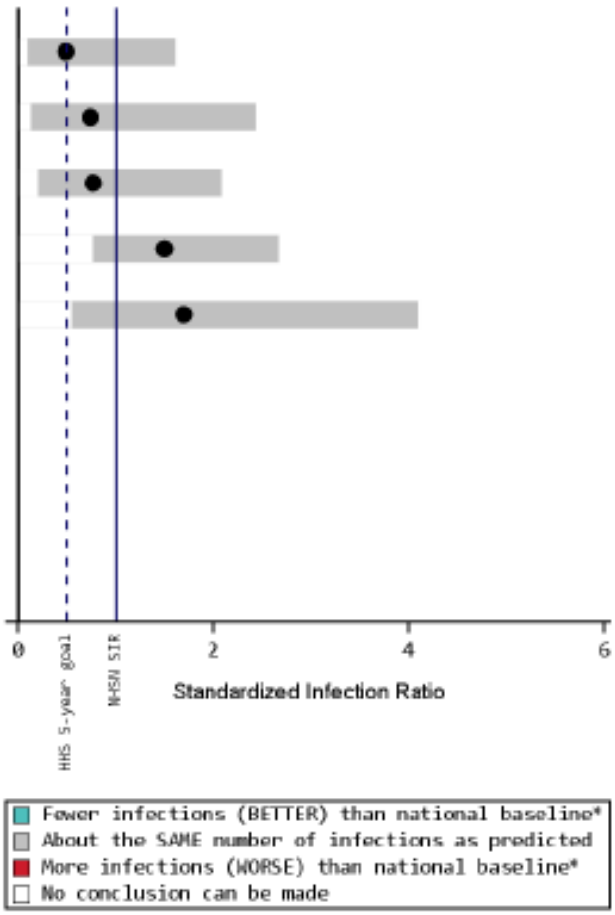
HOSPITAL	OBS	PRED	CLD	SIR
Women's Hospital	3	2.0	1435	1.5
Carolinas Medical Center-University	0	0.1	77	NC
Nash Health Care Systems	NA	NA	N	NA
Novant Health Matthews Medical Center	0	0.1	94	NC
Onslow Memorial Hospital	NA	NA	N	NA



Data reported from neonatal units as of March 19, 2019 .
OBS = # infections observed
PRED = # infections statistically 'predicted' by national baseline
CLD = # central line days
SIR = Standardized infection ratio (OBS/PRED # of infections)
NA = Data not shown for hospitals with <50 catheter days
NC = SIR not calculated for hospitals with <1 predicted infection
*Significantly different than 2015 national baseline

CLABSI in Neonatal ICUs
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with 400 or More Beds

HOSPITAL	OBS	PRED	CLD	SIR
Novant Health Forsyth Medical Center	2	4.1	2234	0.5
WakeMed	2	2.7	2059	0.7
New Hanover Regional Medical Center	3	3.9	2494	0.8
Novant Health Presbyterian Medical	10	6.7	4516	1.5
Mission Hospital	4	2.4	1558	1.7
Rex Healthcare	0	0.3	315	NC
Carolinas Healthcare System - Northeast	2	0.8	427	NC
Gaston Memorial Hospital	1	0.3	328	NC
Cape Fear Valley Health System	0	0.5	289	NC

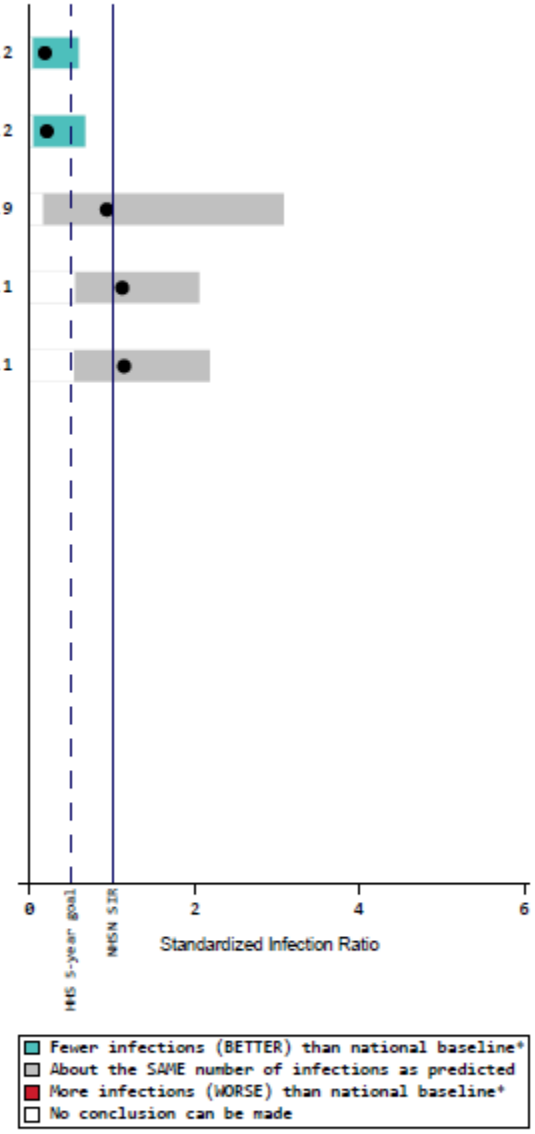


Data reported from neonatal units as of October 15, 2019 .
OBS = # infections observed
PRED = # infections statistically 'predicted' by national baseline
CLD = # central line days
SIR = Standardized infection ratio (OBS/PRED # of infections)
NA = Data not shown for hospitals with <50 catheter days
NC = SIR not calculated for hospitals with <1 predicted infection
*Significantly different than 2015 national baseline

CLABSI in Neonatal ICUs

Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with Primary Medical School Affiliation

HOSPITAL	OBS	PRED	CLD	SIR
Duke University Hospital	2	11.2	7371	0.2
Carolinas Medical Center	2	9.8	7072	0.2
Vidant Medical Center	2	2.1	1481	0.9
UNC Health Care	9	8.0	5085	1.1
Wake Forest University Baptist Medical	8	7.0	4928	1.1



Data reported from neonatal units as of March 19, 2019 .
OBS = # infections observed
PRED = # infections statistically 'predicted' by national baseline
CLD = # central line days
SIR = Standardized infection ratio (OBS/PRED # of infections)
NA = Data not shown for hospitals with <50 catheter days
NC = SIR not calculated for hospitals with <1 predicted infection
*Significantly different than 2015 national baseline

B. Catheter-Associated Urinary Tract Infections (CAUTI)

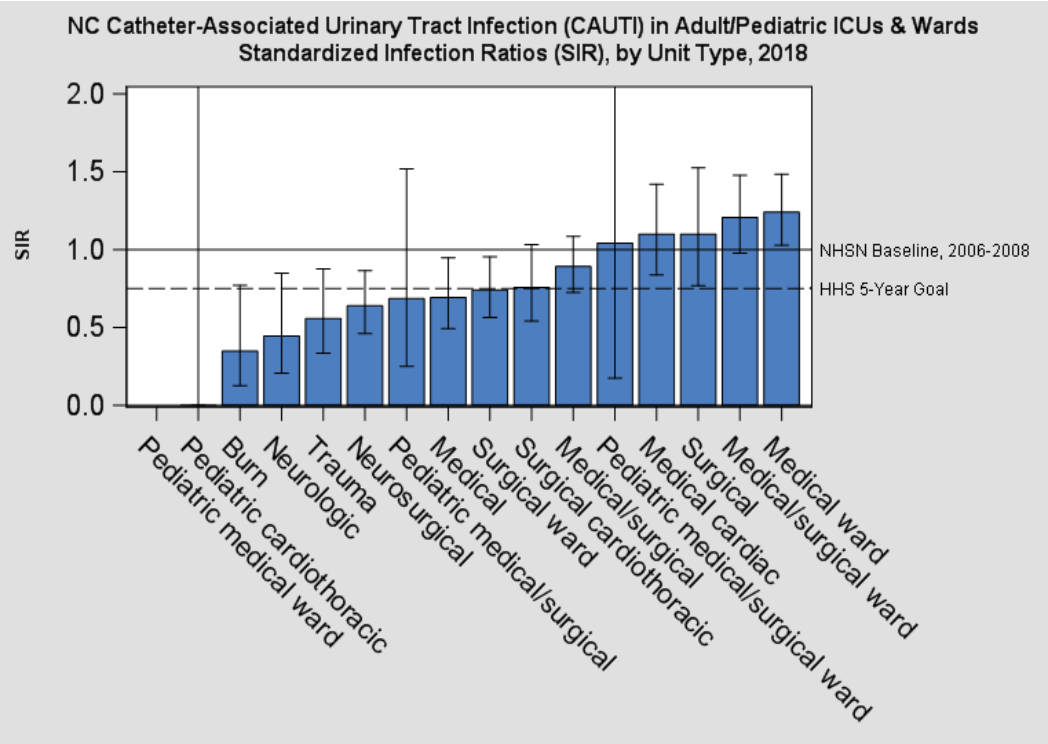
North Carolina 2018 CAUTI Highlights

- In 2018, North Carolina hospitals reported 591 CAUTI infections, compared to the 670 infections that were predicted. This was better than the 2015 national experience.
- In 2018, North Carolina did not meet the U.S. Department of Health and Human Services 2020 goal to reduce CAUTIs by 25% from the 2015 national baseline experience.
- The most commonly identified organisms were *E. coli* and *Klebsiella*.

Table 5. NC Catheter-Associated Urinary Tract Infections (CAUTI) in ICUs and wards, 2018

Year	# Observed Infections	# Predicted Infections	How Does North Carolina Compare to the National Experience?
2018	**591**	**669.9**	**★Better: Fewer infections than were predicted (better than the national experience)**

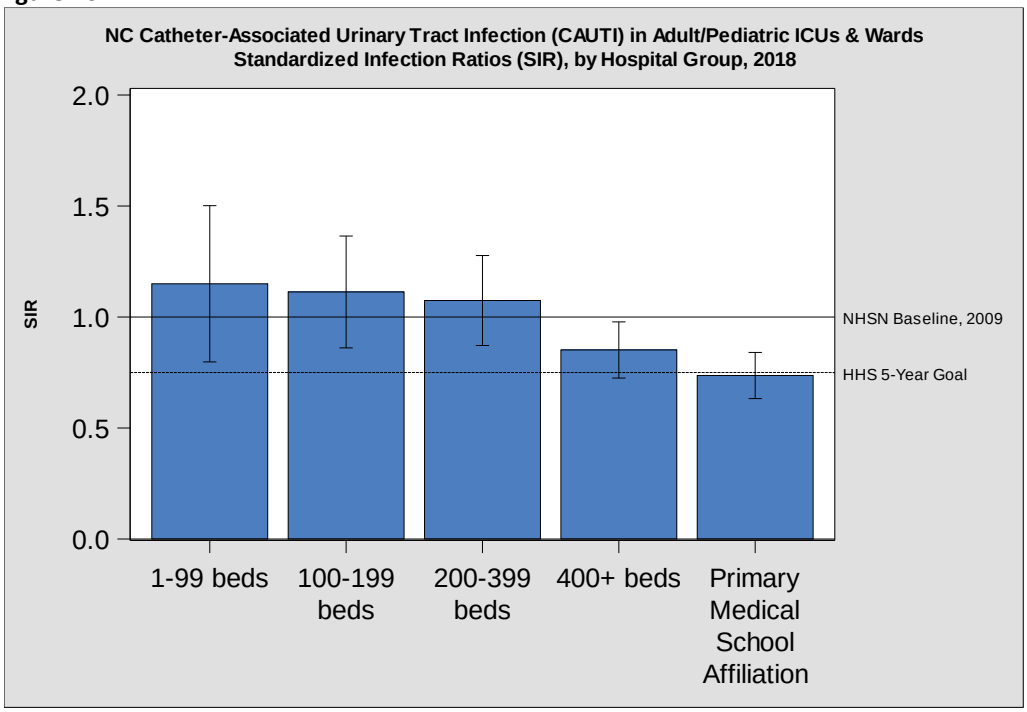
Figure 15.



How to Understand Figure 15:

- Medical wards reported more CAUTIs than predicted, performing WORSE than the 2015 national experience
- Burn, Medical, Neurologic, Neurosurgical, Surgical , and Trauma units/wards had fewer CAUTIs than predicted, performing BETTER than the national experience
- All other locations reported the same number of CAUTIs as predicted, performing the SAME as the national experience

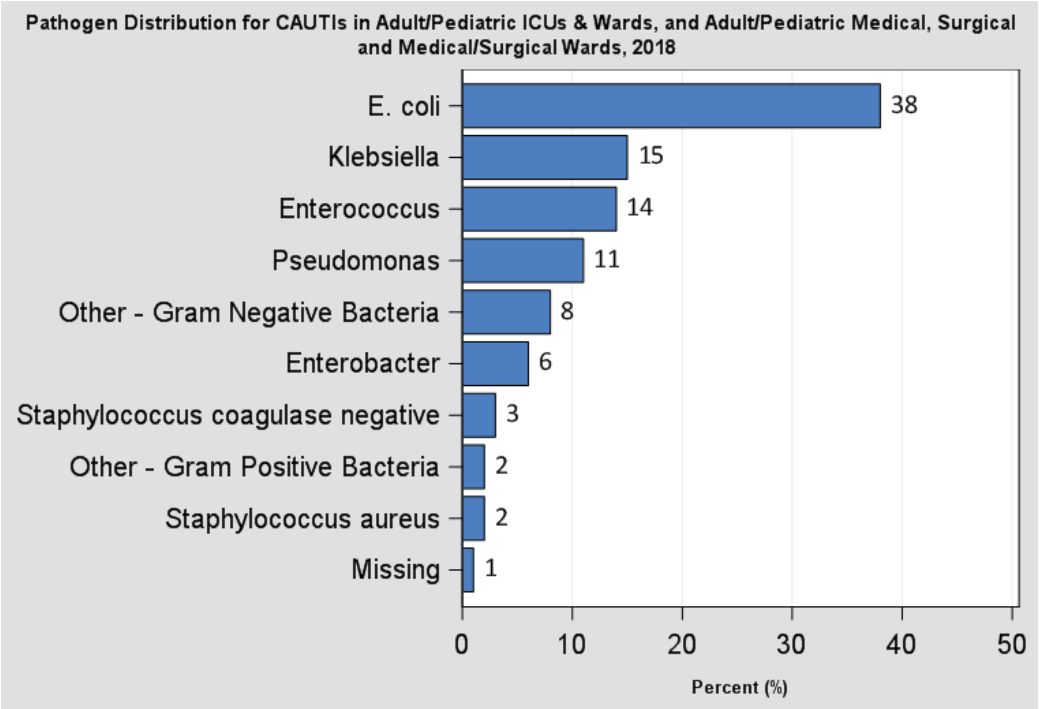
Figure 16.



How to Understand Figure 16:

- Hospitals with 400+ beds and primary medical school affiliated hospitals had fewer CAUTIs than predicted performing BETTER than the national experience
- All other hospital sized groups reported about the same number of infections as predicted, performing the SAME as the national experience

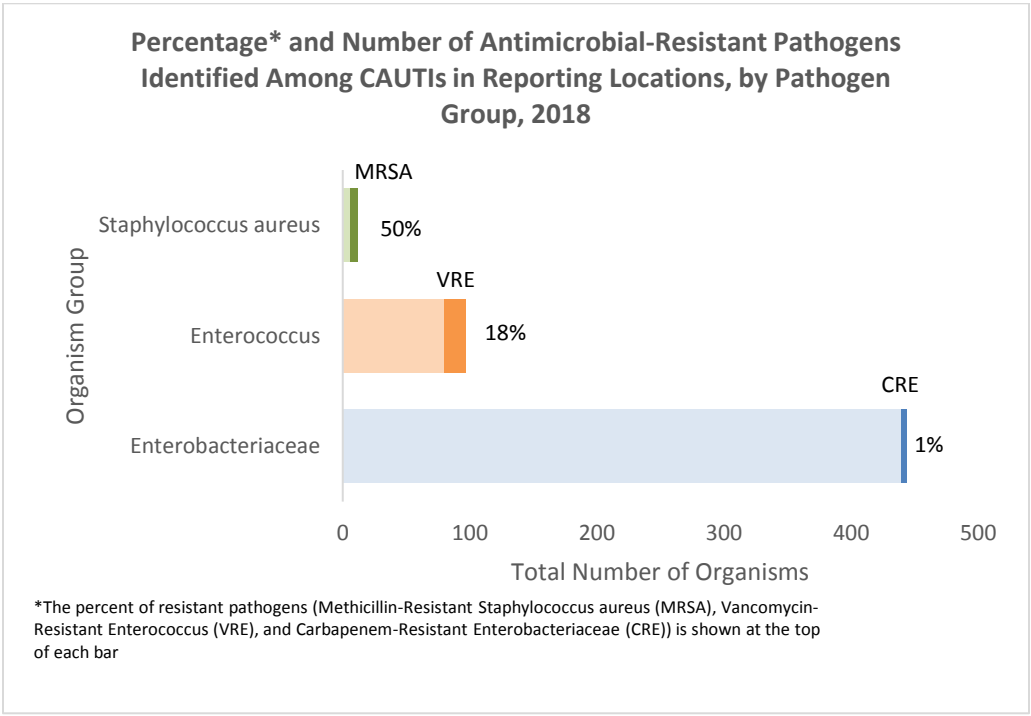
Figure 17.



How to Understand Figure 17:

- *E. coli* (38%) and *Klebsiella* (15%) were the most commonly identified pathogens among reported CAUTI infections in 2018
- *Candida* species and other yeasts are considered excluded organisms and cannot be used to meet the CAUTI definition

Figure 18.



