2017

Annual Report May 2018

Healthcare-Associated Infections in North Carolina

2017 Annual Report

Product of:
N.C. Surveillance of Healthcare-Associated and Resistant Pathogens Patient Safety (SHARPPS) Program
N.C. Communicable Disease Branch
N.C. Division of Public Health
N.C. Department of Health and Human Services

N.C. SHARPPS Program

Overview of Healthcare-Associated Infections in North Carolina

The U.S. Centers for Disease Control and Prevention estimates that healthcare-associated infections affect one in 25 hospitalized patients, culminating in approximately 722,000 infections[1] and 75,000 deaths each year[2] as well as $28–$33 billion in excess costs.[3] In North Carolina, HAIs result in approximate direct costs to facilities ranging from $124 million to $348 million annually.[4] In 2017, 4,504 HAIs were reported by NC acute care hospitals, resulting in at least $ $19,742,140 of excess cost[5]. 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 2017.

Click here for fast facts about HAIs in North Carolina.

HAIs are infections caused by a variety of organisms, including bacteria and fungi, while receiving medical care. Hospitals are required to report specific types of HAIs to the North Carolina Division of Public Health (N.C. DPH). This report focuses on five important types of HAIs that occurred while patients were hospitalized in Acute Care Hospitals during January 1, 2017 – December 31, 2017. 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 was a product of this collaboration 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 N.C. DPH. Report definitions are provided (Appendix A). Prevention tips on HAIs are also provided (Appendix C). 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 as a whole. 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 state and hospital-specific progress to the national experience and to learn from best practices highlighted in our Stories of Success in Elimination.

The N.C. 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 health care 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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[2] Klevens RM, Edwards JR, Richards CL, Jr., et al. Estimating health care-associated infections and deaths in U.S. hospitals, 2002. *Public Health Rep.* Mar-Apr 2007;122(2):160-166. Available at http://www.cdc.gov/HAI/surveillance/index.html.

[3] 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 http://www.cdc.gov/HAI/surveillance/index.html.

[4] 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.

[5] APIC. APIC Cost of healthcare-associated Infections. May 2011 Available at https://apic.org/resources/cost-calculators. Accessed May 16, 2018.

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 N.C. SHARPPS Program, please visit http://epi.publichealth.nc.gov/cd/diseases/hai.
- To review background information on HAI surveillance in N.C. and details information on common statistics used: http://epi.publichealth.nc.gov/cd/hai/figures/hai_may2016_reference.pdf

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 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 D. In particular, the Program is grateful for their ongoing guidance and feedback on the presentation and content of N.C. DPH HAI reports.

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

Special Acknowledgement!

The NC Division of Health Service Regulation is a key partner in infection prevention specifically targeting long-term care facilities. Cindy Deporter, State Agency Director, Acute Home Care Assistant Section Chief of the Quality Evaluative Systems Nursing Home Section, has been instrumental in developing and maintaining this relationship. During a joint meeting in January 2018, we presented Cindy with an award in appreciation of her relationship and the effort conducted to assure patient safety in long-term care settings. Thank you, Cindy!

(L to R): Evelyn Foust, Cindy Deporter, Jennifer MacFarquhar, Dr. Zack Moore

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I. Highlights of Healthcare-Associated Infections Activities in 2017

A. N.C. 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 2017 include the following:

- ***Investigation and Response:*** In 2017, the SHARPPS Program led or participated in over 100 acute responses statewide, including outbreaks, bloodborne pathogen exposures, and sentinel event investigations. Of these responses, 30 were outbreaks, the vast majority (21 or 70%) of which occurred in long term care facilities. This is in line with the broader Communicable Disease Branch's outbreak response from January 1 – December 31, 2017: A total of 320 outbreaks were reported to the Communicable Disease Branch and 243 or 79% occurred in long term care facilities.

- ***Program Infrastructure:*** The SHARPPS team has grown and now consists of a program director, medical director, 3 epidemiologists (2 permanent and 1 temporary FTE), and a health educator! From a quarterly newsletter to program infographics, this year the SHARPPS team worked to increase communication and outreach to our HAI stakeholders and consumers! Communication highlights include the development and dissemination of an interfacility transfer tool: http://epi.publichealth.nc.gov/cd/hai/docs/InterfacilityTransferInstructionsandForm.pdf and a half-day training on multidrug resistant organisms (MDROs) provided to long-term care facilities.

The SHARPPS team (L to R) Katie Steider, Savannah Carrico, Heather Dubendris, James Lewis, Jennifer MacFarquhar

- ***One and Only Safe Injection Practices Campaign:*** NC SHARPPS worked to improve safe injection practices through the One & Only injection safety campaign. The SHARPPS Program and One & Only Campaign 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 six presentations in addition to additional exhibits/educational events.

- ***Be Antibiotics Aware- Smart Use Best Care:*** This campaign supports public and provider awareness about the dangers of unnecessary use of antibiotics. To commemorate National Be Antibiotics Aware Week in November 2017, NC SHARPPS developed new materials and activities to enhance consumer education about antibiotics and appropriate use thereof. The second annual children's artwork competition was held for children in pre-kindergarten to 12th grade to introduce appropriate antibiotic use. Schools, daycares, and pediatric offices were

recruited to promote the competition and collect submissions and 5 winning artwork submissions were converted into posters. SHARPPS team members also created and disseminated an MDRO toolkit and created or adapted 6 new patient handouts with facts on appropriate antibiotic use.

- ***Antimicrobial Resistance:*** The SHARPPS program and the NC State Laboratory of Public Health (SLPH) remain involved in the surveillance and response of antimicrobial resistant organisms through the Centers for Disease Control and Prevention (CDC) Antibiotic Resistance Laboratory Network (ARLN). ARLN funding provides infrastructure and laboratory capacity to detect and support response to antimicrobial resistant organisms including Carbapenem Resistant Enterobacteriaceae (CRE). The SHARPPS program partnered with sentinel laboratories to continue the routine submission of CRE isolates to SLPH for molecular characterization. DPH continues to expand outreach to facilities for participation in CRE testing as capacity increases. Through ARLN, DPH routinely facilitates shipping of swabs for colonization screens in accordance with CDC's containment strategy. DPH is working to increase capacity at clinical laboratories as well. DPH administered the laboratory capacity survey in late summer of 2017 to assess facilities' capacity to detect and respond to CRE and is working in partnership with microbiologists throughout NC to develop laboratory guidance for identifying CRE.

- ***Data Validation:*** In 2017, the SHARPPS program continued to prioritize data validation. Eleven facilities participated in validation of laboratory-identified MRSA events. Validation of laboratory-identified CDI and CLABSIs are currently underway.

- ***Antimicrobial Stewardship***: An antimicrobial resistance and stewardship (ARAS) subcommittee was established this year comprised of multidisciplinary experts and representatives from partner organizations. The initial ARAS subcommittee meeting laid the inceptive groundwork for the Stewardship of Antimicrobial Resources (STAR) Partners initiative. This initiative will address activities related to antimicrobial resistance, surveillance and stewardship. The initiative will aim to encourage and motivate acute care hospitals to promote stewardship activities within their facilities and 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. STAR Partners will encourage and motivate facilities to institute and expand stewardship efforts by providing 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: http://epi.publichealth.nc.gov/cd/antibiotics/star_partners.html

- ***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 receive additional outreach twice a year. This follow-up includes 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 subsequently conduct individual follow up calls with these facilities to discuss their data and how SHARPPS may assist with their HAI prevention goals. We use 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 (N.C. SPICE)

NC SPICE promotes prevention and control of healthcare-associated infections in North Carolina by providing evidence-based education and consultation across the healthcare spectrum.

Classroom Courses:

- In 2017, SPICE held four classroom courses targeting new infection preventionists (IPs) in acute and long-term care settings, training 418 healthcare professionals.

In-services/presentations:

- One infection prevention training session was held for North Carolina Division of Health Service Regulation (DHSR) Surveyors, training 100 surveyors.
- Participated as faculty in Safe Injection Train the Trainer Workshop for NC SHARPPS Program on 3/23/17 and 10/30/17
- Held Infection Prevention Symposium on 4/28/17, honoring William A. Rutala at his retirement.
- Sponsored Antibiotic Stewardship in LTCFs Webinar on 5/17/17; presenter Dr. Lisa Davidson
- AHEC/APIC Presentation in Greensboro 9/7/17
- In-service lecture for NCDPH staff and nurse consultants 9/13/17
- Developed video tours of UNC Health Care Nutrition and Food Services, and Pharmacy 10/17/17
- Invited by Tennessee DPH to provide IC in LTCFs one-day course at three Tennessee locations October 20, 23, 24, 2017.
- Provided 1.5-hour lecture at Wrightsville Beach for the NC AORN chapter, topic SSI prevention 11/4/17

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. 474 modules completed.
- Coursera also houses these modules as a course. To date, 572 have completed all 6 modules.
- Outpatient, Dental and Home Health/Hospice Settings sessions continued to be taught via classroom, webinar and on-line formats. 1040 healthcare personnel completed this curriculum

Phone and email consultations

- SPICE provided 896 infection control consultations by phone or email in 2017.

Infection Control, Assessment, and Response (ICAR) Project

- Three nurse consultants conducted on-site infection control assessments in 138 healthcare facilities in 2017, bringing total facilities assessed to 277.
- New SPICE website was launched in May 2017.
- Conducted focus group and surveying of outpatient facilities to develop marketing campaign.
- Revised .0206 outpatient course, and continued work on interactive, on-line version.
- Presentation to Western North Carolina Chapter of Medical Group Management Assoc., August 2017.

North Carolina Division of Health Service Regulation (DHSR)

In 2017, DHSR conducted or participated in the following:

1. Annual training to approximately 100 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 to Long Term Care (LTC) and Acute Home Care Surveyors and nursing home administrators;
3. Centers for Medicaid and Medicare Services (CMS) mandatory training for all Long-Term Care (LTC) surveyors;
4. A series of three CMS Infection Control webinars mandatory for all Nursing Home surveyors. These webinars addressed Contact Precautions, multi-drug resistant organism's (MDRO's), 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.

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; North Carolina Division of Public Health (NC DPH); 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)

- Technical Assistance provided for 50+ North Carolina Long Term Care Facilities currently reporting *Clostridium difficile* 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 Outpatient Antibiotic Stewardship in 140 recruited providers in the outpatient settings of Emergency Services, Urgent Care and Physician Practices across NC provided through newsletters, on-site and telephonic meetings, and consultative conferences.
- Serve as collaborative partners on efforts to reduce Healthcare Acquired Infections underway in dialysis centers.
- Serves on consultative workgroups for the Pneumonia Knockout program as well as the STAR 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

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

The Journey to Zero is long and sometimes arduous but well worth the effort. For seven years, CarolinaEast has been on a path and now is able to report a zero CLABSI rate for the past 11 months! This has been accomplished through multiple interventions during this time, which are briefly summarized below:

- Champions at the top – CEO, CNO, and CMO
- Champions at the staff level – Infection Prevention Liaison Program, staff level nurses with advanced training in Infection Prevention
- Central line insertion bundle
- Central line care bundle that includes CHG dressings and CHG bathing
- "Scrub the hub" device
- Annual return demonstration competency for central lines
- Staff engagement through bundle audits, safety huddle, safety boards, "days since" goals and celebrations when goals were met
- Case Reviews of every infection with opportunities completed by care providers

While all interventions are important, and evidence based, the last three were implemented most recently and proved to be highly effective at engaging staff and changing behavior. Celebrations when goals were met included small baskets of "goodies" and positive feedback. The staff have taken pride in their accomplishments, patients have clearly benefitted, and the challenges remain to "maintain the gain."

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II. Explanation of Statewide Healthcare-Associated Infections Data

The HAI Annual Report for 2017 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). 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, 2017 – December 31, 2017. 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 F.

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.

D. WHAT DO THE NUMBERS MEAN?

This report shows how the state performed during a single year (2017) and compares each year'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.

E. 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/2017/pcsmanual_2017.pdf).

F. THINGS TO CONSIDER WHEN LOOKING AT THE REPORT

A total of 114 North Carolina hospitals reported HAIs in 2017, including 92 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, 2017 - December 31, 2017. Data were downloaded from the National Healthcare Safety Network (NHSN) on May 25, 2018; 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.

III. Statewide Healthcare-Associated Infections

A. Central Line-Associated Bloodstream Infections (CLABSI)

1. CLABSI in Adult/Pediatric ICUs

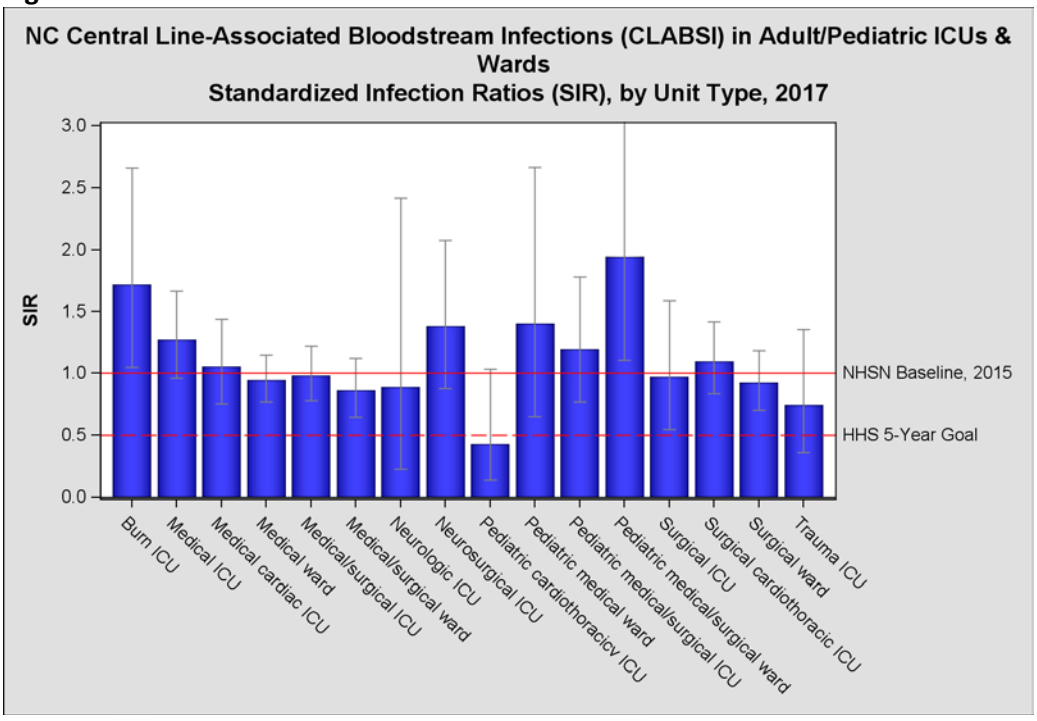
North Carolina 2017 CLABSI Highlights in Adult/Pediatric Medical, Surgical and Medical/Surgical Wards & ICUs

- North Carolina hospitals reported 533 infections, compared to the 521 infections predicted by the national experience; this was about the same as the 2015 national experience.
- In 2017, 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 spp.*.

Table 1. N.C. Central Line Associated Bloodstream Infections (CLABSI) in Adult/Pediatric Medical, Surgical and Medical/Surgical Wards & ICUs, 2017

Year	# Observed Infections	# Predicted Infections	How Does North Carolina Compare to the National Experience?
2017	533	520.58	= Same: about the same number of infections as were predicted (same as the national experience)

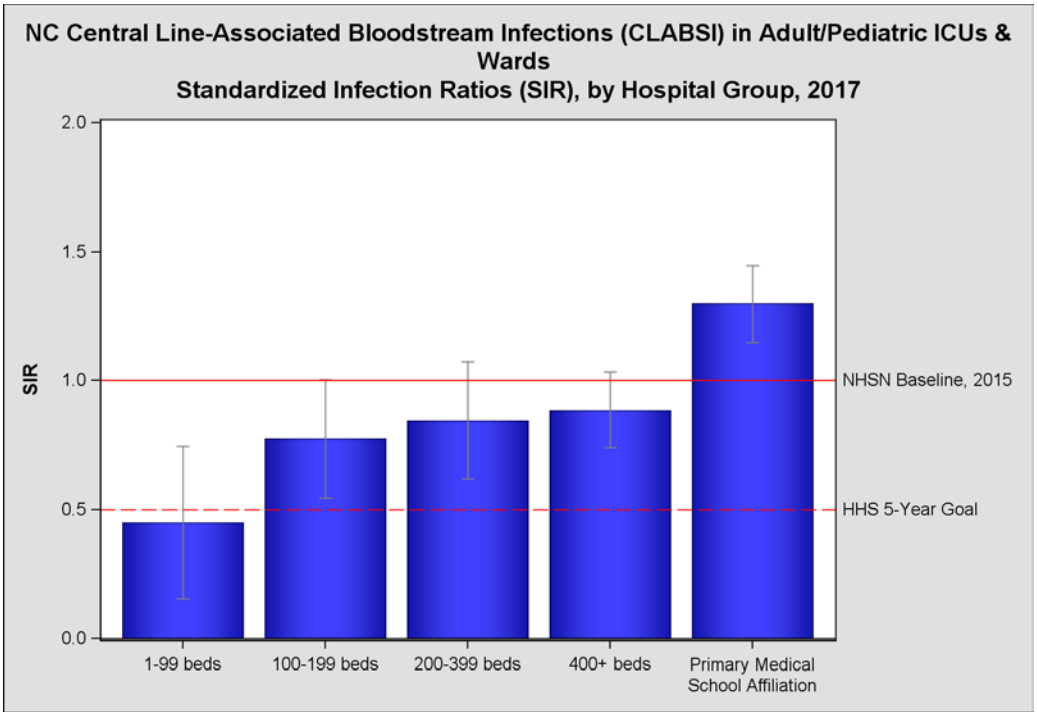
Figure 1.



How to Understand Figure 1:

- Most location types reported about the same number of CLABSIs as predicted, performing the SAME as the national experience
- In 2017, pediatric medical/surgical wards and burn ICUs reported more infections than predicted, performing WORSE than the national experience

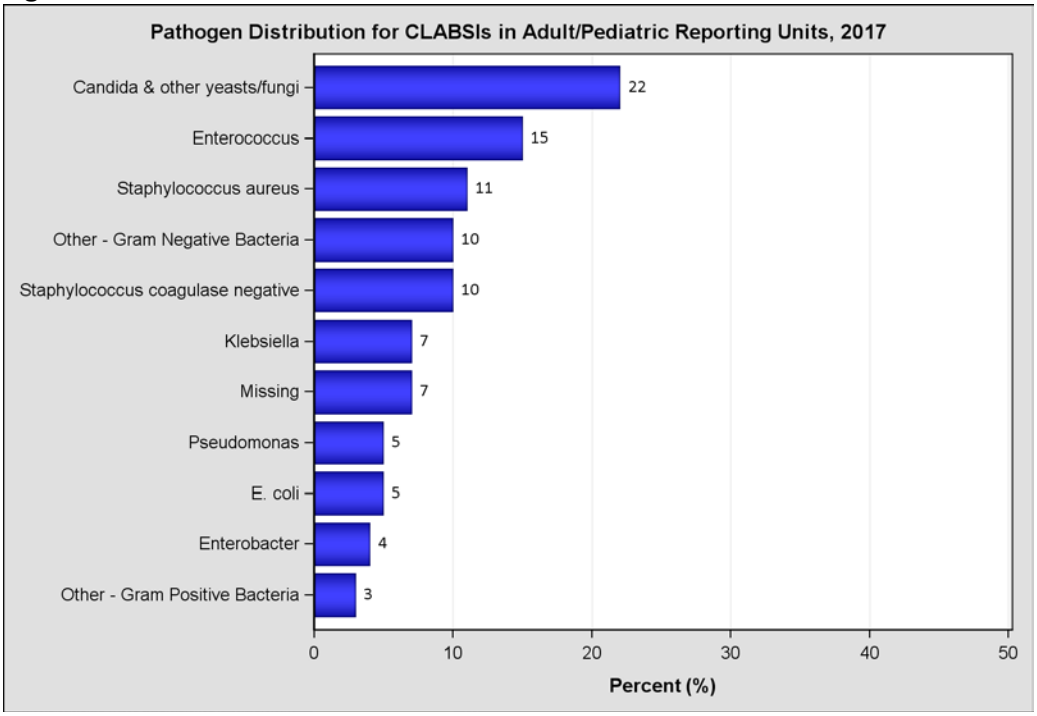
Figure 2.



How to Understand Figure 2:

- There is variability in CLABSIs by facility size
- In 2017, hospitals with less than 100 beds observed fewer CLABSIs than predicted, performing BETTER than the national experience
- Hospitals with a primary medical school affiliation observed more CLABSIs than predicted, performing WORSE than the national experience

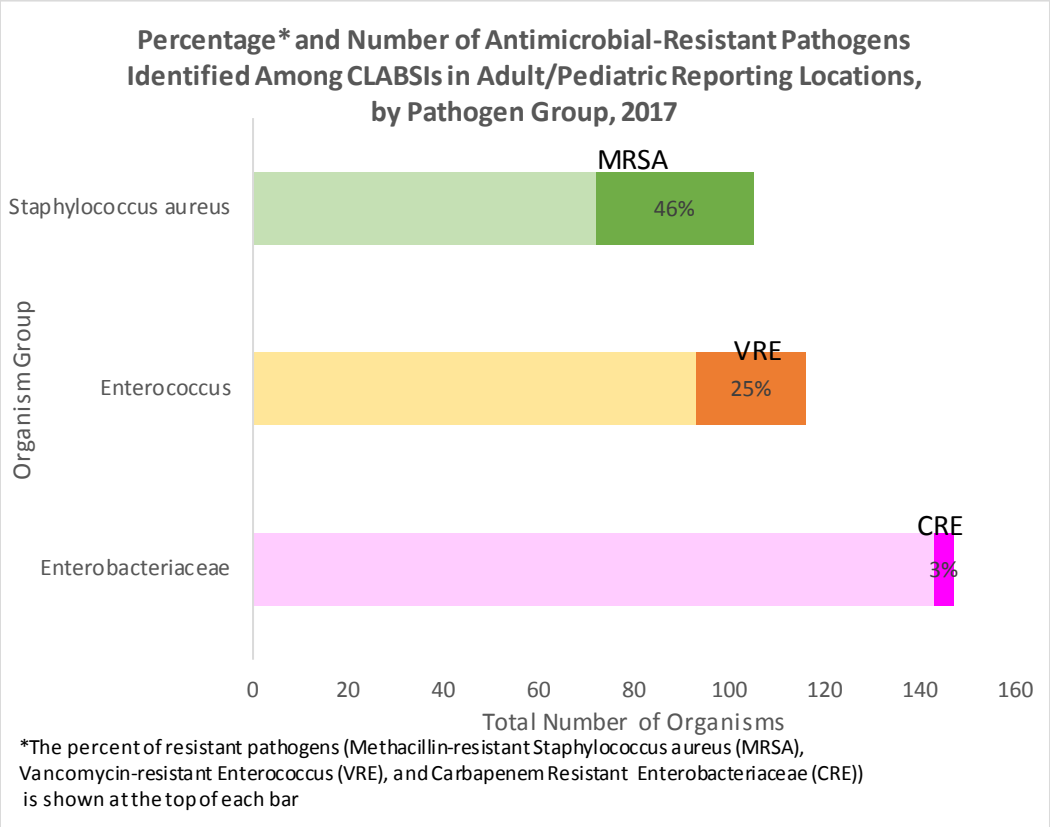
Figure 3.



How to Understand Figure 3:

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

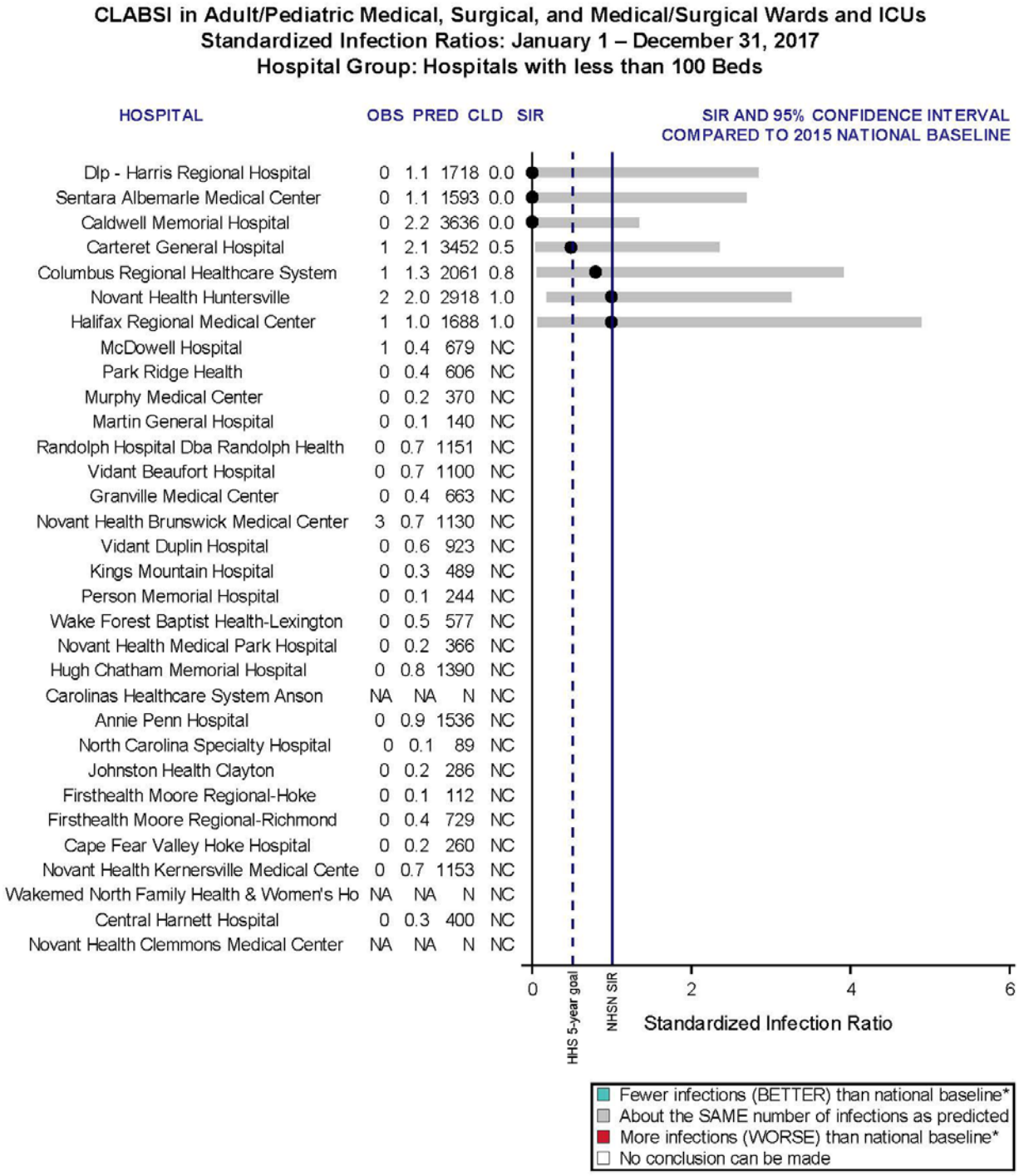
Figure 4.



