Tennessee's Report on Healthcare-Associated Infections:

January 1, 2008 — June 30, 2011

Report Date:

June 2012

EXECUTIVE SUMMARY

Since January 2008, hospitals in Tennessee with an average daily census ≥25 have monitored central line-associated bloodstream infection (CLABSI) rates in adult and pediatric intensive care units (ICUs, also referred to as "critical care units"), excluding burn and trauma ICUs. Neonatal ICUs in Tennessee have been reporting CLABSIs to NHSN since July 2008. Hospitals began reporting CLABSIs in burn and trauma ICUs, specialty care areas (SCAs), and long-term acute care (LTAC) facilities in July 2010. For each reporting location, hospitals collect the number of CLABSIs that occur, the number of patient days, and the number of central line-days, including permanent and temporary central line-days in SCA locations.

Hospitals in Tennessee have reported surgical site infections (SSIs) related to coronary artery bypass graft surgery with both a chest and donor site incision (CBGB) and from coronary artery bypass graft surgery with a chest incision only (CBGC) since January 2008. Tennessee hospitals also reported SSIs related to hip prosthesis (HPRO) procedures from July 2010 through December 2011.

Central Line-Associated Bloodstream Infections (CLABSIs) in Adult and Pediatric ICUs, January–June 2011:

Excluding burn and trauma ICUs, which became reportable in Tennessee July 2010, the overall CLABSI standardized infection ratio (SIR) in Tennessee ICUs in January–June 2011 was 30% lower than the national 2006-8 SIR of 1 (SIR=0.70; 95% CI: 0.59, 0.81) (Table 3). Including burn and trauma ICUs, the overall CLABSI standardized infection ratio (SIR) in Tennessee was 23% lower than the national 2006-8 SIR of 1 (SIR=0.77; 95% CI: 0.67, 0.88) (Table 4). Viewing the data by year, the overall CLABSI SIR in Tennessee went from being significantly higher than the national 2006-8 SIR of 1 in 2008 (SIR=1.19; 95% CI: 1.09, 1.30) to being significantly lower than 1 in the first half of 2011. From baseline to January–June 2011, CLABSI SIRs decreased in all ICU types except non-major teaching medical ICUs, pediatric surgical cardiothoracic ICUs, and trauma ICUs (Table 5).

CLABSI rates during January–June 2011 were highest in burn ICUs (8.8 infections per 1,000 central line-days), followed by: trauma (3.6), pediatric surgical cardiothoracic (3.3), non-major teaching medical (1.6), major teaching medical-surgical (1.6), surgical (1.5), medical cardiac (1.4), non-major teaching medical-surgical with >15 beds (1.4), surgical cardiothoracic (1.4), major teaching medical (1.3), neurosurgical (0.9), pediatric medical-surgical (0.8), non-major teaching medical-surgical with ≤15 beds (0.7), neurological (0.0), and pediatric medical (0.0) (Table 6, Figure 3). Tennessee rates were significantly lower than national rates in major teaching medical ICUs [1.3 vs. 2.6 infections per 1,000 central line-days; SIR=0.52 (0.25, 0.96)], non-major teaching medical-surgical ICUs with ≤15 beds [0.7 vs. 1.5 infections per 1,000 central line-days; SIR=0.45 (0.18, 0.94)], neurosurgical ICUs [0.8 vs. 2.5 infections per 1,000 central line-days; SIR=0.36 (0.12, 0.84)], and pediatric medical-surgical ICUs [0.8 vs. 3.0 infections per 1,000 central line-days; SIR=0.29 (0.11, 0.63)] (Table 6, Figures 3-4). No ICU type had a CLABSI rate that was significantly higher than the corresponding 2006–2008 National Healthcare Safety Network (NHSN) baseline rate.

CLABSI rates in the first half of 2011 varied across the three grand divisions of Tennessee (Table 8). CLABSI SIRs were significantly lower than 1 in West Tennessee among non-major teaching

medical-surgical ICUs with >15 beds [0.4 vs. 1.5; SIR=0.25 (0.03, 0.89)], in Middle Tennessee among pediatric medical-surgical ICUs [0.9 vs. 3.0; SIR=0.29 (0.06, 0.86)] and surgical ICUs [0.2 vs. 2.3; SIR=0.09 (0.00, 0.50)] and in East Tennessee among major teaching medical ICUs [1.0 vs. 2.6; SIR=0.41 (0.13, 0.95)] and major teaching medical-surgical ICUs [0.0 vs. 2.1; SIR=0.00 (0.00, 0.55)]. The overall SIRs for Middle and East Tennessee were significantly lower than the national 2006-8 SIR of 1 [Middle: SIR=0.73 (0.55, 0.94); East: SIR=0.50 (0.36, 0.68)]. The overall SIR for ICUs in West Tennessee was not statistically significantly different from 1 [SIR=0.89 (0.67, 1.16)].

Some hospitals' ICUs reported zero infections. However, because of the low number of central line-days, these results may not be statistically significant. We cannot conclude that these ICUs would continue to have zero infections if there were an increased number of central line-days. The number and proportion of facilities that reported zero infection rates are listed by ICU type in the result section "Facility-Specific CLABSI Rates in Adult and Pediatric ICUs".

The microorganisms identified in 200 CLABSI events among adult and pediatric ICU patients are listed in Table 2 and Figure 7. The four most common pathogens among total positive isolates were *Candida* species and other yeasts (24.8%), coagulase-negative *Staphylococcus* species (22.5%), *Staphylococcus aureus* (13.1%), and *Enterococcus* species (12.2%). Methicillin-resistant *S. aureus* (MRSA) accounted for 9.0% and vancomycin-resistant *Enterococcus* (VRE) for 3.2% of total positive isolates.

Central Line-Associated Bloodstream Infections (CLABSIs) in Neonatal ICUs, January–June 2011:

The overall SIR across all reporting NICUs in Tennessee in January–June 2011was statistically significantly lower than the national SIR of 1 (SIR=0.52; 95% CI: 0.35, 0.75) (Table 23). Viewing the data by year, the overall CLABSI SIR in Tennessee went from being significantly higher than the national 2006-8 SIR of 1 in the second half of 2008 (SIR=1.51; 95% CI: 1.22, 1.85) to being significantly lower than 1 in the first half of 2011 (Table 23). From July–December 2009 to January–June 2011, CLABSI SIRs decreased or stayed the same for all ICU/birth weight categories, except among infants with birth weight 1001-1500 g in Level II/III NICUs (Table 26).

During January–June 2011, the overall CLABSI SIR in level III neonatal ICUs in Tennessee was statistically significantly lower than 1, while the CLABSI SIR in level II/III NICUs was not statistically different from 1 (Table 25). CLABSI rates in level III NICUs were significantly lower than 2006-8 rates for three birth weight categories: 1001-1500 g, 1501-2500 g, and >2500 g; CLABSI rates were not significantly different from national 2006-8 rates in any birth weight category in level II/III NICUs (Table 25, Figures 22-23).

CLABSI rates in the first half of 2011 varied among neonatal ICUs in the three grand divisions of Tennessee (Table 27). Level III neonatal ICUs in Middle Tennessee had a CLABSI SIR that was significantly less than 1 (SIR=0.13; 95% CI: 0.02, 0.46). The overall SIRs in Middle and East Tennessee were also significantly less than 1 [Middle: SIR=0.17 (0.04, 0.50); East: SIR=0.43 (0.18, 0.84)]. The overall SIR for NICUs in West Tennessee was not significantly different from 1 (SIR=0.97; 95% CI: 0.56, 1.55).

Some hospitals' neonatal ICUs reported zero infections. However, because of the low number of central line-days, these results may not be statistically significant. We cannot conclude that these

ICUs would continue to have zero infections if there were an increased number of central line-days. The number and proportion of facilities that reported zero infection rates by neonatal ICU type are listed in the result section "Facility-Specific SIRs and Device Utilization Ratios".