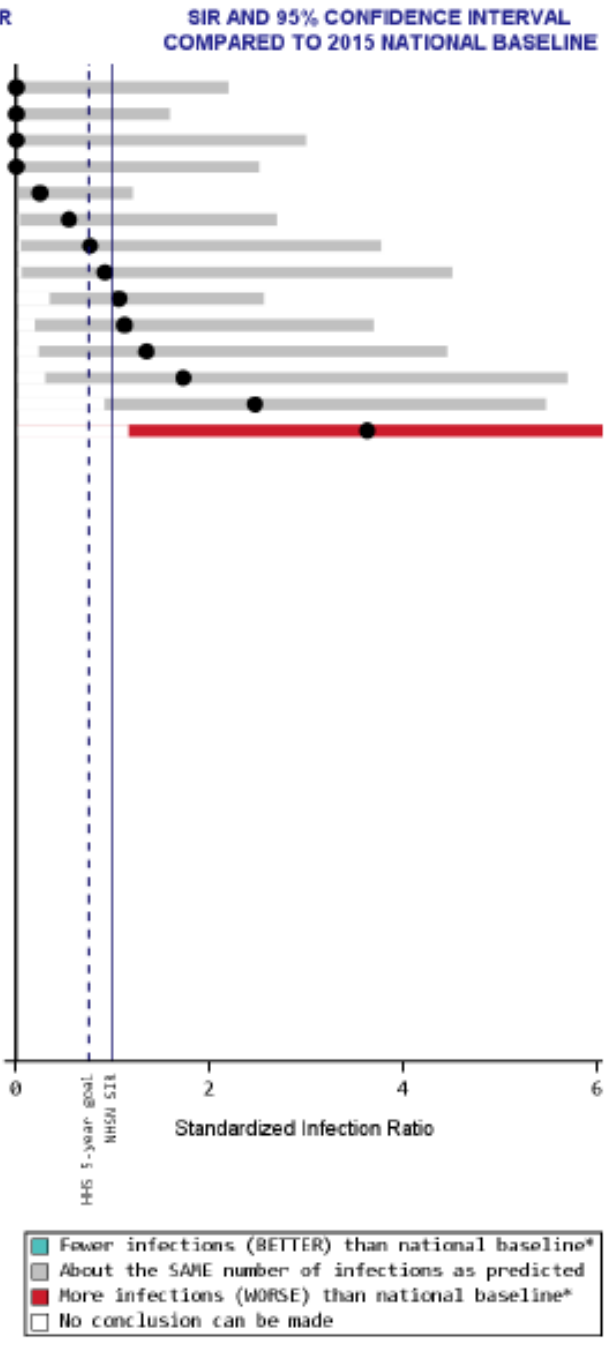
How to Understand Figure 18:

- Six of 12 (50%) *Staphylococcus aureus* identified among reported CAUTIs were resistant to methicillin
- 18% of *Enterococcus* identified among reported CAUTIs were resistant to Vancomycin
- 1% of *Enterobacteriaceae* identified among reported CAUTIs were resistant to carbapenems

The following SIR plots summarize CAUTI infection data for North Carolina hospitals by hospital groups (Appendix E).

CAUTI in Adult/Pediatric Medical, Surgical, and Medical/Surgical Wards and ICUs
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with less than 100 Beds

HOSPITAL	OBS	PRED	PROC	SIR
Sentara Albemarle Medical Center	0	1.4	1964	0.0
Maria Parham Medical Center	0	1.9	2636	0.0
Novant Health Medical Park Hospital	0	1.0	1791	0.0
Hugh Chatham Memorial Hospital	0	1.2	2338	0.0
Catawba Valley Medical Center	1	4.1	5813	0.2
Haywood Regional Medical Center	1	1.8	2286	0.5
Dlp - Harris Regional Hospital	1	1.3	2429	0.8
Wake Forest Baptist Health-Lexington	1	1.1	1457	0.9
Caldwell Memorial Hospital	4	3.8	5380	1.1
Novant Health Huntersville	2	1.8	2330	1.1
Central Carolina Hospital	2	1.5	2809	1.3
Betsy Johnson Hospital	2	1.2	2003	1.7
Halifax Regional Medical Center	5	2.0	3024	2.5
Columbus Regional Healthcare System	4	1.1	2132	3.6
McDowell Hospital	2	0.7	1374	NC
Cherokee Indian Hospital	0	0.1	183	NC
Martin General Hospital	0	0.3	516	NC
Randolph Hospital Dba Randolph Health	1	0.9	1698	NC
Vidant Beaufort Hospital	0	0.9	1877	NC
Scotland Memorial Hospital	1	0.5	718	NC
Granville Medical Center	1	0.7	1442	NC
Carteret General Hospital	3	0.9	1865	NC
Novant Health Brunswick Medical Center	0	0.6	1195	NC
Vidant Duplin Hospital	1	0.7	1075	NC
Kings Mountain Hospital	0	0.2	419	NC
Person Memorial Hospital	4	0.4	694	NC
Carolinas Healthcare System Anson	NA	NA	N	NA
Annie Penn Hospital	1	0.9	1772	NC
North Carolina Specialty Hospital	0	0.3	671	NC
Wake Forest Baptist Health-Davie Medical	1	0.1	237	NC
Johnston Health Clayton	1	0.2	450	NC
Firsthealth Moore Regional-Hoke	0	0.0	95	NC
Firsthealth Moore Regional-Richmond	1	0.6	1220	NC
Cape Fear Valley Hoke Hospital	0	0.1	222	NC
Novant Health Kernersville Medical Cente	1	0.4	790	NC
Central Harnett Hospital	0	0.5	897	NC
Novant Health Clemmons Medical Center	0	0.1	146	NC



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PROC = # procedures
SIR = Standardized infection ratio (OBS/PRED # of infections)
NA = Data not shown for hospitals with <20 procedures
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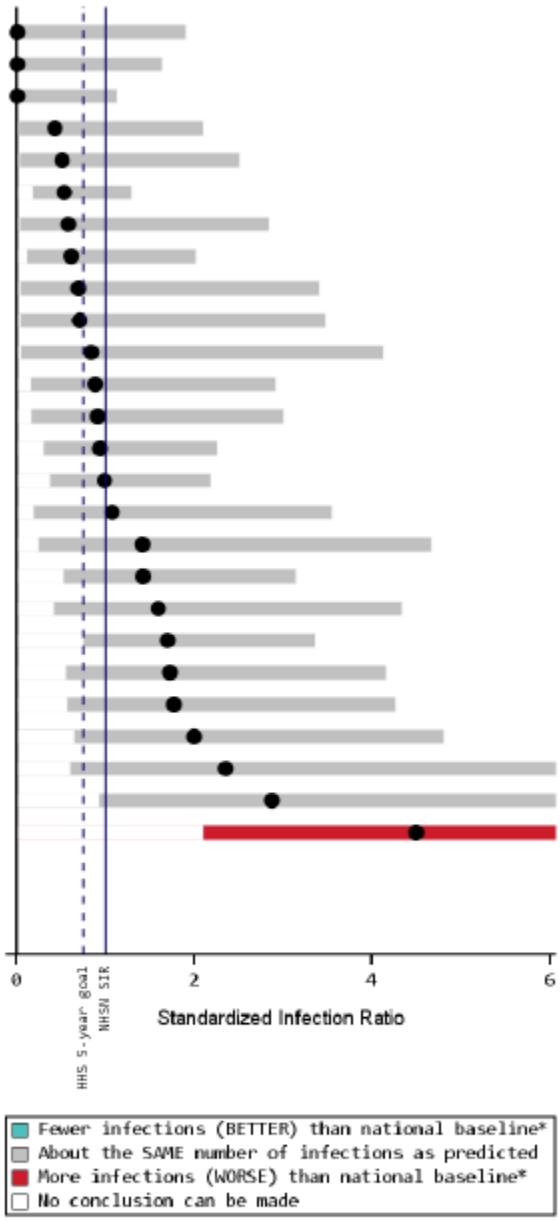
CAUTI in Adult/Pediatric Medical, Surgical, and Medical/Surgical Wards and ICUs
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with 100 to 199 Beds

HOSPITAL	OBS	PRED	PROC	SIR
Carolinas Medical Center-University	0	1.6	2009	0.0
Lake Norman Regional Medical Center	0	1.8	2569	0.0
Carolinas Healthcare System Blue Ridge	0	2.7	2616	0.0
Carolinas Medical Center-Union	1	2.4	3377	0.4
Unc Rockingham Health	1	2.0	2760	0.5
Frye Regional Medical Center	4	7.6	5120	0.5
Vidant Edgecombe Hospital	1	1.7	2097	0.6
Iredell Memorial Hospital	2	3.3	4746	0.6
Advent Health Hendersonville	1	1.5	2123	0.7
Onslow Memorial Hospital	1	1.4	1950	0.7
Vidant Roanoke Chowan Hospital	1	1.2	1706	0.8
Novant Health Matthews Medical Center	2	2.3	3364	0.9
Johnston Health	2	2.2	3146	0.9
Nash Health Care Systems	4	4.3	6064	0.9
Duke Raleigh Hospital	5	5.1	5017	1.0
Sampson Regional Medical Center	2	1.9	2397	1.1
Stanly Regional Medical Center	2	1.4	2049	1.4
Pardee Hospital	5	3.5	4549	1.4
Carolinas Healthcare System Lincoln	3	1.9	2657	1.6
WakeMed Cary Hospital	7	4.1	5248	1.7
Wesley Long Hospital	4	2.3	3267	1.7
Lenoir Memorial Hospital	4	2.3	3229	1.8
Wilson Medical Center	4	2.0	2920	2.0
Northern Regional Hospital	3	1.3	1874	2.3
Wake Forest Baptist Health Wilkes Medica	4	1.4	1950	2.9
Rutherford Regional Medical Center	8	1.8	2611	4.5
ARHS-Watauga Medical Center	2	0.9	1496	NC
Davis Regional Medical Center	1	0.9	1182	NC
Novant Health Thomasville Medical Center	1	0.5	720	NC



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CAUTI in Adult/Pediatric Medical, Surgical, and Medical/Surgical Wards and ICUs
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with 200 to 399 Beds

HOSPITAL	OBS	PRED	PROC	SIR
Wayne Memorial Hospital	6	10.3	10327	0.6
Carolinas Medical Center-Mercy	2	3.1	3900	0.6
Carolinas Medical Center-Pineville	6	8.5	10679	0.7
Duke Regional Hospital	9	9.6	7443	0.9
Moses Cone Hospital	20	20.5	13844	1.0
Carolinas Healthcare System Cleveland	5	5.0	5797	1.0
CarolinaEast Medical Center	6	5.4	6320	1.1
High Point Regional Health System	13	10.6	8291	1.2
FirstHealth Moore Regional Hospital	16	12.0	13717	1.3
Alamance Regional Medical Center	6	4.0	3177	1.5
Novant Health Rowan Medical Center	4	2.7	3067	1.5
Southeastern Regional Medical Center	16	8.5	8636	1.9

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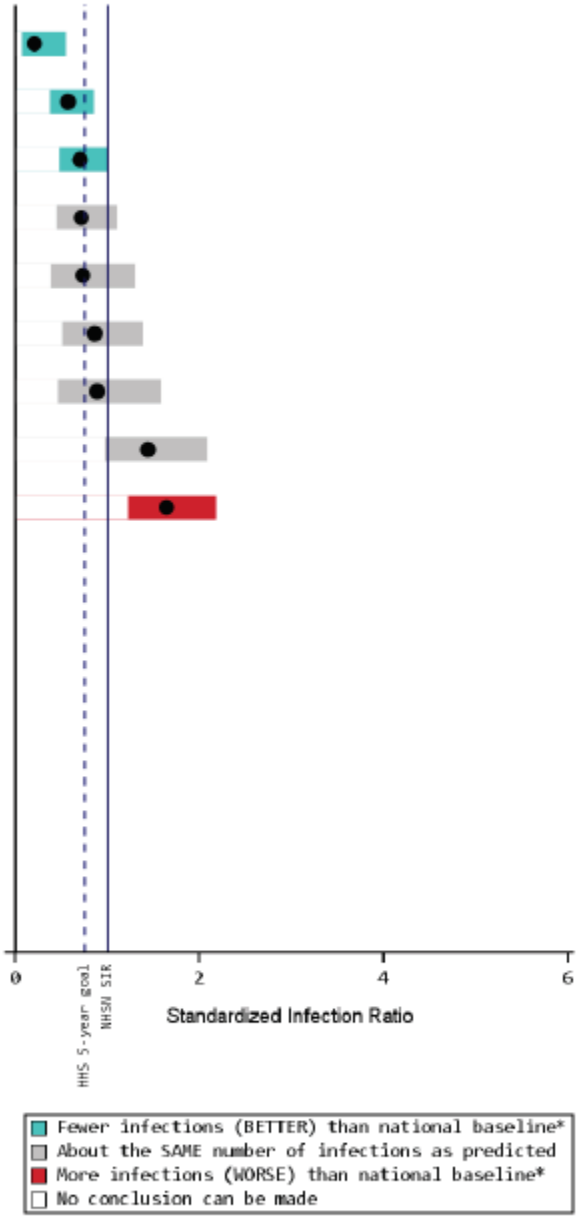
PROC = # procedures
SIR = Standardized infection ratio (OBS/PRED # of infections)
NA = Data not shown for hospitals with <20 procedures
NC = SIR not calculated for hospitals with <1 predicted infection
*Significantly different than 2015 national baseline

CAUTI in Adult/Pediatric Medical, Surgical, and Medical/Surgical Wards and ICUs
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with 400 or More Beds

HOSPITAL	OBS	PRED	PROC	SIR
Gaston Memorial Hospital	3	15.2	10943	0.2
Rex Healthcare	21	37.4	28923	0.6
Mission Hospital	26	37.6	22950	0.7
New Hanover Regional Medical Center	18	25.5	18153	0.7
Carolinas Healthcare System - Northeast	10	13.9	14022	0.7
Cape Fear Valley Health System	15	17.6	13928	0.9
Novant Health Presbyterian Medical	10	11.4	9154	0.9
Novant Health Forsyth Medical Center	26	18.2	14007	1.4
WakeMed	45	27.5	17379	1.6

SIR AND 95% CONFIDENCE INTERVAL
COMPARED TO 2015 NATIONAL BASELINE



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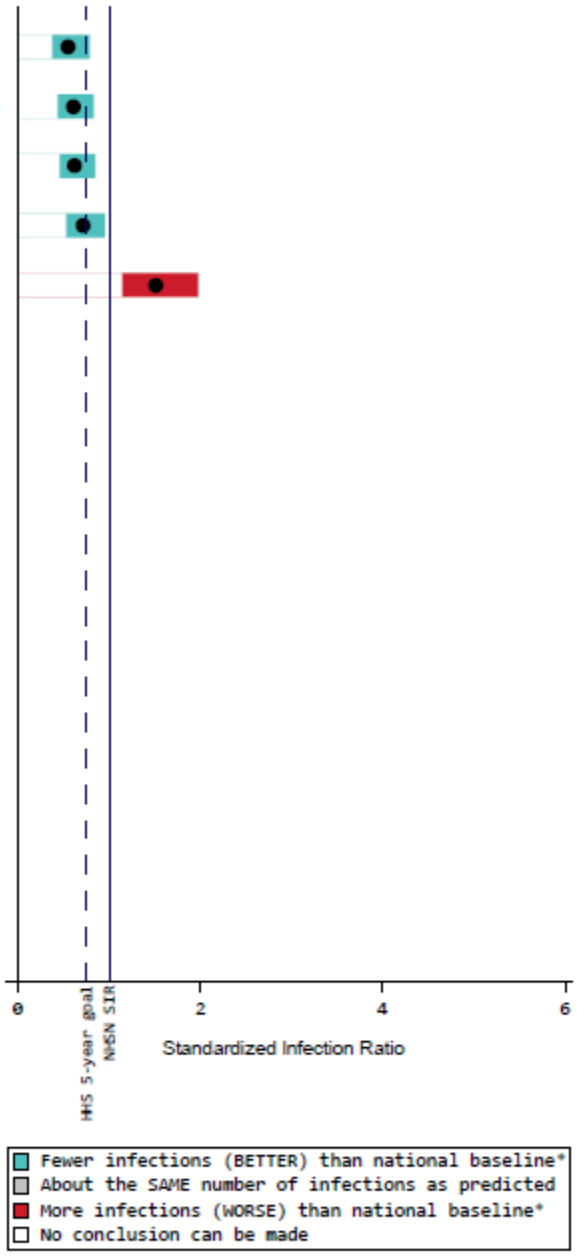
*Significantly different than 2015 national baseline

CAUTI in Adult/Pediatric Medical, Surgical, and Medical/Surgical Wards and ICUs
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with Primary Medical School Affiliation

HOSPITAL	OBS	PRED	PROC	SIR
Carolinas Medical Center	27	49.5	26294	0.5
UNC Health Care	35	58.0	34115	0.6
Wake Forest University Baptist Medical	38	61.1	37493	0.6
Duke University Hospital	43	60.5	37836	0.7
Vidant Medical Center	50	33.1	21448	1.5



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*Significantly different than 2015 national baseline

C. Surgical Site Infections (SSI)

1. Abdominal Hysterectomies

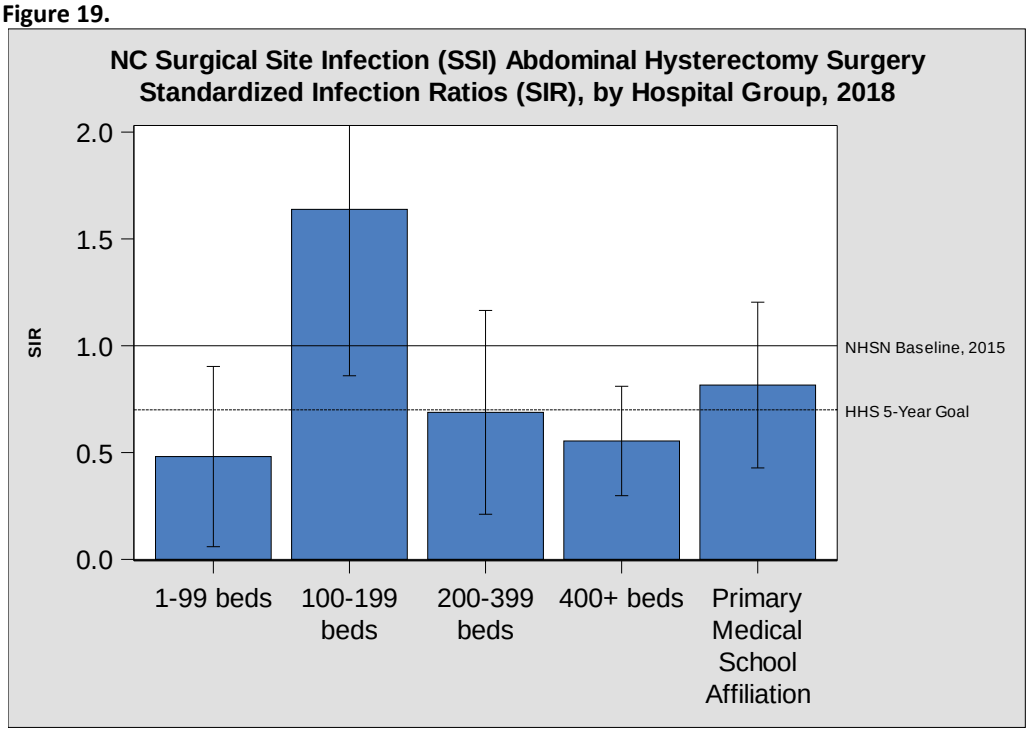
North Carolina 2018 SSI Highlights Post Abdominal Hysterectomy