How to Understand Figure 4:

- In 2017, 46% of *Staphylococcus aureus* identified among adult/pediatric CLABSIs were resistant to methicillin.
- 25% 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%).

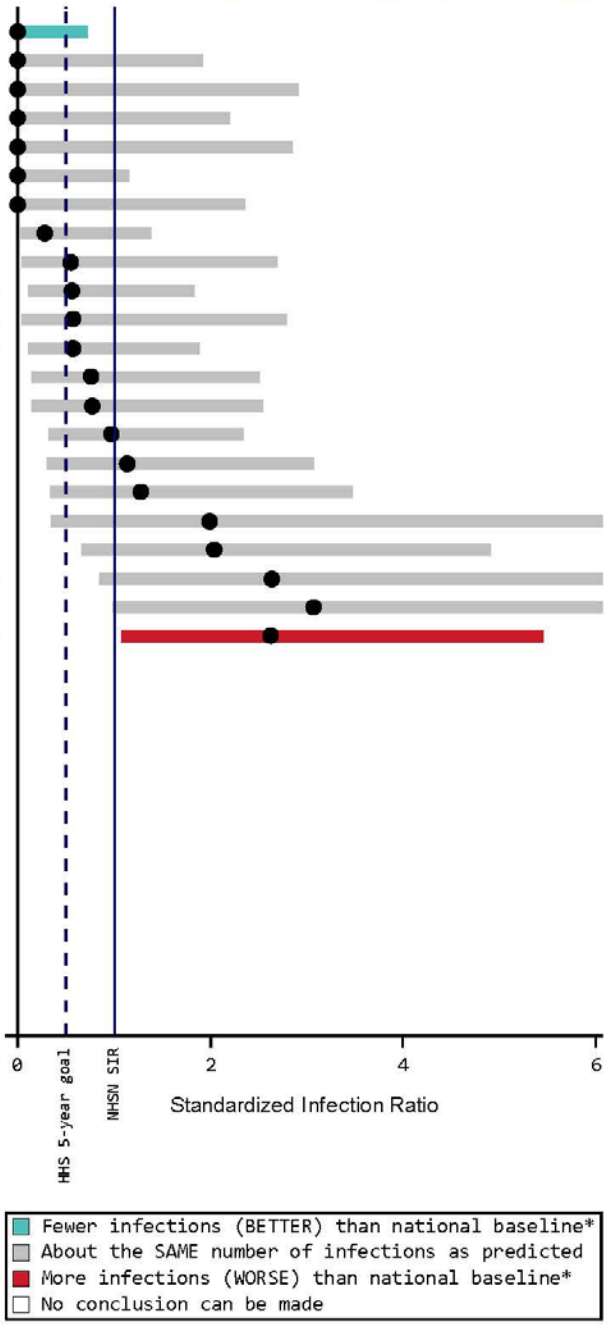
The following SIR plots summarize CLABSI infection data among Adult/Pediatric locations for North Carolina hospitals by hospital groups (Appendix E).



Data reported from adult/pediatric units as of May 25, 2018 .
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 central line days
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, 2017
Hospital Group: Hospitals with 100 to 199 Beds

HOSPITAL	OBS	PRED	CLD	SIR
Vidant Edgecombe Hospital	0	4.2	4627	0.0
Carolinas Medical Center-University	0	1.6	1924	0.0
Rutherford Regional Medical Center	0	1.0	1517	0.0
Maria Parham Medical Center	0	1.4	1918	0.0
Lake Norman Regional Medical Center	0	1.1	1540	0.0
Catawba Valley Medical Center	0	2.6	3727	0.0
Central Carolina Hospital	0	1.3	1845	0.0
Wesley Long Hospital	1	3.6	3945	0.3
Johnston Health	1	1.8	2706	0.5
Duke Raleigh Hospital	2	3.6	5313	0.6
Carolinas Healthcare System Lincoln	1	1.8	2581	0.6
Frye Regional Medical Center	2	3.5	4910	0.6
Iredell Memorial Hospital	2	2.6	3805	0.8
Wilson Medical Center	2	2.6	3756	0.8
Nash Health Care Systems	4	4.1	5983	1.0
Novant Health Matthews Medical Center	3	2.7	3385	1.1
WakeMed Cary Hospital	3	2.4	3420	1.3
Stanly Regional Medical Center	2	1.0	1483	2.0
Carolinas Medical Center-Union	4	2.0	2750	2.0
Pardee Hospital	4	1.5	1931	2.6
Carolinas Healthcare System Blue Ridge	4	1.3	1610	3.1
Lenoir Memorial Hospital	6	2.3	3385	2.6
Haywood Regional Medical Center	0	0.9	1169	NC
ARHS-Watauga Medical Center	0	0.3	422	NC
Davis Regional Medical Center	0	0.6	847	NC
Vidant Roanoke Chowan Hospital	0	0.9	1105	NC
Novant Health Thomasville Medical Center	2	0.7	927	NC
Sampson Regional Medical Center	0	0.5	618	NC
Northern Hospital Of Surry County	0	0.4	506	NC
Scotland Memorial Hospital	0	0.1	188	NC
Onslow Memorial Hospital	1	0.8	1036	NC
Betsy Johnson Hospital	0	0.8	1059	NC
UNC Rockingham Health	0	0.5	746	NC
Wake Forest Baptist Health Wilkes Medica	0	0.4	555	NC
Women's Hospital	NA	NA	N	NC

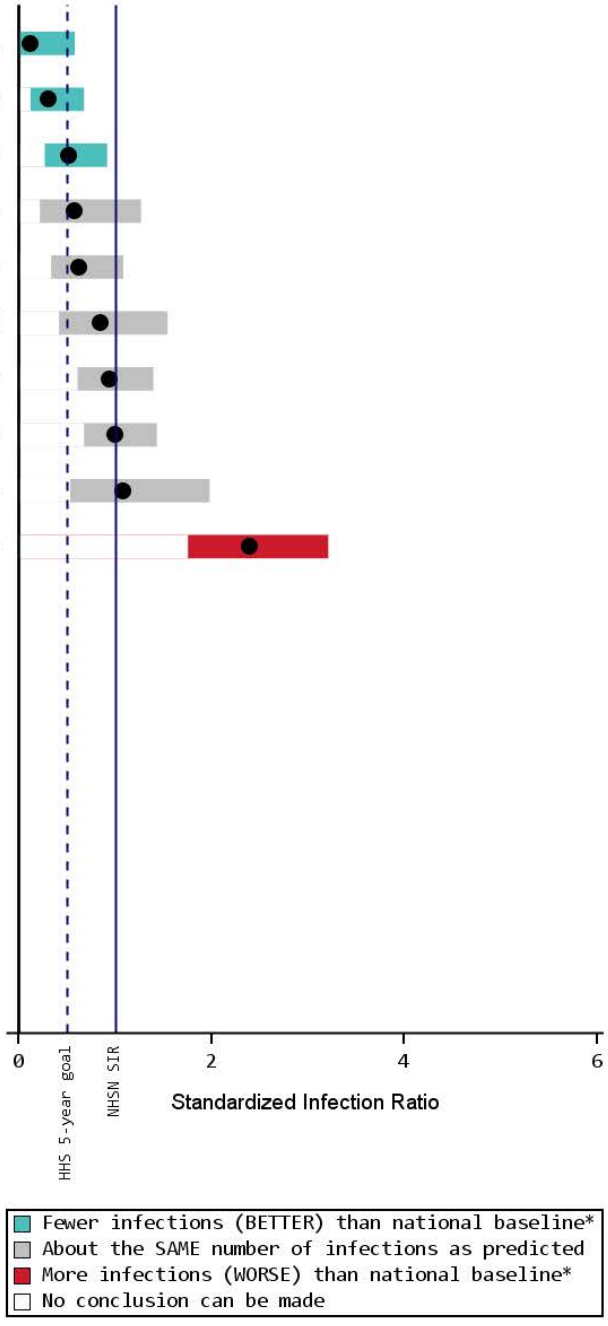


Data reported from adult/pediatric units as of May 25, 2018 .
OBS = # infections observed
PRED = # infections statistically 'predicted' by national baseline
CLD = # central line days
SIR = Standardized infection ratio (OBS/PRED # of infections)
NA = Data not shown for hospitals with <50 central line days
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, 2017
Hospital Group: Hospitals with 400 or More Beds

HOSPITAL	OBS	PRED	CLD	SIR
Gaston Memorial Hospital	1	8.6	8047	0.1
Rex Healthcare	5	16.6	16036	0.3
New Hanover Regional Medical Center	10	19.7	18707	0.5
Carolinas Healthcare System - Northeast	5	8.8	9502	0.6
Moses Cone Hospital	11	17.8	16488	0.6
Cape Fear Valley Health System	9	10.8	11102	0.8
WakeMed	22	23.6	20951	0.9
Mission Hospital	27	27.2	25508	1.0
Novant Health Presbyterian Medical	9	8.4	9988	1.1
Novant Health Forsyth Medical Center	42	17.6	18406	2.4

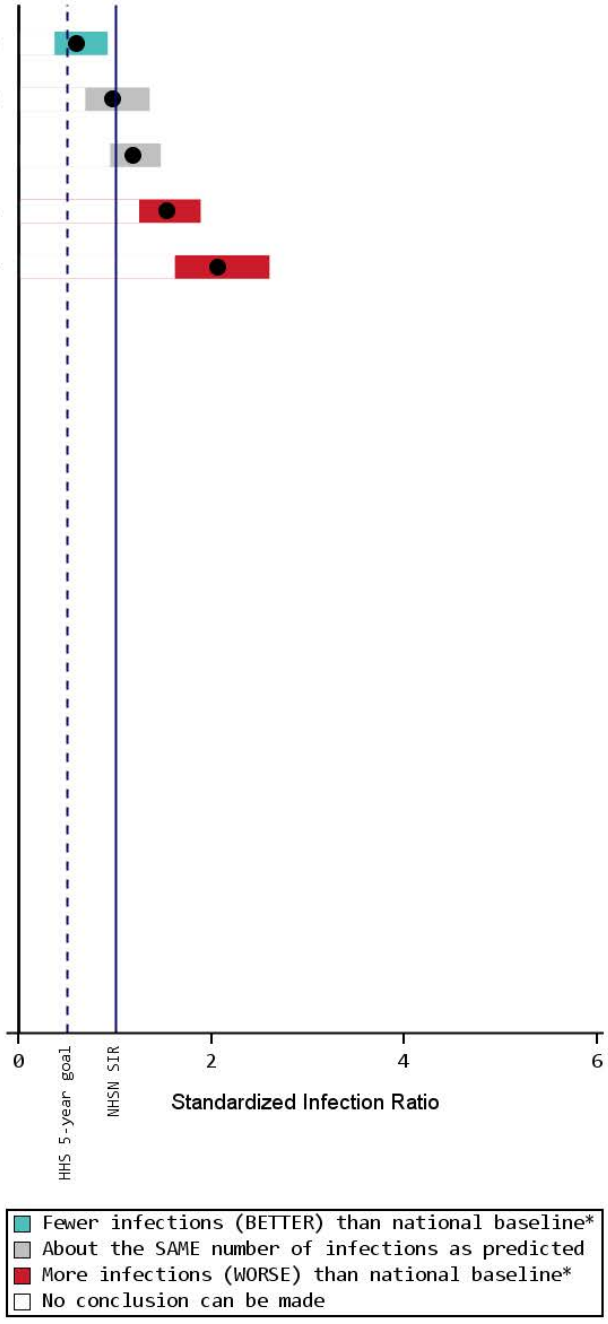
SIR AND 95% CONFIDENCE INTERVAL
COMPARED TO 2015 NATIONAL BASELINE



Data reported from adult/pediatric units as of May 25, 2018 .
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 central line days
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, 2017
Hospital Group: Hospitals with Primary Medical School Affiliation

HOSPITAL	OBS	PRED	CLD	SIR
Vidant Medical Center	18	30.6	28492	0.6
Carolinas Medical Center	33	34.0	29358	1.0
Duke University Hospital	78	66.2	60441	1.2
UNC Health Care	89	58.1	48603	1.5
Wake Forest University Baptist Medical	68	33.1	29642	2.1



Data reported from adult/pediatric units as of May 25, 2018 .
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 central line days
NC = SIR not calculated for hospitals with <1 predicted infection
*Significantly different than 2015 national baseline

2. CLABSI in Neonatal Intensive Care Units

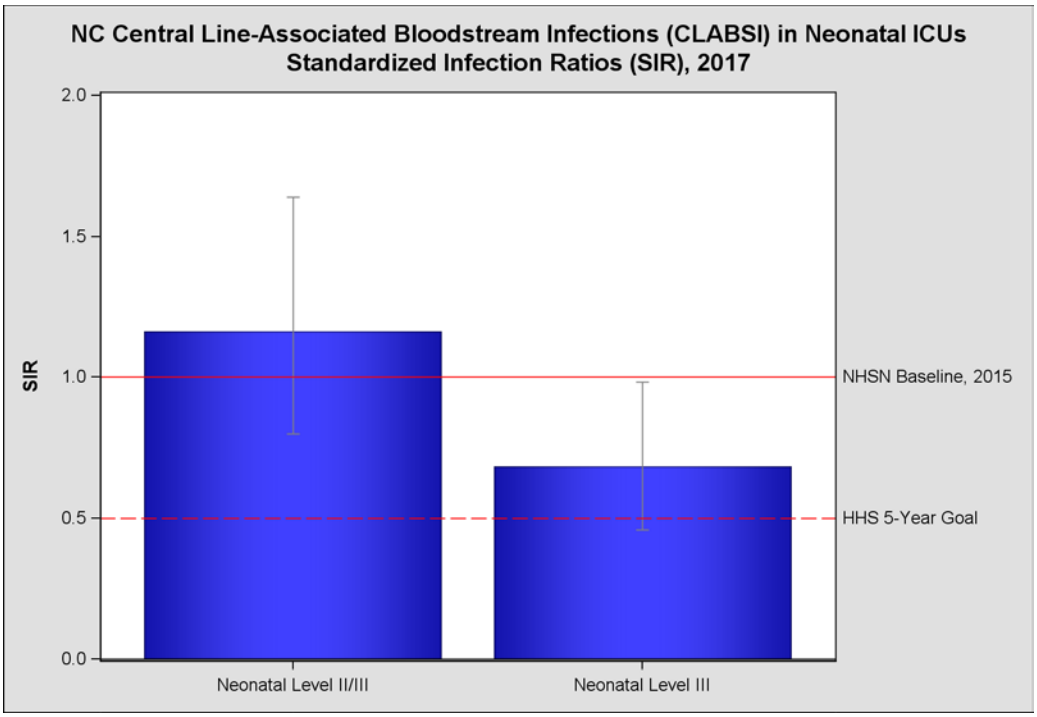
North Carolina 2017 CLABSI Highlights in NICUs

- In 2017, North Carolina hospitals reported 57 infections in neonatal ICUs, compared to the 65 infections that were predicted. This was about the same as the 2015 national experience.
- In 2017, 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 *Staphylococcus aureus*.

Table 3. N.C. Central Line Associated Bloodstream Infections (CLABSI) in neonatal ICUs, 2017

Year	# Observed Infections	# Predicted Infections	How Does North Carolina Compare to the National Experience?
2017	**57**	**65.26**	= Same: about the same number of infections as were predicted (same as the national experience)

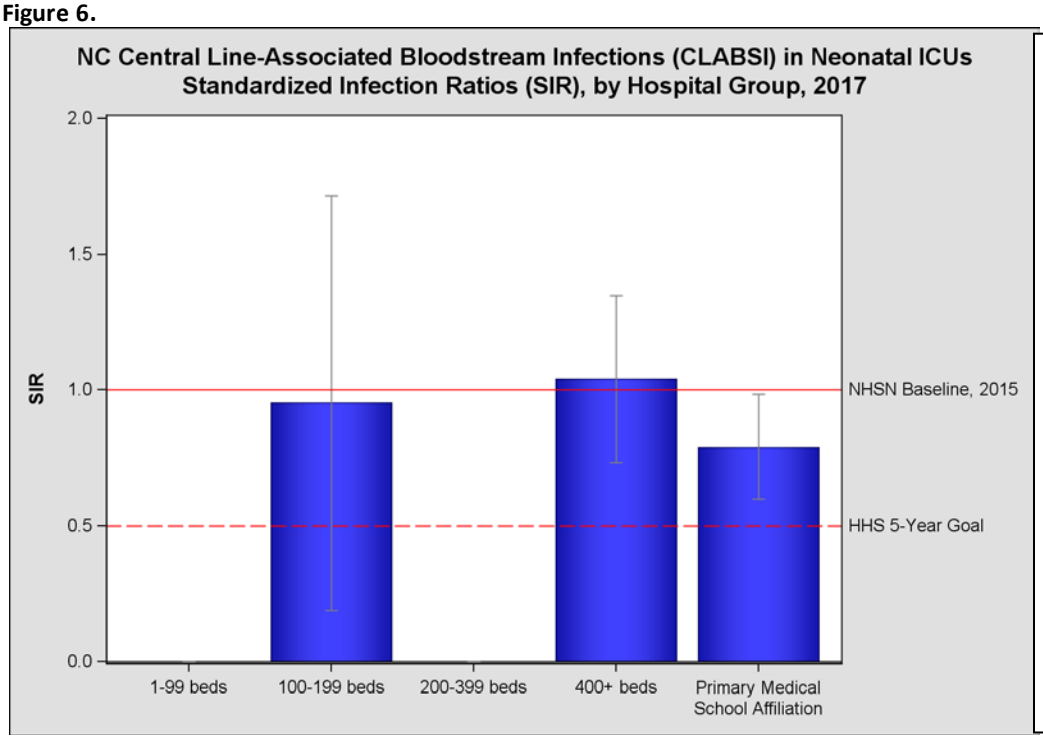
Figure 5.



How to Understand Figure 5:

- In 2017, level II/III and 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 ICU III locations met the HHS 5-year goal.

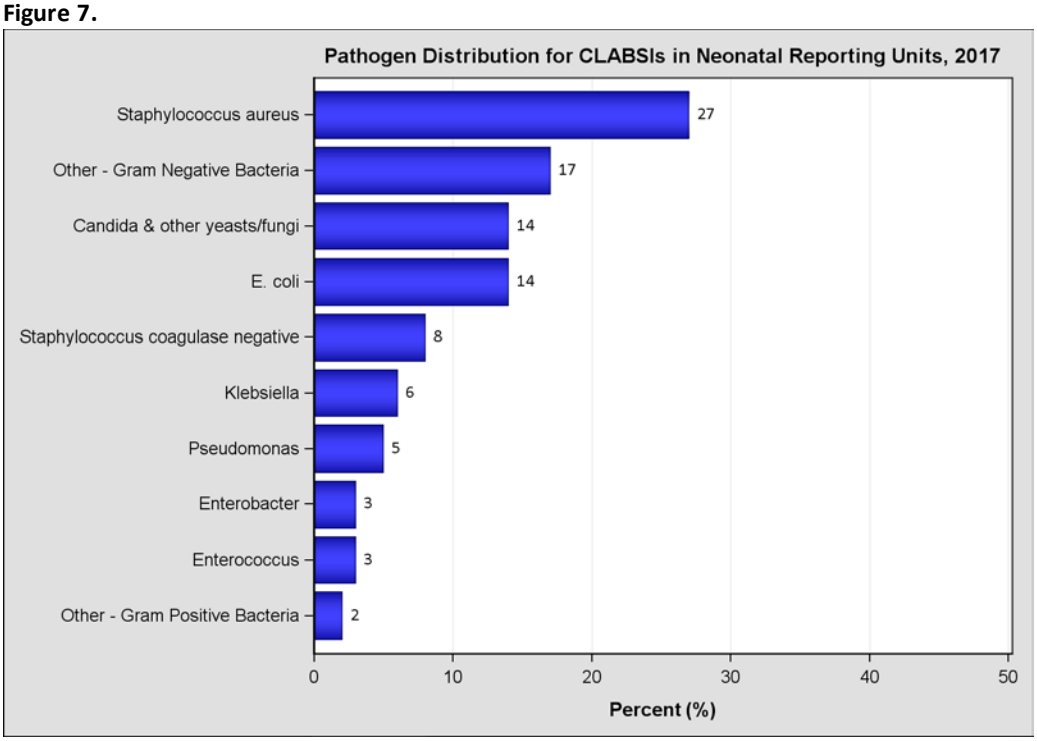
Figure 6.



How to Understand Figure 6:

- Not all hospital size groups have NICU locations
- Hospitals with 100-199 beds and 400+ beds reported the same number of CLABSIs as predicted, performing the SAME as the 2015 national experience
- Hospitals with a primary medical school affiliation reported fewer CLABSIs in NICUs than predicted, performing BETTER than the 2015 national experience

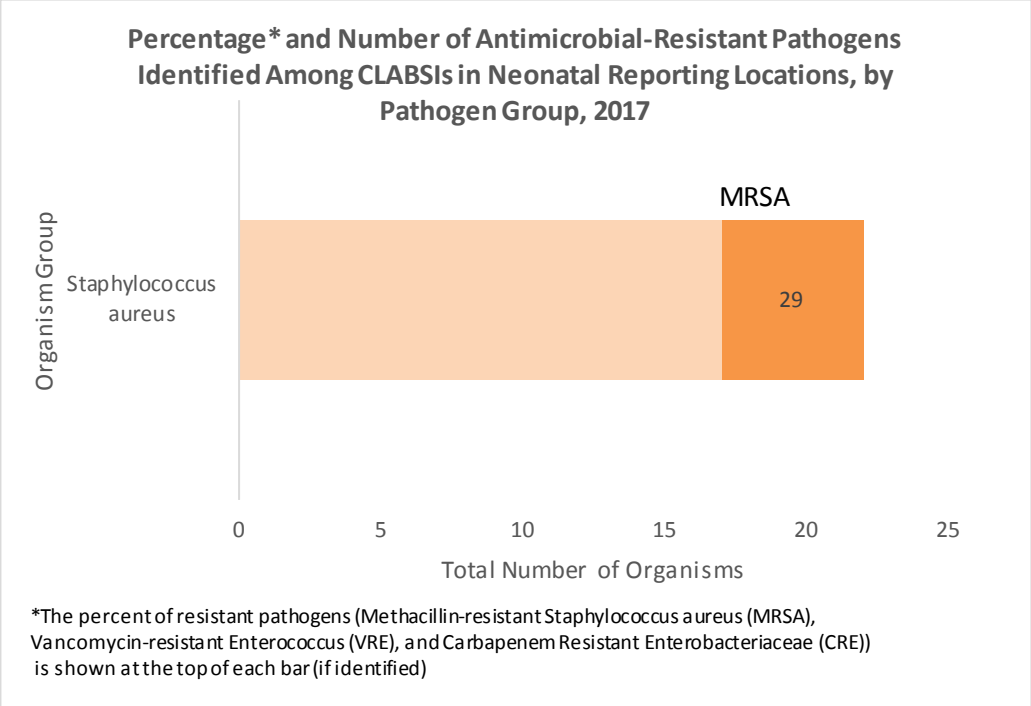
Figure 7.



How to Understand Figure 7:

- In 2017, *Staphylococcus aureus* (27%), 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 8.