The microorganisms identified in 28 CLABSI events among neonatal ICU patients are listed in Table 22 and Figure 27. The most common microorganisms identified in NICU-related CLABSIs were *Staphylococcus aureus* (41.4%), coagulase-negative *Staphylococcus* (17.2%), *Escherichia coli* (10.3%), and *Pseudomonas aeruginosa* (10.3%). Methicillin-resistant *S. aureus* (MRSA) accounted for 29.6% of organisms identified, and one vancomycin-resistant *Enterococcus* (VRE) was identified among the isolates.

Central Line-Associated Bloodstream Infections (CLABSIs) in Specialty Care Areas (SCAs), January–June 2011:

The overall CLABSI standardized infection ratio (SIR) in Tennessee SCAs in January–June 2011 was 12% lower than the national 2006-8 SIR of 1 (SIR=0.88; 95% CI: 0.67, 1.14); the overall CLABSI SIR in Tennessee SCAs was 0.93 (95% CI: 0.71, 1.18) during July–December 2010. The SIR was not significantly different from 1 in either time period (Table 31). CLABSI SIRs were significantly lower than 1 among bone marrow transplant (SIR=0.48; 95% CI: 0.24, 0.86) and pediatric hematology/oncology SCAs (SIR=0.42; 95% CI: 0.16, 0.92) in the first half of 2011 (Table 32, Figure 32). Because only one solid organ transplant SCA existed in Tennessee during the reporting period, data for this SCA type are not shown in this report. Additionally, NHSN 2006-8 baseline data are not available for pediatric bone marrow transplant units.

During January–June 2011, rates of BSIs associated with permanent central lines were highest in pediatric bone marrow transplant SCAs (2.7 infections per 1,000 central line-days), followed by: bone marrow transplant (1.7), hematology/oncology (1.2), and pediatric hematology/oncology (1.1) (Table 33, Figure 30). Rates of BSIs associated with temporary central lines were highest in hematology/oncology SCAs (2.5 infections per 1,000 central line-days), followed by: bone marrow transplant (1.7), pediatric bone marrow transplant (0.0), and pediatric hematology/oncology (0.0) (Table 34, Figure 31). The rate of BSIs associated with temporary central lines was significantly lower than the corresponding national rate in bone marrow transplant SCAs. No SCA type had a CLABSI rate that was significantly higher than the corresponding 2006–2008 National Healthcare Safety Network (NHSN) baseline rate.

The microorganisms identified in 61 CLABSI events among SCA patients are listed in Table 30 and Figure 36. The three most common pathogens among total positive isolates were *Enterococcus* species (17.5%), coagulase-negative *Staphylococcus* species (15.9%), and *Pseudomonas* species (12.7%). Vancomycin-resistant *Enterococcus* (VRE) accounted for 9.5% of total positive isolates, and methicillin-resistant *S. aureus* (MRSA) accounted for 3.2%.

Central Line-Associated Bloodstream Infections (CLABSIs) in Long-Term Acute Care (LTAC) Facilities, January–June 2011:

The overall CLABSI standardized infection ratio (SIR) in Tennessee LTACs in January–June 2011 was very close to the national 2006-8 SIR of 1 (SIR=0.99; 95% CI: 0.75, 1.28); the overall CLABSI SIR in Tennessee LTACs was 1.05 (95% CI: 0.79, 1.37) during July–December 2010. The SIR was not significantly different from 1 in either time period (Table 36). Only one type of unit, the LTAC

ward, was present among the nine Tennessee LTACs during the reporting period. Tennessee's pooled mean CLABSI rate for this unit type in January–June 2011 was the same as the national 2006-8 rate (1.7 CLABSIs per 1,000 central-line days) (Table 37).

The microorganisms identified in 57 CLABSI events among LTAC patients are listed in Table 35 and Figure 38. The three most common pathogens among total positive isolates were *Enterococcus* species (33.3%), *Staphylococcus aureus* (10.6%), and *Candida* species and other yeasts (9.1%). Vancomycin-resistant *Enterococcus* (VRE) accounted for 15.2% of total positive isolates, and methicillin-resistant *S. aureus* (MRSA) accounted for 10.6% (all *S. aureus* isolates were methicillin-resistant).

Surgical Site Infections (SSIs) Related to Coronary Artery Bypass Graft (CBGB/C) and Hip Prosthesis (HPRO) procedures, January–June 2011:

The combined All SSI SIR for CBGB/C or HPRO procedures in Tennessee in January-June 2011was statistically significantly lower than the national SIR of 1 (SIR=0.75; 95% CI: 0.63, 0.90). The Complex A/R SIR for SSIs related to CBGB/C or HPRO procedures in Tennessee was not statistically significantly different from 1 (SIR=0.77; 95% CI: 0.70, 1.09) (Table 38).

Surgical Site Infections (SSIs) Related to Coronary Artery Bypass Graft Surgery with Both a Chest and Donor Site Incision (CBGB) and Coronary Artery Bypass Graft Surgery with a Chest Incision Only (CBGC), January–June 2011:

The All SSI SIR for CBGB/C procedures in Tennessee in January–June 2011 was statistically significantly lower than the national SIR of 1 (SIR=0.70; 95% CI: 0.53, 0.91). The Complex A/R SSI SIR was not statistically significantly different than the national SIR of 1 (SIR=0.96; 95% CI: 0.70, 1.30) (Table 40). Overall, CBGB/C SSIs were most often deep primary (37.7%) and least often deep secondary infections (1.5%) (Table 42). The most common pathogens among total positive isolates were *Staphylococcus aureus* (38.6%) and coagulase-negative *Staphylococcus* species (14.3%) (Table 39, Figure 40). Methicillin-resistant *S. aureus* (MRSA) accounted for 17.1% of total positive isolates, and vancomycin-resistant *Enterococcus* (VRE) accounted for 1.4%. SSIs related to CBGB/C procedures were most often identified upon readmission (72.5%) (Figure 43).

Surgical Site Infections (SSIs) Related to Hip Prosthesis (HPRO) Surgery, January–June 2011:

The All SSI SIR for HPRO procedures in Tennessee in January–June 2011 was not statistically significantly different from the national SIR of 1 (SIR=0.79; 95% CI: 0.61, 1.02). The Complex A/R SIR was not statistically significantly different from the national SIR of 1 (SIR=0.81; 95% CI: 0.58, 1.10) (Table 45). The most common pathogens among total positive isolates were *Staphylococcus aureus* (51.8%) and *Enterococcus* species (12.1%) (Figure 44, Table 44). Methicillin-resistant *S. aureus* (MRSA) accounted for 29.3% of total positive isolates, and vancomycin-resistant *Enterococcus* (VRE) accounted for 1.7%. SSIs related to HPRO procedures were relatively evenly distributed among the three possible sites, with deep primary infections being most common (39.1%) (Figure 46). Overall, SSIs related to HPRO procedures were most often identified upon readmission (81.3%) (Figure 47).

BACKGROUND

Healthcare-associated infections (HAIs) are a major public health problem. According to the Centers for Disease Control and Prevention (CDC), there were an estimated 1.7 million HAIs and 99,000 HAI-related deaths in the United States in 2002, making HAIs one of the top ten leading causes of death (Klevens et al, 2007, Public Health Reports). A 2009 CDC report estimated that the annual medical costs (adjusted to 2007 dollars) of HAIs to U.S. hospitals to be between $35.7 billion and $45 billion (Scott, 2009, available at: http://www.cdc.gov/ncidod/dhqp/pdf/Scott_CostPaper.pdf), though these monetary costs do not measure the effects of HAIs on patients or their family members, friends, and colleagues. The emotional, physical, and personal costs associated with HAIs are not quantifiable.