- North Carolina reported 65 surgical site infections after inpatient abdominal hysterectomies performed on adults ≥ 18 years in North Carolina acute care hospitals, compared to the 88 infections predicted. This was better than the 2015 national experience.
- NC did not meet the U.S. Department of Health and Human Services 2020 goal to reduce SSIs nationally by 30% from the 2015 baseline experience
- In 2018, the most commonly identified organism from adult patients with SSI following inpatient abdominal hysterectomies was Other Gram-Negative Bacteria

Table 4. NC Surgical Site Infections following Abdominal Hysterectomies, 2018

Year	# Observed Infections	# Predicted Infections	How Does North Carolina Compare to the National Experience?
2018	65	88.17	★Better: Fewer infections than were predicted (better than the national experience)

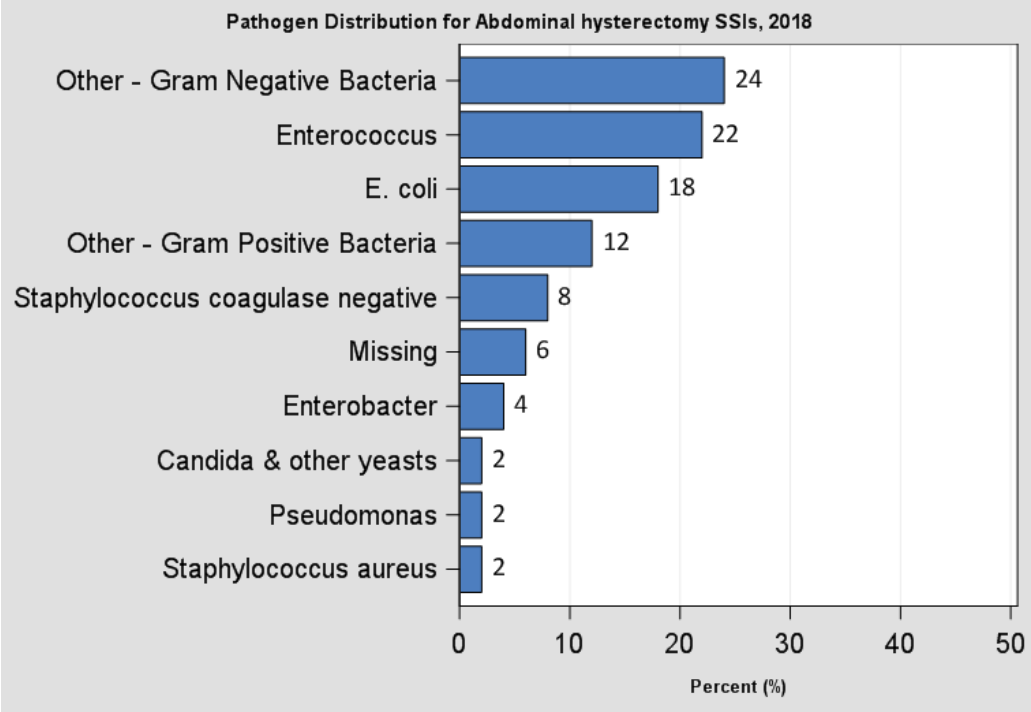
Figure 19.



How to Understand Figure 19:

- Hospitals with 1-99 beds and hospitals with greater than 400 beds saw fewer SSIs following abdominal hysterectomies than predicted, performing BETTER than the national experience
- All other hospital sized groups reported the same number of SSIs following abdominal hysterectomies than predicted, performing the SAME as the national experience

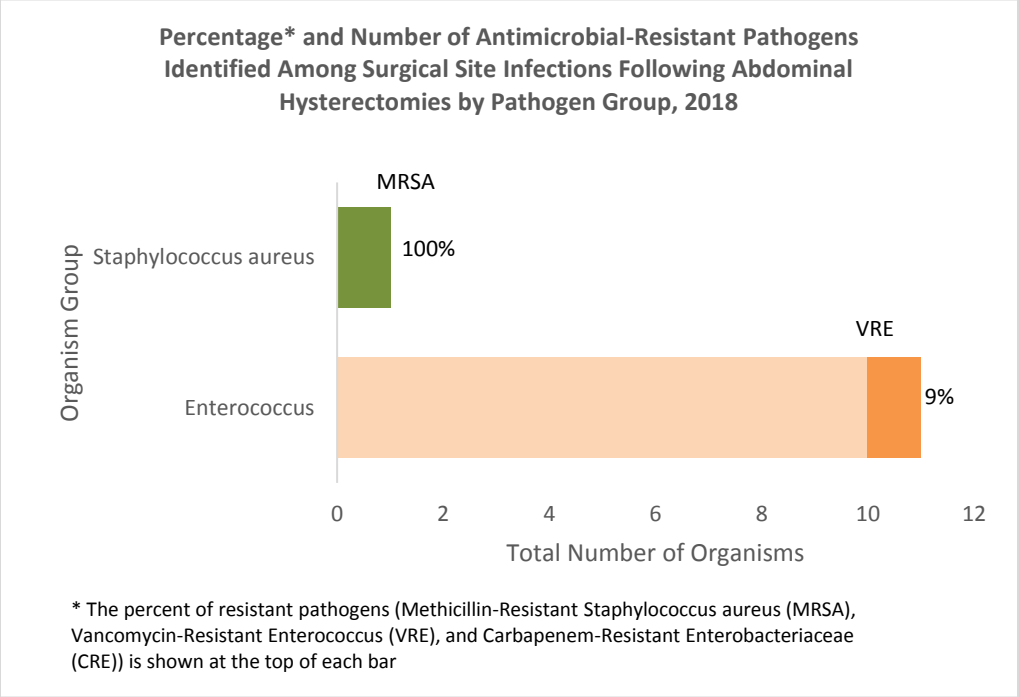
Figure 20.



How to Understand Figure 20:

- Other gram-negative bacteria (24%) and *Enterococcus* (22%) were the most commonly reported pathogens among SSIs following abdominal hysterectomies
- *Staphylococcus aureus* was one of the least commonly reported pathogens among SSIs following abdominal hysterectomies

Figure 21.

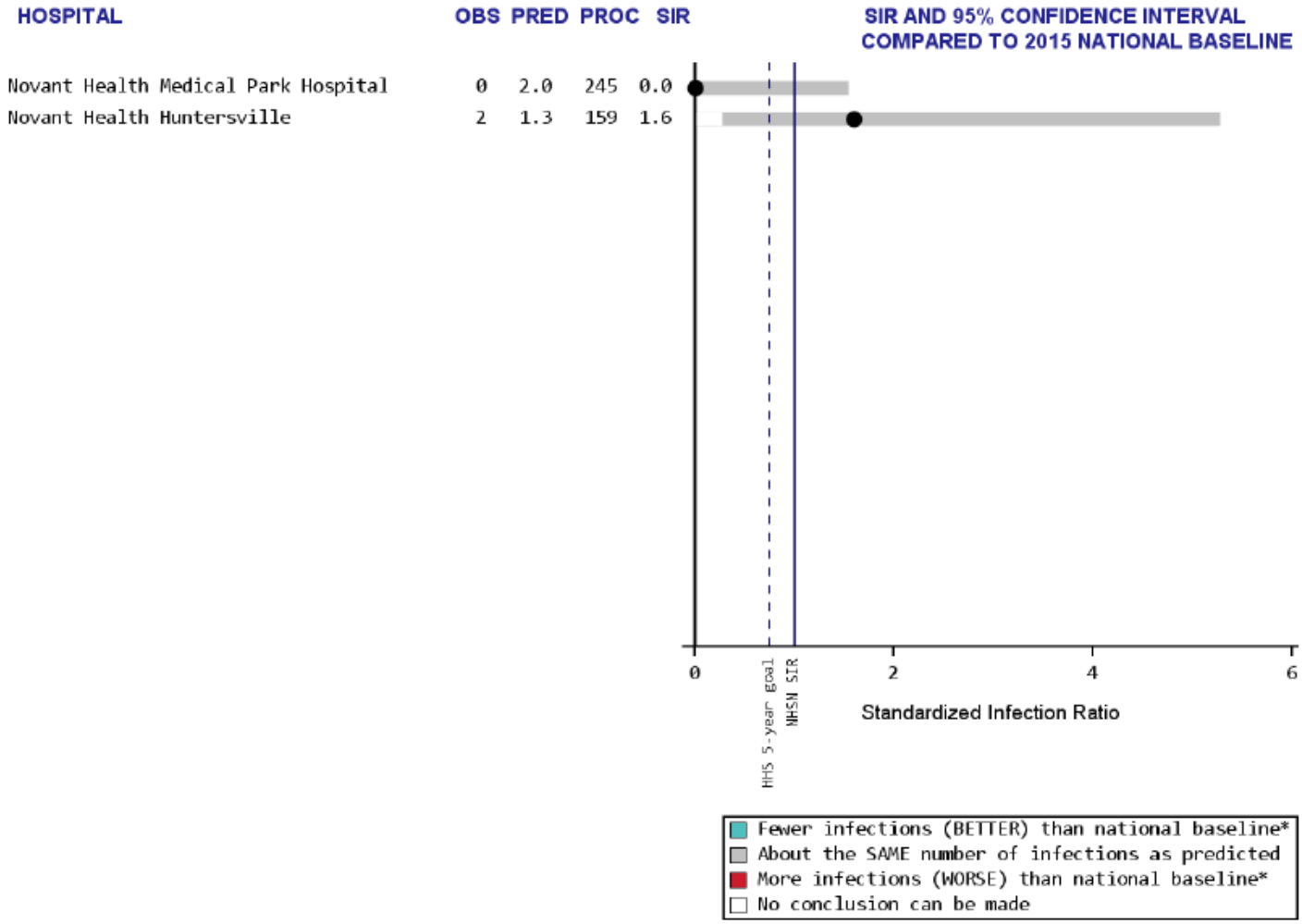


How to Understand Figure 21:

- In 2018, 100% of *Staphylococcus aureus* identified among SSIs following abdominal hysterectomies surgeries were methicillin resistant
- 9% of *Enterococcus* among SSIs following abdominal hysterectomies were Vancomycin resistant

The following SIR plots summarize SSI HYST infection data for North Carolina hospitals by hospital groups (Appendix E).

SSI Folowing Abdominal Hysterectomy Surgeries in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with less than 100 Beds



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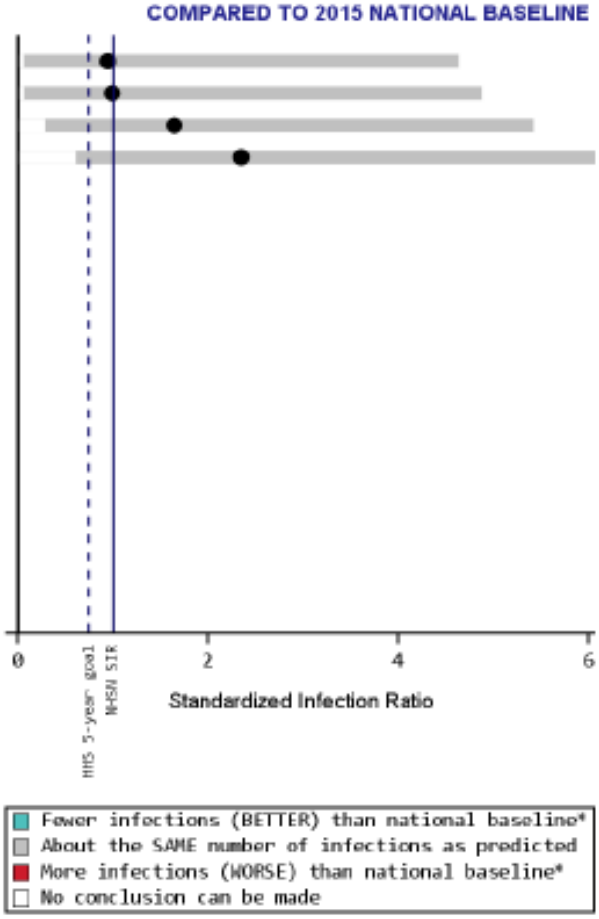
*Significantly different than 2015 national baseline

SSI Folowing Abdominal Hysterectomy Surgeries in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with 100 to 199 Beds

HOSPITAL	OBS	PRED	PROC	SIR
Women's Hospital	1	1.1	123	0.9
WakeMed Cary Hospital	1	1.0	121	1.0
Carolinas Medical Center-University	2	1.2	147	1.6
Novant Health Matthews Medical Center	3	1.3	166	2.3



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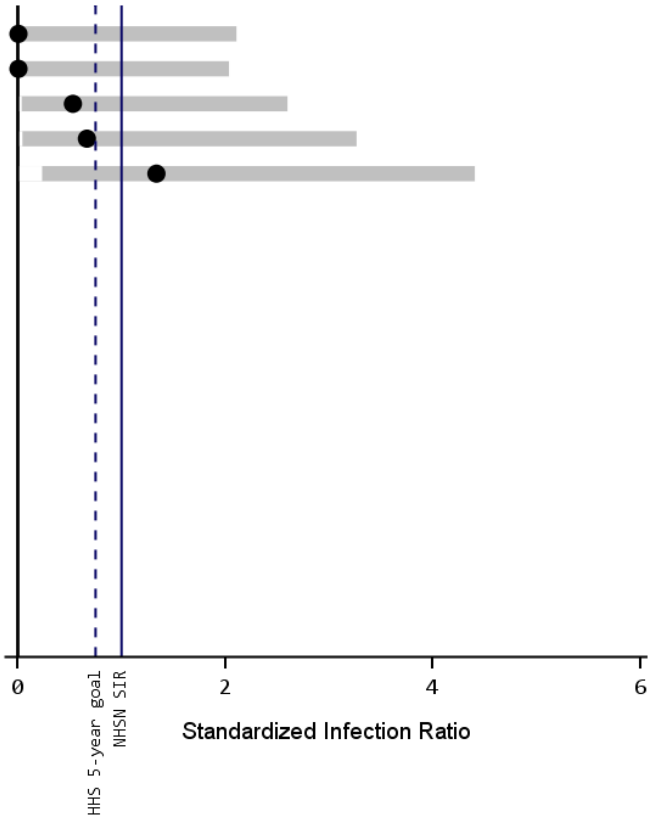
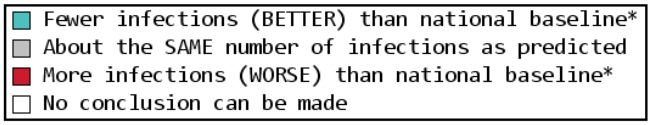
*Significantly different than 2015 national baseline

SSI Folowing Abdominal Hysterectomy Surgeries in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with 200 to 399 Beds

HOSPITAL	OBS	PRED	PROC	SIR
CarolinaEast Medical Center	0	1.4	177	0.0
FirstHealth Moore Regional Hospital	0	1.5	166	0.0
Carolinas Medical Center-Pineville	1	1.9	245	0.5
Duke Regional Hospital	1	1.5	199	0.7
High Point Regional Health System	2	1.5	165	1.3

SIR AND 95% CONFIDENCE INTERVAL
COMPARED TO 2015 NATIONAL BASELINE





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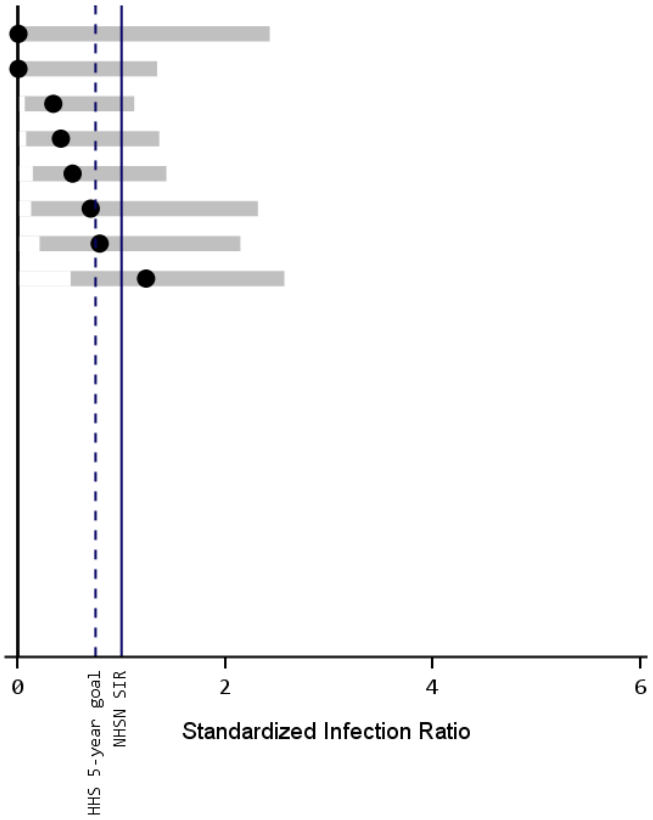
*Significantly different than 2015 national baseline

SSI Folowing Abdominal Hysterectomy Surgeries in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with 400 or More Beds

HOSPITAL	OBS	PRED	PROC	SIR
WakeMed	0	1.2	136	0.0
Cape Fear Valley Health System	0	2.3	236	0.0
New Hanover Regional Medical Center	2	5.9	706	0.3
Rex Healthcare	2	4.9	603	0.4
Novant Health Presbyterian Medical	3	5.7	695	0.5
Carolinas Healthcare System - Northeast	2	2.9	344	0.7
Novant Health Forsyth Medical Center	3	3.8	457	0.8
Mission Hospital	6	4.9	546	1.2