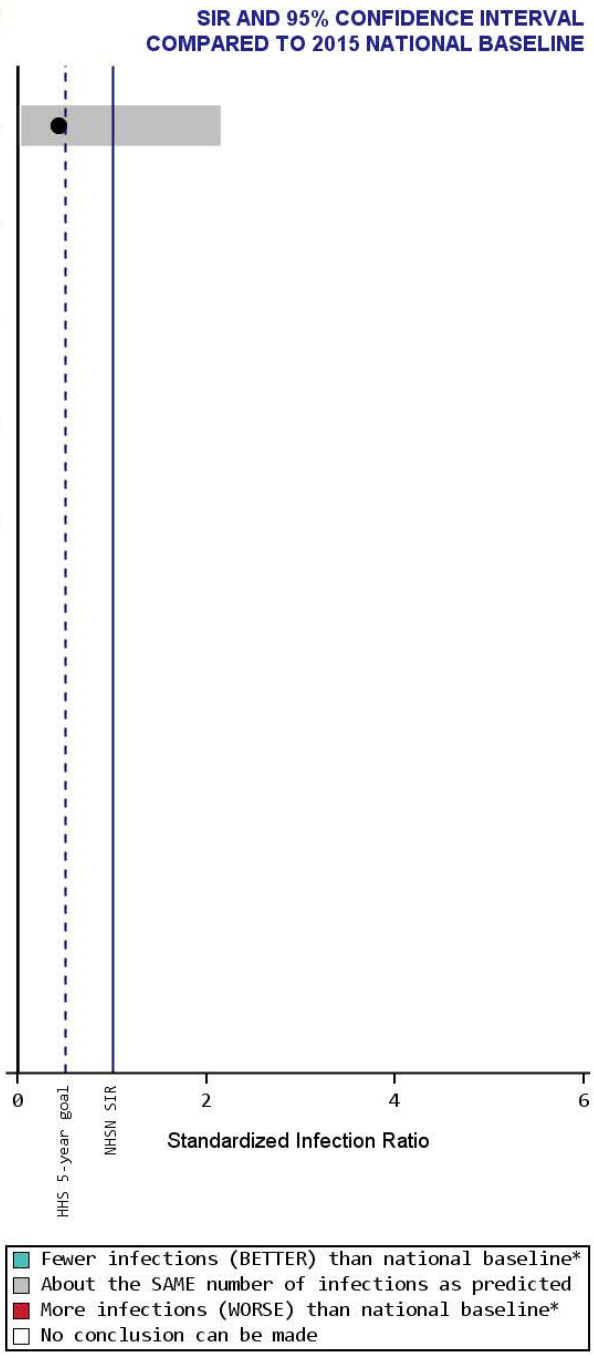
How to Understand Figure 8:

- In 2017, five of 17 (29%) *Staphylococcus aureus* identified among observed CLABSI infections in NICUs 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, 2017
Hospital Group: Hospitals with 100 to 199 Beds

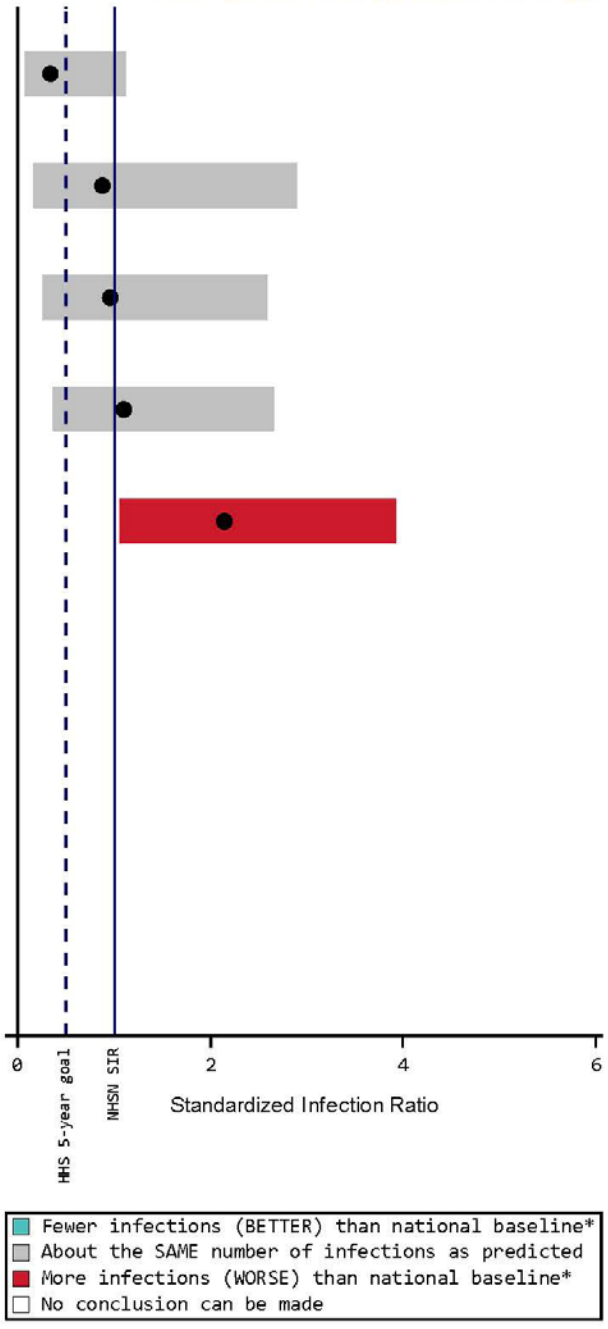
HOSPITAL	OBS	PRED	CLD	SIR
Women's Hospital	1	2.3	1714	0.4
Carolinas Medical Center-University	NA	NA	N	NA
Nash Health Care Systems	NA	NA	N	NA
Novant Health Matthews Medical Center	NA	NA	N	NA
Onslow Memorial Hospital	NA	NA	N	NA
Catawba Valley Medical Center	2	0.8	659	NC



Data reported from neonatal units as of May 25, 2018 .
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, 2017
Hospital Group: Hospitals with 400 or More Beds

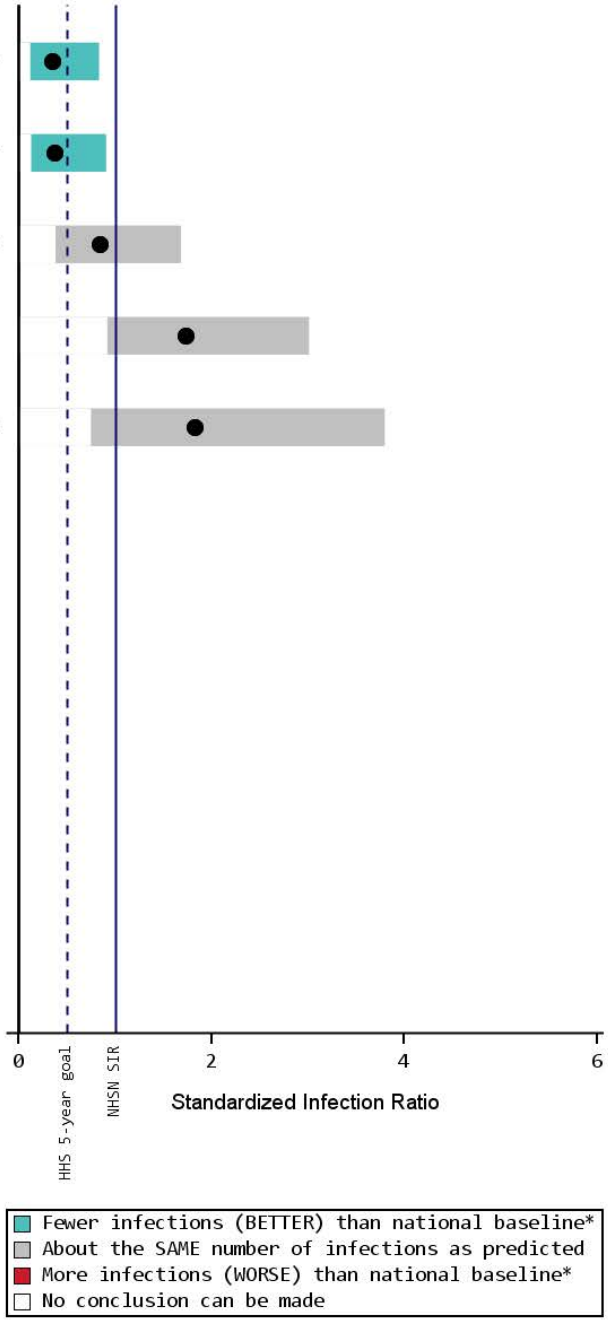
HOSPITAL	OBS	PRED	CLD	SIR
Novant Health Presbyterian Medical	2	5.9	3417	0.3
Mission Hospital	2	2.3	1560	0.9
New Hanover Regional Medical Center	3	3.2	1861	1.0
WakeMed	4	3.6	2562	1.1
Novant Health Forsyth Medical Center	9	4.2	2285	2.1
Rex Healthcare	0	0.4	455	NC
Carolinas Healthcare System - Northeast	0	0.7	420	NC
Gaston Memorial Hospital	1	0.2	231	NC
Cape Fear Valley Health System	1	0.6	356	NC



Data reported from neonatal units as of May 25, 2018 .
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, 2017
Hospital Group: Hospitals with Primary Medical School Affiliation

HOSPITAL	OBS	PRED	CLD	SIR
Duke University Hospital	4	11.7	7574	0.3
Carolinas Medical Center	4	10.8	7303	0.4
Wake Forest University Baptist Medical	7	8.3	6065	0.8
UNC Health Care	11	6.4	4525	1.7
Vidant Medical Center	6	3.3	2080	1.8



Data reported from neonatal units as of May 25, 2018 .
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)

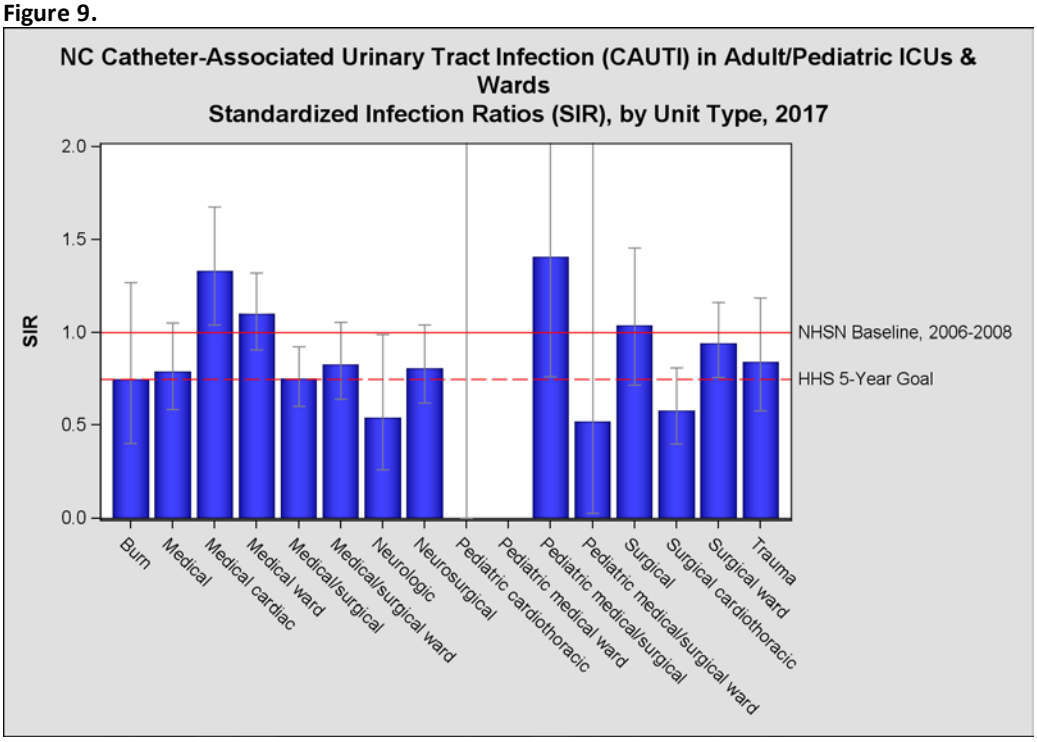
North Carolina 2017 CAUTI Highlights

- In 2017, North Carolina hospitals reported 636 CAUTI infections, compared to the 717 infections that were predicted. This was better than the 2015 national experience.
- In 2017, 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 *Enterococcus*

Table 5. N.C. Catheter-Associated Urinary Tract Infections (CAUTI) in ICUs and wards, by year, 2012-2016

Year	# Observed Infections	# Predicted Infections	How Does North Carolina Compare to the National Experience?
2017	637	717.3	★Better: Fewer infections than were predicted (better than the national experience)

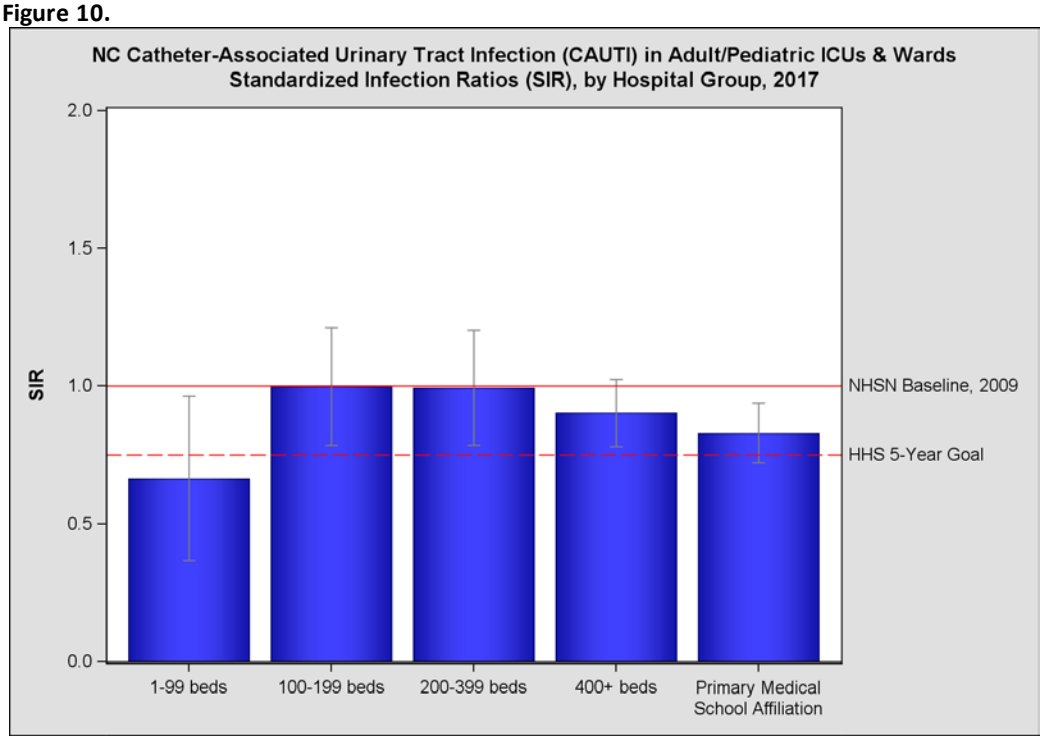
Figure 9.



How to Understand Figure 9:

- Medical cardiac locations reported more CAUTIs than predicted, performing WORSE than the 2015 national experience
- Medical/surgical ICUs and Neurologic reported fewer CAUTIs than predicted, performing BETTER than the national experience
- Most other locations reported the same number of CAUTIs as predicted by the 2015 national experience

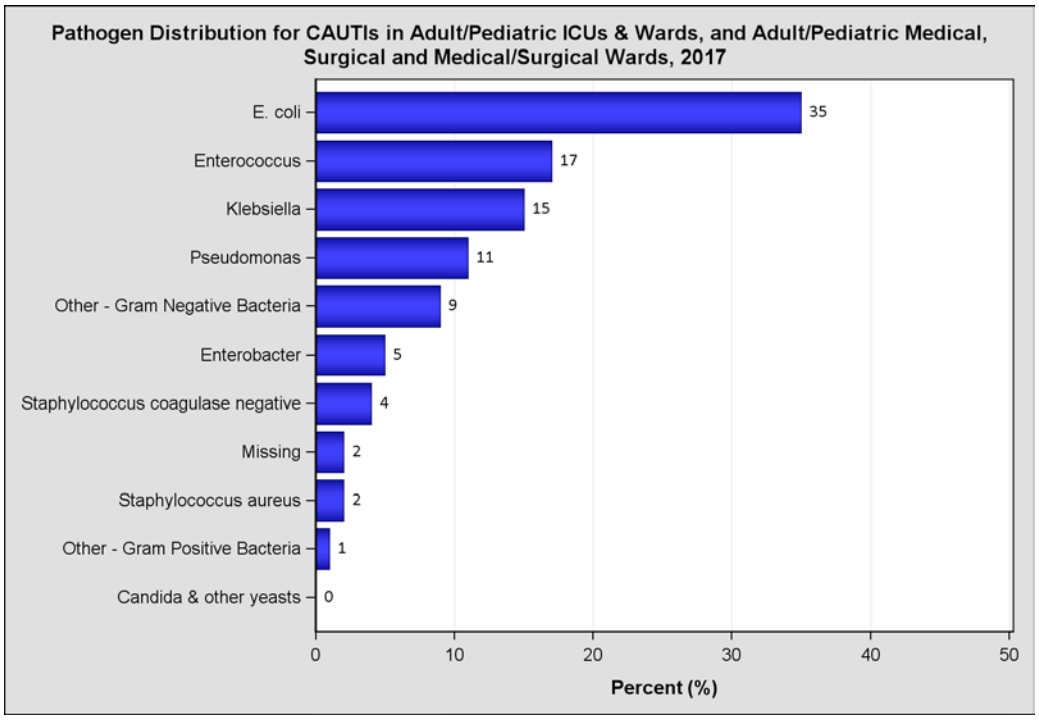
Figure 10.



How to Understand Figure 10:

- In 2017, hospitals with less than 100 beds and those affiliated with a primary medical school reported fewer CAUTIs than predicted, performing BETTER than the 2015 national experience
- All other hospital sized groups reported about the same number of infections as predicted, performing the SAME as the 2015 national experience

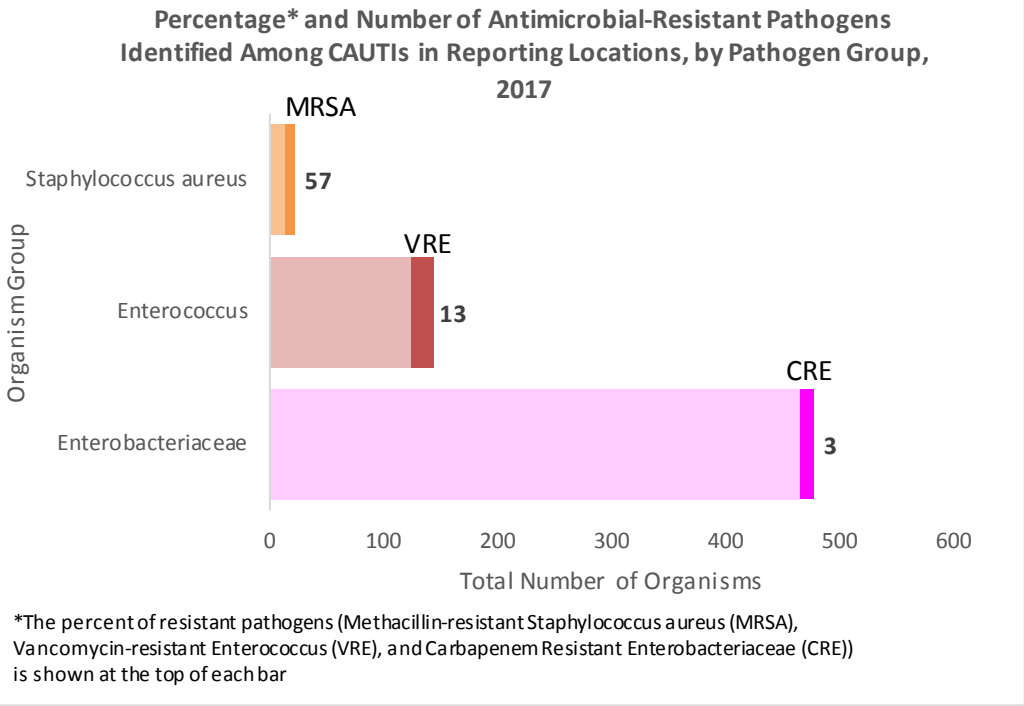
Figure 11.



How to Understand Figure 11:

- *E. coli* (35%) and *Enterococcus* (17%) were the most commonly identified pathogens among reported CAUTI infections in 2017
- *Candida* species and other yeasts are considered excluded organisms and cannot be used to meet the UTI definition

Figure 12.



*The percent of resistant pathogens (Methacillin-resistant Staphylococcus aureus (MRSA), Vancomycin-resistant Enterococcus (VRE), and Carbapenem Resistant Enterobacteriaceae (CRE)) is shown at the top of each bar

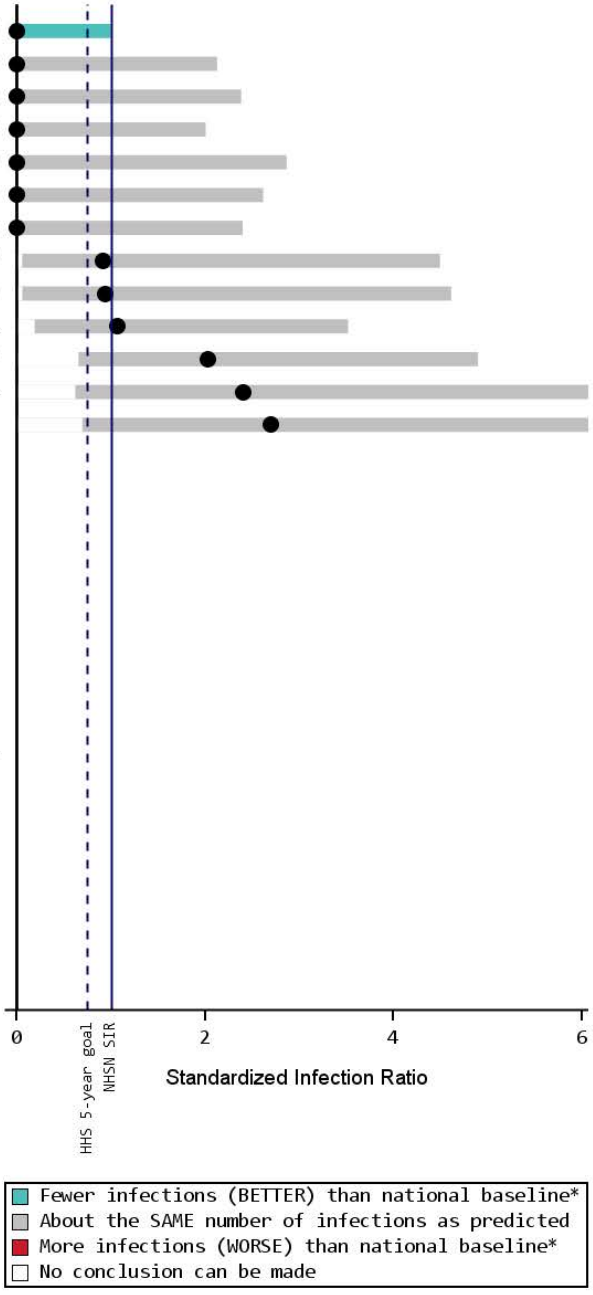
How to Understand Figure 12:

- Eight of 14 (57%) *Staphylococcus aureus* identified among reported CAUTIs were resistant to methicillin
- 13% of *Enterococcus* identified among reported CAUTIs were resistant to Vancomycin
- 3% 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, 2017
Hospital Group: Hospitals with less than 100 Beds

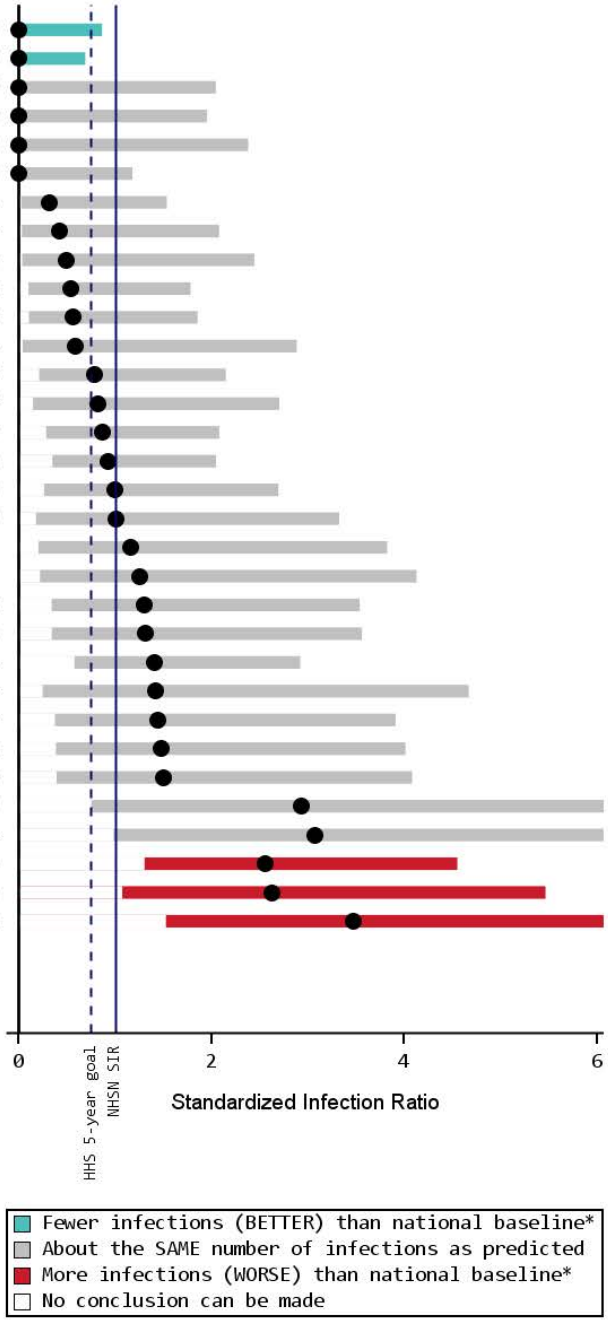
HOSPITAL	OBS	PRED	UCD	SIR
Caldwell Memorial Hospital	0	3.0	5809	0.0
Park Ridge Health	0	1.4	2057	0.0
Dlp - Harris Regional Hospital	0	1.3	2344	0.0
Sentara Albemarle Medical Center	0	1.5	2178	0.0
Columbus Regional Healthcare System	0	1.0	2021	0.0
Vidant Beaufort Hospital	0	1.1	1641	0.0
Hugh Chatham Memorial Hospital	0	1.3	2453	0.0
Annie Penn Hospital	1	1.1	2137	0.9
Randolph Hospital Dba Randolph Health	1	1.1	2067	0.9
Novant Health Huntersville	2	1.9	2530	1.1
Halifax Regional Medical Center	4	2.0	2941	2.0
Carteret General Hospital	3	1.3	2371	2.4
Novant Health Medical Park Hospital	3	1.1	1995	2.7
McDowell Hospital	2	0.9	1621	NC
Murphy Medical Center	0	0.7	1316	NC
Martin General Hospital	0	0.3	668	NC
Granville Medical Center	0	0.9	1698	NC
Novant Health Brunswick Medical Center	1	0.8	1610	NC
Vidant Duplin Hospital	0	0.5	938	NC
Kings Mountain Hospital	0	0.6	1087	NC
Person Memorial Hospital	0	0.6	1120	NC
Wake Forest Baptist Health-Lexington	0	0.9	1276	NC
Carolinas Healthcare System Anson	NA	NA	N	NA
North Carolina Specialty Hospital	0	0.6	1250	NC
Johnston Health Clayton	0	0.2	438	NC
Firsthealth Moore Regional-Hoke	0	0.1	139	NC
Firsthealth Moore Regional-Richmond	1	0.7	1276	NC
Cape Fear Valley Hoke Hospital	0	0.0	79	NC
Novant Health Kernersville Medical Cente	0	0.7	1308	NC
Wakemed North Family Health & Women's Ho	0	0.1	172	NC



Data reported from adult/pediatric units as of May 25, 2018 .
OBS = # infections observed
PRED = # infections statistically 'predicted' by national baseline
UCD = # urinary catheter 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

CAUTI in Adult/Pediatric Medical, Surgical, and Medical/Surgical Wards and ICUs
Standardized Infection Ratios: January 1 – December 31, 2017
Hospital Group: Hospitals with 100 to 199 Beds