In June 2006, the Tennessee Legislature passed Senate Bill 2978 and the Governor signed the Public Acts, Public Chapter 904 (PC904) requiring hospitals to report selected HAIs to the Tennessee Department of Health (TDH). The legislation required use of CDC's National Healthcare Safety Network (NHSN) for reporting, making Tennessee the fifth state to use this system. Currently, 28 states require reporting of HAIs using NHSN, which has become the standard system for state reporting. Additionally, as of January 2011, the Centers for Medicare and Medicaid Services (CMS) require hospitals in the Hospital Inpatient Quality Reporting Program to report CLABSIs in ICUs to NHSN.

The following report summarizes the TDH CLABSI and SSI reporting activities for the period from January 2008 through June 2011. This report provides CLABSI standardized infection ratios (SIRs) and rates by individual hospital, grand division, and state aggregate. The 2011 CLABSI SIRs are compared to Tennessee data from 2008-2010 and to national baseline data (2006-2008). SSI data are provided by state aggregate only and are compared to national baseline data (2006-2008).

DEFINITIONS

Unless a reader works in the healthcare field or understands statistics, he/she may not be familiar with some of the words or labels mentioned in the Tennessee Healthcare-Associated Infections (HAI) Report. On this page, we attempt to explain what some of these terms mean. Do not worry if it seems like too much information to absorb at once. A reader does not need to know all of the terms in order to understand the reports.

All Surgical Site Infection Standardized Infection Ratio (All SSI SIR): (See Standardized Infection Ratio.) A standardized infection ratio calculated by NHSN for surgical site infections, which includes all inpatient and outpatient procedures and all primary SSIs identified during admission, readmission, or post-discharge surveillance, as defined in the NHSN Manual.

ASA Score: Assessment by the anesthesiologist of the patient's preoperative physical condition using the American Society of Anesthesiologists' (ASA) Classification of Physical Status. Patient is assigned one of the following which is used as one element of the SSI Basic Risk index:
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 that is a constant threat to life
5 -- Moribund patient who is not expected to survive for 24 hours with or without the operation

Coronary Artery Bypass Graft (CBGB/C): *Coronary artery bypass graft with both chest and donor site incisions (CBGB):* Chest procedure to perform direct revascularization of the heart; includes obtaining suitable vein from donor site for grafting.

Coronary artery bypasses graft with chest incision only (CBGC): Chest procedure to perform direct vascularization of the heart using, for example the internal mammary (thoracic) artery.

Central line: A flexible tube that is inserted near a patient's heart or into one of the large blood vessels near the heart. A central line (or, for newborns, an umbilical line) can be used to give fluids, antibiotics, medical treatments such as chemotherapy, and liquid food if a patient is unable to eat or digest food normally. If a central line is inserted incorrectly or not cared for properly, it can lead to dangerous bloodstream infections. Central lines are also sometimes called central venous lines or central venous catheters.

In specialty care areas, rates are calculated separately for permanent and temporary central lines. According to NHSN, permanent central lines include tunneled catheters (including certain dialysis catheters) and implanted catheters (including ports). Temporary central lines are non-tunneled catheters.

Central line-associated bloodstream infection (CLABSI): When a patient develops a bloodstream infection while having a central line in place or within 48 hours of central line removal, the infection is considered a CLABSI. According to the Centers for Disease Control and Prevention (CDC), an estimated 200,000 CLABSIs occur in U.S. hospitals each year. These bloodstream infections often lead to longer hospital stays, higher costs, and an increased risk of dying. CLABSIs can be prevented through proper insertion and care of the central line (see Patient guide to CLABSI [pdf]).

Central line-days: This is the total number of days a central line is in place for patients in a particular unit. The count is performed at the same time each day. Each patient with one or more central lines at the time the count is performed is counted as one central line day.

For example: 5 patients on the first day of the month had one or more central lines in place. Similarly, 5 patients on day two, 2 patients on day three, 5 patients on day four, 3 patients on day five, 4 patients on day six, and 4 patients on day seven had central lines in place. Adding the number of patients with central lines on days one through seven, we would have 5 + 5 + 2 + 5 + 3 + 4 + 4 = 28 central line-days for the first week. The number of central line-days for the month is simply the sum of the daily counts.

In specialty care areas, central line-days are collected separately for permanent and temporary central lines (see "Central line" definition above). If a patient has both a permanent and a temporary central line, the day is recorded as a temporary central line-day.

CLABSI infection rate: To calculate this rate, divide the total number of central line-associated bloodstream infections by the number of central line-days and multiply the result by 1,000.

Central line utilization ratio: This ratio is obtained by dividing the number of central line-days by the number of patient-days. It is also referred to as the device utilization (DU) ratio.

Complex Admission/Readmission Standardized Infection Ratio (Complex A/R SIR): (See Standardized Infection Ratio.) A standardized infection ratio calculated by NHSN for surgical site infections, which only includes inpatient procedures and deep incisional primary and organ/space SSIs identified during admission or readmission to the reporting facility, as defined in the NHSN Manual.

Confidence intervals: Confidence intervals tell us about the reliability of a point estimate. If TDH mentions a confidence interval of 95%, it means that the TDH is 95%confident that the hospital's precise infection rate (the point estimate in this case) falls within the range given.

For TDH reports, the confidence interval is based on the number of infections observed in a hospital during the time period in question and on the number of central line-days.

If two hospitals have different infection rates, but the confidence intervals for the two rates overlap, then it is reasonably possible that the true rates are the same (Discussion of confidence intervals [pdf]).

Deep incisional SSI: A surgical site infection that involves the deep soft tissues (e.g., fascial and muscle layers) of the incision and meets the NHSN criteria for a deep incisional SSI as described in the NHSN Patient Safety Manual. A deep incisional SSI can be either 1) *primary* – identified in the primary incision in a patient that had an operation with one or more incisions (e.g., chest incision in a CBGB) or 2) *secondary* – identified in the secondary incision in a patient that had an operation with more than one incision (e.g., donor site (leg) incision in a CBGB).

Healthcare-associated infection (HAI): For an infection to be considered healthcare-associated, there must be no evidence that the infection was present or incubating at the time of hospital admission. A HAI may be confined to one area of the body (localized) or be spread throughout

(systemic). It is the body's adverse reaction to the presence of an infectious agent(s) or its toxin(s).

Hip prosthesis (HPRO): In HPRO surgery (also called a "hip arthroplasty"), all or part of a diseased hip joint is removed and replaced with an artificial joint.

Infection control/prevention processes: These are routine measures that can be used in all healthcare settings to prevent infections. These steps or principles can be expanded to meet the needs of specialized types of hospitals. Some hospitals make the processes mandatory. Examples include:

- Diligent hand cleaning
- Use of personal protective equipment such as gloves, gowns, and/or masks when caring for patients in select situations to prevent the spread of infections
- Use of an infection prevention checklist when putting in central lines. The list reminds healthcare workers to clean their hands thoroughly; clean the patient's skin with the appropriate type of disinfectant before insertion; wear the recommended sterile gown, gloves and mask; and place sterile barriers around the insertion site.
- Monitoring staff to ensure that they are following proper infection prevention procedures

Infection preventionists (IPs): These health professionals have special training in infection prevention and monitoring.

Intensive care unit (ICU) (also known as a "critical care unit"): ICUs are hospital units that provide intensive observation and treatment for patients either dealing with, or at risk of developing, life-threatening problems. Smaller hospitals typically care for both medical and surgical patients in a combined medical-surgical ICU. Larger hospitals often have separate ICUs for medical patients and surgical patients.

Long-Term Acute Care (LTAC) Facility: LTACs provide evaluation, treatment, and management of patients suffering medically complex conditions, or who have suffered recent catastrophic illness or injury, and require and extended stay in an acute care environment.

National Healthcare Safety Network (NHSN): This is the online system that Tennessee hospitals must use to report HAI data to the Tennessee Department of Health. NHSN is a secure, internet-based surveillance (monitoring and reporting) system. Among other features, the network offers integrated patient and healthcare worker safety surveillance systems. NHSN is managed by CDC's Division of Healthcare Quality Promotion. In NHSN, hospitals submit specific infection and other information (e.g., number of central line-days, procedural information) that are needed to calculate HAI rates and standardized infection ratios (SIRs). Hospitals must confer rights to TDH in order for TDH to collect data from NHSN and report the information to the public.