SIR AND 95% CONFIDENCE INTERVAL
COMPARED TO 2015 NATIONAL BASELINE



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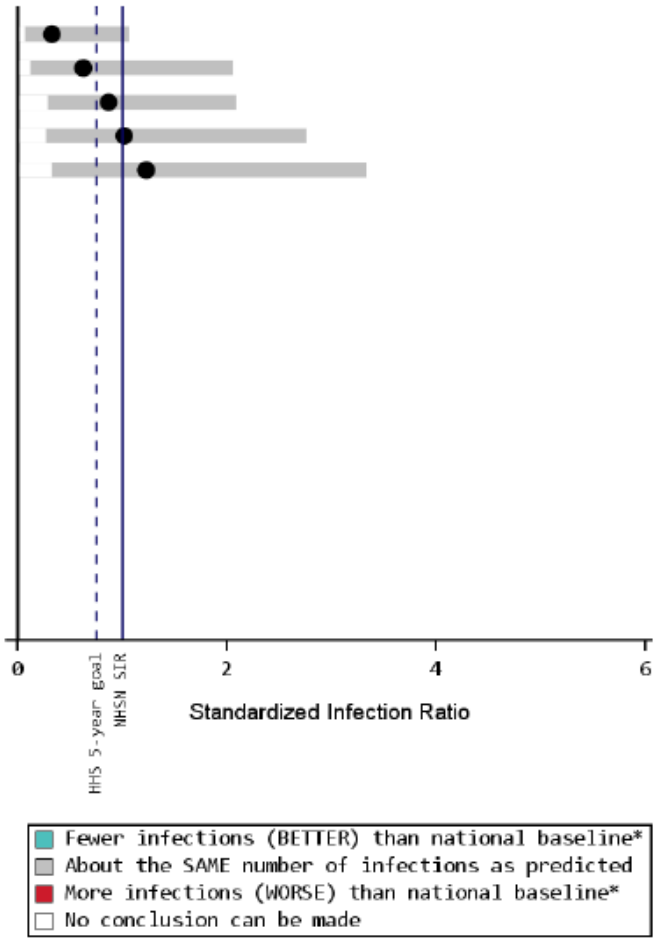
SSI Folowing Abdominal Hysterectomy Surgeries in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with Primary Medical School Affiliation

HOSPITAL	OBS	PRED	PROC	SIR
UNC Health Care	2	6.3	666	0.3
Wake Forest University Baptist Medical	2	3.2	343	0.6
Carolinas Medical Center	4	4.7	508	0.9
Duke University Hospital	3	3.0	350	1.0
Vidant Medical Center	3	2.5	289	1.2

SIR AND 95% CONFIDENCE INTERVAL
COMPARED TO 2015 NATIONAL BASELINE



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*Significantly different than 2015 national baseline

2. Colon Surgeries

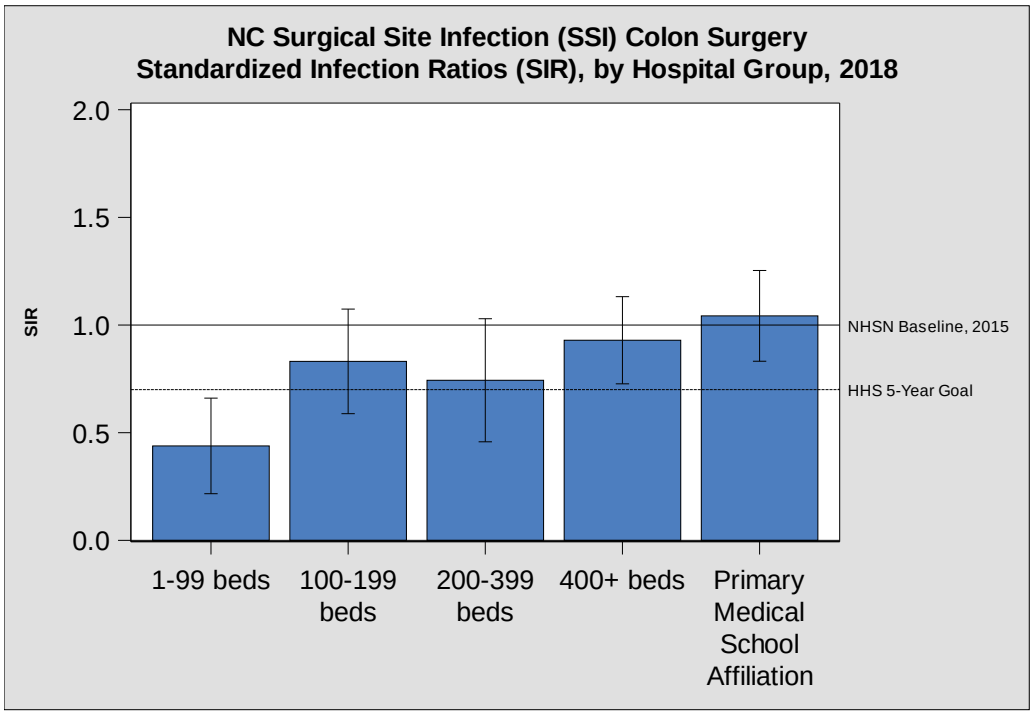
North Carolina 2018 SSI Highlights Post Colon Surgery

- Among inpatient colon surgeries performed on adults ≥ 18 years, North Carolina hospitals reported 262 infections, compared to the 306 infections which were predicted.
- This was the better than predicted by the 2015 national experience.
- The U.S. Department of Health and Human Services set a goal to reduce SSIs nationally by 30% from the baseline experience in 2015 by 2020; North Carolina has not met this goal for SSIs following colon surgeries.
- The most commonly identified organisms isolated from colon surgery SSI patients were *E. coli* and *Enterococcus*.

Table 5. NC Surgical Site Infections following colon surgeries, 2018

Year	# Observed Infections	# Predicted Infections	How Does North Carolina Compare to the National Experience?
2018	262	306.1	★Better: Fewer infections than were predicted (better than the national experience)

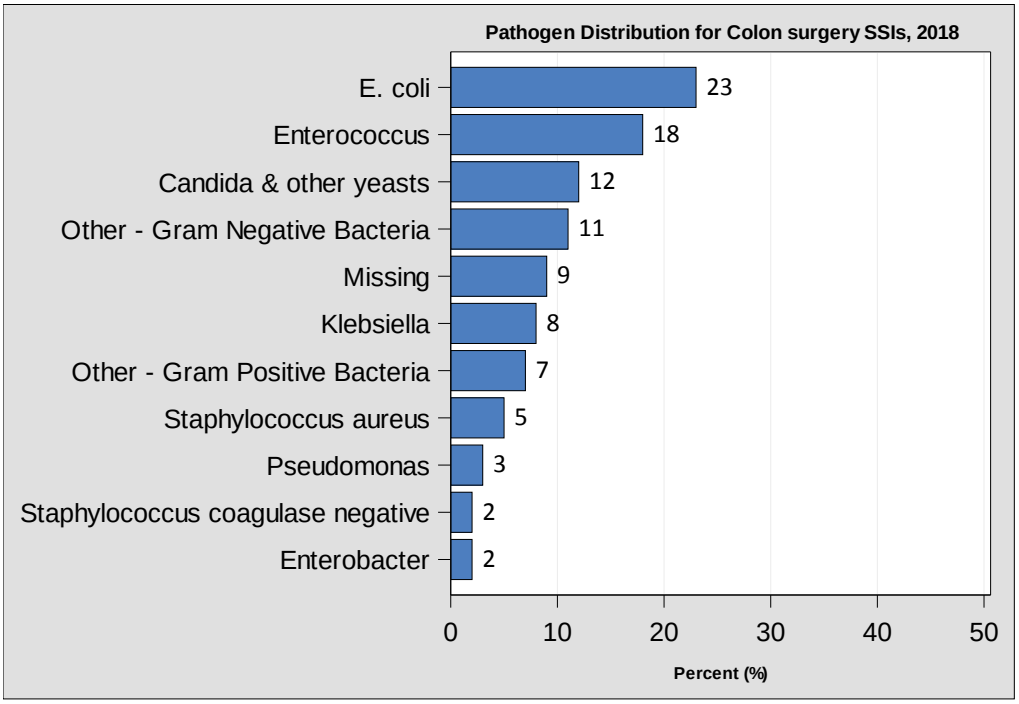
Figure 22.



How to Understand Figure 22:

- Hospitals with 1-99 beds had fewer SSIs following colon surgeries than predicted, performing BETTER than the national experience
- All other hospitals had the same number of SSIs following colon surgeries than predicted, performing the SAME as the national experience

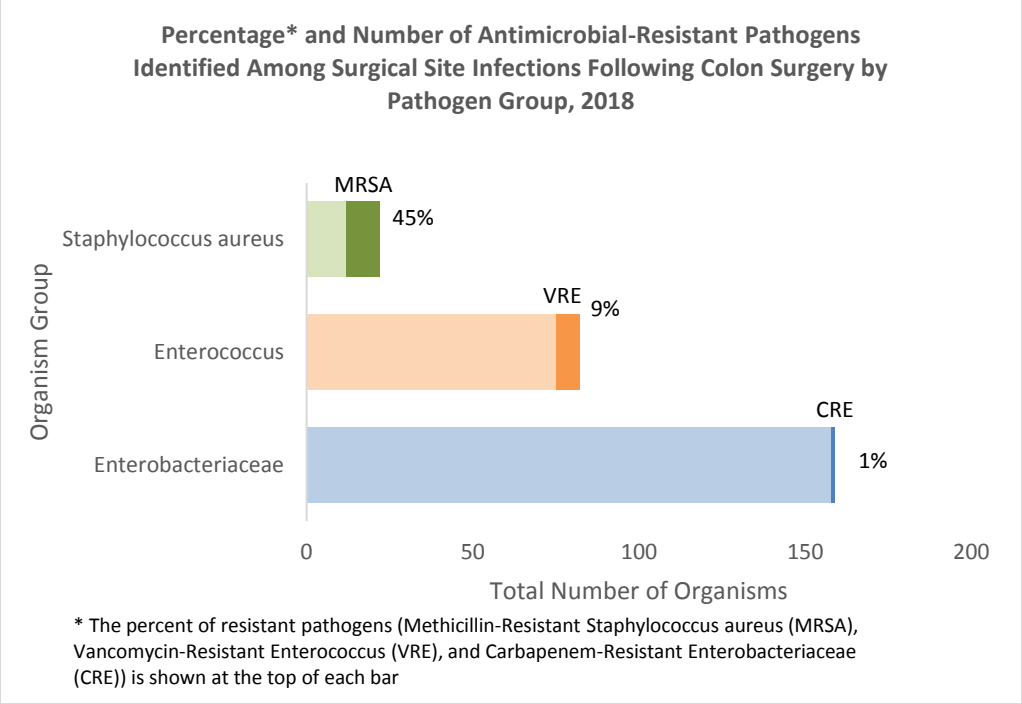
Figure 23.



How to Understand Figure 23:

- *E. coli* (23%) and *Enterococcus* (18%) were the most commonly reported pathogens isolated from patients with surgical site infections following colon surgeries

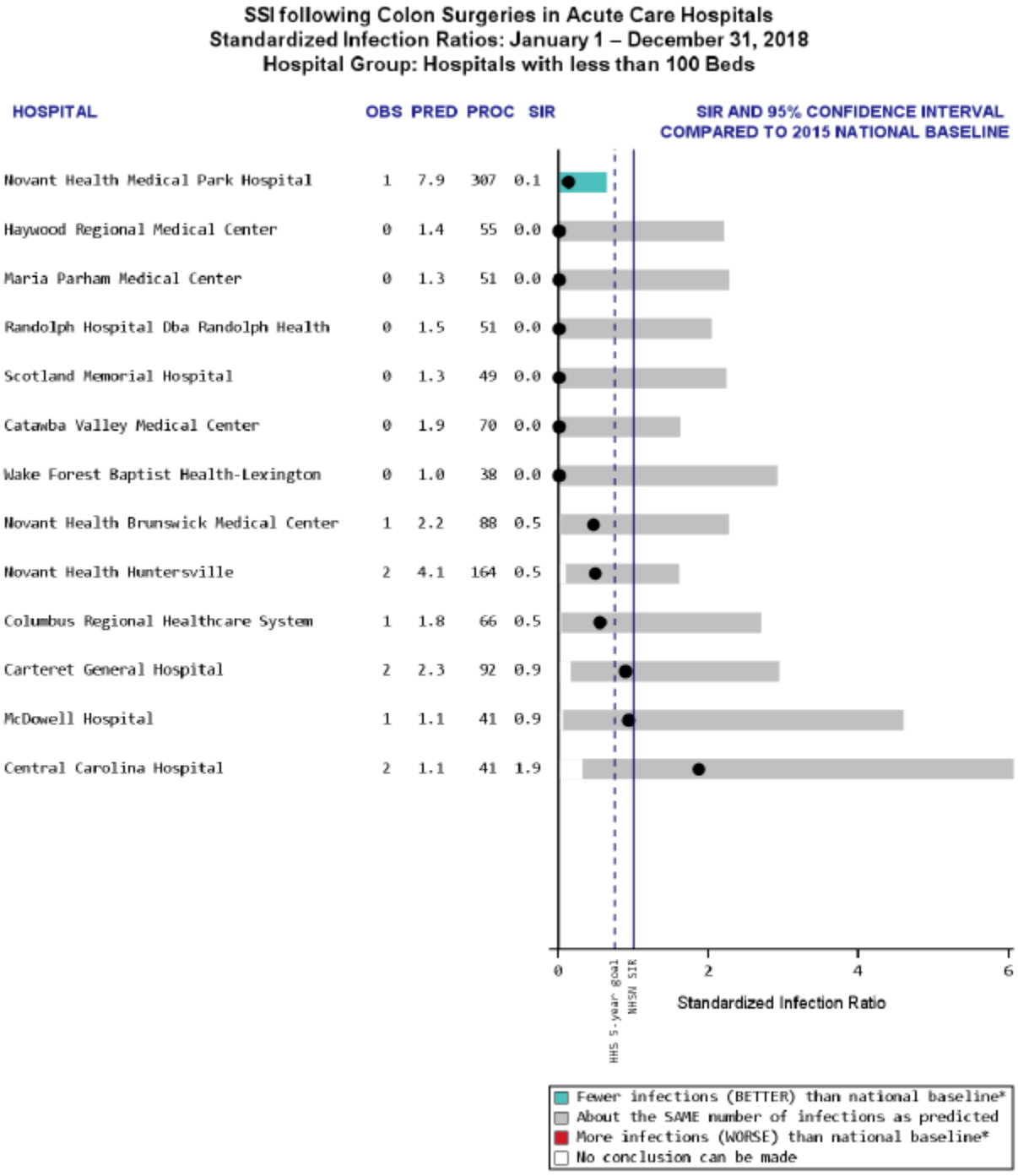
Figure 24.



How to Understand Figure 24:

- In 2018, 45% of *Staphylococcus aureus* identified among SSIs following colon surgeries were resistant to methicillin
- 9% of *Enterococcus* identified among SSIs following colon surgeries were Vancomycin resistant
- Only 1% of Enterobacteriaceae identified among SSIs following colon surgeries were resistant to carbapenems

The following SIR plots summarize colon surgery SSI infection data for North Carolina hospitals by hospital groups (Appendix E).



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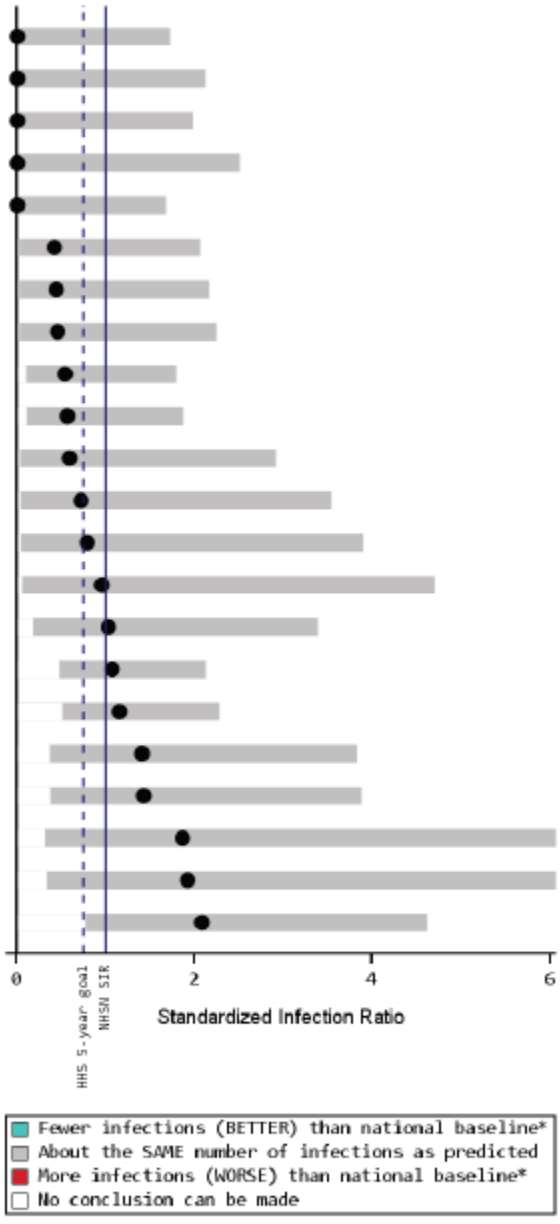
*Significantly different than 2015 national baseline

SSI following Colon Surgeries in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with 100 to 199 Beds

HOSPITAL	OBS	PRED	PROC	SIR
Carolinas Medical Center-University	0	1.7	64	0.0
Rutherford Regional Medical Center	0	1.4	50	0.0
Advent Health Hendersonville	0	1.5	60	0.0
Vidant Edgecombe Hospital	0	1.2	43	0.0
Nash Health Care Systems	0	1.8	64	0.0
Carolinas Healthcare System Blue Ridge	1	2.4	88	0.4
Lenoir Memorial Hospital	1	2.3	82	0.4
Iredell Memorial Hospital	1	2.2	84	0.5
Novant Health Matthews Medical Center	2	3.7	140	0.5
Duke Raleigh Hospital	2	3.5	132	0.6
Novant Health Thomasville Medical Center	1	1.7	66	0.6
Wilson Medical Center	1	1.4	52	0.7
Onslow Memorial Hospital	1	1.3	50	0.8
Lake Norman Regional Medical Center	1	1.1	42	1.0
Frye Regional Medical Center	2	2.0	79	1.0
Wesley Long Hospital	7	6.5	253	1.1
WakeMed Cary Hospital	7	6.1	223	1.2
Johnston Health	3	2.1	79	1.4
Carolinas Medical Center-Union	3	2.1	76	1.4
Carolinas Healthcare System Lincoln	2	1.1	37	1.9
Northern Regional Hospital	2	1.0	42	1.9
Pardee Hospital	5	2.4	93	2.1