HOSPITAL	OBS	PRED	UCD	SIR	
Iredell Memorial Hospital	0	3.5	5066	0.0	
Catawba Valley Medical Center	0	4.4	6194	0.0	
Carolinas Medical Center-University	0	1.5	1844	0.0	
Haywood Regional Medical Center	0	1.5	1918	0.0	
Onslow Memorial Hospital	0	1.3	1740	0.0	
Carolinas Medical Center-Union	0	2.6	3645	0.0	
Novant Health Matthews Medical Center	1	3.2	4180	0.3	
Unc Rockingham Health	1	2.4	3399	0.4	
Lake Norman Regional Medical Center	1	2.0	2825	0.5	
Wesley Long Hospital	2	3.7	3596	0.5	
Vidant Edgecombe Hospital	2	3.6	3460	0.6	
Maria Parham Medical Center	1	1.7	2403	0.6	
Pardee Hospital	3	3.8	4911	0.8	
Johnston Health	2	2.5	3464	0.8	
Nash Health Care Systems	4	4.7	6594	0.9	
Frye Regional Medical Center	5	5.4	5866	0.9	
Wilson Medical Center	3	3.0	4330	1.0	
Sampson Regional Medical Center	2	2.0	2576	1.0	
Novant Health Thomasville Medical Center	2	1.7	2194	1.2	
Stanly Regional Medical Center	2	1.6	2315	1.2	
Central Carolina Hospital	3	2.3	3272	1.3	
Betsy Johnson Regional	3	2.3	2983	1.3	
WakeMed Cary Hospital	6	4.3	6206	1.4	
Northern Hospital Of Surry County	2	1.4	2081	1.4	
Wake Forest Baptist Health Wilkes Medica	3	2.1	2972	1.4	
Carolinas Healthcare System Lincoln	3	2.0	2864	1.5	
Carolinas Healthcare System Blue Ridge	3	2.0	2497	1.5	
ARHS-Watauga Medical Center	3	1.0	1534	2.9	
Vidant Roanoke Chowan Hospital	4	1.3	1631	3.1	
Duke Raleigh Hospital	10	3.9	5596	2.5	
Lenoir Memorial Hospital	6	2.3	3244	2.6	
Rutherford Regional Medical Center	7	2.0	2963	3.5	
Davis Regional Medical Center	1	0.9	1239	NC	
Scotland Memorial Hospital	0	0.5	712	NC	
Women's Hospital	0	0.3	512	NC	



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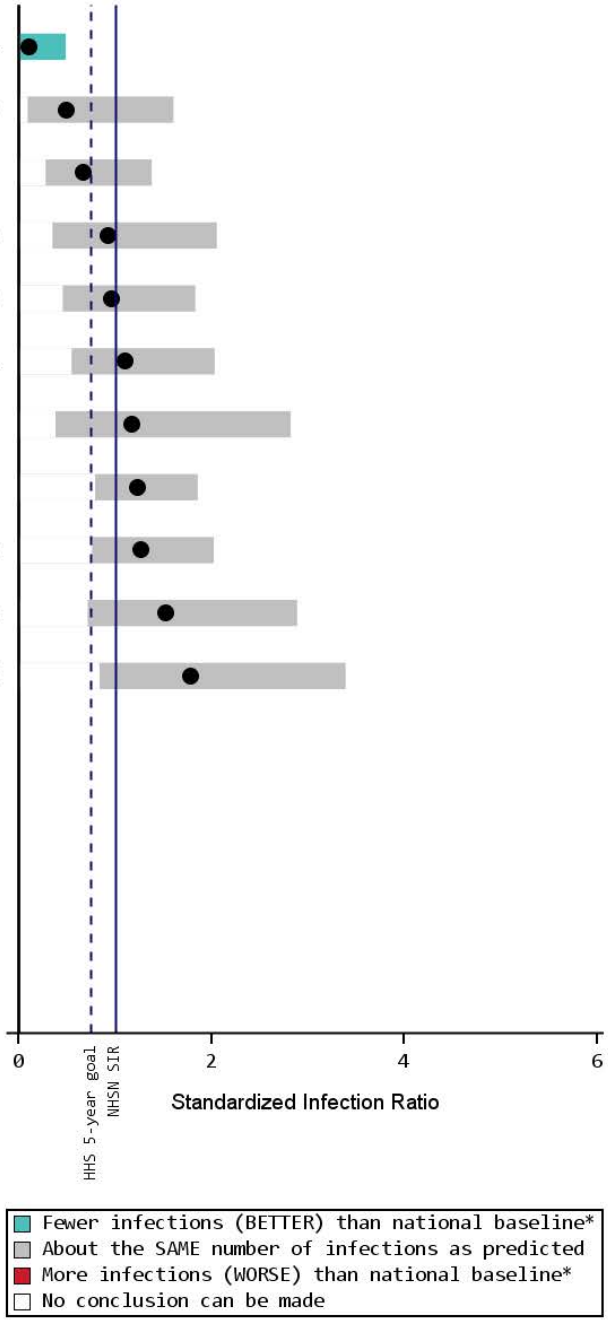
SIR = Standardized infection ratio (OBS/PRED # of infections)
NA = Data not shown for hospitals with <50 catheter days
NC = SIR not calculated for hospitals with <1 predicted infection
*Significantly different than 2015 national baseline

CAUTI in Adult/Pediatric Medical, Surgical, and Medical/Surgical Wards and ICUs
Standardized Infection Ratios: January 1 – December 31, 2017
Hospital Group: Hospitals with 200 to 399 Beds

HOSPITAL	OBS	PRED	UCD	SIR
Wayne Memorial Hospital	1	10.4	10412	0.1
Alamance Regional Medical Center	2	4.1	3273	0.5
Carolinas Medical Center-Pineville	6	9.1	11363	0.7
Carolinas Healthcare System Cleveland	5	5.4	6199	0.9
Duke Regional Hospital	8	8.3	7983	1.0
High Point Regional Health System	9	8.2	9355	1.1
Carolinas Medical Center-Mercy	4	3.4	4284	1.2
FirstHealth Moore Regional Hospital	21	17.1	19520	1.2
Southeastern Regional Medical Center	16	12.6	12924	1.3
CarolinaEast Medical Center	8	5.3	6238	1.5
Novant Health Rowan Medical Center	8	4.5	5103	1.8

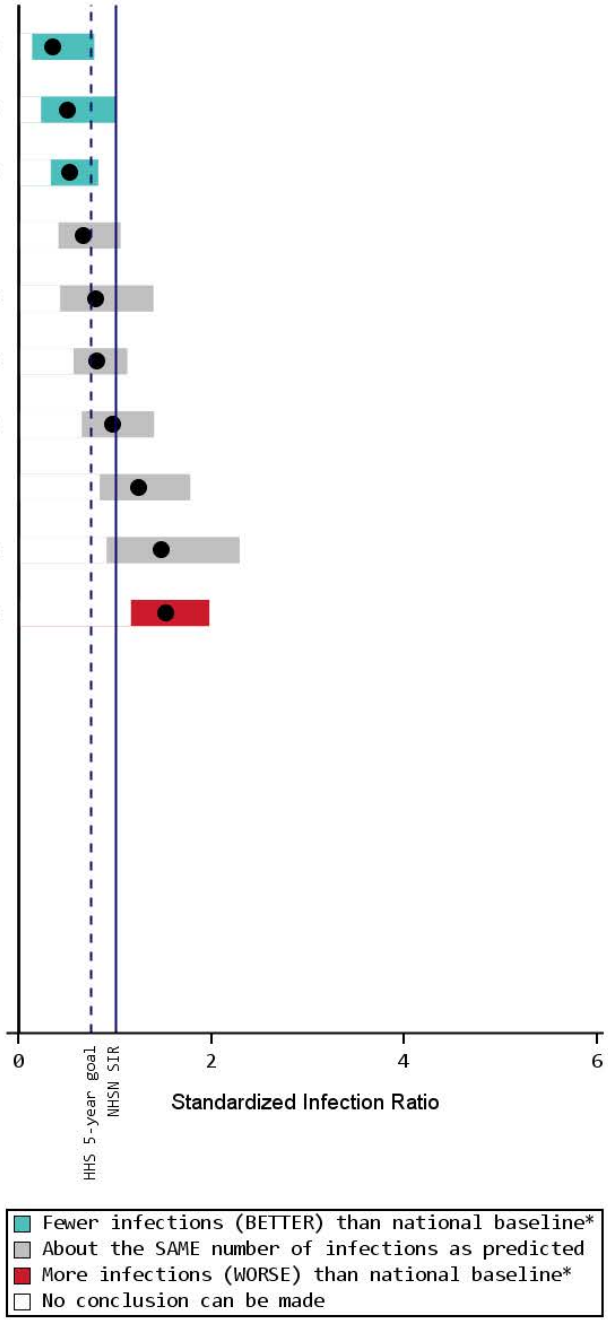
SIR AND 95% CONFIDENCE INTERVAL
COMPARED TO 2015 NATIONAL BASELINE



Data reported from adult/pediatric units as of May 25, 2018 .
OBS = # infections observed
PRED = # infections statistically 'predicted' by national baseline
UCD = # urinary catheter 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

CAUTI in Adult/Pediatric Medical, Surgical, and Medical/Surgical Wards and ICUs
Standardized Infection Ratios: January 1 – December 31, 2017
Hospital Group: Hospitals with 400 or More Beds

HOSPITAL	OBS	PRED	UCD	SIR
Gaston Memorial Hospital	5	14.3	10189	0.3
Carolinas Healthcare System - Northeast	7	13.9	14037	0.5
Rex Healthcare	18	34.3	26818	0.5
New Hanover Regional Medical Center	17	25.5	18070	0.7
Cape Fear Valley Health System	11	13.8	13961	0.8
Mission Hospital	32	40.0	24493	0.8
Moses Cone Hospital	26	27.0	16054	1.0
Novant Health Forsyth Medical Center	27	21.9	16574	1.2
Novant Health Presbyterian Medical	18	12.2	10571	1.5
WakeMed	54	35.5	22007	1.5



Data reported from adult/pediatric units as of May 25, 2018 .
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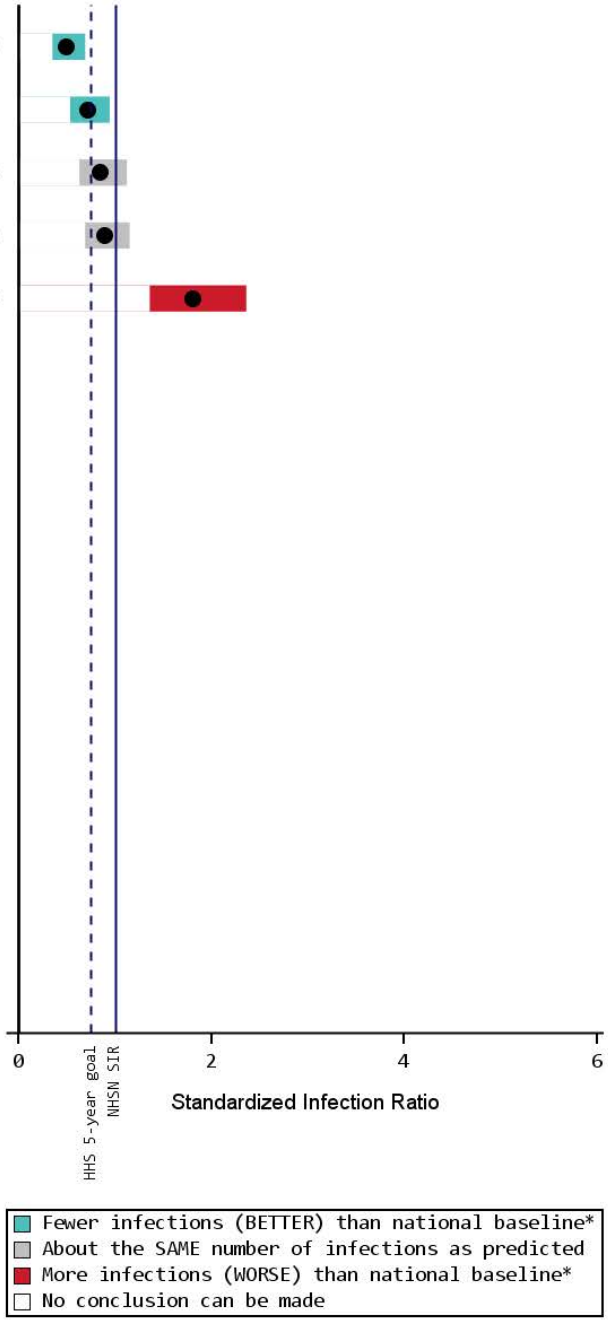
PRED = # infections statistically 'predicted' by national baseline
UCD = # urinary catheter days
SIR = Standardized infection ratio (OBS/PRED # of infections)
NA = Data not shown for hospitals with <50 catheter days
NC = SIR not calculated for hospitals with <1 predicted infection
*Significantly different than 2015 national baseline

CAUTI in Adult/Pediatric Medical, Surgical, and Medical/Surgical Wards and ICUs
Standardized Infection Ratios: January 1 – December 31, 2017
Hospital Group: Hospitals with Primary Medical School Affiliation

HOSPITAL	OBS	PRED	UCD	SIR
Wake Forest University Baptist Medical	32	65.8	39672	0.5
UNC Health Care	46	65.3	39073	0.7
Carolinas Medical Center	45	53.7	28627	0.8
Duke University Hospital	57	64.4	40644	0.9
Vidant Medical Center	50	27.8	18947	1.8



Data reported from adult/pediatric units as of May 25, 2018 .
OBS = # infections observed
PRED = # infections statistically 'predicted' by national baseline
UCD = # urinary catheter 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

C. Surgical Site Infections (SSI)

1. Abdominal Hysterectomies

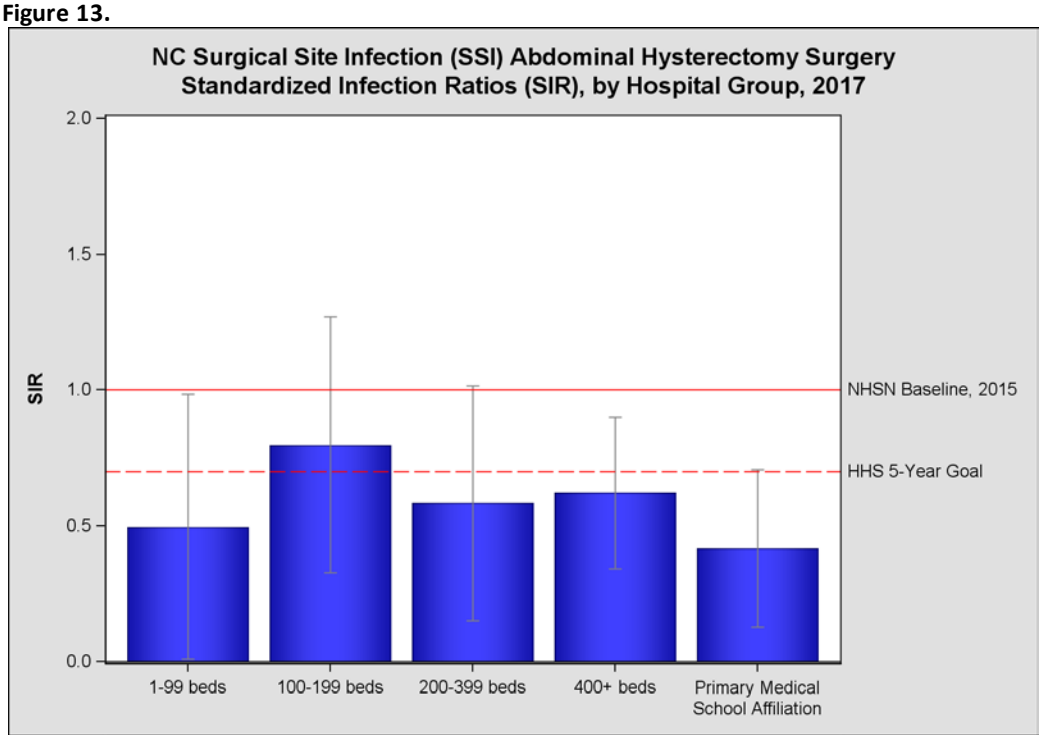
North Carolina 2017 SSI Highlights Post Abdominal Hysterectomy

- North Carolina reported 49 surgical site infections after inpatient abdominal hysterectomies performed on adults ≥ 18 years in North Carolina acute care hospitals, compared to the 87 infections predicted. This was better than the 2015 national experience.
- N.C. met the U.S. Department of Health and Human Services 2020 goal to reduce SSIs nationally by 30% from the 2015 baseline experience
- In 2017, the most commonly identified organism from adult patients with SSI following inpatient abdominal hysterectomies was *Enterococcus*

Table 4. N.C. Surgical Site Infections following Abdominal Hysterectomies, by year, 2012-2016

Year	# Observed Infections	# Predicted Infections	How Does North Carolina Compare to the National Experience?
2017	49	86.22	★Better: Fewer infections than were predicted (better than the national experience)

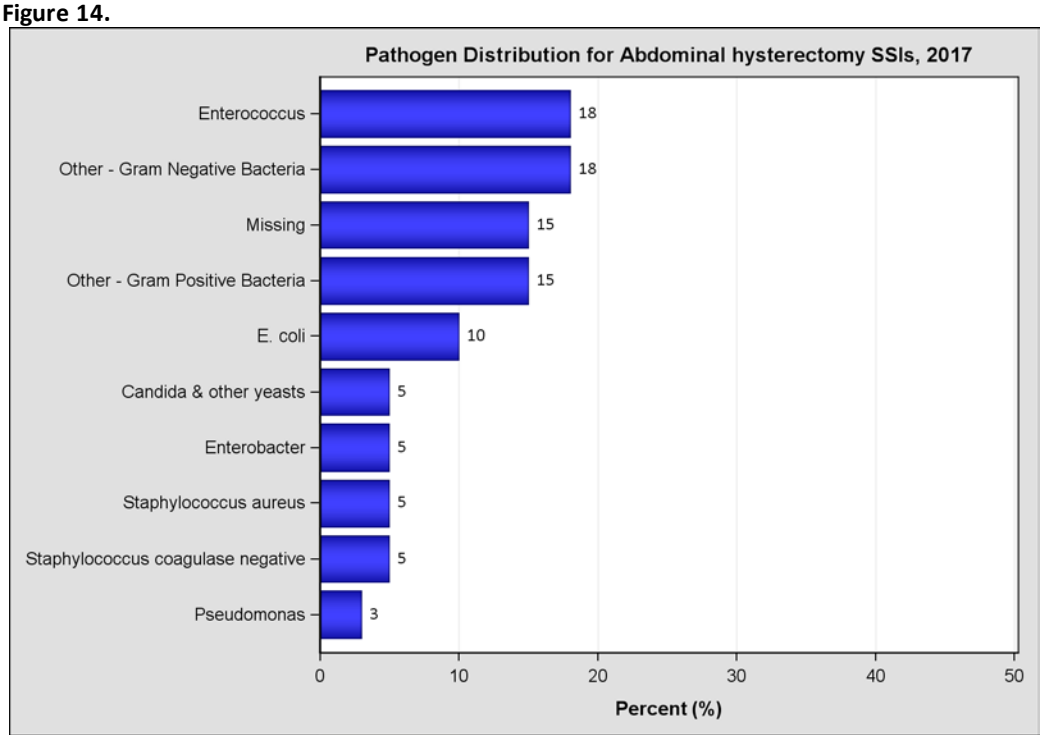
Figure 13.



How to Understand Figure 13:

- Hospitals with 100-199 beds and 200-399 reported the same number of SSIs following abdominal hysterectomies as predicted by the 2015 national experience
- All other hospital sized groups reported fewer SSIs following abdominal hysterectomies than predicted, performing BETTER than the 2015 national experience

Figure 14.



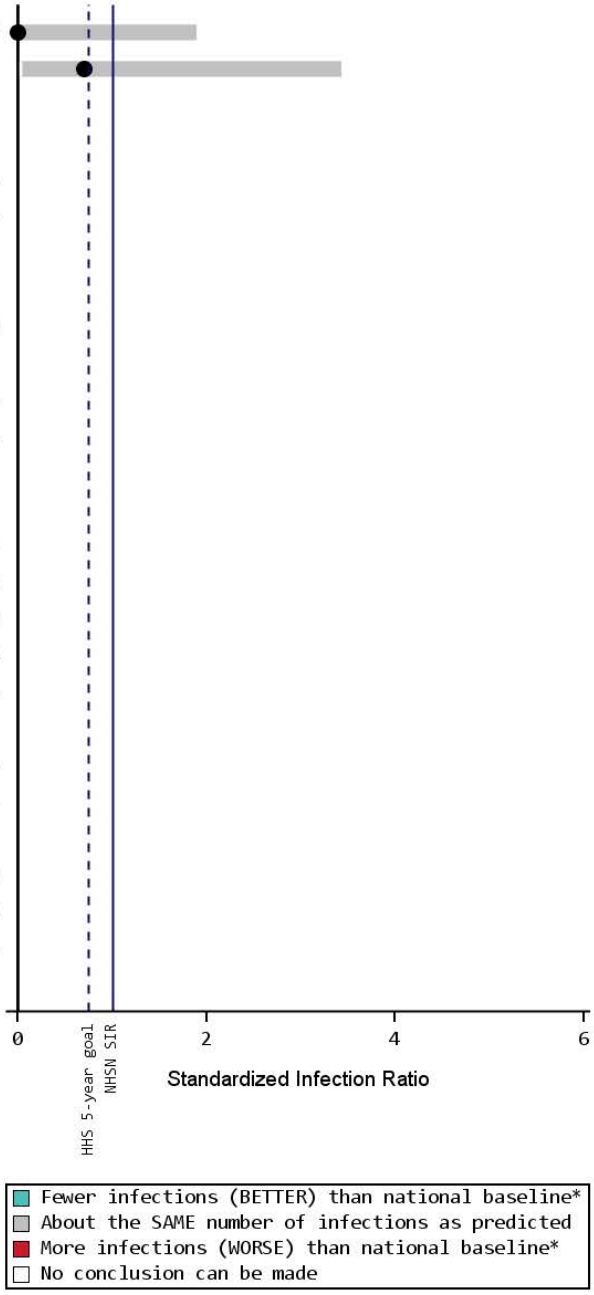
How to Understand Figure 14:

- Enterococcus and other-gram negative bacteria were the most commonly reported pathogens among SSIs following abdominal hysterectomies
- Pseudomonas was the least commonly reported pathogen among SSIs following abdominal hysterectomies

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, 2017
Hospital Group: Hospitals with less than 100 Beds

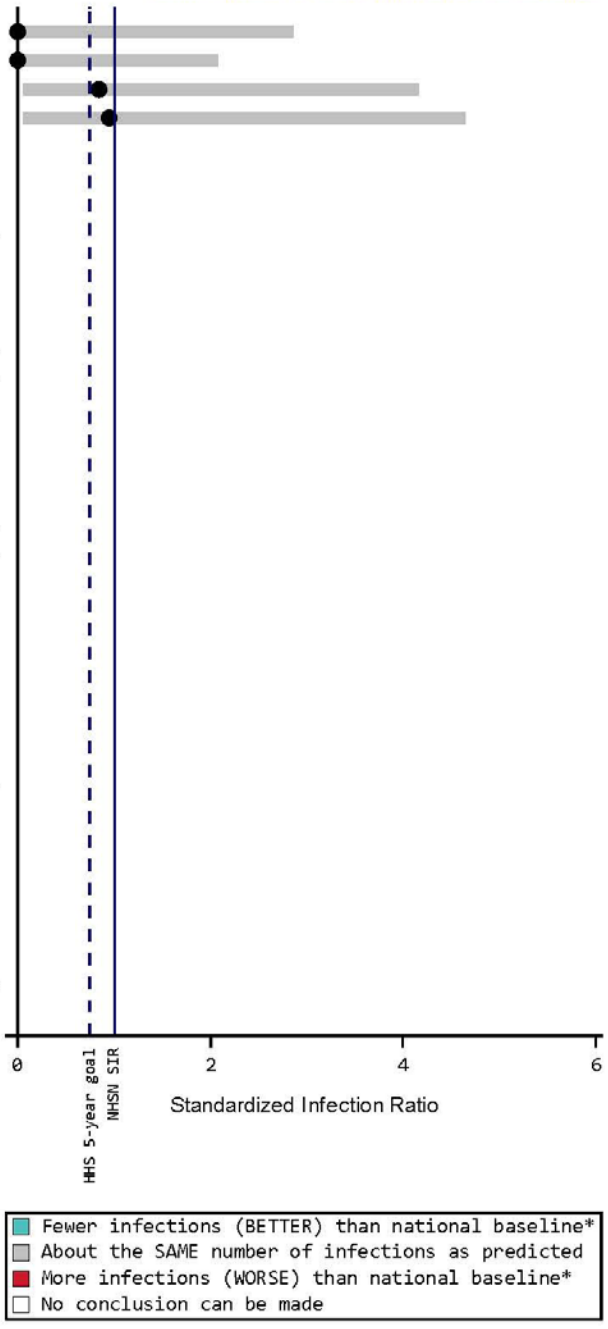
HOSPITAL	OBS	PRED	PROC	SIR
Novant Health Medical Park Hospital	0	1.6	203	0.0
Novant Health Huntersville	1	1.4	185	0.7
McDowell Hospital	1	0.4	50	NC
Park Ridge Health	0	0.5	64	NC
Murphy Medical Center	NA	NA	NA	NA
Dlp - Harris Regional Hospital	NA	NA	NA	NA
Sentara Albemarle Medical Center	0	0.4	46	NC
Columbus Regional Healthcare System	0	0.5	53	NC
Martin General Hospital	NA	NA	NA	NA
Randolph Hospital Dba Randolph Health	0	0.5	61	NC
Vidant Beaufort Hospital	NA	NA	NA	NA
Granville Medical Center	NA	NA	NA	NA
Carteret General Hospital	0	0.4	51	NC
Novant Health Brunswick Medical Center	0	0.7	76	NC
Vidant Duplin Hospital	NA	NA	NA	NA
Kings Mountain Hospital	NA	NA	NA	NA
Caldwell Memorial Hospital	NA	NA	NA	NA
Person Memorial Hospital	NA	NA	NA	NA
Wake Forest Baptist Health-Lexington	NA	NA	NA	NA
Halifax Regional Medical Center	0	0.2	23	NC
Hugh Chatham Memorial Hospital	NA	NA	NA	NA
Carolinas Healthcare System Anson	NA	NA	NA	NA
Annie Penn Hospital	0	0.3	28	NC
Johnston Health Clayton	NA	NA	NA	NA
Firsthealth Moore Regional-Richmond	NA	NA	NA	NA
Cape Fear Valley Hoke Hospital	NA	NA	NA	NA
Wakemed North Family Health & Women's Ho	1	0.9	132	NC