NHSN Patient Safety Component Manual: This manual contains standardized surveillance definitions and data collection methods that are essential for fair reporting of HAIs (CDC - PSC Manual - NHSN).

NHSN operative procedure: A procedure that:

1) Is performed on a patient who is an NHSN inpatient or an NHSN outpatient
2) Takes place during an operation where a surgeon makes at least one incision through the skin or mucous membrane, including laparoscopic approach, and closes the incision before the patient leaves the operating room, and

3) That is included in Table 1, Chapter 9 of the NHSN Patient Safety Manual.
Operation: A single trip to the operating room (OR) where a surgeon makes at least one incision through the skin or mucous membrane, including laparoscopic approach, and closes the incision before the patient leaves the OR.

Organ/space SSI: A surgical site infection that involves any part of the body, excluding the skin incision, fascia, of muscle layers, that is opened or manipulated during the operative procedure (e.g., osteomyelitis).

Specialty care area (SCA): SCAs are hospital units dedicated to management and treatment of patients with special conditions, such as bone marrow transplant, solid organ transplant, hematology/oncology, and inpatient dialysis units.

Standardized infection ratio (SIR): The SIR is a summary measure used to compare infection data from one population to data from a "standard population." For HAI reports, the standard population comes from data reported from the hundreds of U.S. hospitals that use the NHSN system. The SIR is calculated by dividing the observed number of infections by the predicted (or statistically expected) number of infections, which is calculated using data from the standard population.

Standardized infection ratio (SIR) methodology: A SIR is the number of observed infections divided by the number of predicted infections.

- A SIR of 1.0 means the observed number of infections is equal to the number of predicted infections.
- A SIR above 1.0 means that the infection rate is higher than that found in the "standard population." For HAI reports, the standard population comes from data reported by the hundreds of U.S. hospitals that use the NHSN system. The difference above 1.0 is the percentage by which the infection rate exceeds that of the standard population.
- A SIR below 1.0 means that the infection rate is lower than that of the standard population. The difference below 1.0 is the percentage by which the infection rate is lower than that experienced by the standard population.

For CLABSIs, the indirect standardization method accounts for differences in the risk of CLABSIs among patient populations in different critical care units. In neonatal ICUs, the SIR accounts for risk differences among different unit type/birth weight categories; in specialty care areas, the SIR accounts for risk differences among different unit type/line type categories. The predicted number of CLABSIs is calculated by multiplying the facility's number of central line-days for each stratum of data (i.e., unit type for adult/pediatric ICUs or unit type/birth weight/line type category for NICUs) by the NHSN pooled mean CLABSI rate (per 1,000 line-days) for that stratum.

For SSIs, logistic regression models are used to account for procedure- and patient-specific risk factors, which include factors such as patient age, gender, and procedure duration. With this method, each risk factor's contribution varies according to its association with risk of SSI for a given operative procedure, and this is reflected in each model's parameter estimates. The predicted number of SSIs is determined by calculating each patient's risk of SSI with the regression model, then summing across patients to give the expected number of infections in the population.

Superficial incisional SSI: A surgical site infection that involves only skin and soft tissue layers of the incision and meets the NHSN criteria for a superficial incisional SSI as described in the NHSN

Patient Safety Manual. A incisional SSI can be either 1) *primary* – identified in the primary incision in a patient that had an operation with one or more incisions (e.g., chest incision in a CBGB) or 2) *secondary* – identified in the secondary incision in a patient that had an operation with more than one incision (e.g., donor site (leg) incision in a CBGB).

Surgical Site Infection (SSI): Infection found after an operation in the part of the body where the surgery was performed.

Surveillance: The process of finding and documenting infections.

- Active surveillance: This includes, but is not limited to, active, patient-based, prospective surveillance by a trained infection control professional (IP). The IP seeks out infections during a patient's stay by screening a variety of data sources. The sources may include laboratory, pharmacy, admission/discharge/transfer, radiology/imaging, and pathology databases and patient charts, including history and physical exam notes, nurses/physician notes, and temperature charts. The complete definition of surveillance, including how to capture denominator data to calculate infection rates, is found in each module of the NHSN Patient Safety Component Manual (see above).
- Post-discharge surveillance: This is the process IPs use to seek out infections after patients have been discharged from the hospital. Post-discharge surveillance includes screening a variety of data sources, including re-admission and emergency department visit records.

Validation: In Tennessee, validation is the process of making sure that HAI data reported to NHSN are complete and accurate. The purposes of validation are to:

- Assess the accuracy and quality of data submitted to NHSN
- Provide hospitals with information to help them correctly use the NHSN application
- Provide education to IPs and other hospital staff to improve data accuracy and quality, if necessary
- Teach IPs how to validate the written or electronic data they receive from hospital departments, such as the Operating Room
- Look for unreported HAIs
- Assess selected infection control processes
- Make recommendations for improvements if data accuracy and/or quality issues are discovered

Key Abbreviations Found in the HAI Public Report

APIC – Association for Professionals in Infection Control and Epidemiology
A/R – Admission/Readmission
ASA – American Society of Anesthesiologists
CBGB – coronary artery bypass graft surgery: both chest and donor site incisions
CBGC – coronary artery bypass graft surgery: chest incision only
CCU – critical care unit (used interchangeably with intensive care unit (ICU))
CDC – Centers for Disease Control and Prevention
CI – confidence interval
CL days- central line-days
CLABSI – central line-associated bloodstream infection
CMS – Centers for Medicare and Medicaid Services
DIP – deep incisional primary SSI
DIS – deep incisional secondary SSI
DU ratio – device utilization ratio
HAI – healthcare-associated infection
HPRO – hip prosthesis procedure
IP – infection preventionist
ICU – intensive care unit (use interchangeably with critical care unit (CCU))
LTAC – long-term acute care
MRSA – methicillin-resistant *Staphylococcus aureus*
NHSN – National Healthcare Safety Network
NICU – neonatal intensive care unit
No. – number
OR – operating room
SCA – specialty care area
SIP – superficial incisional primary SSI
SIR – standardized infection ratio
SIS – superficial incisional secondary SSI
SSI – surgical site infection
TDH – Tennessee Department of Health
THA – Tennessee Hospital Association
TN – Tennessee
VRE – vancomycin-resistant *Enterococcus*

METHODS

CLABSI Reporting for 2008-2011

A central line is a tube that is placed into a patient's large vein, usually in the neck, chest, arm or groin. The line is used to give fluids and medication, withdraw blood, and monitor the patient's condition. A bloodstream infection can occur when microorganisms (e.g., bacteria, fungi) are introduced, attach and multiply on the tubing or in fluid administered through the tubing, and then enter the blood.

The Tennessee Department of Health (TDH) and CMS require CLABSIs in intensive care units to be reported to NHSN; TDH also requires CLABSIs in long-term acute care facilities and CLABSIs in SCAs (through 2011) to be reported to NHSN.

SSI Reporting for 2008-2011

Surgical site infections (SSIs) are infections found after an operation in the part of the body where the surgery was performed. The majority of SSIs involve only the skin surrounding the incision site; however, others may be deeper and more serious. TDH requires reporting of SSIs associated with coronary artery bypass graft surgery, including coronary artery bypass graft surgery with both chest and donor site incisions (CBGB) and coronary artery bypass graft surgery with chest incision only (CBGC); TDH also requires reporting of SSIs associated with hip prosthesis (HPRO) procedures through 2011.

CBGB/C surgery is a procedure performed for heart disease in which a vein or artery from the chest or another part of the body is used to create an alternate path for blood to flow to the heart, bypassing a blocked artery. In HPRO surgery, all or part of a diseased hip joint is removed and replaced with an artificial joint. All facilities performing CBGB, CBGC, and/or HPRO procedures were required to report to NHSN.