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PROC = # procedures
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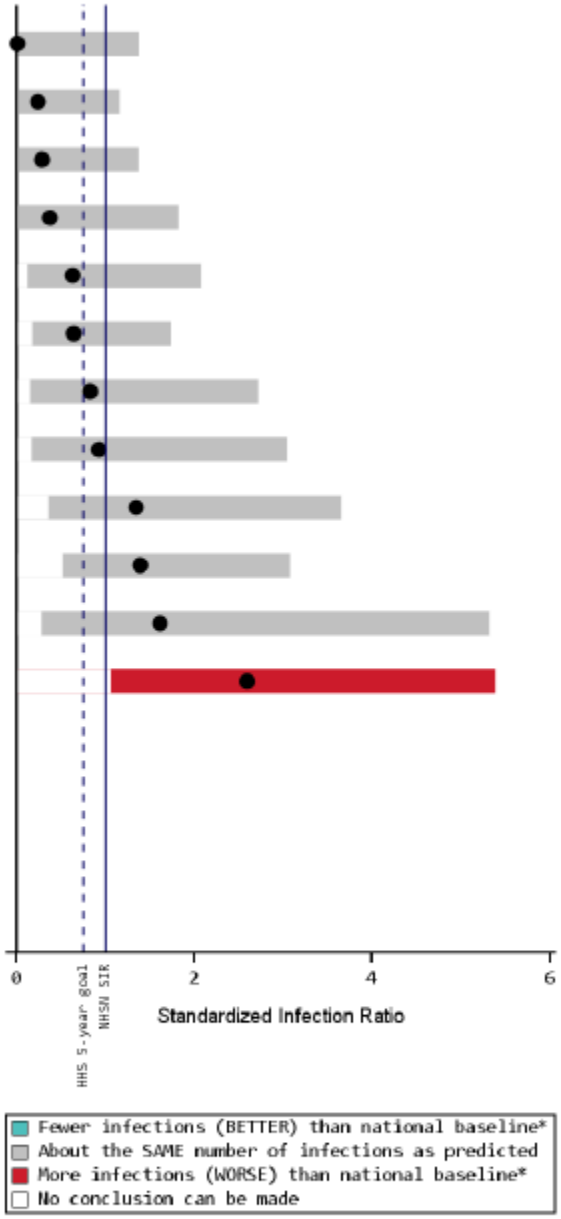
*Significantly different than 2015 national baseline

SSI following Colon Surgeries in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with 200 to 399 Beds

HOSPITAL	OBS	PRED	PROC	SIR
Carolinas Healthcare System Cleveland	0	2.2	81	0.0
Carolinas Medical Center-Pineville	1	4.3	165	0.2
High Point Regional Health System	1	3.6	134	0.3
Carolinas Medical Center-Mercy	1	2.7	99	0.4
CarolinaEast Medical Center	2	3.2	122	0.6
FirstHealth Moore Regional Hospital	3	4.7	185	0.6
Novant Health Rowan Medical Center	2	2.4	93	0.8
Wayne Memorial Hospital	2	2.2	83	0.9
Alamance Regional Medical Center	3	2.2	84	1.3
Moses Cone Hospital	5	3.6	128	1.4
Southeastern Regional Medical Center	2	1.2	45	1.6
Duke Regional Hospital	6	2.3	85	2.6

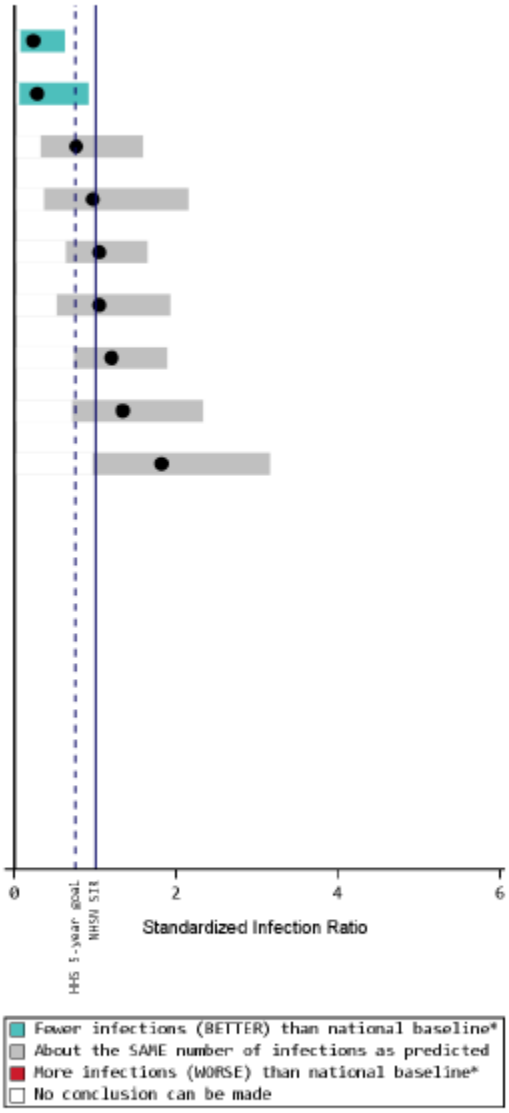


Data reported as of March 19, 2019 .
OBS = # infections observed
PRED = # infections statistically 'predicted' by national baseline
PROC = # procedures
SIR = Standardized infection ratio (OBS/PRED # of infections)
NA = Data not shown for hospitals with <20 procedures
NC = SIR not calculated for hospitals with <1 predicted infection
*Significantly different than 2015 national baseline

SSI following Colon Surgeries in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with 400 or More Beds

HOSPITAL	OBS	PRED	PROC	SIR
New Hanover Regional Medical Center	3	13.3	478	0.2
Carolinas Healthcare System - Northeast	2	7.3	274	0.3
Cape Fear Valley Health System	6	7.9	267	0.8
Gaston Memorial Hospital	5	5.2	186	1.0
Rex Healthcare	17	16.3	592	1.0
Novant Health Presbyterian Medical	9	8.6	317	1.0
Mission Hospital	17	14.2	507	1.2
Novant Health Forsyth Medical Center	11	8.2	307	1.3
WakeMed	11	6.1	204	1.8

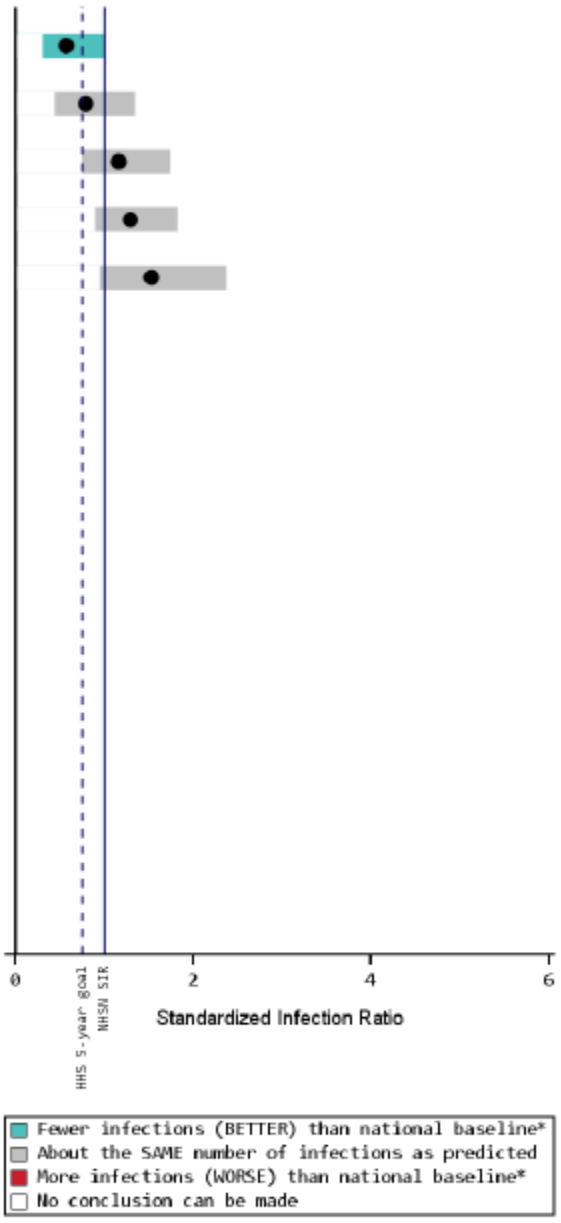
SIR AND 95% CONFIDENCE INTERVAL
COMPARED TO 2015 NATIONAL BASELINE



Data reported as of October 15, 2019 .
OBS = # infections observed
PRED = # infections statistically 'predicted' by national baseline
PROC = # procedures
SIR = Standardized infection ratio (OBS/PRED # of infections)
NA = Data not shown for hospitals with <20 procedures
NC = SIR not calculated for hospitals with <1 predicted infection
*Significantly different than 2015 national baseline

SSI following Colon Surgeries in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with Primary Medical School Affiliation

HOSPITAL	OBS	PRED	PROC	SIR
Carolinas Medical Center	11	19.5	640	0.6
Wake Forest University Baptist Medical	12	15.3	508	0.8
Duke University Hospital	21	18.2	631	1.2
UNC Health Care	30	23.4	761	1.3
Vidant Medical Center	18	11.8	409	1.5



Data reported as of March 19, 2019 .
OBS = # infections observed
PRED = # infections statistically 'predicted' by national baseline
PROC = # procedures
SIR = Standardized infection ratio (OBS/PRED # of infections)
NA = Data not shown for hospitals with <20 procedures
NC = SIR not calculated for hospitals with <1 predicted infection
*Significantly different than 2015 national baseline

D. Laboratory-Identified Events

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

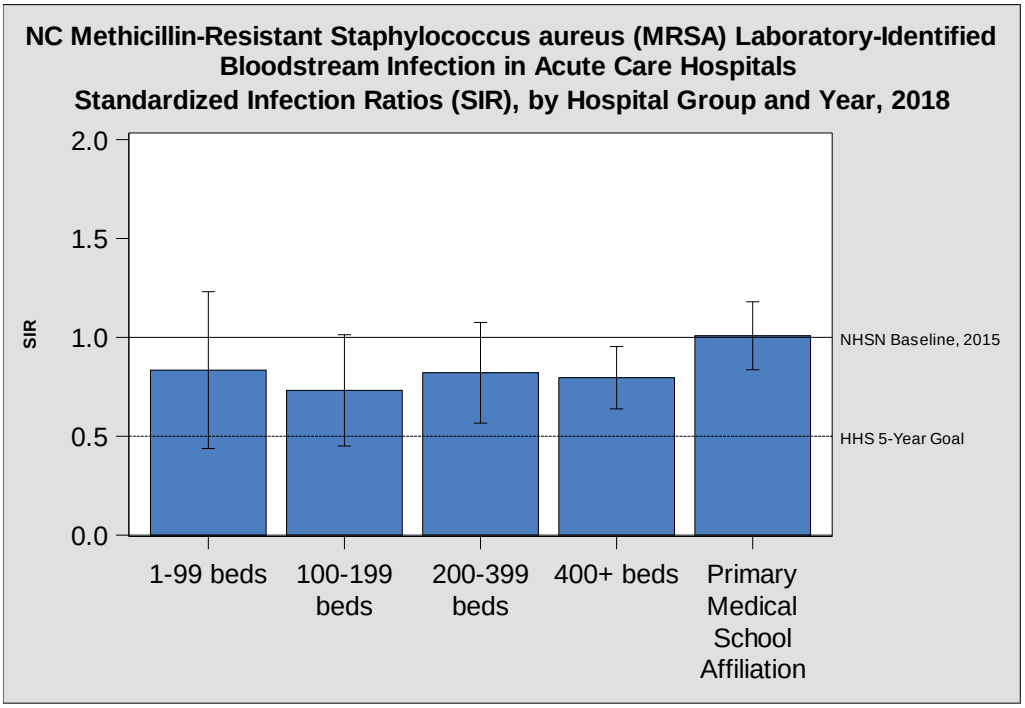
North Carolina 2018 MRSA LabID Highlights

- In 2018 North Carolina hospitals reported 313 MRSA LabID events, compared to the 359 MRSA LabID events which were predicted. This is better than predicted by the 2015 national experience.
- The U.S. Department of Health and Human Services set a goal to reduce MRSA nationally by 50% from the baseline experience by 2020; North Carolina has not yet met this goal.

Table 6. NC Methicillin-Resistant Staphylococcus Aureus Laboratory-Identified events, 2018

Year	# Observed Events	# Predicted Events	How Does North Carolina Compare to the National Experience?
2018	**313**	**358.6**	**★Better: Fewer infections than were predicted (better than the national experience)**

Figure 25.



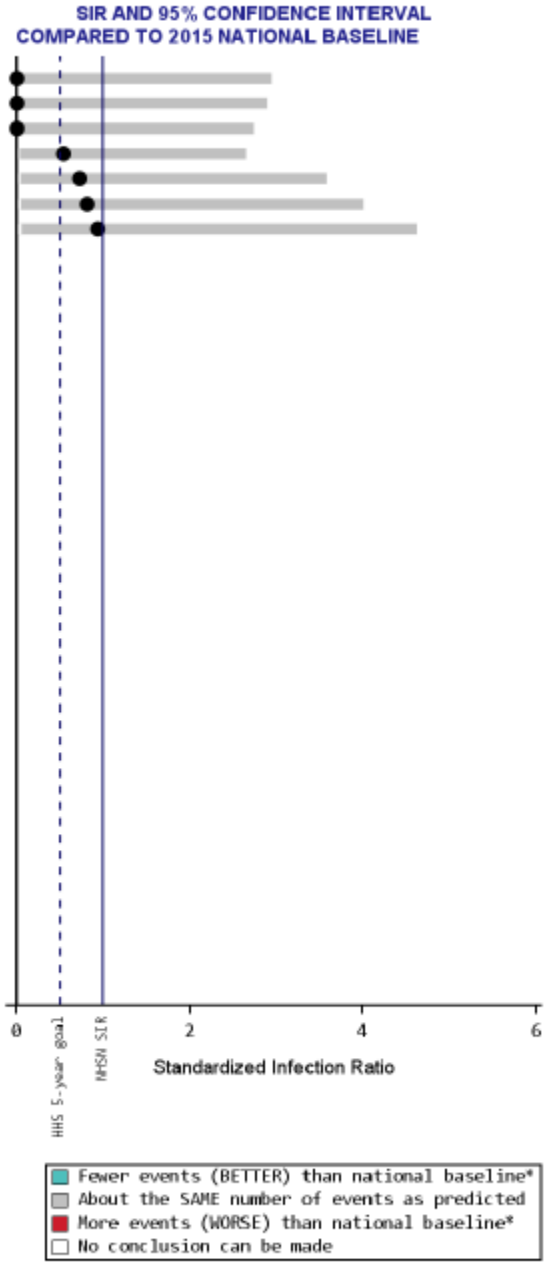
How to Understand Figure 25:

- Hospitals with 400+ beds performed BETTER than the national experience, with fewer MRSA LabID events than predicted
- All other hospital size groups reported about the same number of events as predicted, performing the SAME as the national experience

The following SIR plots summarize MRSA labID data for North Carolina hospitals by hospital groups (Appendix E).

MRSA in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with less than 100 Beds

HOSPITAL	OBS	PRED	PD	SIR
Columbus Regional Healthcare System	0	1.0	19709	0.0
Randolph Hospital Dba Randolph Health	0	1.0	18999	0.0
Halifax Regional Medical Center	0	1.1	20664	0.0
Catawba Valley Medical Center	1	1.9	53259	0.5
Maria Parham Medical Center	1	1.4	18156	0.7
Novant Health Huntersville	1	1.2	34886	0.8
Caldwell Memorial Hospital	1	1.1	20040	0.9
McDowell Hospital	1	0.3	9309	NC
Cherokee Indian Hospital	0	0.1	4630	NC
Dlp - Harris Regional Hospital	0	0.4	12526	NC
Haywood Regional Medical Center	0	0.9	19609	NC
Sentara Albemarle Medical Center	3	0.9	20303	NC
Martin General Hospital	0	0.1	3697	NC
Vidant Beaufort Hospital	0	0.7	23724	NC
Scotland Memorial Hospital	0	0.9	22814	NC
Granville Medical Center	2	0.2	8577	NC
Carteret General Hospital	2	0.8	28840	NC
Novant Health Brunswick Medical Center	1	0.5	20211	NC
Vidant Duplin Hospital	1	0.7	11588	NC
Central Carolina Hospital	2	0.9	15868	NC
Kings Mountain Hospital	0	0.2	6553	NC
Person Memorial Hospital	0	0.1	3797	NC
Wake Forest Baptist Health-Lexington	0	0.7	11404	NC
Novant Health Charlotte Orthopedic Hosp	0	0.1	7219	NC
Novant Health Medical Park Hospital	0	0.1	4691	NC
Betsy Johnson Hospital	1	0.5	15540	NC
Hugh Chatham Memorial Hospital	0	0.4	13638	NC
Carolinas Healthcare System Anson	0	0.0	768	NC
Annie Penn Hospital	0	0.6	14220	NC
North Carolina Specialty Hospital	0	0.1	3508	NC
Wake Forest Baptist Health-Davie Medica	0	0.1	3295	NC
Johnston Health Clayton	0	0.3	12485	NC
Firsthealth Moore Regional-Hoke	0	0.1	2182	NC
Firsthealth Moore Regional-Richmond	0	0.4	10510	NC
Cape Fear Valley Hoke Hospital	0	0.1	4325	NC
Novant Health Kernersville Medical Cent	0	0.4	13383	NC
Wakemed North Family Health & Women's H	0	0.1	7445	NC