Data reported as of May 25, 2018 .
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 Folowing Abdominal Hysterectomy Surgeries in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2017
Hospital Group: Hospitals with 100 to 199 Beds

HOSPITAL	OBS	PRED	PROC	SIR
WakeMed Cary Hospital	0	1.0	128	0.0
Novant Health Matthews Medical Center	0	1.4	175	0.0
Women's Hospital	1	1.2	142	0.8
Carolinas Medical Center-University	1	1.1	132	0.9
Pardee Hospital	0	0.4	52	NC
Rutherford Regional Medical Center	0	0.3	31	NC
Haywood Regional Medical Center	0	0.5	58	NC
ARHS-Watauga Medical Center	NA	NA	NA	NA
Davis Regional Medical Center	1	0.2	21	NC
Vidant Roanoke Chowan Hospital	1	0.2	25	NC
Vidant Edgecombe Hospital	1	0.3	32	NC
Novant Health Thomasville Medical Center	NA	NA	NA	NA
Sampson Regional Medical Center	NA	NA	NA	NA
Lenoir Memorial Hospital	0	0.2	20	NC
Iredell Memorial Hospital	0	0.6	75	NC
Maria Parham Medical Center	0	0.2	26	NC
Nash Health Care Systems	2	0.5	59	NC
Northern Hospital Of Surry County	NA	NA	NA	NA
Lake Norman Regional Medical Center	NA	NA	NA	NA
Frye Regional Medical Center	0	0.4	53	NC
Johnston Health	2	0.7	80	NC
Scotland Memorial Hospital	0	0.9	110	NC
Carolinas Healthcare System Lincoln	0	0.3	34	NC
Wilson Medical Center	0	0.5	64	NC
Onslow Memorial Hospital	0	0.4	53	NC
Catawba Valley Medical Center	0	0.5	68	NC
Carolinas Healthcare System Blue Ridge	NA	NA	NA	NA
Central Carolina Hospital	0	0.3	34	NC
Carolinas Medical Center-Union	2	0.5	60	NC
Duke Raleigh Hospital	0	0.2	26	NC
Stanly Regional Medical Center	0	0.2	23	NC
Betsy Johnson Hospital	0	0.2	27	NC
UNC Rockingham Health	0	0.2	21	NC
Wake Forest Baptist Health Wilkes Medica	NA	NA	NA	NA
Wesley Long Hospital	0	0.2	25	NC



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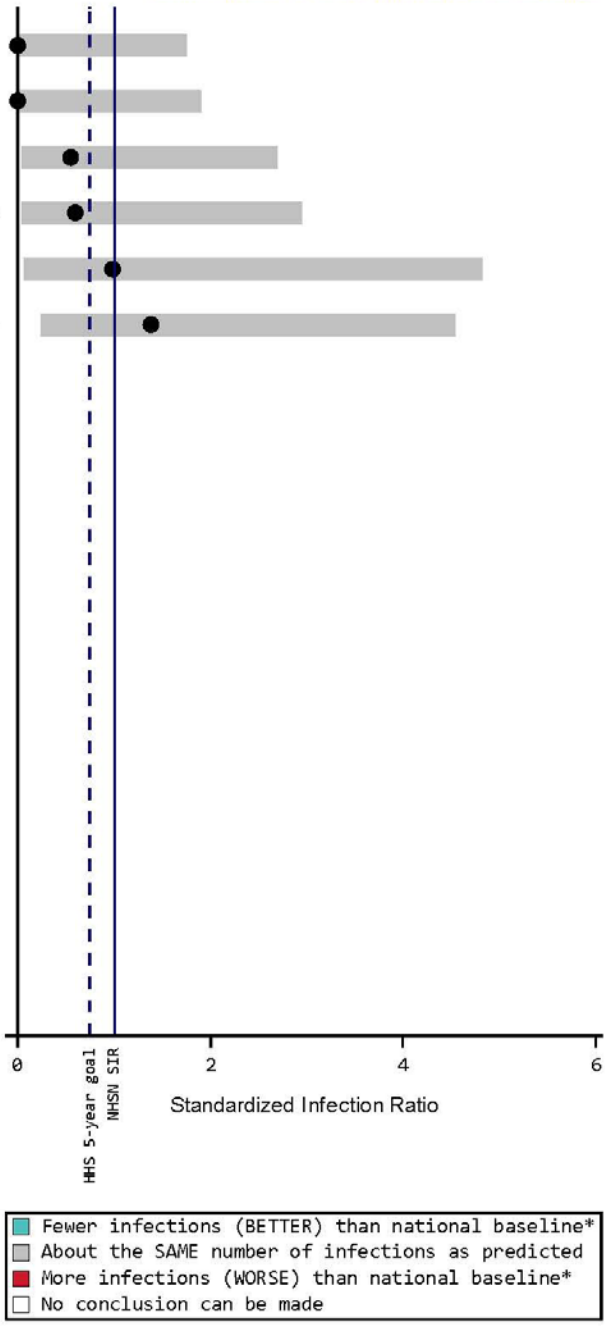
NA = Data not shown for hospitals with <20 procedures
NC = SIR not calculated for hospitals with <1 predicted infection
*Significantly different than 2015 national baseline

SSI Folowing Abdominal Hysterectomy Surgeries in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2017
Hospital Group: Hospitals with 200 to 399 Beds

HOSPITAL	OBS	PRED	PROC	SIR
CarolinaEast Medical Center	0	1.7	200	0.0
Carolinas Healthcare System Cleveland	0	1.6	163	0.0
Duke Regional Hospital	1	1.8	244	0.5
Carolinas Medical Center-Pineville	1	1.7	212	0.6
Carolinas Medical Center-Mercy	1	1.0	135	1.0
High Point Regional Health System	2	1.5	164	1.4
Novant Health Rowan Medical Center	0	0.2	26	NC
Wayne Memorial Hospital	1	0.9	112	NC
FirstHealth Moore Regional Hospital	1	0.8	99	NC
Alamance Regional Medical Center	0	0.3	34	NC
Southeastern Regional Medical Center	0	0.4	49	NC



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PROC = # procedures
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NA = Data not shown for hospitals with <20 procedures
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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, 2017
Hospital Group: Hospitals with 200 to 399 Beds

HOSPITAL	OBS	PRED	PROC	SIR
CarolinaEast Medical Center	0	1.7	200	0.0
Carolinas Healthcare System Cleveland	0	1.6	163	0.0
Duke Regional Hospital	1	1.8	244	0.5
Carolinas Medical Center-Pineville	1	1.7	212	0.6
Carolinas Medical Center-Mercy	1	1.0	135	1.0
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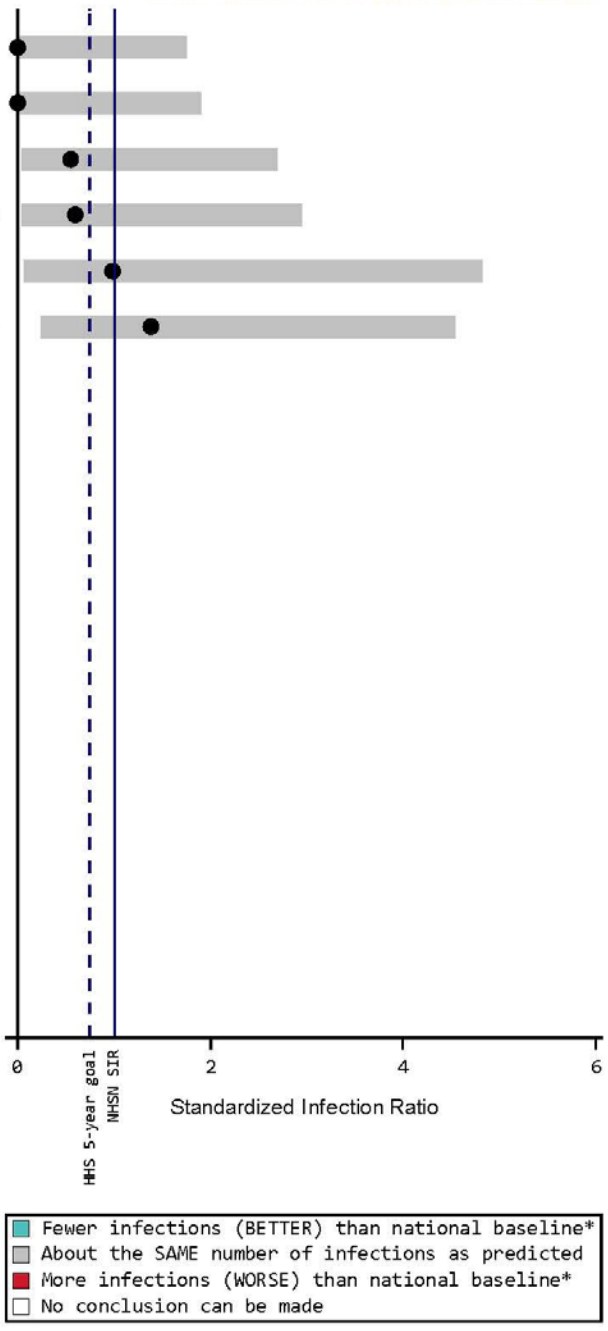
Novant Health Rowan Medical Center	0	0.2	26	NC
Wayne Memorial Hospital	1	0.9	112	NC
FirstHealth Moore Regional Hospital	1	0.8	99	NC
Alamance Regional Medical Center	0	0.3	34	NC
Southeastern Regional Medical Center	0	0.4	49	NC



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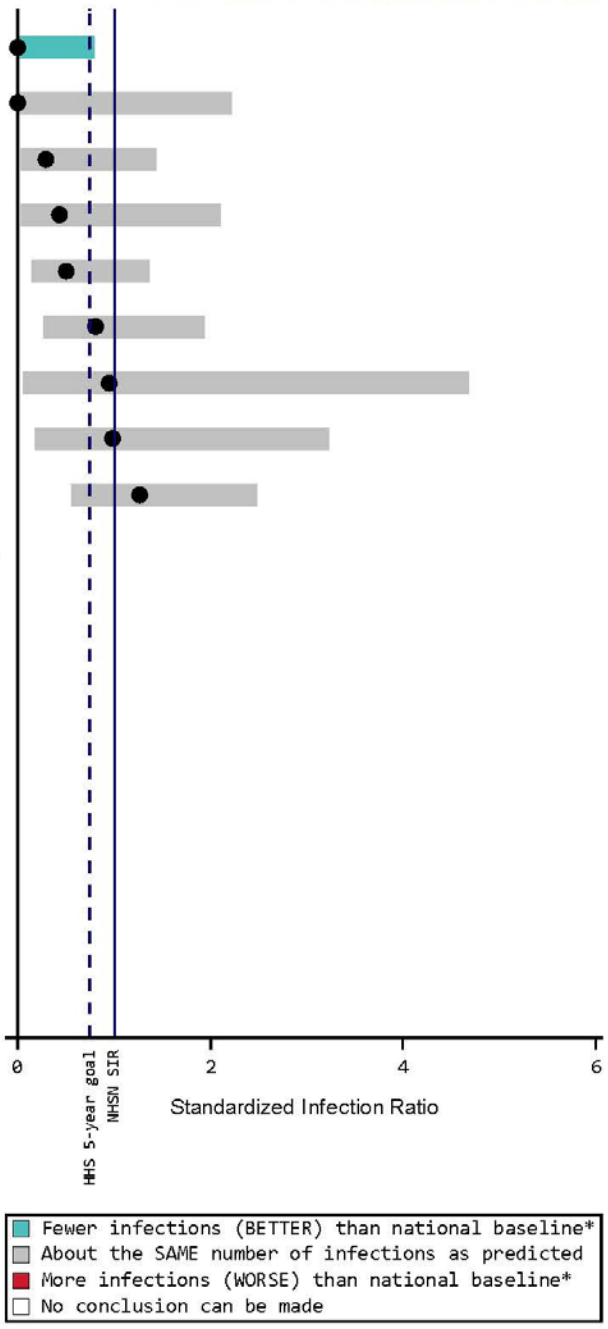
NC = SIR not calculated for hospitals with <1 predicted infection
*Significantly different than 2015 national baseline

SSI Folowing Abdominal Hysterectomy Surgeries in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2017
Hospital Group: Hospitals with 400 or More Beds

HOSPITAL	OBS	PRED	PROC	SIR
Rex Healthcare	0	3.8	459	0.0
WakeMed	0	1.4	156	0.0
Novant Health Forsyth Medical Center	1	3.4	421	0.3
Carolinas Healthcare System - Northeast	1	2.3	282	0.4
New Hanover Regional Medical Center	3	6.0	722	0.5
Mission Hospital	4	5.0	579	0.8
Gaston Memorial Hospital	1	1.1	118	0.9
Cape Fear Valley Health System	2	2.0	213	1.0
Novant Health Presbyterian Medical	7	5.6	686	1.3
Moses Cone Hospital	NA	NA	NA	NA



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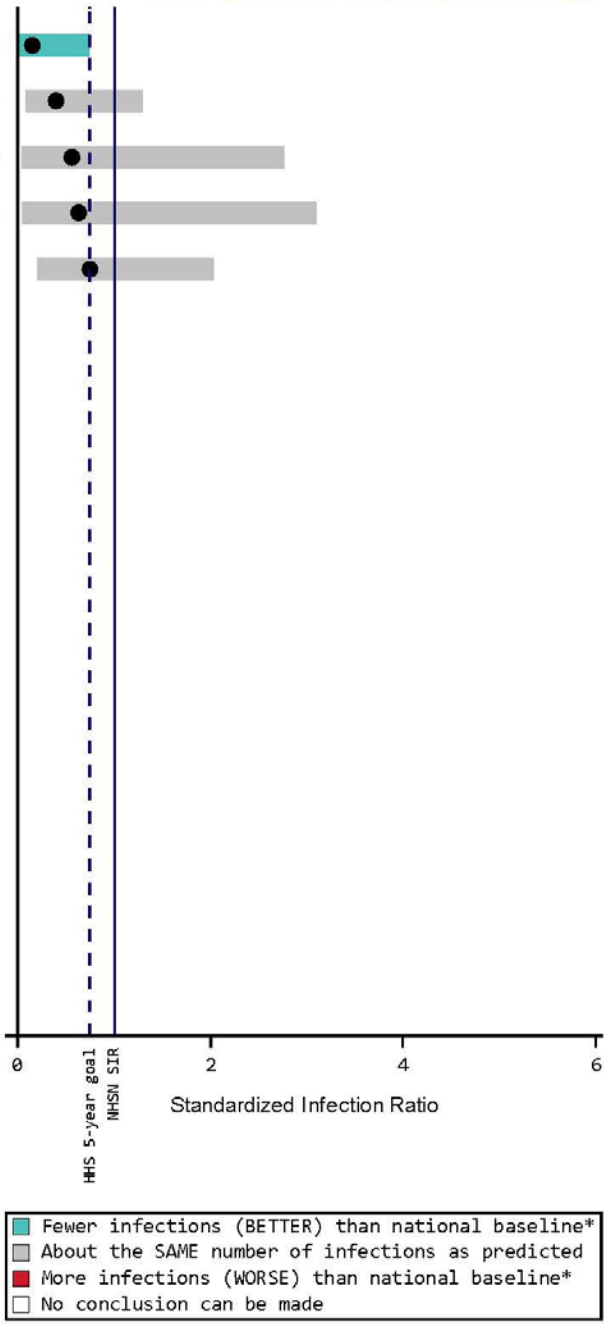
PROC = # procedures
SIR = Standardized infection ratio (OBS/PRED # of infections)
NA = Data not shown for hospitals with <20 procedures
NC = SIR not calculated for hospitals with <1 predicted infection
*Significantly different than 2015 national baseline

SSI Folowing Abdominal Hysterectomy Surgeries in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2017
Hospital Group: Hospitals with Primary Medical School Affiliation

HOSPITAL	OBS	PRED	PROC	SIR
UNC Health Care	1	6.6	748	0.2
Carolinas Medical Center	2	5.1	573	0.4
Wake Forest University Baptist Medical	1	1.8	190	0.6
Vidant Medical Center	1	1.6	182	0.6
Duke University Hospital	3	4.0	490	0.7



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*Significantly different than 2015 national baseline

2. Colon Surgeries

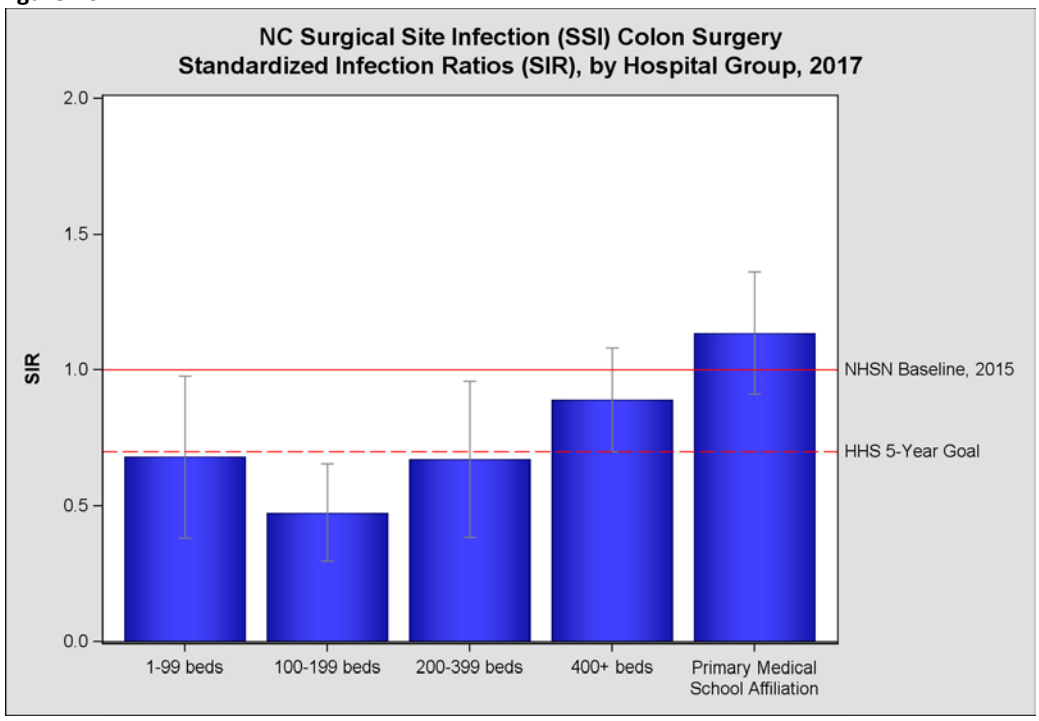
North Carolina 2017 SSI Highlights Post Colon Surgery

- Among inpatient colon surgeries performed on adults ≥ 18 years, North Carolina hospitals reported 253 infections, compared to the 303 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. N.C. Surgical Site Infections following colon surgeries, by year, 2012-2016

Year	# Observed Infections	# Predicted Infections	How Does North Carolina Compare to the National Experience?
2017	**253**	**302.8**	**★Better: Fewer infections than were predicted (better than the national experience)**

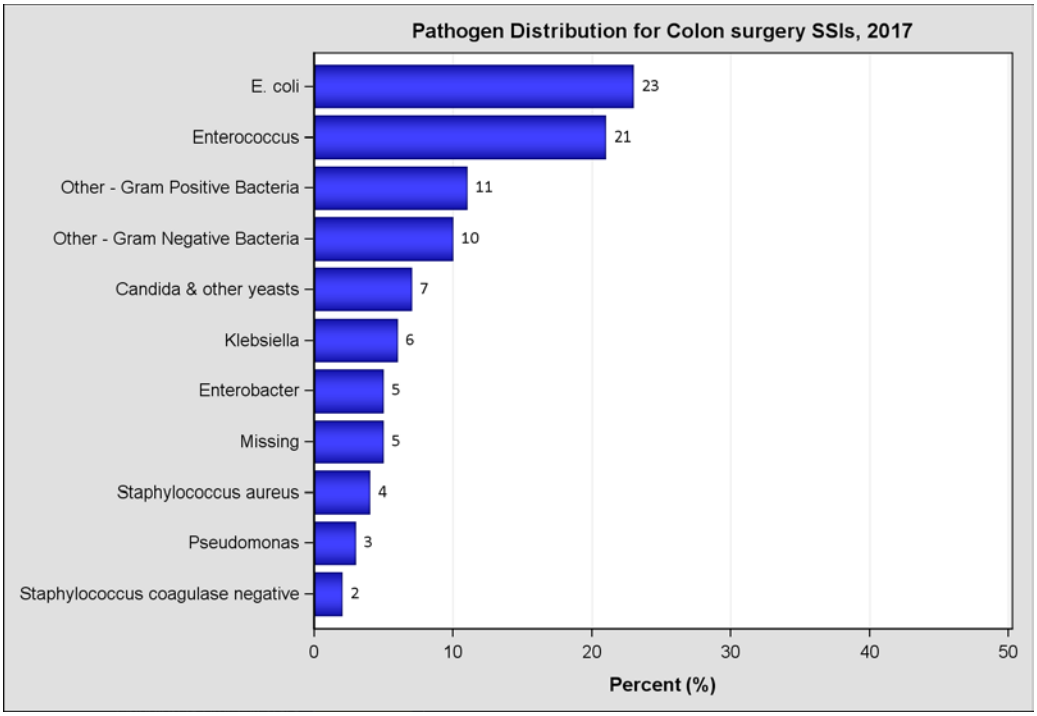
Figure 16.



How to Understand Figure 16:

- Hospitals with a primary medical school affiliation, and hospitals with more than 400 beds performed about the SAME as the 2015 national experience, reporting the same number of SSIs following colon surgeries as predicted.
- All smaller hospital sized groups performed BETTER than the 2015 national experience, reporting fewer SSIs following colon surgeries than predicted

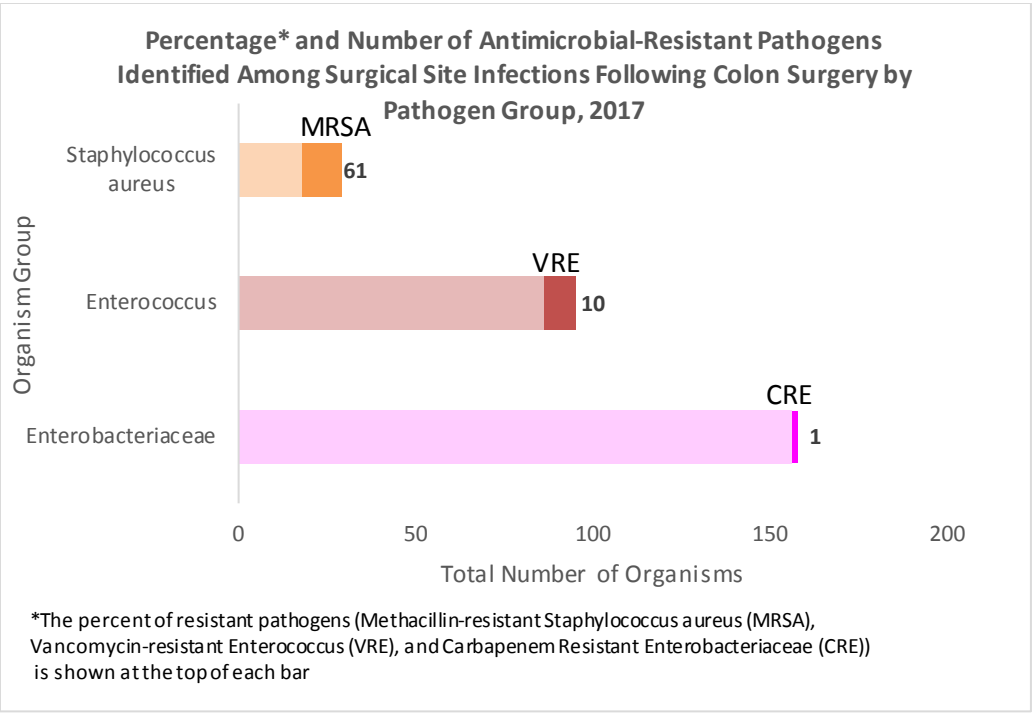
Figure 17.



How to Understand Figure 17:

- *E. coli* (23%) and *Enterococcus* (21%) *were* the most commonly reported pathogens isolated from patients with surgical site infections following colon surgeries

Figure 18.