Training of Infection Preventionists at Healthcare Facilities

Hospitals are required to review the NHSN patient safety protocol, archived webinars, and other training materials from CDC as per CDC/NHSN instructions. In May 2010, regional in-person training sessions were conducted to ensure full understanding of NHSN protocols and definitions. These sessions included didactic lectures on NHSN enrollment and definitions, with question-and-answer sessions and case-studies. Support from local Association for Professionals in Infection Control and Epidemiology (APIC) chapters and the Tennessee Hospital Association (THA) was essential to the success of this training; these organizations provided venues, logistical support (e.g., registration), and copies of training materials. TDH also held nine NHSN training webinars during 2010 and the first half of 2011. Facilities continue to participate in monthly NHSN conference calls during which definitions and protocols are clarified and case scenarios are discussed.

Timeliness, Completeness and Accuracy of Reporting

TDH staff monitored the timeliness, completeness, and accuracy of hospital reports and conducted

on-site audits to assure compliance with the statutory reporting requirements. In each Tennessee state HAI report, facilities with missing data during the reporting period are displayed in Table 1. No facilities were missing data during the current reporting period.

Table 1: Facilities with Incomplete Central Line-Associated Bloodstream Infection (CLABSI) Data for the Reporting Period January–June 2011

Facility	Missing Data		Reason for Missing Data
	From	To	
None	N/A	N/A	N/A

Data Validation

Data reported to NHSN are validated using several methods:

Point-of-entry checks – NHSN is a web-based data reporting and submission program that includes validation routines for many data elements, thus reducing common data entry errors. Hospitals can view, edit, and analyze their data at any time.

Monthly checks for internal consistency – Each month, TDH staff download CLABSI data from NHSN and verify completeness with a computerized data validation program. Data that are missing, unusual, inconsistent, or duplicative are identified and investigated through email or telephone communication with hospital staff. Hospitals are given the opportunity to verify and/or correct the data. This process has not yet been implemented for SSI data.

On-site CLABSI audits – Audits of a sample of medical records were conducted by TDH to assess compliance with reporting requirements. Onsite visits were conducted by HAI program staff in 14 reporting hospitals in 2009 and in 30 hospitals in 2010-11. These visits consist of reviewing medical charts from adult, pediatric, and neonatal ICUs. The purposes of the audits were to:

- Enhance reliability and consistency in applying NHSN surveillance definitions
- Evaluate the adequacy of surveillance methods to detect infections
- Evaluate intervention strategies designed to reduce or eliminate specific infections
- Discuss identified inconsistencies and allow hospitals to modify records as needed

Ongoing monitoring, education, and trainings are provided to ensure integrity of the data. Some facilities also conduct their own validation studies.

Thresholds for Reporting Hospital-Specific Infection Rates

Only hospitals with an average daily census of at least 25 inpatients were required to report CLABSIs in ICUs since 2008; however, as of January 2011, CMS requires all facilities with ICUs to report CLABSIs. Several facilities with an average daily census <25 have opted for their ICU data to be included in this state report. Hospital ICUs with very few patients with central lines will have infection rates that may fluctuate greatly over time. Even a few infections will yield a numerically high rate when the denominator of central lines is small. To ensure a fair and representative set of data, TDH adopted the NHSN minimum thresholds for reporting. The minimum thresholds are:

- For CLABSI rates, there must be a minimum of 50 central line-days during the reporting period. Central line-days are the total number of days that central lines are used for patients in an ICU over a given period of time.
- For the calculation of a facility-wide standardized infection ratio (SIR), there must be a minimum of 50 central line-days in all ICUs combined during the reporting period.
- CLABSI SIR key percentiles are not reported for locations with fewer than five facilities reporting (e.g., major teaching medical ICUs, bone marrow transplant SCAs).

Risk Adjustment

Risk adjustment is a statistical technique that allows hospitals to be more fairly compared by accounting for differences in patient populations in terms of severity of illness and other factors that may affect the risk of developing a HAI. A hospital that performs a large number of complex procedures on very sick patients would be expected to have a higher infection rate than a hospital that performs more routine procedures on healthier patients. Therefore, before comparing the infection rates of hospitals, it is important to adjust for the number and proportion of high- and low-risk patients. Different risk adjustment methods are used for different types of HAIs.

For adult and pediatric ICU and LTAC patients with central lines, risk adjustment is limited to the type of intensive care unit; hospital type and unit bed size are used to categorize ICUs in some instances. Additional information is used for risk adjustment in other locations, including birth weight category (≤750 g, 751-1000 g, 1001-1500 g, 1501-2500 g, >2500 g) in NICUs and line type (permanent or temporary) in SCAs.

For individuals undergoing surgical procedures, risk adjustment is calculated through logistic regression models which use NHSN baseline data to represent a standard population[1]. This is a change from the risk adjustment method used in previous Tennessee HAI reports. With this method, risk factors are procedure-specific and each risk factor's contribution varies according to its association with risk of SSI.

For CBGB/C procedures, significant risk factors include:

- Age (≤44 vs >44)
- American Society of Anesthesiologists' physical status score (ASA score) (3/4/5 vs. 1/2)
- Procedure duration
- Gender

Additionally, risk adjustment for the All SSI SIR (explained in more detail below under "Tennessee State and National Comparisons – SSI") includes hospital bed size, and the Complex A/R SIR includes medical school affiliation, and age-gender interaction.

For HPRO procedures, risk factors include:

- Age (≤44 vs >44)
- Anesthesia
- ASA score (3/4/5 vs. 1/2)

[1] Yi M, Edwards JR, et al. Improving risk-adjusted measures of surgical site information for the National Healthcare Safety Network. Infect Control Hosp Epidemiol 2011; 32(10):970-986.

- Duration
- Total/partial/revision
- Hospital bed size
- Presence of trauma

Additionally, the Complex A/R SSI includes medical school affiliation as a risk factor.

Tennessee State and National Comparisons - CLABSI

This report displays Tennessee CLABSI data for 2008-10. For comparison, baseline national data were obtained from the National Healthcare Safety Network (NHSN) report that covered the period of 2006–2008 (available at http://www.cdc.gov/nhsn/PDFs/dataStat/2009NHSNReport.pdf). The CDC modified definitions as of January 1, 2008, and used the new definitions and methods of analysis for their 2006-2007 report onward. The CDC definition of a CLABSI event no longer includes situations in which a single blood culture was positive for a common skin contaminant even if antibiotic therapy was started. Therefore, where data are compared over time, the analyses and methods used are consistent. Additionally, because CDC discontinued the use of clinical sepsis (CSEP) CLABSI criteria for NICUs in January 2010, national baseline NICU data for this report were adjusted by subtracting any CLABSIs meeting the CSEP criteria (see Tables 17-18 of the NHSN report referenced above). In January 2011, the NHSN CLABSI definition was changed to no longer include antibiotic resistance profiles to determine whether two common commensal isolates are considered the same organism. This change could cause an increase in the number of reported CLABSI events associated with common commensal organisms. Further, in October 2011, CDC clarified that because fever is a non-specific sign and, as such, may be due to more than one infection occurring at the same time, fever must be attributed to multiple causes at once (if applicable) in order to prevent selective attribution. Hospitals were asked to review cases dating back to January 2011 to ensure consistency with this clarified definition.

CLABSI rates must be stratified by location type to be risk-adjusted. This scientifically sound risk-adjustment strategy creates a practical challenge to summarizing this information nationally, regionally, or even for an individual healthcare facility. For instance, when comparing CLABSI rates, there may be a number of different types of locations for which CLABSI rates could be reported. In neonatal ICUs and SCAs, data are further stratified by birth weight category and central line type, respectively. This stratification creates the need for a method of combining CLABSI rate data across different risk strata to facilitate data interpretation and comparisons.