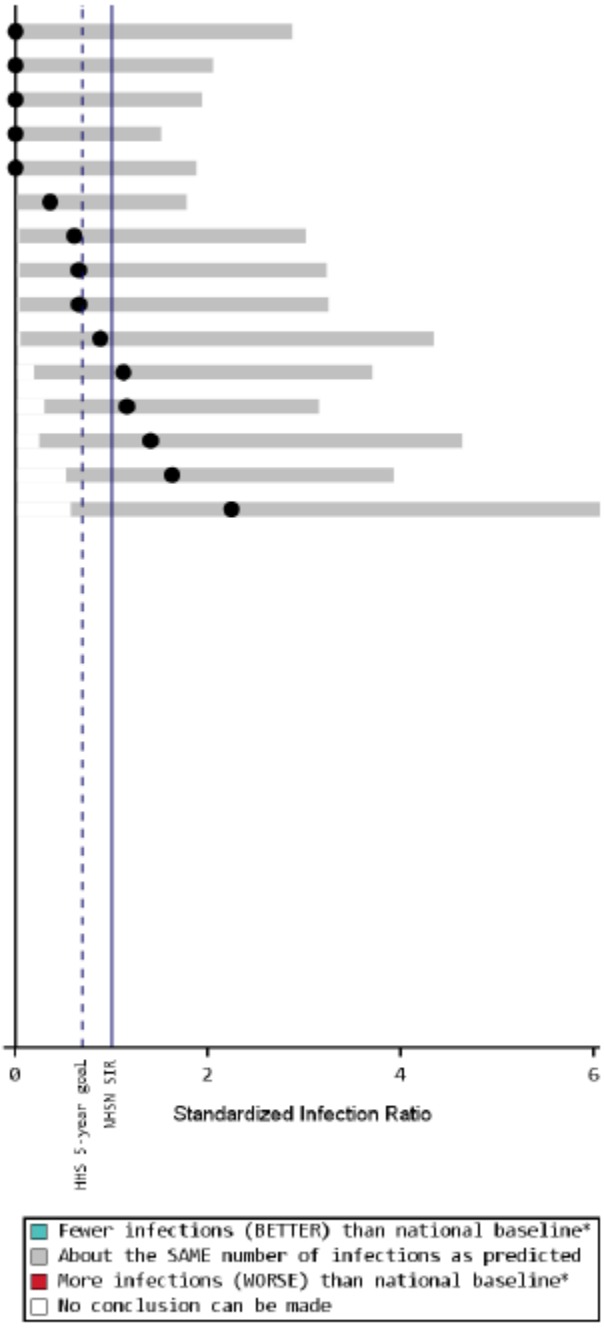
Data reported as of March 19, 2019 .
OBS = # infections observed
PRED = # infections statistically "predicted" by national baseline
PD = # Patient days
SIR = Standardized infection ratio (OBS/PRED # of infections)
NC = SIR not calculated for hospitals with <1 predicted infection
*Significantly different than 2015 national baseline

MRSA in Acute Care Hospitals

Standardized Infection Ratios: January 1 – December 31, 2018

Hospital Group: Hospitals with 100 to 199 Beds

HOSPITAL	OBS	PRED	PD	SIR
Carolinas Medical Center-University	0	1.0	30465	0.0
Iredell Memorial Hospital	0	1.5	36175	0.0
Novant Health Matthews Medical Center	0	1.6	50188	0.0
Wesley Long Hospital	0	2.0	41674	0.0
Women's Hospital	0	1.6	51644	0.0
Duke Raleigh Hospital	1	2.8	52162	0.4
Lenoir Memorial Hospital	1	1.6	28149	0.6
Onslow Memorial Hospital	1	1.5	32491	0.7
Carolinas Healthcare System Blue Ridge	1	1.5	27447	0.7
Pardee Hospital	1	1.1	33213	0.9
WakeMed Cary Hospital	2	1.8	47683	1.1
Nash Health Care Systems	3	2.6	46575	1.2
Johnston Health	2	1.4	31646	1.4
Frye Regional Medical Center	4	2.5	38493	1.6
Carolinas Medical Center-Union	3	1.3	33029	2.2
Rutherford Regional Medical Center	0	0.8	14024	NC
Advent Health Hendersonville	1	0.2	8933	NC
ARHS-Watauga Medical Center	1	0.5	14555	NC
Davis Regional Medical Center	0	0.7	17404	NC
Vidant Roanoke Chowan Hospital	0	0.4	13506	NC
Vidant Edgecombe Hospital	0	0.9	15231	NC
Novant Health Thomasville Medical Cente	0	0.7	15516	NC
Sampson Regional Medical Center	1	0.6	11920	NC
Northern Regional Hospital	0	0.8	16119	NC
Lake Norman Regional Medical Center	0	0.4	14392	NC
Carolinas Healthcare System Lincoln	1	0.9	20090	NC
Wilson Medical Center	0	0.9	28471	NC
Stanly Regional Medical Center	1	0.5	12427	NC
UNC Rockingham Health	0	0.6	13806	NC
Wake Forest Baptist Health Wilkes Medic	2	0.5	11807	NC



Data reported as of October 15, 2019 .

OBS = # infections observed

PRED = # infections statistically 'predicted' by national baseline

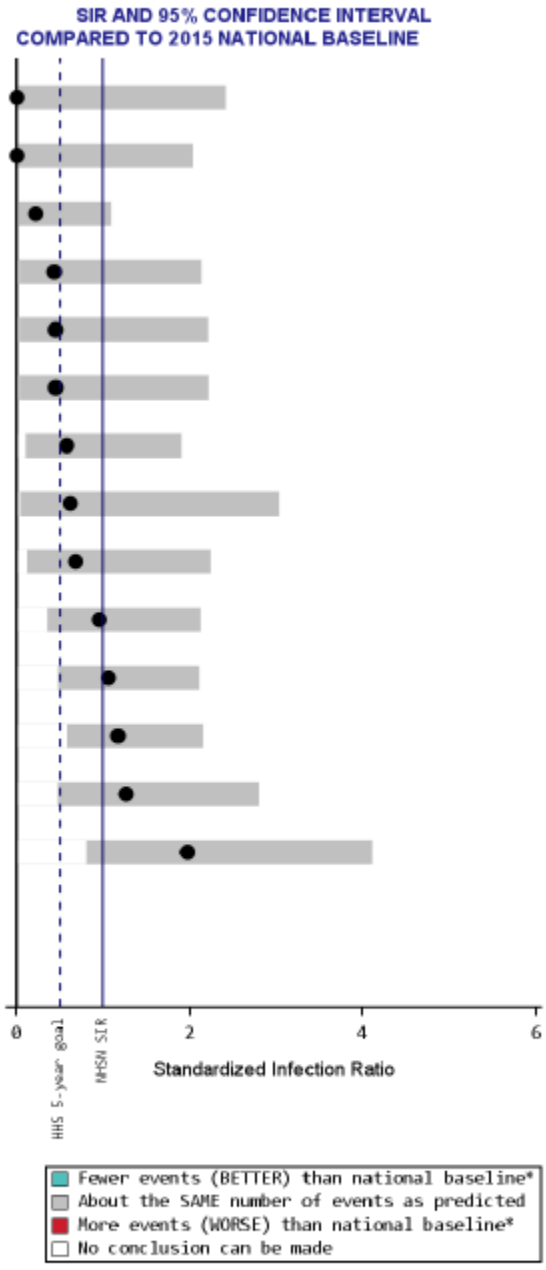
PD = # Patient days

SIR = Standardized infection ratio (OBS/PRED # of infections)

NC = SIR not calculated for hospitals with <1 predicted infection

MRSA in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with 200 to 399 Beds

HOSPITAL	OBS	PRED	PD	SIR
Cherry Hospital	0	1.2	82067	0.0
Broughton Hospital	0	1.5	97710	0.0
High Point Regional Health System	1	4.5	72287	0.2
Carolinas Healthcare System Cleveland	1	2.3	42582	0.4
Carolinas Medical Center-Mercy	1	2.2	42351	0.4
Alamance Regional Medical Center	1	2.2	44096	0.4
Southeastern Regional Medical Center	2	3.5	65978	0.6
Novant Health Rowan Medical Center	1	1.6	41197	0.6
CarolinaEast Medical Center	2	3.0	66283	0.7
Duke Regional Hospital	5	5.2	76587	1.0
FirstHealth Moore Regional Hospital	7	6.6	105715	1.1
Moses Cone Hospital	9	7.7	116541	1.2
Carolinas Medical Center-Pineville	5	4.0	71127	1.3
Wayne Memorial Hospital	6	3.0	54501	2.0



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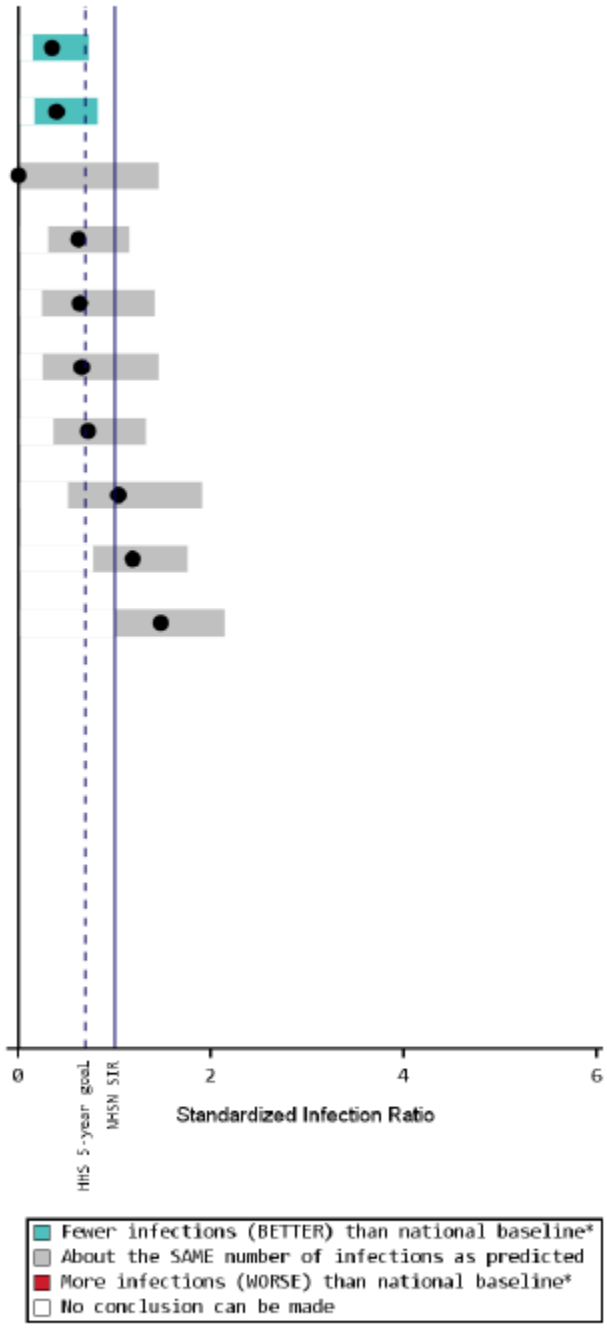
PD = # Patient days
SIR = Standardized infection ratio (OBS/PRED # of infections)
NC = SIR not calculated for hospitals with <1 predicted infection
*Significantly different than 2015 national baseline

MRSA in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with 400 or More Beds

HOSPITAL	OBS	PRED	PD	SIR
Mission Hospital	6	17.4	211229	0.3
Cape Fear Valley Health System	6	15.3	166103	0.4
Central Regional Hospital	0	2.1	121288	0.0
WakeMed	9	14.5	159892	0.6
Carolinas Healthcare System - Northeast	5	7.9	112607	0.6
Gaston Memorial Hospital	5	7.6	110766	0.7
Rex Healthcare	9	12.5	146189	0.7
Novant Health Presbyterian Medical	9	8.7	155338	1.0
New Hanover Regional Medical Center	23	19.5	179036	1.2
Novant Health Forsyth Medical Center	26	17.6	224356	1.5

SIR AND 95% CONFIDENCE INTERVAL
COMPARED TO 2015 NATIONAL BASELINE



Data reported as of October 15, 2019 .
OBS = # infections observed
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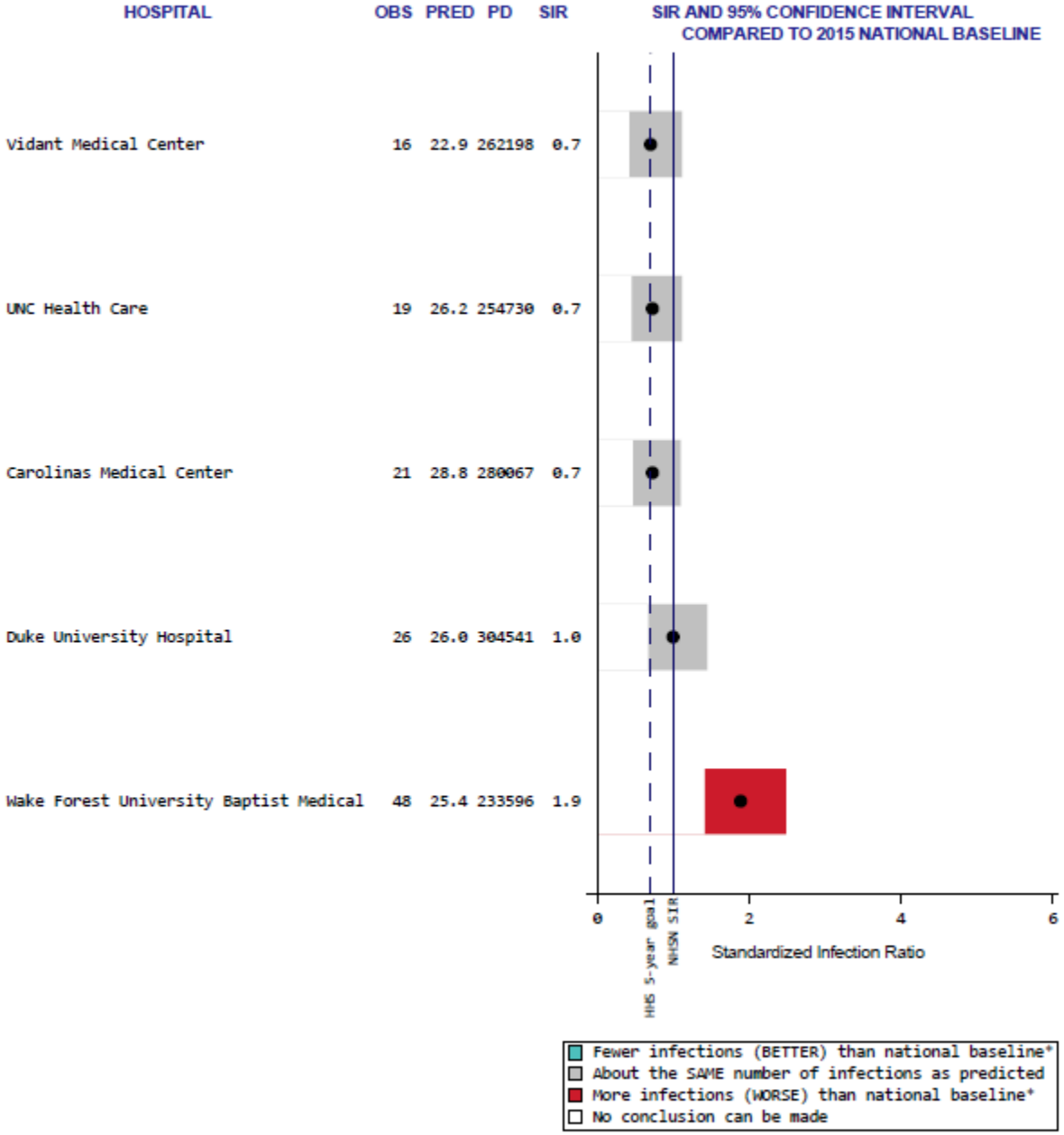
PD = # Patient days
SIR = Standardized infection ratio (OBS/PRED # of infections)
NC = SIR not calculated for hospitals with <1 predicted infection

The SAS System

MRSA in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with Primary Medical School Affiliation



Data reported as of March 19, 2019 .
OBS = # infections observed
PRED = # infections statistically 'predicted' by national baseline
PD = # Patient days
SIR = Standardized infection ratio (OBS/PRED # of infections)
NC = SIR not calculated for hospitals with <1 predicted infection

Clostridium difficile Laboratory-Identified Events (CDI LabID)

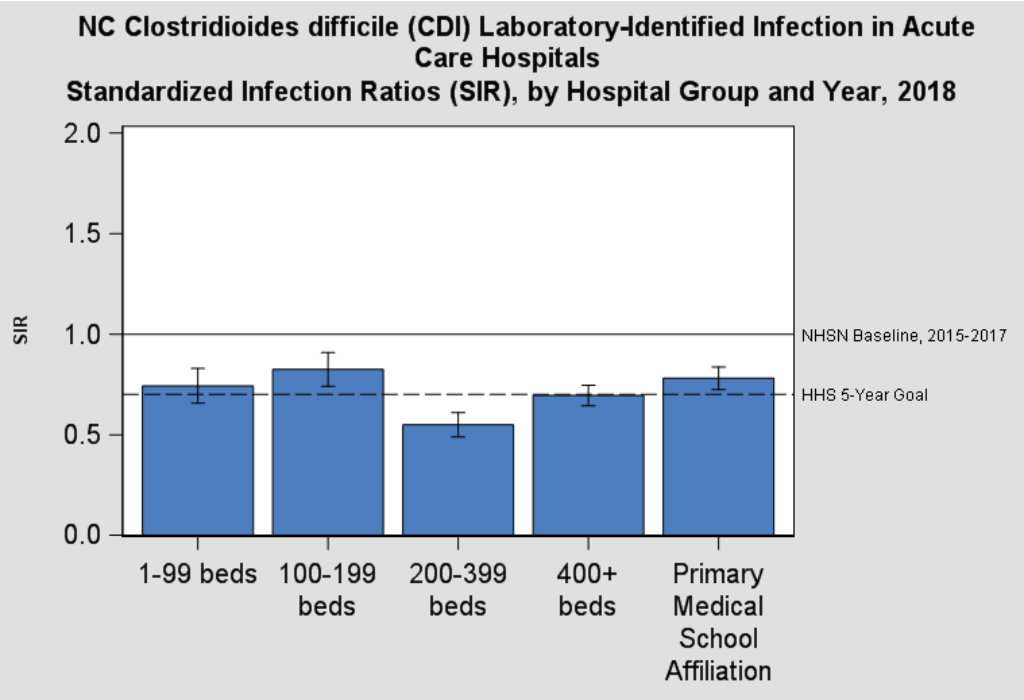
North Carolina 2018 CDI LabID Highlights

- In 2018, North Carolina hospitals reported 2395 CDI LabID events, compared to the 3356 CDI LabID events which were predicted. This was better than the 2015 national experience.
- The U.S. Department of Health and Human Services set a goal to reduce CDI nationally by 30% from the baseline experience by 2020; North Carolina has not yet met this goal.