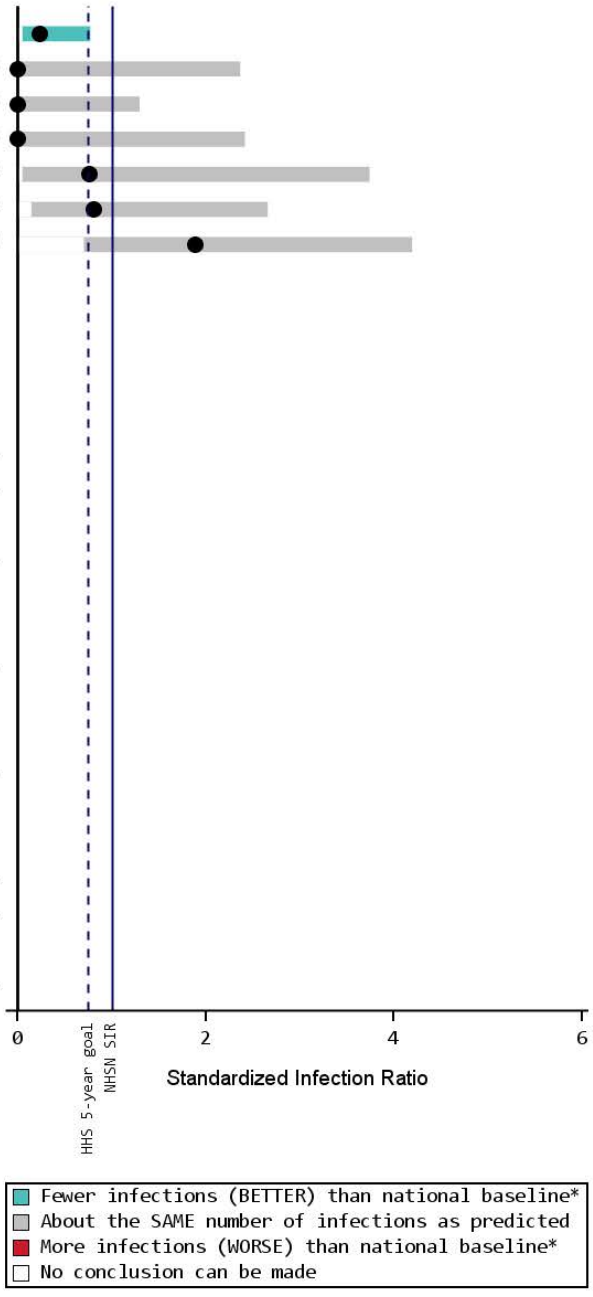
How to Understand Figure 18:

- In 2017, 61% of *Staphylococcus aureus* identified among SSIs following colon surgeries were resistant to methicillin
- 10% of *Enterococcus* identified among SSIs following colon surgeries were Vancomycin resistant
- Only 1% of Enterobacteriaceae identified among SSIs following colon surgeries were carbapenem resistant

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

SSI following Colon Surgeries in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2017
Hospital Group: Hospitals with less than 100 Beds

HOSPITAL	OBS	PRED	PROC	SIR
Novant Health Medical Park Hospital	2	8.7	347	0.2
Randolph Hospital Dba Randolph Health	0	1.3	49	0.0
Novant Health Brunswick Medical Center	0	2.3	92	0.0
Wake Forest Baptist Health-Lexington	0	1.2	46	0.0
Columbus Regional Healthcare System	1	1.3	45	0.8
Novant Health Huntersville	2	2.5	100	0.8
Carteret General Hospital	5	2.6	108	1.9
McDowell Hospital	2	0.5	21	NC
Park Ridge Health	2	0.9	39	NC
Murphy Medical Center	0	0.5	21	NC
Dlp - Harris Regional Hospital	0	0.7	27	NC
Sentara Albemarle Medical Center	0	0.9	31	NC
Martin General Hospital	NA	NA	NA	NA
Vidant Beaufort Hospital	NA	NA	NA	NA
Granville Medical Center	0	0.6	23	NC
Vidant Duplin Hospital	NA	NA	NA	NA
Kings Mountain Hospital	0	0.8	31	NC
Caldwell Memorial Hospital	0	0.8	27	NC
Person Memorial Hospital	NA	NA	NA	NA
Halifax Regional Medical Center	2	0.6	23	NC
Hugh Chatham Memorial Hospital	0	0.7	26	NC
Carolinas Healthcare System Anson	NA	NA	NA	NA
Annie Penn Hospital	1	0.8	28	NC
Johnston Health Clayton	1	0.9	30	NC
Firsthealth Moore Regional-Richmond	NA	NA	NA	NA
Cape Fear Valley Hoke Hospital	NA	NA	NA	NA
Novant Health Kernersville Medical Cente	0	0.6	26	NC
Wakemed North Family Health & Women's Ho	NA	NA	NA	NA



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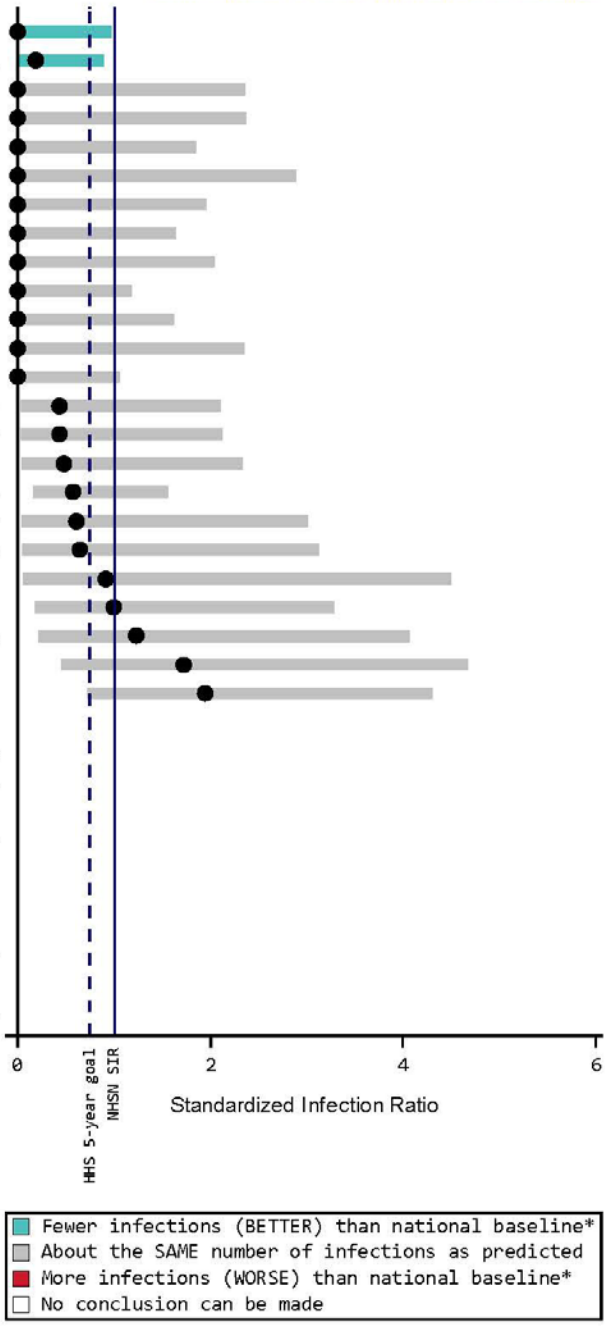
PROC = # procedures
SIR = Standardized infection ratio (OBS/PRED # of infections)
NA = Data not shown for hospitals with <20 procedures
NC = SIR not calculated for hospitals with <1 predicted infection
*Significantly different than 2015 national baseline

SSI following Colon Surgeries in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2017
Hospital Group: Hospitals with 100 to 199 Beds

HOSPITAL	OBS	PRED	PROC	SIR
Carolinas Medical Center-Union	0	3.1	114	0.0
Wesley Long Hospital	1	5.6	216	0.2
Carolinas Medical Center-University	0	1.3	48	0.0
Haywood Regional Medical Center	0	1.3	52	0.0
Lenoir Memorial Hospital	0	1.6	58	0.0
Northern Hospital Of Surry County	0	1.0	42	0.0
Lake Norman Regional Medical Center	0	1.5	61	0.0
Wilson Medical Center	0	1.8	64	0.0
Onslow Memorial Hospital	0	1.5	54	0.0
Catawba Valley Medical Center	0	2.5	94	0.0
Carolinas Healthcare System Blue Ridge	0	1.8	70	0.0
Central Carolina Hospital	0	1.3	50	0.0
Duke Raleigh Hospital	0	2.8	102	0.0
Frye Regional Medical Center	1	2.3	90	0.4
Pardee Hospital	1	2.3	96	0.4
Iredell Memorial Hospital	1	2.1	83	0.5
WakeMed Cary Hospital	3	5.3	203	0.6
Nash Health Care Systems	1	1.6	62	0.6
Carolinas Healthcare System Lincoln	1	1.6	54	0.6
Rutherford Regional Medical Center	1	1.1	40	0.9
Johnston Health	2	2.0	71	1.0
Novant Health Thomasville Medical Center	2	1.6	64	1.2
Maria Parham Medical Center	3	1.7	64	1.7
Novant Health Matthews Medical Center	5	2.6	96	1.9
ARHS-Watauga Medical Center	0	0.9	40	NC
Davis Regional Medical Center	NA	NA	NA	NA
Vidant Roanoke Chowan Hospital	NA	NA	NA	NA
Vidant Edgecombe Hospital	1	0.9	33	NC
Sampson Regional Medical Center	NA	NA	NA	NA
Scotland Memorial Hospital	0	0.9	37	NC
Stanly Regional Medical Center	0	0.9	38	NC
Betsy Johnson Hospital	0	0.7	24	NC
UNC Rockingham Health	NA	NA	NA	NA
Wake Forest Baptist Health Wilkes Medica	0	0.8	29	NC
Women's Hospital	NA	NA	NA	NA



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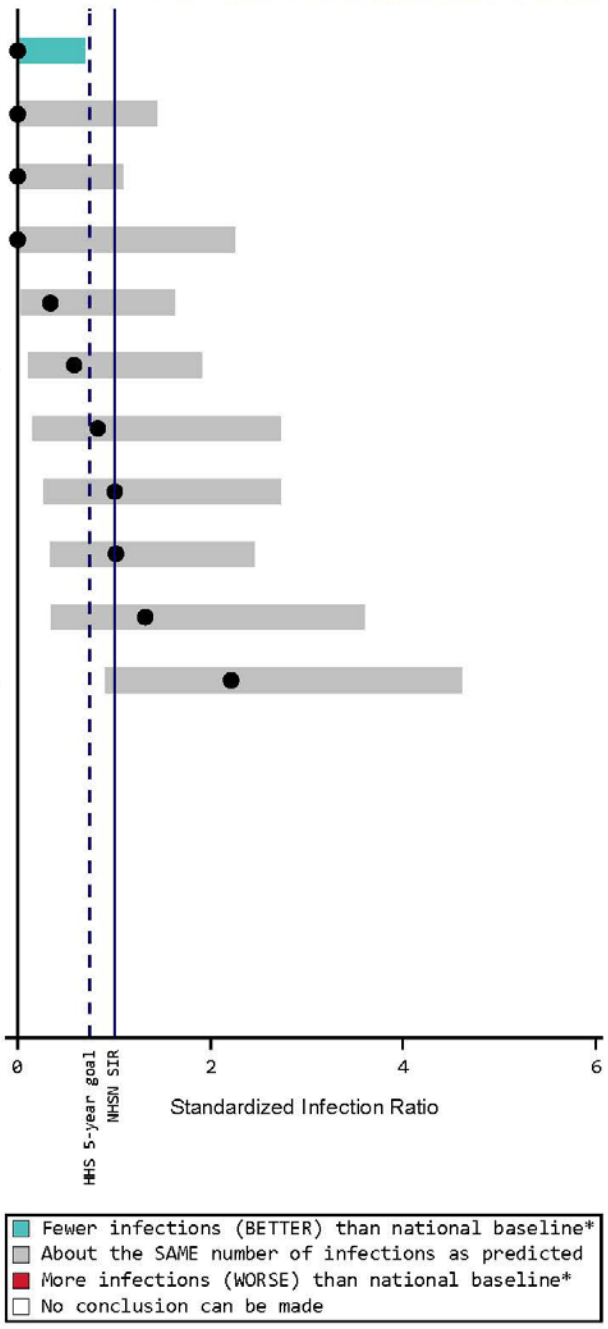
*Significantly different than 2015 national baseline

SSI following Colon Surgeries in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2017
Hospital Group: Hospitals with 200 to 399 Beds

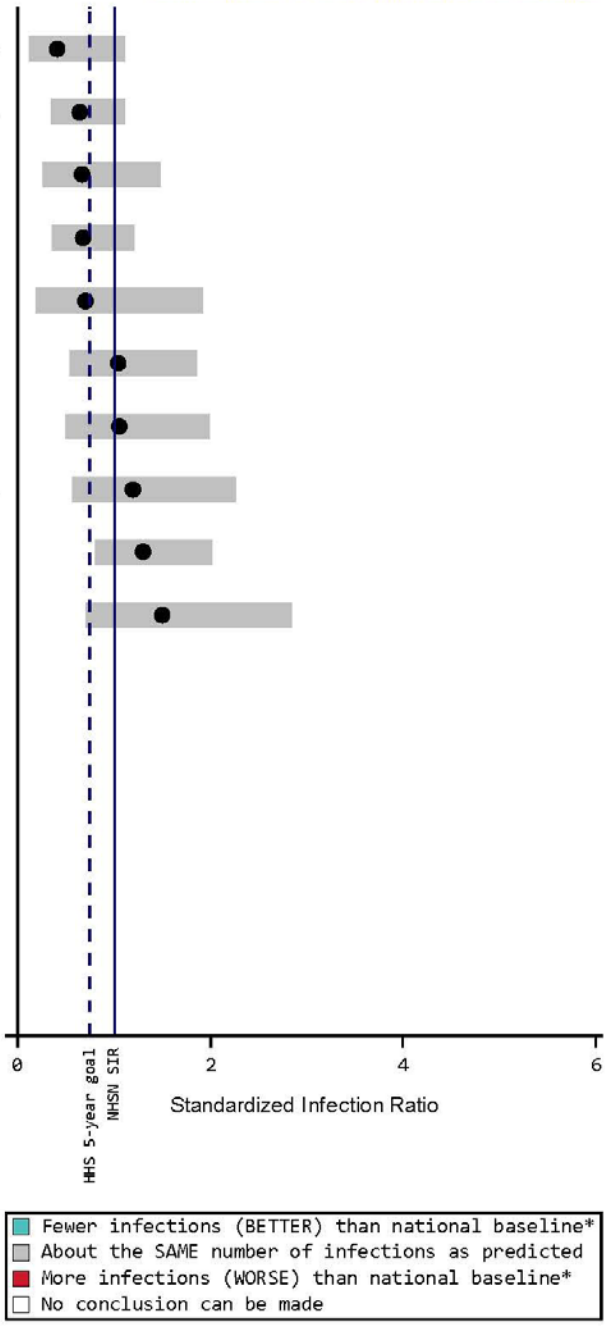
HOSPITAL	OBS	PRED	PROC	SIR
High Point Regional Health System	0	4.3	155	0.0
Novant Health Rowan Medical Center	0	2.1	83	0.0
Wayne Memorial Hospital	0	2.7	101	0.0
Southeastern Regional Medical Center	0	1.3	45	0.0
Carolinas Medical Center-Mercy	1	3.0	108	0.3
FirstHealth Moore Regional Hospital	2	3.5	141	0.6
Duke Regional Hospital	2	2.4	89	0.8
CarolinaEast Medical Center	3	3.0	116	1.0
Carolinas Medical Center-Pineville	4	3.9	152	1.0
Alamance Regional Medical Center	3	2.3	81	1.3
Carolinas Healthcare System Cleveland	6	2.7	100	2.2



Data reported as of May 25, 2018 .
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, 2017
Hospital Group: Hospitals with 400 or More Beds

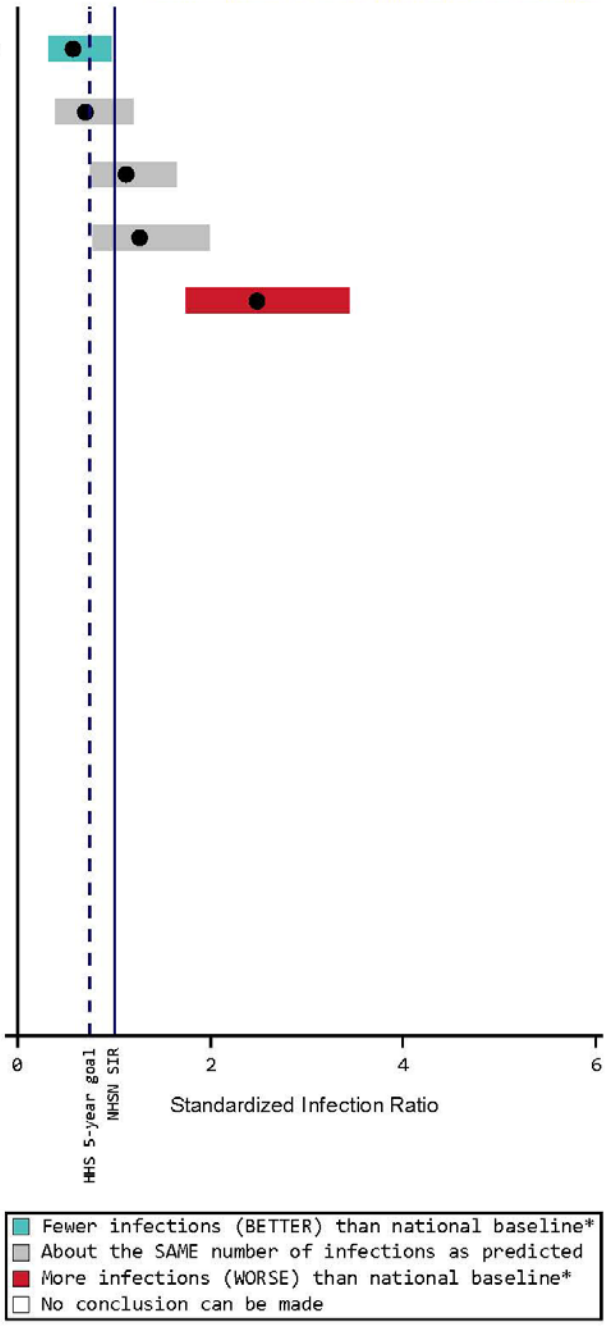
HOSPITAL	OBS	PRED	PROC	SIR
Carolinas Healthcare System - Northeast	3	7.3	276	0.4
Rex Healthcare	11	17.3	644	0.6
Novant Health Forsyth Medical Center	5	7.5	278	0.7
New Hanover Regional Medical Center	10	14.8	542	0.7
Moses Cone Hospital	3	4.3	144	0.7
Novant Health Presbyterian Medical	10	9.6	359	1.0
Cape Fear Valley Health System	8	7.6	256	1.0
WakeMed	8	6.7	219	1.2
Mission Hospital	18	13.9	509	1.3
Gaston Memorial Hospital	8	5.3	191	1.5



Data reported as of May 25, 2018 .
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, 2017
Hospital Group: Hospitals with Primary Medical School Affiliation

HOSPITAL	OBS	PRED	PROC	SIR
UNC Health Care	12	21.1	677	0.6
Duke University Hospital	12	17.0	595	0.7
Carolinas Medical Center	24	21.4	687	1.1
Wake Forest University Baptist Medical	17	13.4	451	1.3
Vidant Medical Center	33	13.3	466	2.5



Data reported as of May 25, 2018 .
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)

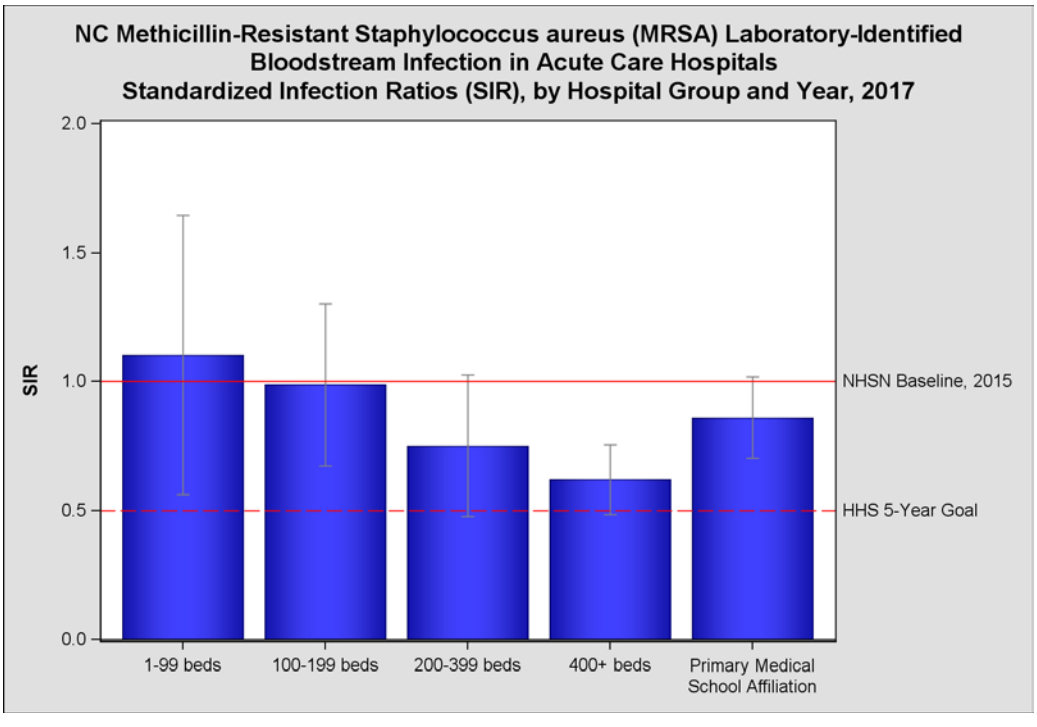
North Carolina 2017 MRSA LabID Highlights

- In 2017 North Carolina hospitals reported 279 MRSA LabID events, compared to the 356 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 been met this goal.

Table 6. N.C. Methicillin-Resistant Staphylococcus Aureus Laboratory-Identified events, by year, 2012-2016

Year	# Observed Events	# Predicted Events	How Does North Carolina Compare to the National Experience?
2017	279	355.5	★Better: Fewer infections than were predicted (better than the national experience)

Figure 19.



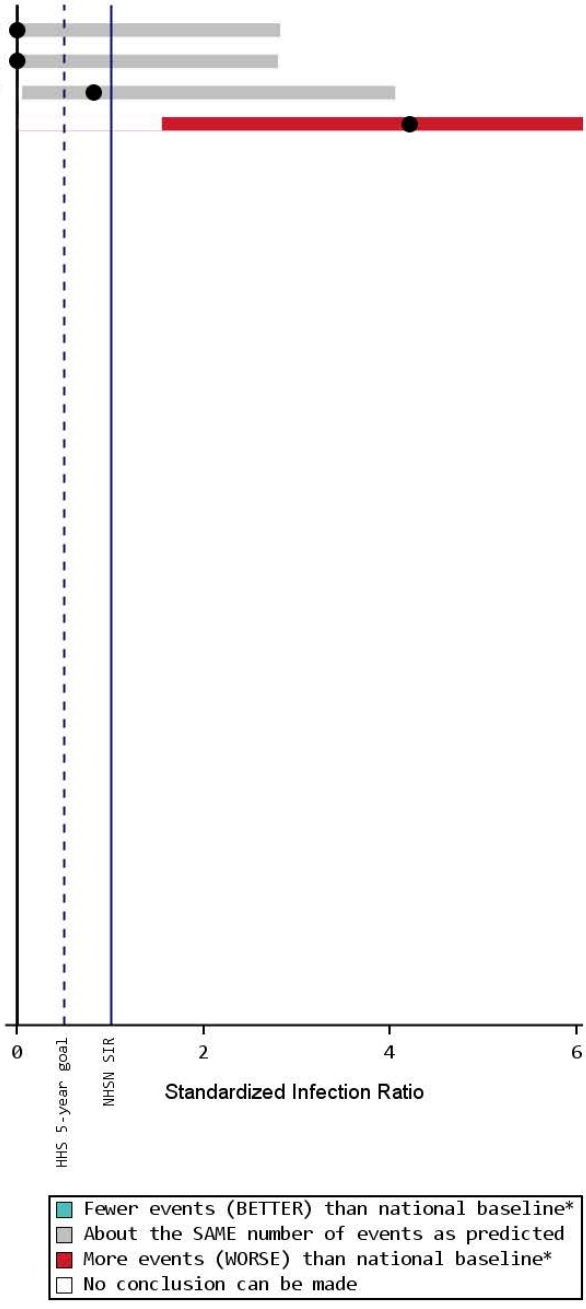
How to Understand Figure 19:

- 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 by 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, 2017
Hospital Group: Hospitals with less than 100 Beds

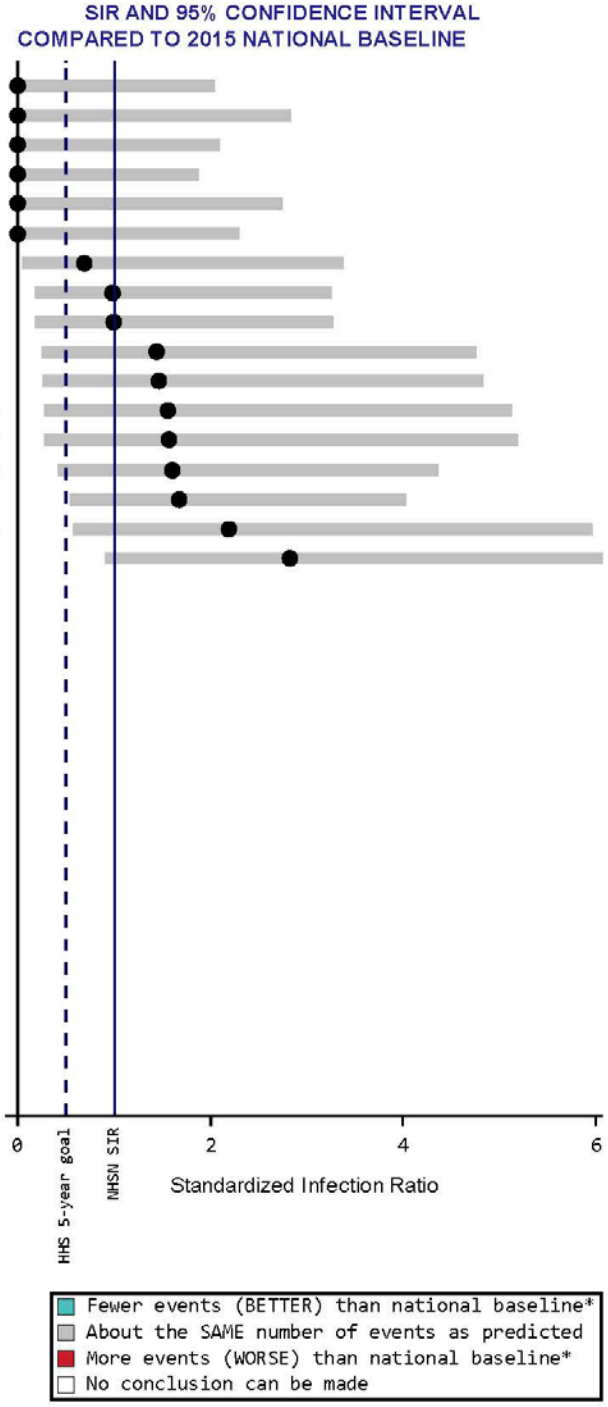
HOSPITAL	OBS	PRED	PD	SIR
Columbus Regional Healthcare System	0	1.1	18183	0.0
Randolph Hospital Dba Randolph Health	0	1.1	19480	0.0
Halifax Regional Medical Center	1	1.2	21358	0.8
Novant Health Huntersville	5	1.2	30415	4.2
McDowell Hospital	0	0.4	9241	NC
Park Ridge Health	0	0.3	10859	NC
Murphy Medical Center	0	0.2	6096	NC
Dlp - Harris Regional Hospital	2	0.5	12825	NC
Sentara Albemarle Medical Center	0	0.9	21274	NC
Martin General Hospital	0	0.1	3795	NC
Vidant Beaufort Hospital	0	0.8	16781	NC
Granville Medical Center	0	0.2	8312	NC
Carteret General Hospital	1	0.7	27599	NC
Novant Health Brunswick Medical Center	0	0.5	19753	NC
Vidant Duplin Hospital	0	0.7	11543	NC
Kings Mountain Hospital	0	0.1	7063	NC
Caldwell Memorial Hospital	2	0.8	18760	NC
Person Memorial Hospital	1	0.1	3110	NC
Wake Forest Baptist Health-Lexington	1	0.6	9802	NC
Novant Health Charlotte Orthopedic Hosp	0	0.1	7071	NC
Novant Health Medical Park Hospital	0	0.1	5249	NC
Hugh Chatham Memorial Hospital	0	0.4	12921	NC
Carolinas Healthcare System Anson	0	0.0	425	NC
Annie Penn Hospital	1	0.8	14323	NC
North Carolina Specialty Hospital	0	0.1	4110	NC
Wake Forest Baptist Health-Davie Medica	0	0.1	2084	NC
Johnston Health Clayton	0	0.3	11192	NC
Firsthealth Moore Regional-Hoke	0	0.0	1796	NC
Firsthealth Moore Regional-Richmond	0	0.3	9858	NC
Cape Fear Valley Hoke Hospital	0	0.1	4241	NC
Novant Health Kernersville Medical Cent	2	0.4	13698	NC
Wakemed North Family Health & Women's H	0	0.1	5621	NC