Tennessee rates were compared to national rates using the same statistical tests implemented in NHSN for comparing hospital rates to national rates within risk categories. CLABSI rates are based on the Poisson distribution. We used the SIR as a summary measure to compare pooled mean CLABSI rates in adult, pediatric, and neonatal ICUs in Tennessee to published national (NHSN) rates for 2006-8 for each location type. The SIR is identical in concept to a standardized mortality ratio and is an indirect standardization method for summarizing the HAI experience across any number of stratified groups of data.

The CLABSI SIR calculation is based on dividing the total number of observed CLABSI events by the predicted[*] number of CLABSIs, using the CLABSI rates from the standard population (in this

[*] "Predicted" is used throughout the report as a synonym for the standard statistical term "expected".

case, national NHSN 2006-8 data). This predicted number, which can also be understood as a projection, is calculated by multiplying the national CLABSI rate from the standard population by the observed number of central line-days (CLD) for each stratum. When the SIR = 1, the healthcare facility's units had the same CLABSI rate as the national average (pooled mean) rate. A SIR > 1 implies the facility is experiencing more CLABSIs than predicted; a SIR < 1 means the facility is experiencing fewer infections than predicted.

ICU CLABSI SIRs were calculated for each ICU type, each facility, each Grand Division (West, Middle, and East), all adult/pediatric ICUs in Tennessee, and all NICUs in Tennessee compared to national NHSN data. The SIR for each facility was calculated separately for data adult/pediatric ICUs and neonatal ICUs. In calculating SIRs for neonatal ICUs, birth weight category was also taken into account; NHSN no longer stratifies neonatal data by line type (central vs. umbilical). SCA CLABSI SIRs were calculated for each SCA type and for all SCAs in Tennessee, risk adjusting by unit type and line type (permanent vs. temporary). LTAC CLABSI SIRs were also calculated for each LTAC unit type and for all LTACs in Tennessee.

The following table illustrates the method of calculating a SIR across two risk strata (two ICU types: medical cardiac and medical-surgical) for which national data exist from NHSN. If the observed data represented a follow-up period such as January–June 2011, one would state that a SIR of 0.77 implies that there were 23% fewer CLABSIs than predicted for the nation, region, or facility.

Risk Group Stratifier	**Observed CLABSI Rates**			**NHSN CLABSI Rates for 2006-2007 (Standard Population)**		
Location Type	**#CLABSI**	**#Central line-days**	**CLABSI rate***	**#CLABSI**	**#Central line-days**	**CLABSI rate***
Medical cardiac ICU	170	100,000	1.7	1260	600,000	2.1
Med-Surg ICU	58	58,000	1.0	600	400,000	1.5

$$\text{SIR} = \frac{\text{observed}}{\text{expected}} = \frac{170+58}{100000\times\left(\frac{2.1}{1000}\right)+58{,}000\times\left(\frac{1.5}{1000}\right)} = \frac{228}{210+87} = \frac{228}{297} = 0.77$$

In summary, to calculate the CLABSI Standardized Infection Ratio (SIR) for a facility:

1. For each reporting unit, multiply the number of central line-days (CLD) by the published national infection rate for that unit type to estimate the number of infections predicted (expected) for that unit if it were to produce CLABSIs at the same frequency as the national rate (CLD x national rate / 1000).

2. Within each hospital, calculate the sum of predicted (expected) infections and the sum of reported infections across all reporting units.

3. Calculate SIR = total reported infections/total predicted (expected) infections.[2]

The SIR concept and calculation are based on the underlying CLABSI rate data that exist across a potentially large number of strata. Thus, the SIR provides a single metric for performing comparisons as an alternative to the cumbersome task of performing multiple comparisons across many strata. Given the underlying CLABSI rate data, one retains the option to perform comparisons within a particular set of strata where observed rates may differ significantly from the rates in the standard population. These more detailed comparisons can be very useful and necessary for identifying areas needing more focused prevention efforts.

Tennessee State and National Comparisons - SSI

This report displays CBGB, CBGC, and HPRO SSI data in aggregate for Tennessee from January 2009 through June 2011. For comparison, baseline national data were obtained from the National Healthcare Safety Network (NHSN) report that covered the period of 2006 through 2008 (available at http://www.cdc.gov/nhsn/PDFs/dataStat/2009NHSNReport.pdf). For SSI data, both crude (unadjusted) rates and SIRs are presented.

Crude (unadjusted) SSI rates are calculated as follows:

$$\text{SSI Rate} = \frac{\text{Number of SSI reported}}{\text{Number of procedures reported}} * 100$$

SIRs for surgical site infections are calculated similarly to those for CLABSIs, by dividing the number of observed infections by the number of predicted infections. However, for SSIs, the risk adjustment used to determine the predicted number of infections differs in that this number for a given operative procedure category is derived from a logistic regression model using the baseline national data (see above section on risk adjustment).

Below is a general logistic regression model. For each operative procedure, parameter estimates (represented by β in the model) have been calculated by CDC and represent each risk factor's contribution to a patient's overall risk. In this model, $\hat{p}$ represents a patient's probability of SSI, and x=1 if a given risk factor is present or 0 if the risk factor is absent.

$$\text{logit}(\hat{p}) = \alpha + \beta 1\ X1 + \beta 2\ X2 + \beta 3\ X3 + \beta 4\ X4$$

For a given NHSN operative procedure, the table below illustrates the parameter estimates for the significant risk factors associated with that procedure. Note that this table is for teaching purposes only and should not be considered an actual model for predicting a patient's risk of SSI[3].

---

[2] Copyright 2010 by Consumers Union of United States, Inc., 101 Truman Ave., Yonkers, NY 10703, a nonprofit organization. This report was posted with permission for educational purposes only, from www.ConsumerReportsHealth.org. No downloading, transmission, photocopying, or commercial use permitted. www.ConsumerReportsHealth.org and www.ConsumerReports.org.®

[3] Example extracted from "NHSN e-News: SIRs Special Edition," Division of Healthcare Quality Promotion, Centers for Disease Control and Prevention, 10 December 2010 (http://www.cdc.gov/nhsn/PDFs/Newsletters/NHSN_NL_OCT_2010SE_final.pdf)

Factor	Parameter Estimate	OR	p-value
Intercept	-5.448	-	-
Age (≤44 vs >44)	0.520	1.659	<0.0001
ASA (3/4/5 vs 1/2)	0.425	1.529	0.0415
Duration (>100 vs ≤100)	0.501	1.650	0.0019
Medical School affiliation (Y vs N)	1.069	2.912	<0.0001

Applying the parameter estimates to the above model gives the following formula:

$\text{logit}(\hat{p}) = -5.448 + 0.520\,(\text{Age} \leq 44) + 0.425\,(\text{ASA } 3/4/5) + 0.501\,(\text{Duration} > 100) + 1.069\,(\text{Med school affiliation})$

The probability of SSI for a given patient can be calculated using this formula. For example:

Patient	Age	ASA	Duration	Med School Affiliation
A	35	3	105	Y

$\text{logit}(\hat{p}) = -5.448 + 0.520\,(1) + 0.425\,(1) + 0.501\,(1) + 1.069\,(1) = -2.934$

Solving for $\hat{p}$ gives a probability of SSI for Patient A of 0.05, or 5%.

To calculate the predicted number of infections for a population, each patient's risk of SSI is generated using the appropriate logistic regression model, and summed.

For this report, SSI SIRs are generated by NHSN, and come in two forms: All SSI and Complex Admission/Readmission (Complex A/R) SIRs.

The All SSI SIR includes all procedures and superficial incisional primary, deep incisional primary, and organ/space SSIs identified during admission, readmission, or post-discharge surveillance; it does not include secondary SSIs. Complex A/R SIRs include only inpatient procedures and deep incisional primary and organ/space SSIs which were identified during admission or readmission to the reporting facility, as defined in the NHSN manual.