Table 7. NC Clostridium difficile laboratory-identified events, 2018

Year	# Observed Infections	# Predicted Infections	How Does North Carolina Compare to the National Experience?
2018	2395	3356.11	★Better: Fewer infections than were predicted (better than the national experience)

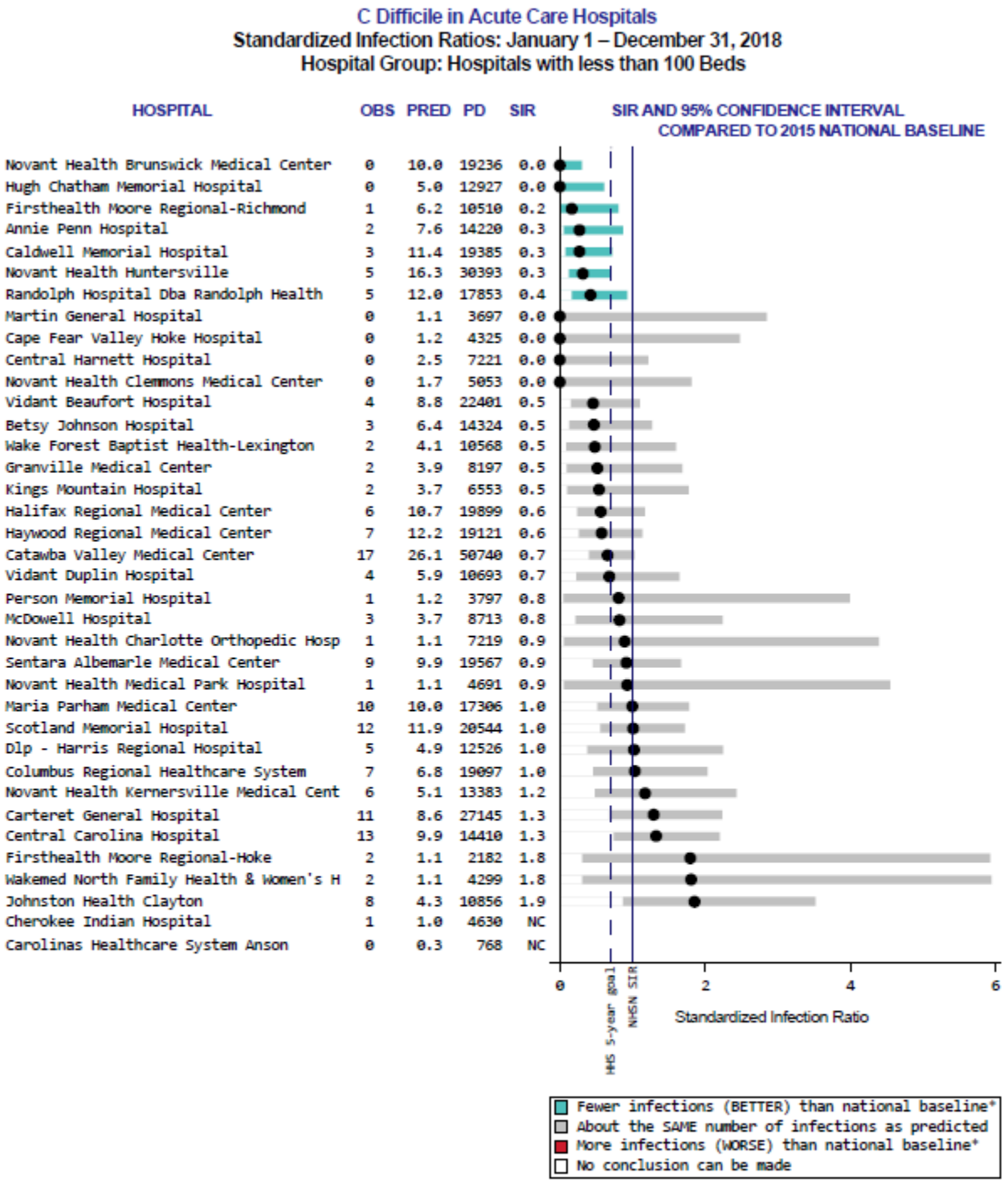
Figure 26.



How to Understand Figure 26:

- All hospital sized groups performed BETTER than the national experience, with fewer LabID CDI events than predicted

The following SIR plots summarize CDI labID data for North Carolina hospitals by hospital groups (Appendix E).



Data reported as of March 19, 2019 .
OBS = # infections observed
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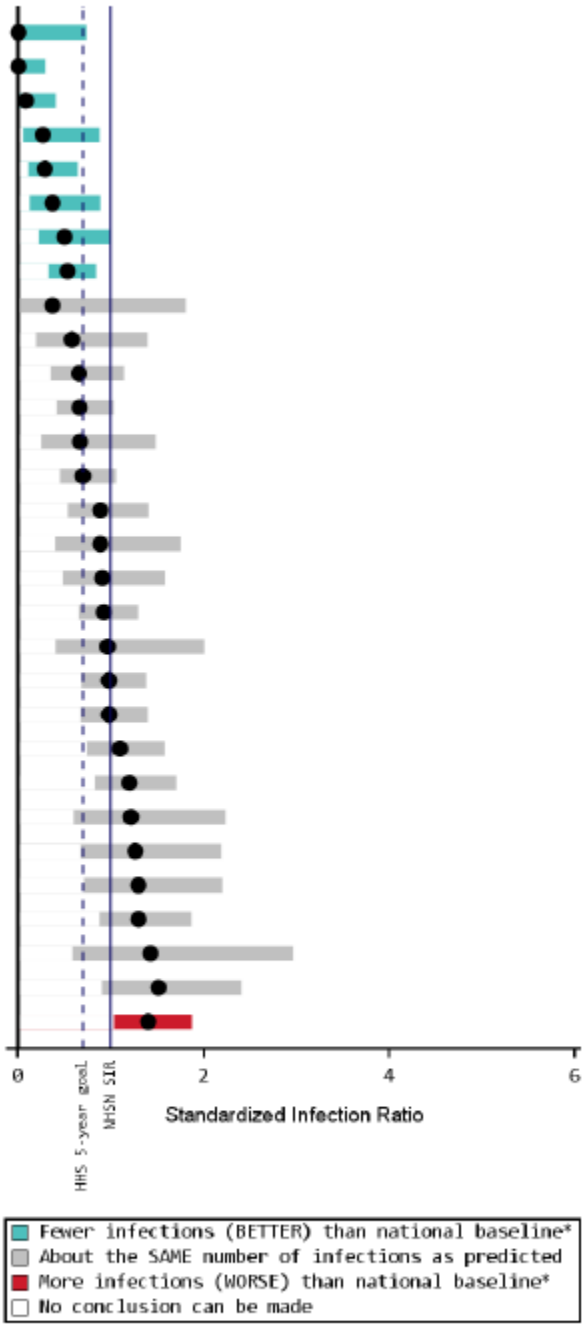
PD = # Patient days
SIR = Standardized infection ratio (OBS/PRED # of infections)
NC = SIR not calculated for hospitals with <1 predicted infection

C Difficile in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with 100 to 199 Beds

HOSPITAL	OBS	PRED	PD	SIR
Sampson Regional Medical Center	0	4.1	11034	0.0
Women's Hospital	0	10.7	29198	0.0
Carolinas Healthcare System Lincoln	1	12.6	19219	0.1
Davis Regional Medical Center	2	7.6	17404	0.3
Carolinas Medical Center-Union	5	17.5	29978	0.3
Novant Health Thomasville Medical Cente	4	10.9	14078	0.4
Carolinas Medical Center-University	7	14.2	25597	0.5
Novant Health Matthews Medical Center	17	32.1	44616	0.5
Advent Health Hendersonville	1	2.7	8051	0.4
Vidant Roanoke Chowan Hospital	4	7.0	12836	0.6
Pardee Hospital	11	16.8	33213	0.7
Wesley Long Hospital	18	27.3	41674	0.7
Vidant Edgecombe Hospital	5	7.5	14154	0.7
Carolinas Healthcare System Blue Ridge	21	30.3	25454	0.7
Lenoir Memorial Hospital	16	18.2	27293	0.9
Lake Norman Regional Medical Center	7	7.9	12508	0.9
Northern Regional Hospital	11	12.2	15539	0.9
Frye Regional Medical Center	32	34.8	37631	0.9
Unc Rockingham Health	6	6.2	12930	1.0
Duke Raleigh Hospital	30	30.8	52162	1.0
Nash Health Care Systems	28	28.7	43307	1.0
Johnston Health	27	24.7	30059	1.1
WakeMed Cary Hospital	29	24.3	41237	1.2
Stanly Regional Medical Center	9	7.4	11503	1.2
Rutherford Regional Medical Center	11	8.8	13948	1.3
ARHS-Watauga Medical Center	12	9.3	14555	1.3
Onslow Memorial Hospital	27	20.9	28752	1.3
Wake Forest Baptist Health Wilkes Medic	6	4.2	11807	1.4
Wilson Medical Center	16	10.6	26688	1.5
Iredell Memorial Hospital	43	30.8	34883	1.4



Data reported as of October 15, 2019 .
OBS = # infections observed
PRED = # infections statistically 'predicted' by national baseline
PD = # Patient days
SIR = Standardized infection ratio (OBS/PRED # of infections)
NC = SIR not calculated for hospitals with <1 predicted infection

C Difficile in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with 200 to 399 Beds

HOSPITAL	OBS	PRED	PD	SIR
Cherry Hospital	0	13.1	82067	0.0
Broughton Hospital	0	15.9	97710	0.0
Novant Health Rowan Medical Center	9	29.9	39432	0.3
CarolinaEast Medical Center	13	40.9	63817	0.3
Moses Cone Hospital	28	76.3	116541	0.4
Carolinas Medical Center-Pineville	21	42.0	64694	0.5
Carolinas Medical Center-Mercy	15	27.2	42351	0.6
Alamance Regional Medical Center	16	27.1	39051	0.6
FirstHealth Moore Regional Hospital	46	76.8	99939	0.6
High Point Regional Health System	37	58.7	69061	0.6
Southeastern Regional Medical Center	27	42.4	62513	0.6
Carolinas Healthcare System Cleveland	18	27.2	40289	0.7
Wayne Memorial Hospital	33	36.4	51648	0.9
Duke Regional Hospital	47	50.2	68244	0.9

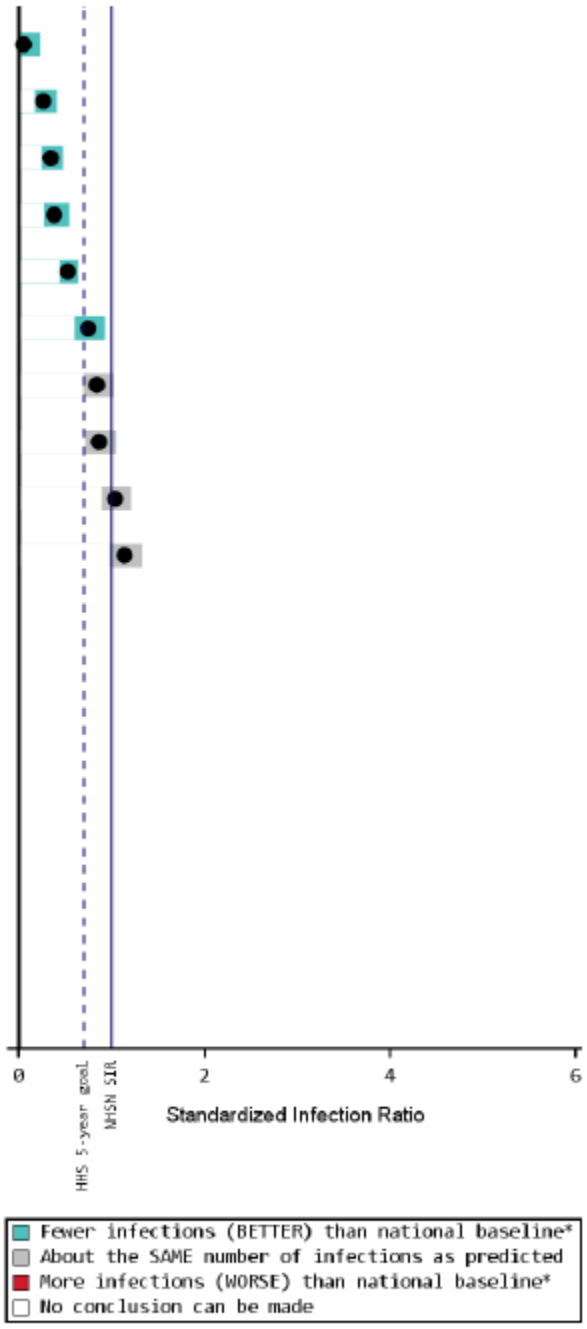
SIR AND 95% CONFIDENCE INTERVAL
COMPARED TO 2015 NATIONAL BASELINE

Data reported as of March 19, 2019 .
OBS = # infections observed
PRED = # infections statistically 'predicted' by national baseline
PD = # Patient days
SIR = Standardized infection ratio (OBS/PRED # of infections)
NC = SIR not calculated for hospitals with <1 predicted infection

C Difficile in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with 400 or More Beds

HOSPITAL	OBS	PRED	PD	SIR
Central Regional Hospital	1	22.3	132802	0.0
Gaston Memorial Hospital	19	74.3	103865	0.3
Novant Health Presbyterian Medical	34	101	125050	0.3
Carolinas Healthcare System - Northeast	29	77.8	102055	0.4
Novant Health Forsyth Medical Center	100	192	196807	0.5
Cape Fear Valley Health System	81	110	144711	0.7
WakeMed	95	114	137233	0.8
Rex Healthcare	105	123	130294	0.9
Mission Hospital	169	164	191841	1.0
New Hanover Regional Medical Center	163	144	170484	1.1

SIR AND 95% CONFIDENCE INTERVAL
COMPARED TO 2015 NATIONAL BASELINE



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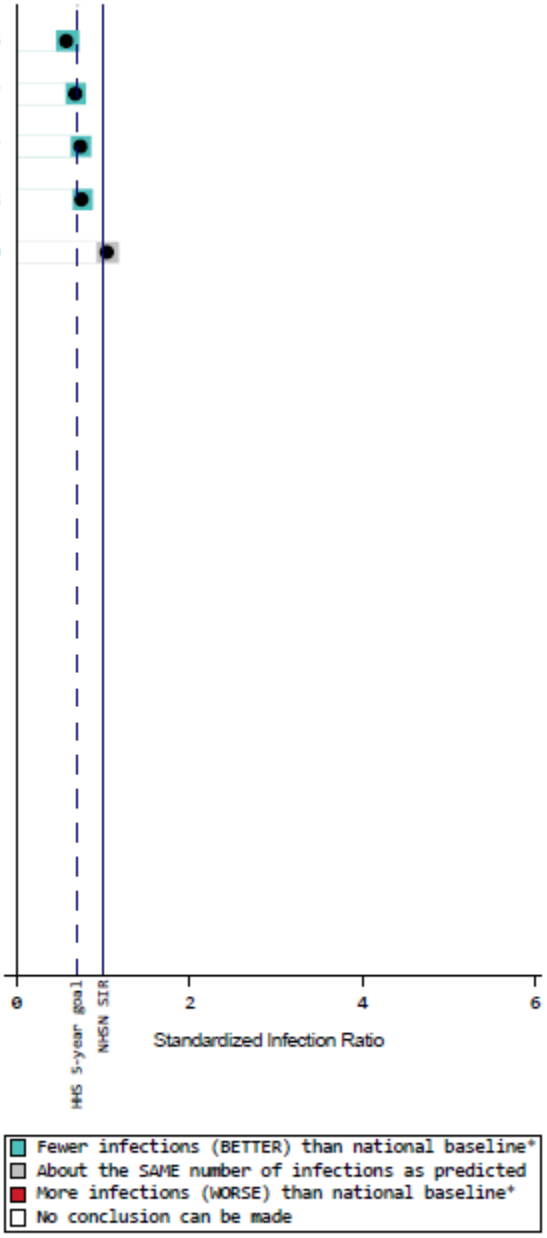
PRED = # infections statistically 'predicted' by national baseline
PD = # Patient days
SIR = Standardized infection ratio (OBS/PRED # of infections)
NC = SIR not calculated for hospitals with <1 predicted infection

C Difficile in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2018
Hospital Group: Hospitals with Primary Medical School Affiliation

HOSPITAL	OBS	PRED	PD	SIR
Wake Forest University Baptist Medical	69	120	220865	0.6
Carolinas Medical Center	127	189	236671	0.7
UNC Health Care	143	196	229147	0.7
Vidant Medical Center	149	198	246683	0.8
Duke University Hospital	242	232	291410	1.0



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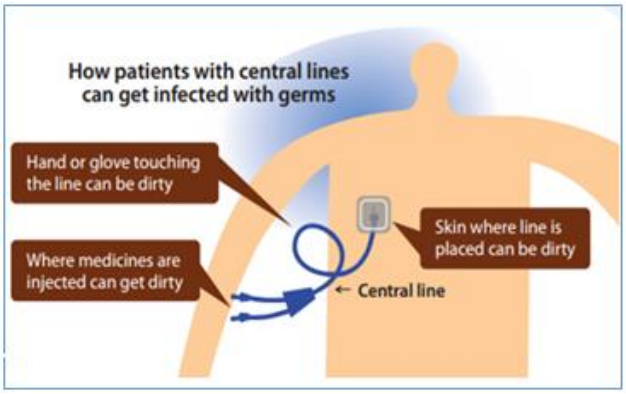
PD = # Patient days
SIR = Standardized infection ratio (OBS/PRED # of infections)
NC = SIR not calculated for hospitals with <1 predicted infection

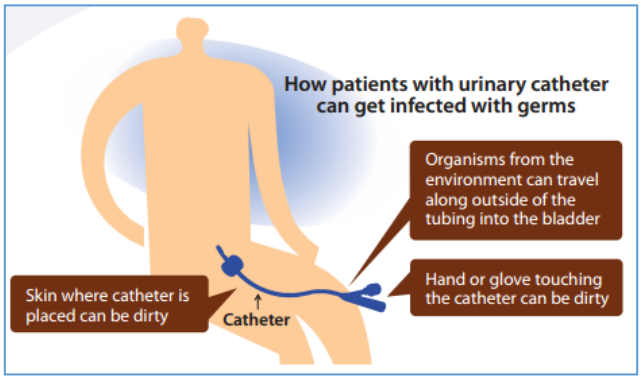
FAST FACTS: What You Need to Know About Healthcare-Associated Infections

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.