Data reported as of May 25, 2018 .
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, 2017
Hospital Group: Hospitals with 100 to 199 Beds

HOSPITAL	OBS	PRED	PD	SIR
Pardee Hospital	0	1.5	31966	0.0
Haywood Regional Medical Center	0	1.1	21255	0.0
Iredell Memorial Hospital	0	1.4	38236	0.0
Frye Regional Medical Center	0	1.6	35875	0.0
Wilson Medical Center	0	1.1	28841	0.0
Women's Hospital	0	1.3	54113	0.0
Novant Health Matthews Medical Center	1	1.5	46921	0.7
Wesley Long Hospital	2	2.0	40166	1.0
Catawba Valley Medical Center	2	2.0	54187	1.0
Carolinas Healthcare System Blue Ridge	2	1.4	30819	1.4
Carolinas Medical Center-Union	2	1.4	31758	1.5
Johnston Health	2	1.3	31577	1.6
Onslow Memorial Hospital	2	1.3	30796	1.6
Duke Raleigh Hospital	3	1.9	51449	1.6
Nash Health Care Systems	4	2.4	47232	1.7
Lenoir Memorial Hospital	3	1.4	28619	2.2
WakeMed Cary Hospital	4	1.4	45153	2.8
Carolinas Medical Center-University	1	0.9	27674	NC
Rutherford Regional Medical Center	0	0.7	14592	NC
ARHS-Watauga Medical Center	0	0.5	12859	NC
Davis Regional Medical Center	1	0.7	16126	NC
Vidant Roanoke Chowan Hospital	0	0.7	14897	NC
Vidant Edgecombe Hospital	0	0.9	15675	NC
Novant Health Thomasville Medical Cente	1	0.8	14966	NC
Sampson Regional Medical Center	1	0.5	10962	NC
Maria Parham Medical Center	1	0.9	19156	NC
Northern Hospital Of Surry County	0	0.8	15501	NC
Lake Norman Regional Medical Center	1	0.6	15951	NC
Scotland Memorial Hospital	2	0.7	22435	NC
Carolinas Healthcare System Lincoln	1	0.9	17470	NC
Central Carolina Hospital	0	0.7	18748	NC
Stanly Regional Medical Center	0	0.6	12785	NC
Betsy Johnson Hospital	0	0.7	18761	NC
UNC Rockingham Health	1	0.6	15069	NC
Wake Forest Baptist Health Wilkes Medic	1	0.5	13088	NC



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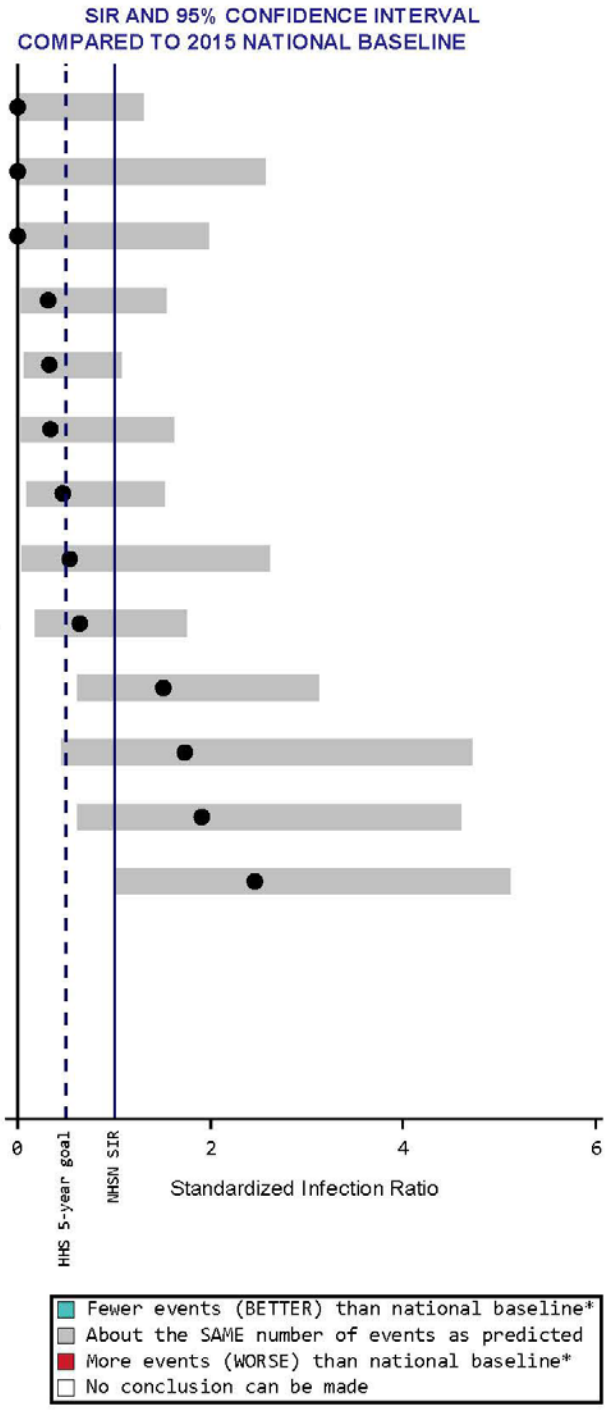
SIR = Standardized infection ratio (OBS/PRED # of infections)
NC = SIR not calculated for hospitals with <1 predicted infection
*Significantly different than 2015 national baseline

MRSA in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2017
Hospital Group: Hospitals with 200 to 399 Beds

HOSPITAL	OBS	PRED	PD	SIR
Carolinas Healthcare System Cleveland	0	2.3	36923	0.0
Cherry Hospital	0	1.2	77035	0.0
Broughton Hospital	0	1.5	99772	0.0
Carolinas Medical Center-Pineville	1	3.2	68954	0.3
Duke Regional Hospital	2	6.2	75773	0.3
CarolinaEast Medical Center	1	3.0	62758	0.3
High Point Regional Health System	2	4.3	74921	0.5
Alamance Regional Medical Center	1	1.9	43469	0.5
Southeastern Regional Medical Center	3	4.7	74050	0.6
FirstHealth Moore Regional Hospital	6	4.0	104991	1.5
Novant Health Rowan Medical Center	3	1.7	41375	1.7
Carolinas Medical Center-Mercy	4	2.1	41353	1.9
Wayne Memorial Hospital	6	2.4	52163	2.5



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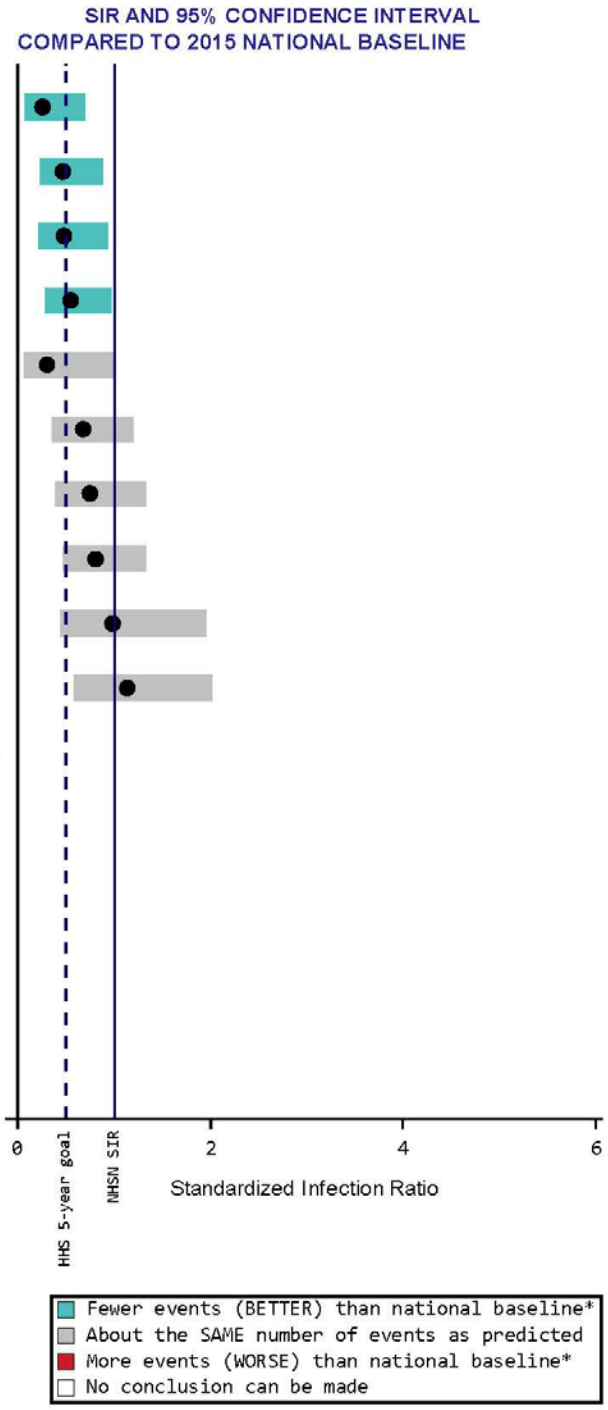
PD = # Patient days
SIR = Standardized infection ratio (OBS/PRED # of infections)
NC = SIR not calculated for hospitals with <1 predicted infection
*Significantly different than 2015 national baseline

MRSA in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2017
Hospital Group: Hospitals with 400 or More Beds

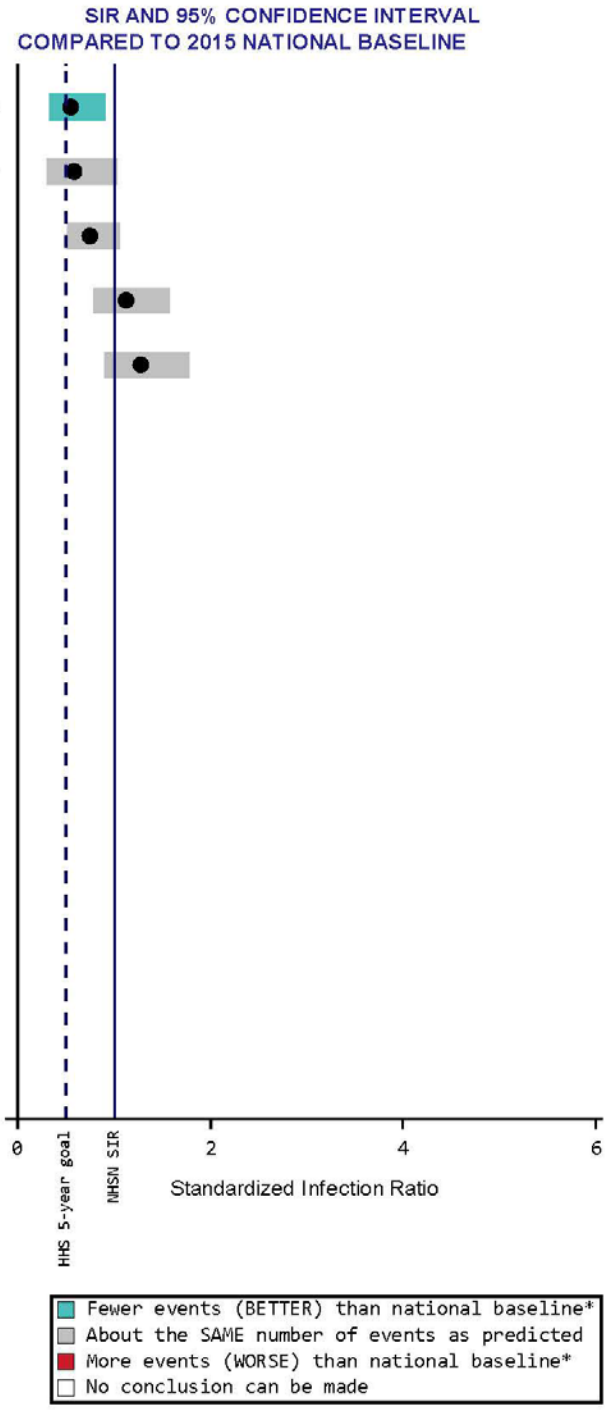
HOSPITAL	OBS	PRED	PD	SIR
Moses Cone Hospital	3	11.8	121056	0.3
Mission Hospital	8	17.3	209792	0.5
Rex Healthcare	7	14.9	144055	0.5
New Hanover Regional Medical Center	10	18.4	178873	0.5
Carolinas Healthcare System - Northeast	2	6.6	105462	0.3
WakeMed	10	14.9	157465	0.7
Cape Fear Valley Health System	10	13.4	167920	0.7
Novant Health Forsyth Medical Center	14	17.3	219972	0.8
Gaston Memorial Hospital	7	7.1	103430	1.0
Novant Health Presbyterian Medical	10	8.8	150873	1.1
Central Regional Hospital	NA	NA	NA	NA



Data reported as of May 25, 2018 .
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, 2017
Hospital Group: Hospitals with Primary Medical School Affiliation

HOSPITAL	OBS	PRED	PD	SIR
Carolinas Medical Center	14	25.4	278469	0.6
Vidant Medical Center	10	17.4	248900	0.6
Duke University Hospital	28	37.8	347344	0.7
UNC Health Care	31	27.7	254191	1.1
Wake Forest University Baptist Medical	32	25.1	230915	1.3



Data reported as of May 25, 2018 .
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

Clostridium difficile Laboratory-Identified Events (CDI LabID)

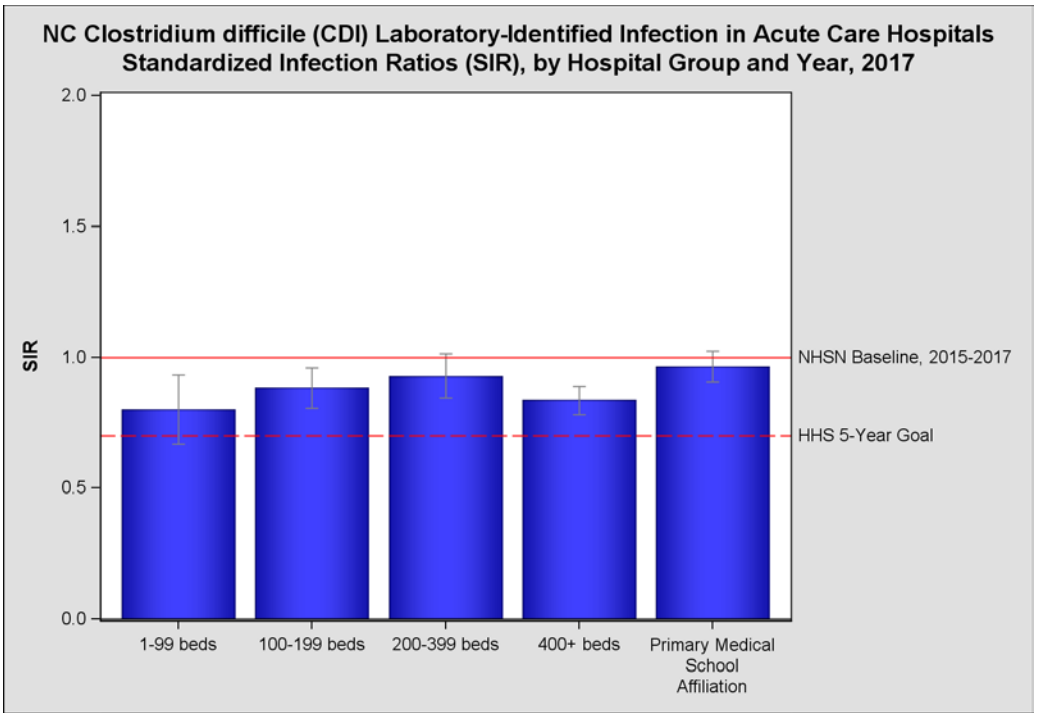
North Carolina 2017 CDI LabID Highlights

- In 2017, North Carolina hospitals reported 2696 CDI LabID events, compared to the 3488 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. N.C. Clostridium difficile laboratory-identified events, by year, 2012-2016

Year	# Observed Infections	# Predicted Infections	How Does North Carolina Compare to the National Experience?
2013	2696	3487.90	★Better: Fewer infections than were predicted (better than the national experience)

Figure 21.



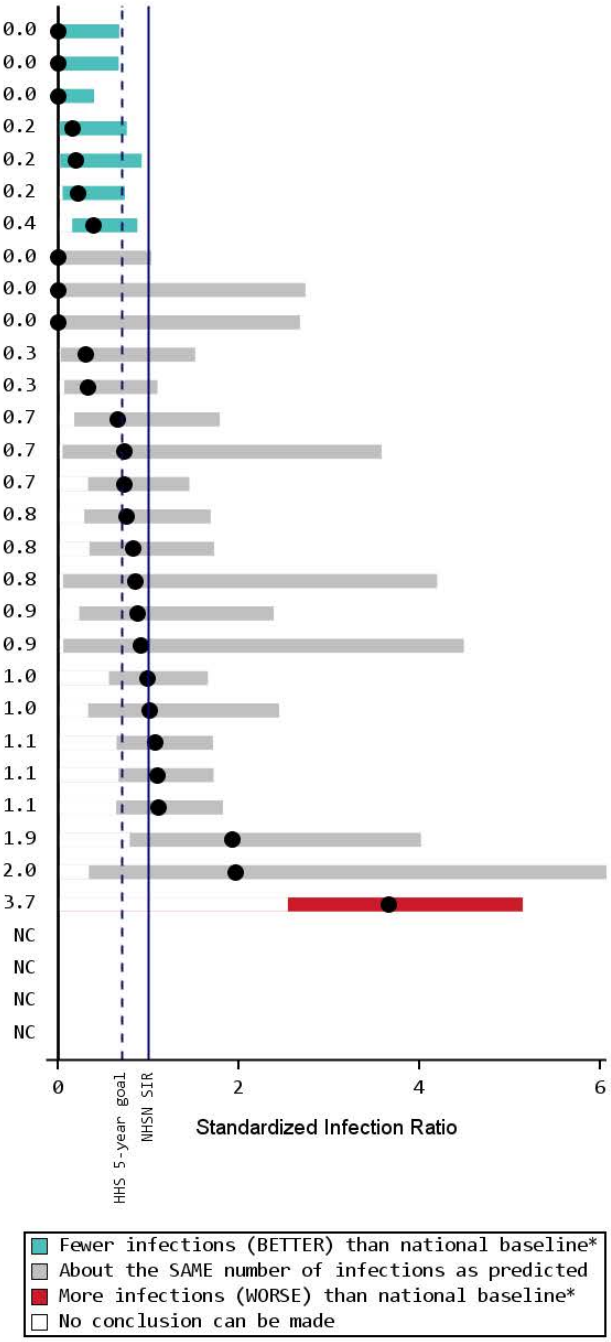
How to Understand Figure 21:

- Hospitals with 200-399 beds and hospitals with a primary medical school affiliation performed about the SAME as the national experience, with the same number of LabID CDI events as predicted.
- All other hospital sized groups performed BETTER than the national experience, with fewer LabID CDI events than predicted
- None of the hospital size groups met the HHS 5-year goal in 2017

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

C Difficile in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2017
Hospital Group: Hospitals with less than 100 Beds

HOSPITAL	OBS	PRED	PD	SIR
McDowell Hospital	0	4.5	8789	0.0
Hugh Chatham Memorial Hospital	0	4.6	12224	0.0
Firsthealth Moore Regional-Richmond	0	7.8	9858	0.0
Vidant Duplin Hospital	1	6.6	10758	0.2
Kings Mountain Hospital	1	5.4	7063	0.2
Vidant Beaufort Hospital	2	9.1	16731	0.2
Sentara Albemarle Medical Center	5	12.8	20598	0.4
Wake Forest Baptist Health-Lexington	0	2.9	8751	0.0
Cape Fear Valley Hoke Hospital	0	1.1	4241	0.0
Wakemed North Family Health & Women's H	0	1.1	3051	0.0
Murphy Medical Center	1	3.3	6096	0.3
Novant Health Kernersville Medical Cent	2	6.1	13698	0.3
Granville Medical Center	3	4.6	7969	0.7
Martin General Hospital	1	1.4	3629	0.7
Novant Health Brunswick Medical Center	7	9.6	18783	0.7
Columbus Regional Healthcare System	5	6.6	17582	0.8
Annie Penn Hospital	6	7.3	14323	0.8
Novant Health Medical Park Hospital	1	1.2	5249	0.8
Park Ridge Health	3	3.4	9031	0.9
Novant Health Charlotte Orthopedic Hosp	1	1.1	7071	0.9
Randolph Hospital Dba Randolph Health	13	13.2	19681	1.0
Dlp - Harris Regional Hospital	4	4.0	12825	1.0
Novant Health Huntersville	16	14.9	26309	1.1
Halifax Regional Medical Center	17	15.6	20354	1.1
Caldwell Memorial Hospital	14	12.7	18120	1.1
Johnston Health Clayton	6	3.1	9817	1.9
Person Memorial Hospital	2	1.0	3110	2.0
Carteret General Hospital	31	8.5	26185	3.7
Carolinas Healthcare System Anson	0	0.1	425	NC
North Carolina Specialty Hospital	0	0.8	4110	NC
Wake Forest Baptist Health-Davie Medica	0	0.4	2084	NC
Firsthealth Moore Regional-Hoke	0	0.6	1352	NC



Data reported as of May 25, 2018 .
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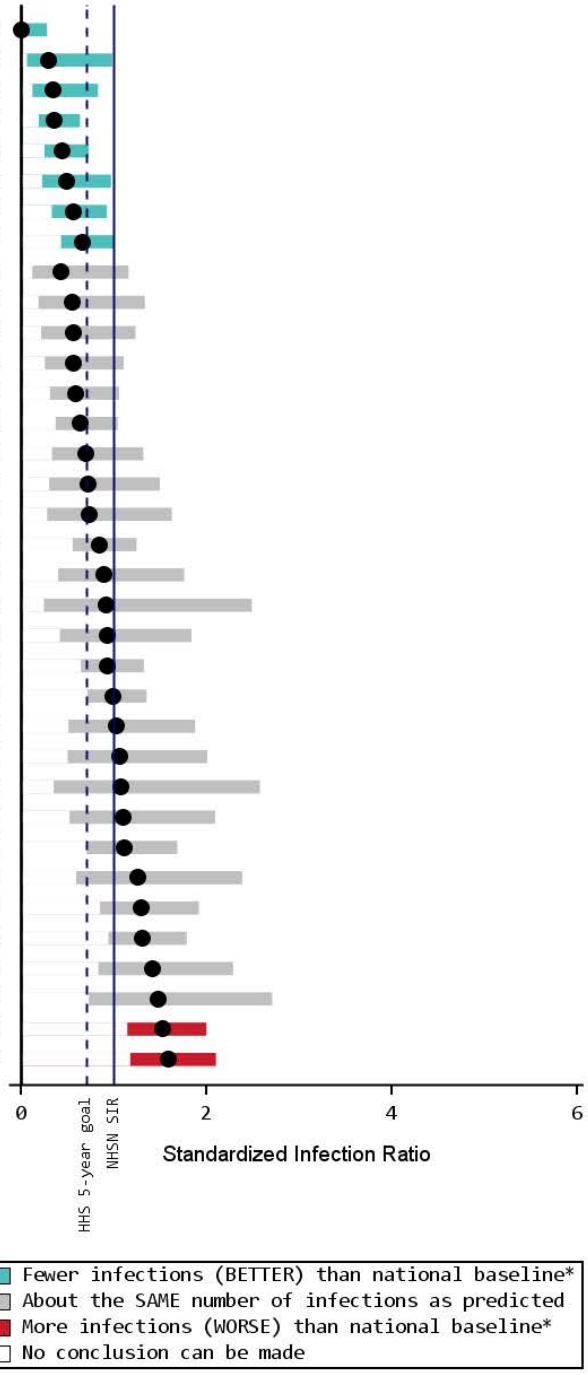
PRED = # infections statistically 'predicted' by national baseline
PD = # Patient days
SIR = Standardized infection ratio (OBS/PRED # of infections)
NC = SIR not calculated for hospitals with <1 predicted infection

C Difficile in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2017
Hospital Group: Hospitals with 100 to 199 Beds