Calculation of Exact Confidence Interval of the SIR[4]:

Rationale

Confidence intervals are frequently required in epidemiology, particularly in relation to standardized infection ratios (SIRs). The SIR is the ratio of the observed number of infections, usually assumed to be the realization of a Poisson variate, to the predicted number of infections, which is assumed to be a constant. The predicted number is assumed to be a constant because the reference rates are usually based on a very large number of persons, so that variation in these rates can be ignored. For a larger number of observed infections, several approximation methods are available. When the number of infections is small, however, all of the approximation methods will be inadequate, and exact confidence limits may be desirable.

Exact Test

Exact confidence limits for a SIR can be derived by setting limits for the numerator and assuming the expected number in the denominator to be a constant. The limits for 'a' with 100(1-α) percent confidence are the iterative solutions $\underline{a}$ and $\overline{a}$.

Computations for the iterative solutions $\underline{a}$ and $\overline{a}$ are below.

Fisher's Exact Test

Lower bound: $\sum_{k=0}^{a} \frac{e^{-\underline{a}}\underline{a}^{k}}{k!} = 1-\alpha/2$

Upper bound: $\sum_{k=0}^{a} \frac{e^{-\overline{a}}\overline{a}^{k}}{k!} = \alpha/2$

Therefore, the exact lower and upper limits for SIR equal to "a/λ" would be

$\frac{\underline{a}}{\lambda}$ and $\frac{\overline{a}}{\lambda}$, respectively.

The notation for the formulae is:
a = the observed number of infections
λ = the expected number of infections

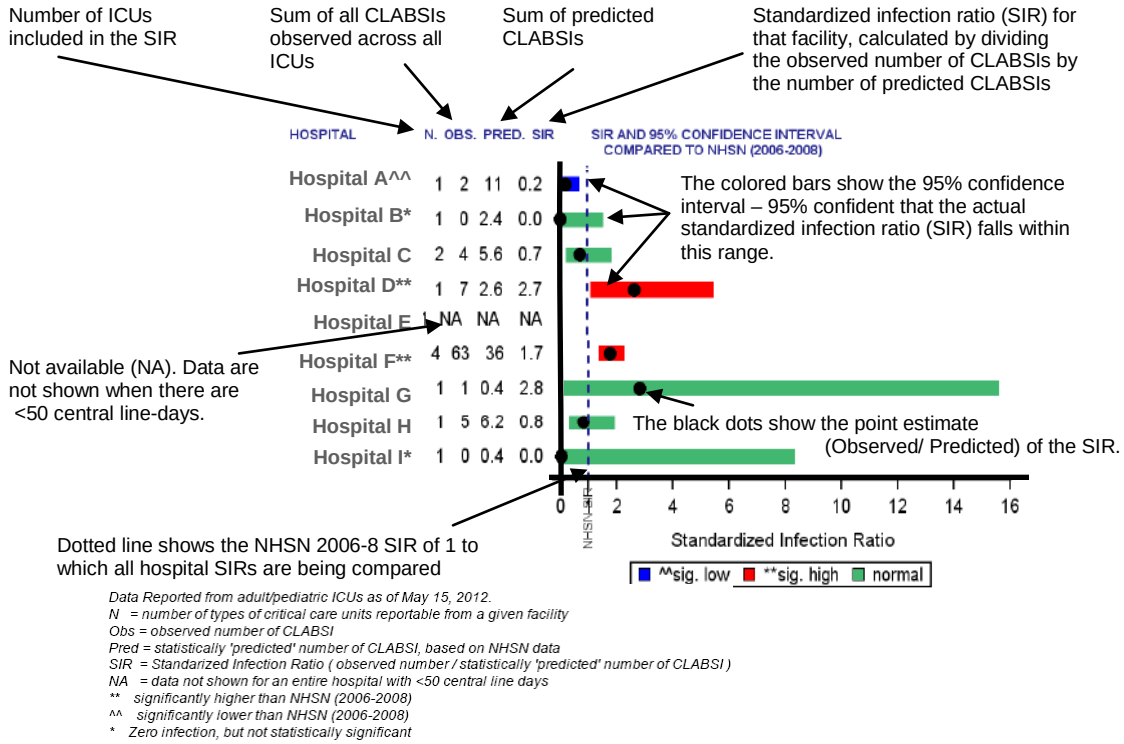
In this report, statistical analyses were performed using SAS version 9.3. Tables and figures were created using SAS version 9.3 and/or Microsoft Excel.

---

[4] Rothman KJ, Boice JD Jr: Epidemiologic analysis with a programmable calculator. NIH Pub No. 79-1649. Bethesda, MD: National Institutes of Health, 1979;31-32.

Figure 1 and Figure 2 demonstrate how the figures pertaining to facility-specific standardized infection ratios (SIRs) and infection rates should be interpreted in this report.

Figure 1: How to Read Hospital-Specific Standardized Infection Ratio Figures



Data Reported from adult/pediatric ICUs as of May 15, 2012.
N = number of types of critical care units reportable from a given facility
Obs = observed number of CLABSI
Pred = statistically 'predicted' number of CLABSI, based on NHSN data
SIR = Standarized Infection Ratio (observed number / statistically 'predicted' number of CLABSI)
NA = data not shown for an entire hospital with <50 central line days
*** significantly higher than NHSN (2006-2008)*
^^ significantly lower than NHSN (2006-2008)
** Zero infection, but not statistically significant*

- Hospital A reported CLABSIs from one ICU (N=1). This facility had a total of two CLABSIs during January–June 2011 (OBS). Statistically, 11 CLABSIs were predicted (PRED) during that time, based on the number of central line-days in Hospital A's ICU and the national NHSN rate for that type of ICU (e.g., medical-surgical). The standardized infection ratio (SIR) is 0.2. Thus, the number of infections observed was 20% of what was predicted. This result was statistically significant, as the blue bar did not cross the dotted line at 1, the NHSN 2006-8 reference SIR. The 95% confidence interval is indicated by the width of the blue bar. The 95% confidence interval for hospital A is narrow, probably due to a large number of central line-days.

- Hospital B reported CLABSIs from one ICU (N=1). They totaled zero CLABSIs in January–June 2011 (OBS). Statistically, two CLABSIs were predicted (PRED) during that time, based on the number of central line-days in that ICU and the national rate for that type of ICU. The standardized infection ratio (SIR) is 0, but the green bar indicates that the 95% confidence interval crosses the dotted line. Therefore, the observed number of CLABSIs is not statistically significantly lower than the predicted number based on national rates. All hospitals reporting zero observed infections (and that consequently have a SIR of zero) are noted with a star (*) because they deserve acknowledgement for achieving zero infections.

- Hospital C has two ICUs (N=2) and reported four infections (5.6 were predicted). Their SIR point estimate was 0.7, meaning this facility's had 30% fewer CLABSIs than predicted. However, the green bar crosses the dotted line (national SIR of 1), which indicates that the point estimate was not statistically significantly lower than the national SIR.

- Hospital D has one ICU (N=1) and observed seven CLABSIs (2.6 were predicted). The SIR was 2.7, and the red bar was above the dotted line. The observed number of CLABSIs in Hospital D was 2.7 times (170%) higher than predicted. Although this hospital's SIR was significantly higher than the national SIR (the confidence interval does not cross the dotted line), the wide confidence interval indicates that this SIR is not very stable (it could be as low as 1.5 and as high as 5.5). Hospital D probably has a small number of central line-days.

- Hospital E reported less than 50 central line-days. Hospital E's data are not shown because the SIR is not stable with such a small denominator.