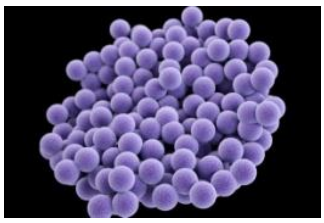


- A **urinary catheter** is a tube placed in the bladder to drain urine. A **catheter-associated urinary tract infection (CAUTI)** can occur when bacteria or other germs travel along a urinary catheter, resulting in an infection in your bladder or your kidney.

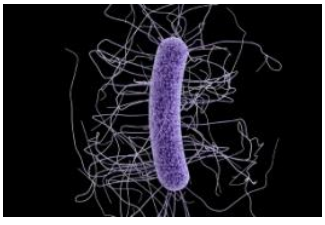
Other HAIs

- 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, and 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.

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

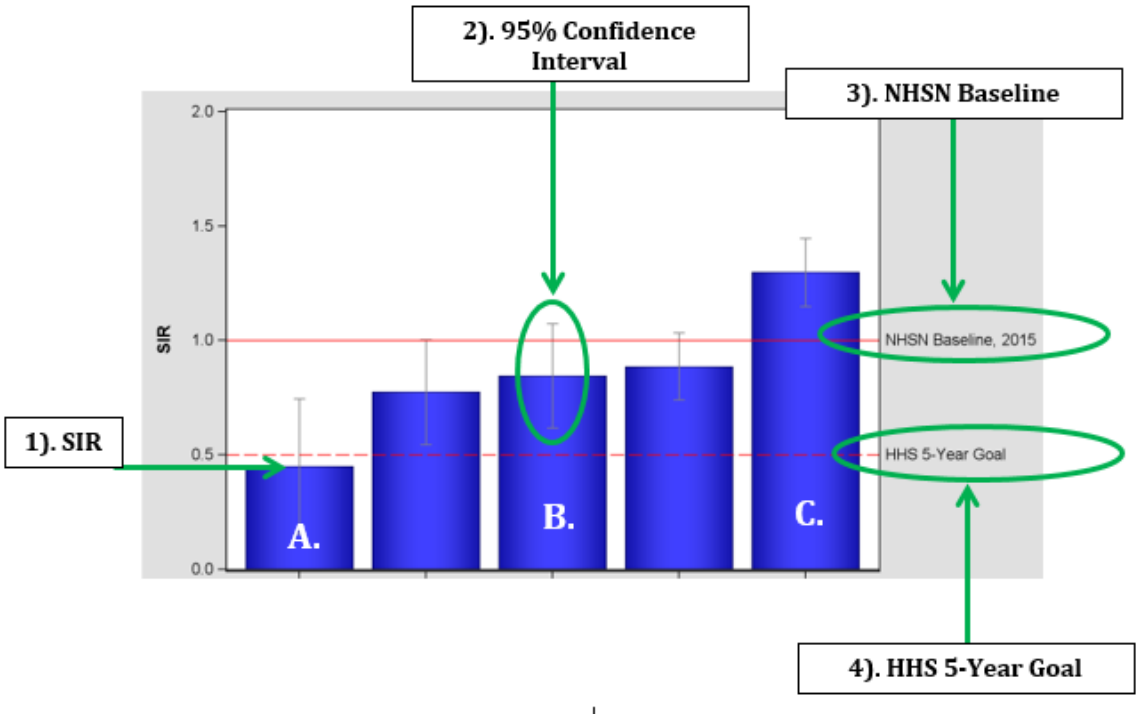
- **Predicted Infections (or Predicted Events):** This is a calculated value that reflects the number of infections (or events, for LabID measures) that we have "predicted" to occur in this facility, based on the national experience.

- **"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 is calculated for each HAI.
- The SIR is considered a "best guess" or estimate of observed infections compared to those predicted during the time period presented.

A) Represents an SIR value of 1
B) Represents an SIR value of less than 1
C) Represents an SIR value of greater than 1

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

These gray lines represent a lower and a higher limit around the SIR; together these limits create an interval. It means we are 95% confident the SIR estimate falls within this interval. Wider bars indicate less confidence in the SIR estimate.

How to understand 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.

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

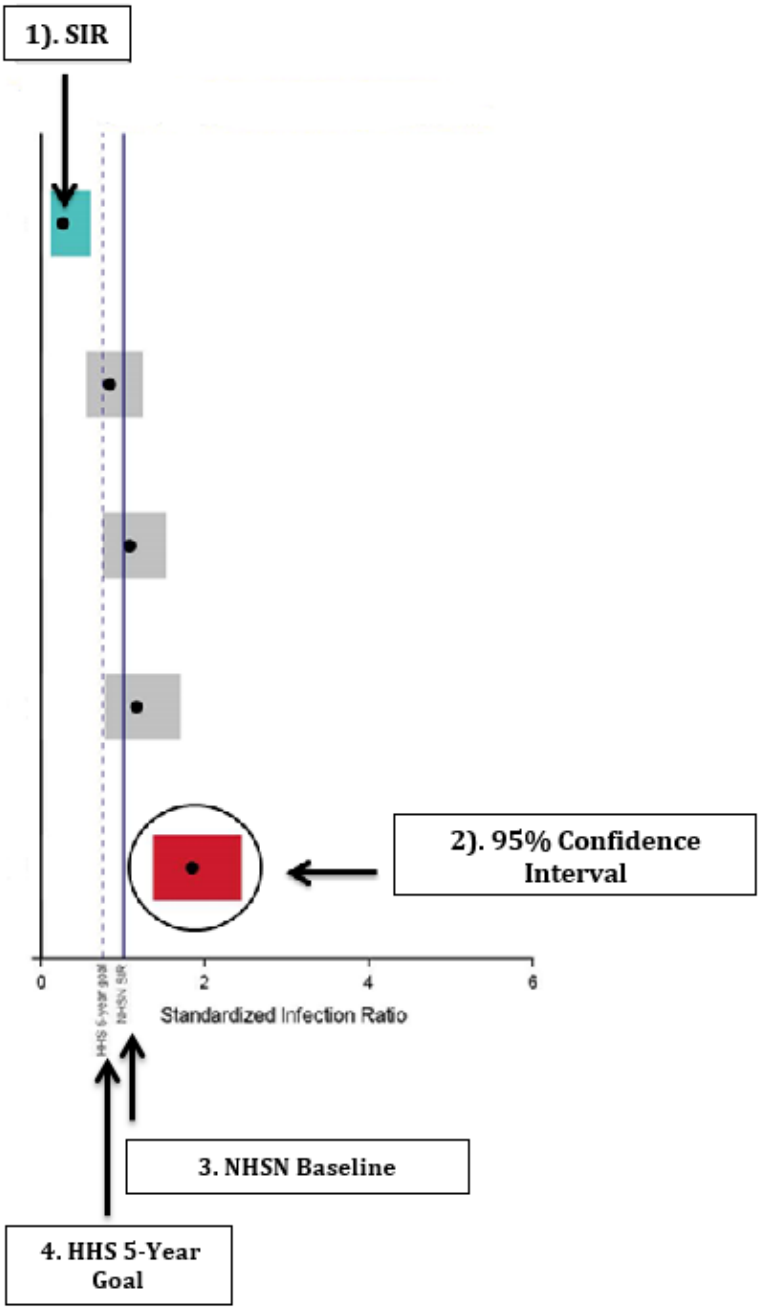
- The NHSN baseline is the number of predicted infections based on the national experience.
- The NHSN baseline year for all HAIs use data from 2015.

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.
- For CLABSI the 5-year goal is a 25% reduction from the 2015 baseline experience by 2020, 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 line and the upper confidence limit is also at or below this dotted line.
- If the SIR estimate is at or below this dotted line but the upper confidence limit crosses this dotted line, the number of infections does not differ from the 5-year goal .

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. You'll Specifically need to know whether the SIR falls around 1.0 (the NHSN baseline), less than 1.0 or greater than 1.0 and whether the 95% Confidence Interval contains the value of 1.0.

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



SIR plots are used to compare HAI infection data in North Carolina by hospital size groups. Each plot displays the facilities in a particular hospital size group on the left-hand side. To the right of each facility's information is the plot. The elements of this plot are described as follows:

1). SIR - Represented by a black circle on the plots

- SIR = number of *observed* infections / number of *predicted* infections based on the national baseline experience.
- SIR is calculated for each facility.
- The SIR is considered a "best guess" or estimate of observed infections compared to those predicted during time period displayed.

2). 95% confidence intervals for the SIR – Represented by the red, grey, and green bands surrounding the SIR dot. These bands represent a lower and a higher limit around the SIR. It means we are 95% confident the SIR estimate falls within this interval. Wider bands indicate less confidence in the SIR estimate.

How to understand 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. Facilities with about the same number observed infections as predicted will have a grey confidence interval.
- If the upper confidence limit is less than 1.0, there were FEWER observed infections than predicted by the national experience. Facilities with fewer observed infections than predicted will have a green confidence interval.
- If the lower confidence limit is greater than 1.0, there were MORE observed infections than predicted by the national experience. Facilities with MORE observed infections than predicted will have a red confidence interval.

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

- The NHSN baseline is the number of predicted infections based on the national experience.
- The NHSN baseline year is 2015.

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

- Health and Human Services established a 5-year goal to reduce each HAI by a certain percentage from the 2015 baseline.
- If the upper confidence limit is below this dotted line, the facility has met the HHS 5-year goal.
- If the confidence interval crosses the dotted line, the number of infections at that facility does not differ from the 5-year goal.
- If the lower confidence limit is above this dotted line the facility has not met the 5-year goal.

APPENDICES

APPENDIX A. Definitions

Term	Definition
Aggregate data	Sum or total data. For example, aggregate NC HAI data refers to the sum, or total, of all hospital HAI data in NC
Beds	The number of staffed beds in a facility or patient care location. This may be different from the number of licensed beds.
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.
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. *Graduate* – 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.
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.
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

APIC-NC	Association for Professionals in Infection Control and Epidemiology, NC Chapter
BSI	Bloodstream infection
CAUTI	Catheter-associated urinary tract infection
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
DHHS	Department of Health and Human Services
DHSR	Division of Health Service Regulation
DPH	Division of Public Health
HAI	Healthcare-associated Infections
ICU	Intensive care unit
IP	Infection preventionist
MRSA	Methicillin resistant *Staphylococcus aureus*
NCHA	North Carolina Healthcare Association
NC SPICE	North Carolina Statewide Program for Infection Control and Epidemiology
NHLC	Nursing Home Licensure and Certification

APPENDIX B. Acronyms (continued)

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 Surveillance for Healthcare-Associated and Resistant Pathogens Patient Safety (SHARPPS) Program Advisory Group

Surveillance for Healthcare-Associated and Resistant Pathogens Patient Safety (SHARPPS) Program Advisory Board

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Appendix D: Facts about HAIs in NC

WHAT YOU NEED TO KNOW ABOUT HEALTHCARE-ASSOCIATED INFECTIONS (HAIs)

The Impact of HAIs in North Carolina

HAIs are preventable, yet in 2017 close to **4,000 HAIs** were reported in North Carolina. The costs of these infections was **over $19 million in excess** of other medical costs.[1,2] This represents a decrease in over 1,000 HAIs reported in 2016 and a $3 million reduction in excess medical costs.

Types of HAIs reportable in North Carolina

- Catheter-associated urinary tract infection (CAUTI)
- Central line-associated bloodstream infection (CLABSI)
- Laboratory identified Clostridium difficile (Lab ID CDI)
- Laboratory identified methicillin-resistant Staphylococcus aureus (Lab ID MRSA)
- Surgical site infection (SSI)

HAIs Quick Facts

An **HAI** is any infection acquired as a result of a healthcare procedure.

HAIs can occur in any healthcare setting.

Nationally, HAIs affect **one in 31** hospitalized patients.[3]

Every day **198** hospitalized Americans die from HAIs.[4]

HAIs **can be prevented** through partnership between healthcare and public health to improve medical care and infection control.

NC SHARPPS Program: Your Partners in HAI Prevention

The mission of the NC Surveillance for Healthcare Associated and Resistant Pathogens Patient Safety (SHARPPS) Program is to work in partnership to prevent, detect and respond to events and outbreaks of healthcare-associated and antimicrobial-resistant infections in North Carolina.

- Detects, investigates and responds to HAIs and antibiotic-resistant threats and provides technical expertise for outbreak response.
- Collaborates with local, state and national partners in public health, healthcare and academia to develop and implement infection prevention and antibiotic stewardship strategies.
- Provides education and training to healthcare professionals to increase awareness and prevent HAIs and antimicrobial resistance.
- Validates data and evaluates trends in North Carolina HAIs and antimicrobial-resistance data.
- Communicates with regulatory, surveillance and public health agencies.
- Serves as a central resource hub for credible, up-to-date, evidence-based information for infection prevention, outbreak response and antimicrobial resistance.

For more information regarding HAIs and the NC SHARPPS Program, visit www.epi.publichealth.nc.gov/cd/hai/program.html and email nchai@dhhs.nc.gov

State of North Carolina • Department of Health and Human Services • Division of Public Health • Communicable Disease Branch
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[1] NC SHARPPS Program, NC Division of Public Health. Healthcare-associated infections in North Carolina: 2017 Annual report. May 2019. Available at https://epi.publichealth.nc.gov/cd/hai/figures/hai_may2019_annual_v2.pdf. Accessed January 25, 2019.

[2] APIC. APIC cost of healthcare-associated infections model. May 2011. Available https://apic.org/Resources/Cost-calculators. Accessed January 31, 2019

[3] CDC. HAI and Antibiotic Use Prevalence Survey. March 2017. Available at https://www.cdc.gov/hai/eip/antibiotic-use.html. Accessed Jan 25, 2019.

[4] New England Journal of Medicine. Changes in Prevalence of Health Care-Associated Infections in US Hospitals. November 2018. Available at https://www.nejm.org/doi/full/10.1056/NEJMoa1801550?url_ver=Z39.88-2003&rfr_id=ori%3Arid%3Acrossref.org&rfr_dat=cr_pub%3Dpubmed). Accessed Jan 31, 2019.

Appendix E. Healthcare Facility Groupings, 2018 National Healthcare Safety Network Annual Hospital Survey

Hospital Group	Name	Number of Beds
1-99 Beds	Cherokee Indian Hospital	1
	Vidant Bertie Hospital	6
	FirstHealth Moore Regional Hospital - Hoke Campus	8
	DLP - Swain Community Hospital	12
	Carolinas Healthcare System Anson	15
	North Carolina Specialty Hospital	18
	The Outer Banks Hospital	21
	Novant Health Medical Park Hospital	22
	Highlands Cashiers Hospital	24
	Blue Ridge Regional Hospital	25
	Angel Medical Center	25
	Dosher Memorial Hospital	25
	Vidant Chowan Hospital	25
	Wake Forest Baptist Health-Davie Hospital	26
	Wake Forest Baptist Health-Davie Medical Center	26
	Transylvania Regional Hospital	27
	Cape Fear Valley Hoke Hospital	29
	McDowell Hospital	30
	Johnston Health Clayton	34
	Central Harnett Hospital	34
	St Lukes Hospital	35
	Novant Health Clemmons Medical Center	36
	Person Memorial Hospital	38
	WakeMed North Family Health & Women's Hospital	44
	Novant Health Charlotte Orthopedic Hospital	48
	Martin General Hospital	49
	Novant Health Kernersville Medical Center	50
	Murphy Medical Center	51
	Annie Penn Hospital	53
	Granville Medical Center	62
	DLP - Harris Regional Hospital	68
	Columbus Regional Healthcare System	70
	Vidant Beaufort Hospital	70
	Kings Mountain Hospital	72
	Betsy Johnson Hospital	72
	Novant Health Brunswick Medical Center	74
	Carteret General Hospital	75
	Central Carolina Hospital	79
	FirstHealth Moore Regional Hospital - Richmond Campus	79

	Vidant Duplin Hospital	80
	Hugh Chatham Memorial Hospital	81
	Wake Forest Baptist Health-Lexington Medical Center	82
	Randolph Hospital DBA Randolph Health	85
	Catawba Valley Medical Center	90
	Halifax Regional Medical Center	90
	Novant Health Huntersville Medical Center	91
	Haywood Regional Medical Center	94
	Scotland Memorial Hospital	96
	Sentara Albemarle Medical Center	97
	Caldwell Memorial Hospital	97
	Maria Parham Medical Center	99
	Carolinas Medical Center- University	100
	Northern Hospital of Surry County	100
	Carolinas HealthCare System Lincoln	101
	UNC Rockingham Health	108
	Stanly Regional Medical Center	109
	Vidant Roanoke Chowan Hospital	114
	Sampson Regional Medical Center	116
	ARHS-Watauga Medical Center	117
	Vidant Edgecombe Hospital	117
	Lake Norman Regional Medical Center	123
100-199 Beds	Rutherford Regional Medical Center	125
	Women's Hospital	134
	Davis Regional Medical Center	141
	Pardee Hospital	142
	Wilson Medical Center	145
	Novant Health Thomasville Medical Center	146
	Wesley Long Hospital	150
	Carolinas Healthcare System Blue Ridge	151
	Novant Health Matthews Medical Center	157
	Onslow Memorial Hospital	162
	Lenoir Memorial Hospital, Inc	167
	Johnston Health	172
	Nash Health Care Systems	173
	WakeMed Cary	180
	Carolinas Medical Center - Union	182
	Duke Raleigh Hospital	187
	Frye Regional Medical Center	190
	Iredell Memorial Hospital	199
200-399 Beds	Carolinas Medical Center- Pineville	206
	Carolinas Medical Center- Mercy	213

	Duke Regional Hospital	222
	Alamance Regional Medical Center	238
	Carolinas Healthcare System Cleveland	241
	Southeastern Regional Medical Center	246
	Cherry Hospital	253
	Wayne Memorial Hospital	261
	Novant Health Rowan Medical Center	268
	Broughton Hospital	297
	High Point Regional Health System	300
	CarolinaEast Medical Center	350
	FirstHealth Moore Regional Hospital	362
	Moses Cone Hospital	368
>=400 Beds	Central Regional Hospital	405
	Gaston Memorial Hospital	435
	Carolinas Healthcare System - NorthEast	457
	Novant Health Presbyterian Medical Center	602
	Rex Healthcare	665
	New Hanover Regional Medical Center	711
	Mission Hospital	741
	Cape Fear Valley Health System	775
	WakeMed Raleigh	800
	Novant Health Forsyth Medical Center	859
Primary Medical School Affiliation	Wake Forest University Baptist Medical Center	885
	Carolinas Medical Center	898
	UNC Health Care	914
	Duke University Hospital	952
	Vidant Medical Center	974