HOSPITAL	OBS	PRED	PD	SIR
Women's Hospital	0	11.3	30890	0.0
Stanly Regional Medical Center	2	6.8	11745	0.3
Haywood Regional Medical Center	4	11.8	20739	0.3
Catawba Valley Medical Center	10	28.7	51506	0.3
Novant Health Matthews Medical Center	13	30.3	40929	0.4
Pardee Hospital	7	14.5	31966	0.5
Wesley Long Hospital	14	25.1	40166	0.6
Carolinas Healthcare System Blue Ridge	21	32.0	29382	0.7
Unc Rockingham Health	3	7.1	14196	0.4
Betsy Johnson Regional	4	7.3	17360	0.5
Vidant Roanoke Chowan Hospital	5	9.1	14119	0.6
Carolinas Medical Center-University	7	12.7	23295	0.6
Carolinas Medical Center-Union	10	17.1	28705	0.6
Lenoir Memorial Hospital	14	22.3	27671	0.6
Northern Hospital Of Surry County	8	11.6	14907	0.7
Novant Health Thomasville Medical Cente	6	8.4	13477	0.7
Davis Regional Medical Center	5	6.9	16126	0.7
Johnston Health	23	27.6	29882	0.8
Vidant Edgecombe Hospital	7	7.9	14484	0.9
Sampson Regional Medical Center	3	3.3	10052	0.9
Lake Norman Regional Medical Center	7	7.6	13852	0.9
Duke Raleigh Hospital	29	31.4	51449	0.9
Frye Regional Medical Center	37	37.6	35117	1.0
Carolinas Healthcare System Lincoln	9	8.9	16620	1.0
Rutherford Regional Medical Center	8	7.6	13917	1.1
Wake Forest Baptist Health Wilkes Medic	4	3.8	12821	1.1
ARHS-Watauga Medical Center	8	7.3	12859	1.1
Wilson Medical Center	20	18.1	27056	1.1
Central Carolina Hospital	8	6.4	17247	1.3
Onslow Memorial Hospital	23	17.8	26393	1.3
WakeMed Cary Hospital	37	28.4	39548	1.3
Maria Parham Medical Center	15	10.6	18175	1.4
Scotland Memorial Hospital	9	6.1	20380	1.5
Nash Health Care Systems	49	32.3	44002	1.5
Iredell Memorial Hospital	45	28.5	36853	1.6



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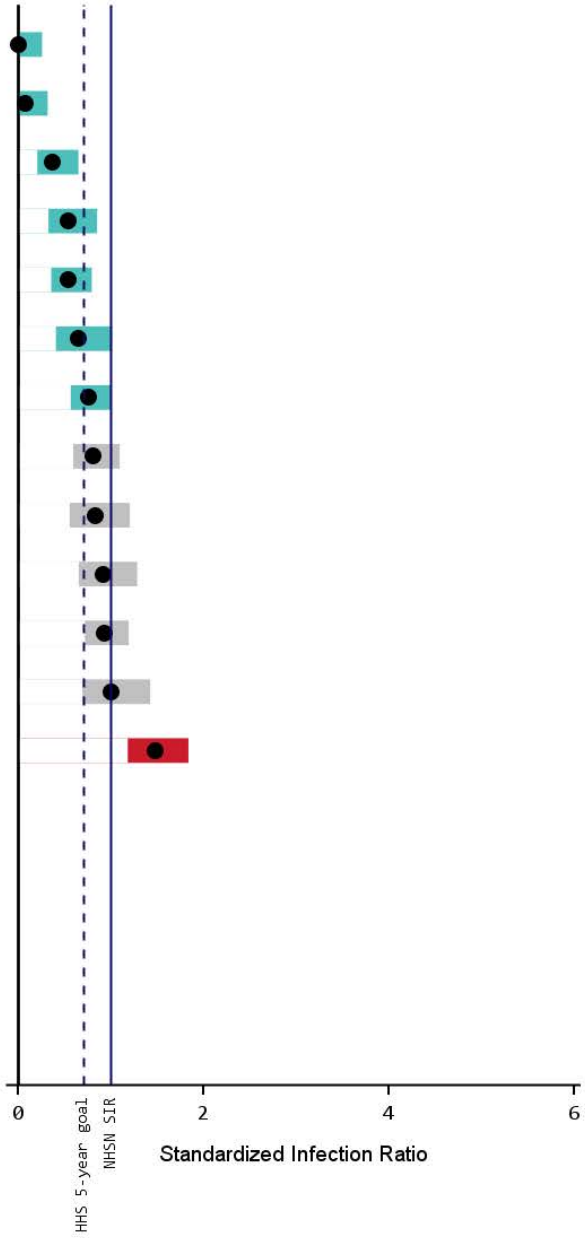
PD = # Patient days
SIR = Standardized infection ratio (OBS/PRED # of infections)
NC = SIR not calculated for hospitals with <1 predicted infection

C Difficile in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2017
Hospital Group: Hospitals with 200 to 399 Beds

HOSPITAL	OBS	PRED	PD	SIR
Cherry Hospital	0	12.3	77035	0.0
Broughton Hospital	1	16.2	99772	0.1
Carolinas Medical Center-Mercy	11	30.0	41353	0.4
Alamance Regional Medical Center	16	30.3	38814	0.5
Carolinas Medical Center-Pineville	23	43.5	62220	0.5
Carolinas Healthcare System Cleveland	18	27.9	34659	0.6
High Point Regional Health System	47	63.0	71698	0.7
Southeastern Regional Medical Center	40	49.8	68933	0.8
Novant Health Rowan Medical Center	25	30.5	39562	0.8
CarolinaEast Medical Center	33	36.0	60404	0.9
FirstHealth Moore Regional Hospital	59	64.0	99122	0.9
Wayne Memorial Hospital	29	29.1	49404	1.0
Duke Regional Hospital	78	53.0	67211	1.5

SIR AND 95% CONFIDENCE INTERVAL
COMPARED TO 2015 NATIONAL BASELINE



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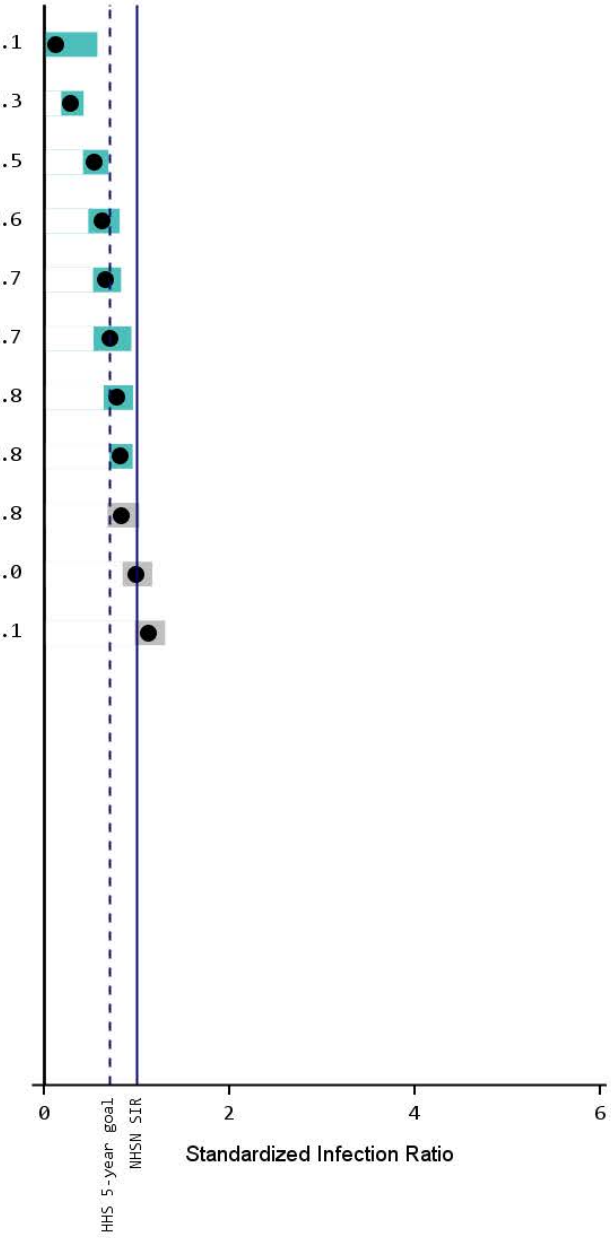
PD = # Patient days
SIR = Standardized infection ratio (OBS/PRED # of infections)
NC = SIR not calculated for hospitals with <1 predicted infection

C Difficile in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2017
Hospital Group: Hospitals with 400 or More Beds

HOSPITAL	OBS	PRED	PD	SIR
Central Regional Hospital	1	8.8	56400	0.1
Gaston Memorial Hospital	20	73.7	96067	0.3
Cape Fear Valley Health System	58	110	145471	0.5
Moses Cone Hospital	51	83.0	121056	0.6
Novant Health Presbyterian Medical	72	110	122098	0.7
Carolinas Healthcare System - Northeast	46	65.5	94737	0.7
Rex Healthcare	92	119	128276	0.8
Novant Health Forsyth Medical Center	161	199	193712	0.8
WakeMed	90	109	133442	0.8
New Hanover Regional Medical Center	146	148	169480	1.0
Mission Hospital	182	163	190126	1.1



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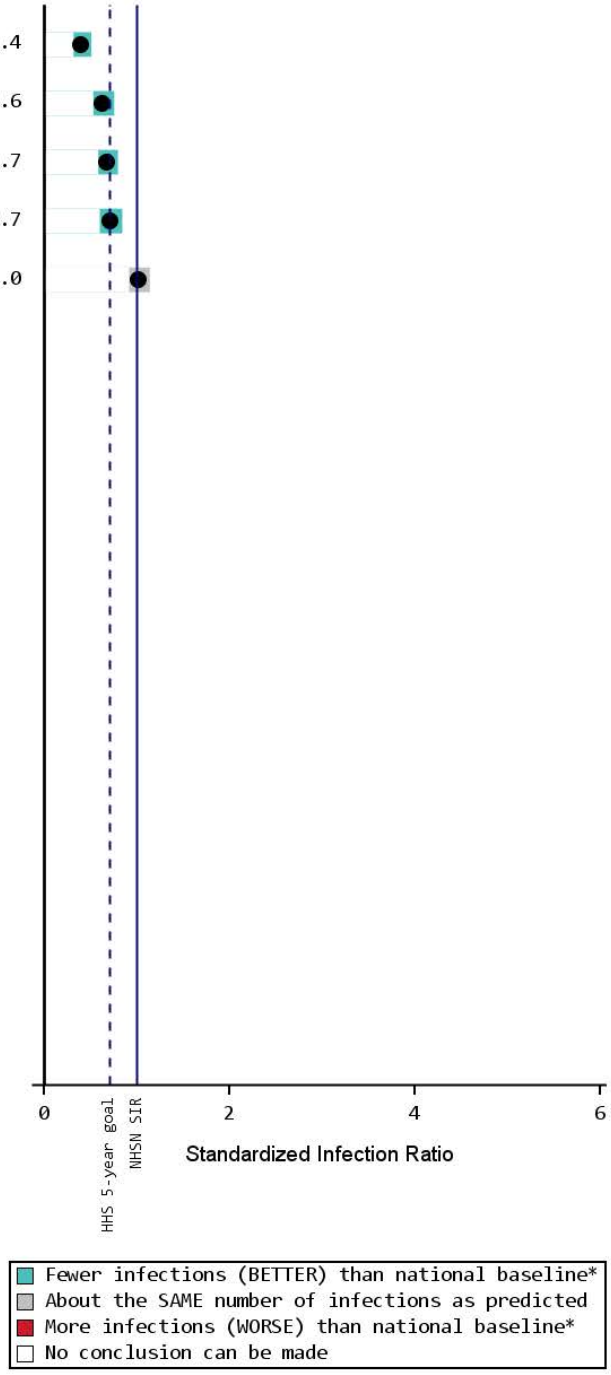
SIR = Standardized infection ratio (OBS/PRED # of infections)
NC = SIR not calculated for hospitals with <1 predicted infection

C Difficile in Acute Care Hospitals
Standardized Infection Ratios: January 1 – December 31, 2017
Hospital Group: Hospitals with Primary Medical School Affiliation

HOSPITAL	OBS	PRED	PD	SIR
Wake Forest University Baptist Medical	63	161	218292	0.4
UNC Health Care	117	188	228357	0.6
Carolinas Medical Center	154	230	235077	0.7
Vidant Medical Center	128	183	234671	0.7
Duke University Hospital	320	316	324736	1.0

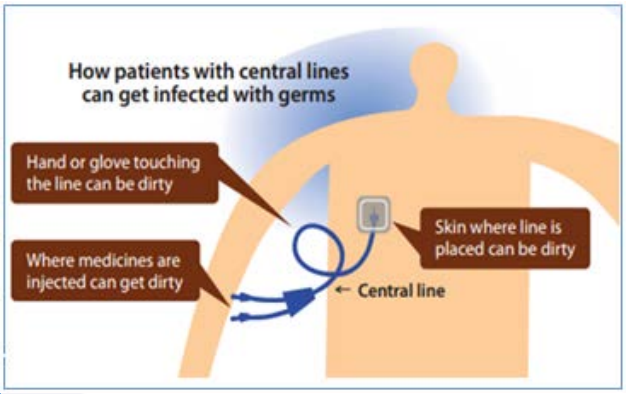


Data reported as of May 25, 2018 .
OBS = # infections observed
PRED = # infections statistically 'predicted' by national baseline
PD = # Patient days
SIR = Standardized infection ratio (OBS/PRED # of infections)
NC = SIR not calculated for hospitals with <1 predicted infection

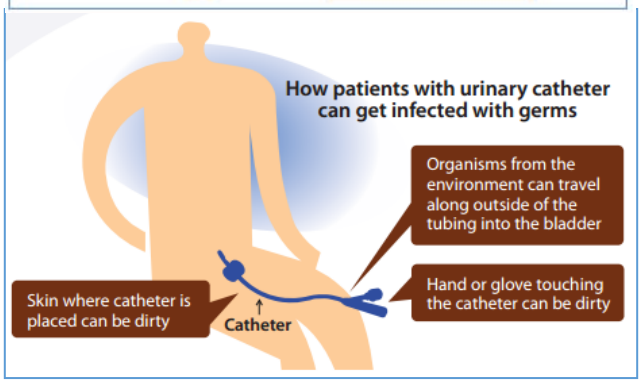
FAST FACTS: What You Need to Know About Healthcare-Associated Infections

Device-Associated HAIs

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



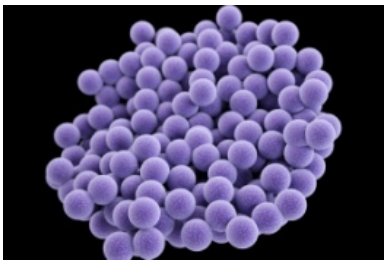
- A **central line** is a tube placed in a large vein to allow access to the bloodstream and provide the patient with important medicine. A **central line-associated bloodstream infection (CLABSI)** can occur when bacteria or other germs travel along a central line and enter the blood. When not put in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



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

Other HAIs

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



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

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

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

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

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

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

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

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

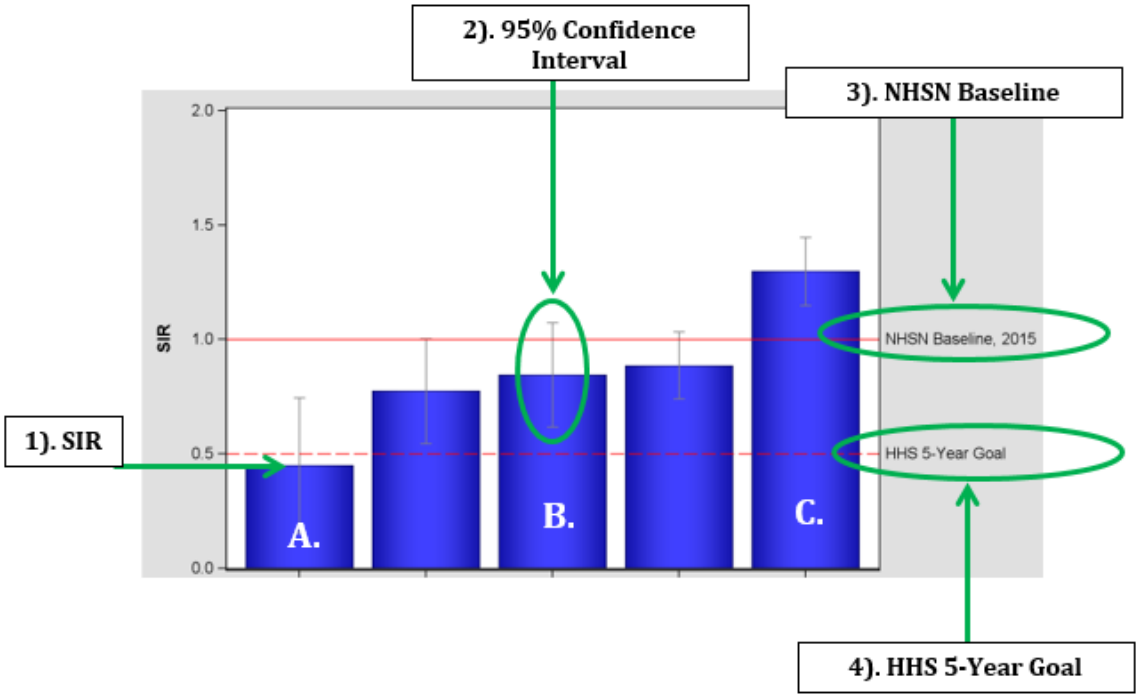
- **Predicted Infections (or Predicted Events):** This is a calculated value that reflects the number of infections (or events, for LabID measures) that we have "predicted" to occur in this facility, based on the national experience.

- **"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.

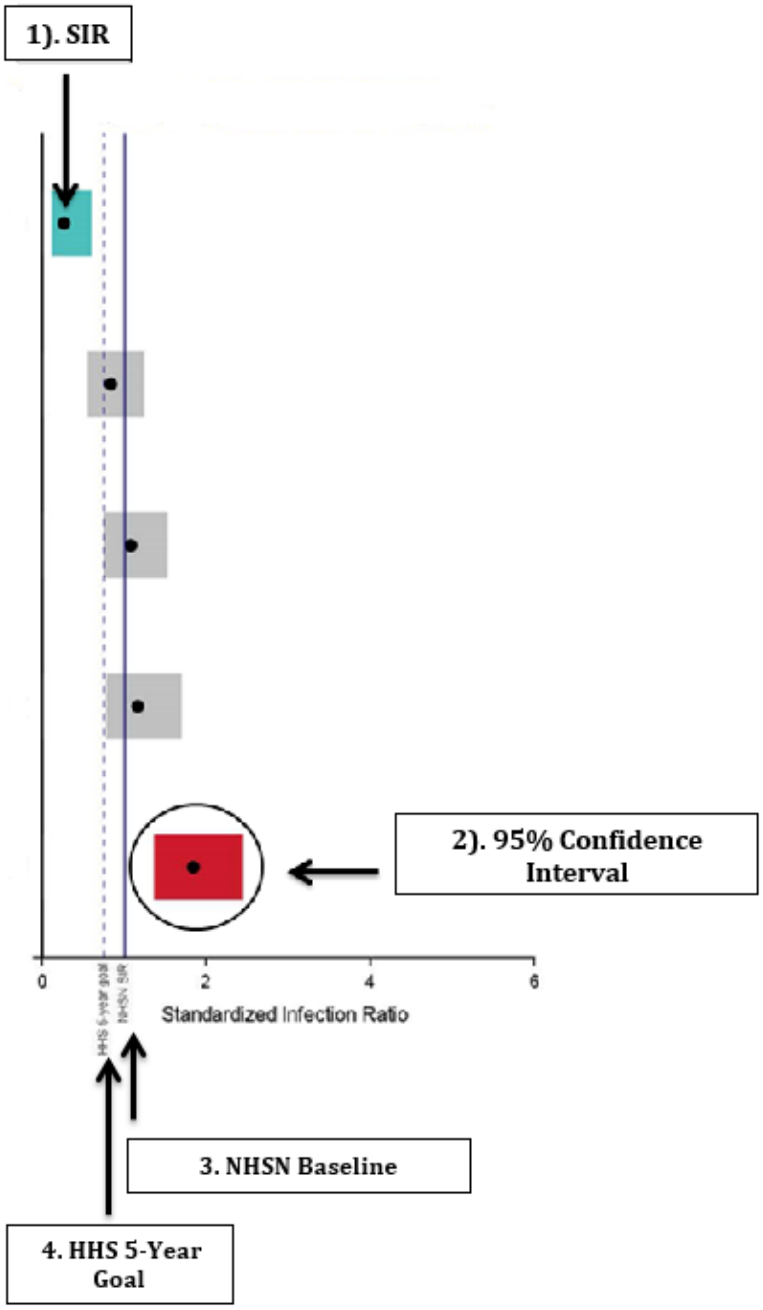
- The NHSN baseline is the number of predicted infections based on the national experience
- The NHSN baseline year for all HAIs use data from 2015

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

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

APPENDIX B. Acronyms

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

APPENDIX C. Healthcare-Associated Infections Prevention Tips

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

Appendix C2. Catheter-Associated Urinary Tract Infections

Appendix C3. Surgical Site Infections

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

Appendix C5. *Clostridium difficile* LabID Events

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

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Appendix E: Facts about HAIs in NC

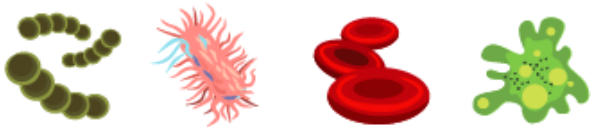
WHAT YOU NEED TO KNOW ABOUT HEALTHCARE-ASSOCIATED INFECTIONS (HAIs)

The Impact of HAIs in North Carolina

In 2016, **4,953 HAIs** were reported in North Carolina resulting in **over $22 million in excess** medical costs. [1, 2]

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 25** hospitalized patients. [3]

Nationally, **99,000 hospitalized patients** die from HAIs per year. [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, email nchai@dhhs.nc.gov and visit www.epi.publichealth.nc.gov/cd/hai/program.html.

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[1] NC SHARPPS Program, NC Division of Public Health. Healthcare-associated infections In North Carolina: 2016 Annual report. May 2017. Available at http://epi.publichealth.nc.gov/cd/hai/figures/hai_may2017_annual_v2.pdf. Accessed Nov 6, 2017.
[2] APIC. APIC cost of healthcare-associated infections model. May 2011. Available https://apic.org/Resources/Cost-calculators. Accessed Jul 18, 2017.
[3] CDC. HAI Data and Statistics. March 2016. Available at https://www.cdc.gov/hai/surveillance/index.html. Accessed May 31, 2017.
[4] Anderson DJ, et al. Statewide costs of health care-associated infections: Estimates for acute care hospitals in North Carolina. Am J Infect Control. 2013 Feb 27.

Appendix E. Healthcare Facility Groupings, 2017 National Healthcare Safety Network Annual Hospital Survey

HOSPITAL GROUP	HOSPITAL NAME	NUMBER OF BEDS
1-99 BEDS	Firsthealth Moore Regional Hospital - Hoke Campus	8
	Carolinas Healthcare System Anson	15
	North Carolina Specialty Hospital	18
	Novant Health Medical Park Hospital	22
	Cape Fear Valley Hoke Hospital	29
	Murphy Medical Center	32
	McDowell Hospital	34
	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
	Wake Forest Baptist Health-Davie Medical Center	50
	Johnston Health Clayton	50
	Novant Health Kernersville Medical Center	50
	Central Harnett Hospital	50
	Annie Penn Hospital	53
	Wake Forest Baptist Health-Lexington Medical Center	58
	Granville Medical Center	62
	Columbus Regional Healthcare System	70
	Carteret General Hospital	72
	Kings Mountain Hospital	72
	Novant Health Brunswick Medical Center	74
	Firsthealth Moore Regional Hospital - Richmond Campus	79
	Vidant Duplin Hospital	80
	Hugh Chatham Memorial Hospital	81
	Randolph Hospital Dba Randolph Health	85
	Caldwell Memorial Hospital	85
	Dlp - Harris Regional Hospital	86
	Vidant Beaufort Hospital	88
	Halifax Regional Medical Center	90
	Novant Health Huntersville Medical Center	91
	Sentara Albemarle Medical Center	97
	Park Ridge Health	98
	Carolinas Medical Center-University	100
100-199		
	Haywood Regional Medical Center	100
	Northern Hospital Of Surry County	100
	Maria Parham Medical Center	101

HOSPITAL GROUP	Hospital Name	Number of Beds
100-199	Carolinas Healthcare System Lincoln	101
	Betsy Johnson Hospital	101
	Scotland Memorial Hospital	104
	UNC Rockingham Health	108
	Stanly Regional Medical Center	109
	Vidant Roanoke Chowan Hospital	114
	Sampson Regional Medical Center	116
	Central Carolina Hospital	116
	ARHS-Watauga Medical Center	117
	Vidant Edgecombe Hospital	117
	Lake Norman Regional Medical Center	123
	Rutherford Regional Medical Center	125
	Wake Forest Baptist Health Wilkes Medical Center	130
	Davis Regional Medical Center	131
	Women's Hospital	134
	Pardee Hospital	138
	Carolinas Healthcare System Blue Ridge	139
	Wilson Medical Center	145
	Novant Health Matthews Medical Center	146
	Novant Health Thomasville Medical Center	149
	Wesley Long Hospital	150
	Nash Health Care Systems	155
	Onslow Memorial Hospital	162
	Lenoir Memorial Hospital	167
	Frye Regional Medical Center	170
	Johnston Health	172
	Duke Raleigh Hospital	177
	WakeMed Cary Hospital	180
	Carolinas Medical Center-Union	182
	Catawba Valley Medical Center	190
	Iredell Memorial Hospital	199
200-399 BEDS	Carolinas Medical Center-Pineville	206
	Carolinas Medical Center-Mercy	213
	Duke Regional Hospital	214
	Alamance Regional Medical Center	238
	Carolinas Healthcare System Cleveland	241
	Wayne Memorial Hospital	242
	Cherry Hospital	243
	Southeastern Regional Medical Center	246
	Novant Health Rowan Medical Center	268
	Broughton Hospital	297
	High Point Regional Health System	300
	CarolinaEast Medical Center	350

HOSPITAL GROUP	Hospital Name	Number of Beds
400+ BEDS	FirstHealth Moore Regional Hospital	376
	Central Regional Hospital	405
	Gaston Memorial Hospital	435
	Moses Cone Hospital	443
	Carolinas Healthcare System - Northeast	457
	Rex Healthcare	665
	Novant Health Presbyterian Medical Center	699
	New Hanover Regional Medical Center	711
	WakeMed	716
	Cape Fear Valley Health System	775
	Mission Hospital	791
	Novant Health Forsyth Medical Center	879
PRIMARY MEDICAL SCHOOL AFFILIATION	Wake Forest University Baptist Medical Center	885
	Carolinas Medical Center	898
	Vidant Medical Center	909
	UNC Health Care	914
	Duke University Hospital	952