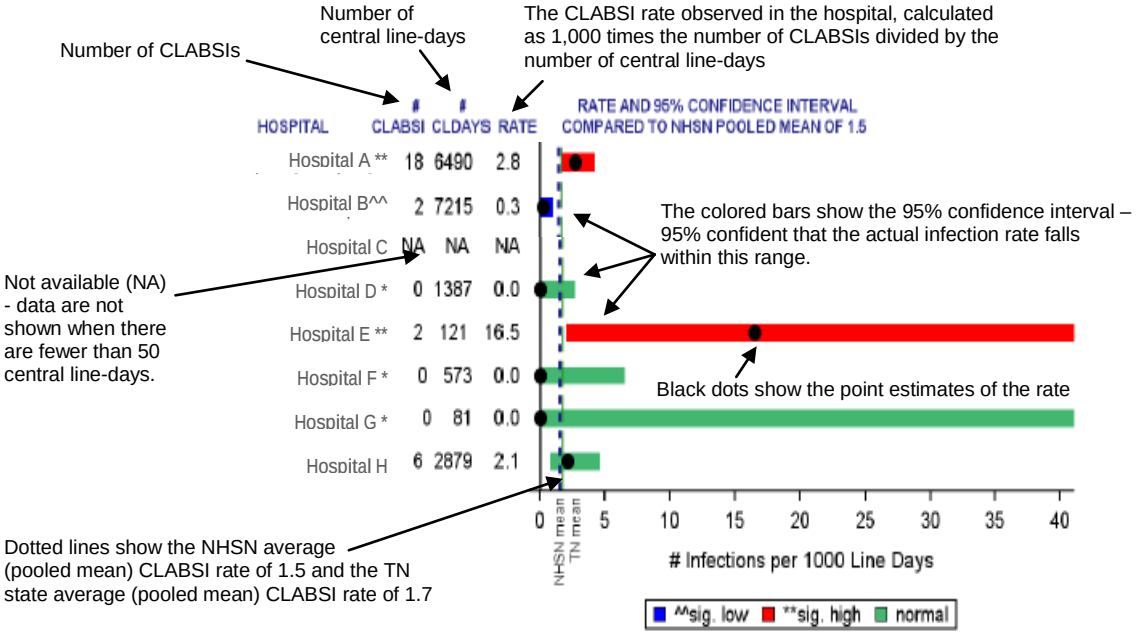
- Hospital F has four ICUs (N=4), and observed 63 CLABSIs across the ICUs during the reporting period. A total of 36 CLABSIs were predicted based on national data. The SIR was 1.7, meaning that Hospital F experienced 70% more infections than predicted based on national data. The red bar does not cross the dotted line; thus, the SIR is significantly higher than the national SIR. Because the confidence interval is very narrow, the SIR is stable and we can be more confident in its measurement.

- Hospital G reported one CLABSI from one ICU (N=1). There were 0.4 infections predicted, and the SIR was 2.8 (180% higher than predicted — the highest of any of the hospitals in this figure). However, the green bar crosses the dotted line and is very wide, so we cannot be very confident in the accuracy of this SIR point estimate. Hospital G's SIR is not significantly higher than the national SIR.

- Hospital H reported five CLABSIs from one ICU (N=1). There were 6.2 infections predicted, and the SIR was 0.8. Because the green bar crosses the dotted line, this hospital's SIR is not significantly lower than the national SIR.

- Hospital I reported zero CLABSIs from its one ICU (N=1). There were 0.4 infections predicted, and the SIR was zero. However, the green bar crosses the dotted line. This means that we cannot be certain that this hospital would have continued to have zero infections if there were more central line-days. All hospitals observing zero infections (and consequently have a SIR of zero) receive a star (*) because they deserve acknowledgement for achieving zero infections.

Figure 2: How to Read Hospital-Specific Infection Rate Figures



Data Reported as of May 15, 2012.
*** significantly higher than NHSN pooled mean*
^^ significantly lower than NHSN pooled mean
** Zero infections, not statistically significant*
NA Rates are not shown in critical care units with <50 central line days.
NHSN pooled mean(2006-2008)=1.5; TN pooled mean(01/01/2011 - 06/30/2011)=1.6

- Hospital A had a CLABSI rate of 2.8 per 1,000 central line-days. This infection rate is significantly higher than the national pooled mean (average) rate, graphically represented by the red bar falling entirely above the dotted line representing the national NHSN pooled mean of 1.5 CLABSIs per 1,000 central line-days. The 95% confidence interval is narrow because there were a large number of central line-days (6,490). A narrow confidence interval implies that the rate is stable, and we can be more confident in the rate measurement.

- Hospital B had a rate of 0.3 CLABSIs per 1,000 central line-days, which is significantly lower than the national pooled mean (i.e., the blue bar is entirely below the dotted line representing the national pooled mean of 1.5 CLABSIs per 1,000 central line-days). The 95% confidence interval is very narrow because of a large number of central line-days (7,215). A narrow confidence interval implies that the rate is stable, and we can be more confident in the rate measurement.

- Hospital C data are not shown because there were fewer than 50 central line-days; therefore, the rate is not stable.

- Hospital D had zero CLABSIs, but the rate was not significantly lower than the national pooled mean because the green bar crosses the dotted line. The hospital had 1,387 central line-days, but we cannot be certain that the hospital would have observed zero infections if they had more central line-days. All hospitals observing zero infections receive a star (*) because they deserve acknowledgement for achieving zero infections.
- Hospital E had the highest infection rate (16.5 CLABSIs per 1,000 central line-days), which

was significantly higher than the national pooled mean because the red bar falls entirely above the dotted line. The confidence interval is wide because there were few central line-days (121).

- Hospital F had zero CLABSIs, but the rate was not statistically lower than the national pooled mean because the green bar crosses the dotted line. The hospital had 573 central line-days, and we cannot be certain the hospital would have seen zero infections if they had more central line-days. All hospitals observing zero infections receive a star (*) because they deserve acknowledgement for achieving zero infections.

- Hospital G had zero CLABSIs, but the rate was not significantly lower than the national pooled mean because the green bar crosses the dotted line. The hospital only had 81 central line-days, and we cannot be certain the hospital would have seen zero infections if they had more central line-days. The 95% confidence interval is very wide because there were very few central line-days. All hospitals observing zero infections receive a star (*) because they deserve acknowledgement for achieving zero infections.

- Hospital H had the third highest infection rate (2.1 CLABSIs per 1,000 central line-days), but the rate was not significantly higher than the national pooled mean because the green bar crosses the dotted line. The 95% confidence interval is narrow because there were a large number of central line-days (2,879). A narrow confidence interval implies that the rate is stable, and we can be more confident in the rate measurement.

RESULTS

CLABSIs in Adult/Pediatric ICUs:

Total number of adult/pediatric ICUs participating in this reporting period: 148

Microorganisms Associated with CLABSIs in Adult and Pediatric ICUs (Table 2, Figure 7)

- The four most common pathogens among total positive isolates were *Candida* species and other yeasts (24.8%), coagulase-negative *Staphylococcus* species (22.5%), *Staphylococcus aureus* (13.1%), and *Enterococcus* species (12.2%). Methicillin-resistant *S. aureus* (MRSA) accounted for 9.0% and vancomycin-resistant *Enterococcus* (VRE) for 3.2% of total positive isolates.

Tennessee and National Comparisons:

Key Percentiles for Tennessee SIRs (Tables 3-5, Figure 4)

- Excluding burn and trauma ICUs, the overall SIR across all reporting adult and pediatric ICUs in Tennessee in January–June 2011 was statistically significantly lower than the national SIR of 1 (SIR=0.70; 95% CI: 0.59, 0.81). This SIR means that overall CLABSI rates in ICUs were 30% lower in Tennessee in January–June 2011 compared to national NHSN 2006-8 data. The overall Tennessee SIR for January–June 2011 was lower than the overall SIRs for 2008–2010.
- Including burn and trauma ICUs, the overall SIR across all reporting adult and pediatric ICUs in Tennessee in January–June 2011 was statistically significantly lower than the national SIR of 1 (SIR=0.77; 95% CI: 0.67, 0.88). This SIR means that overall CLABSI rates in ICUs were 23% lower in Tennessee in January–June 2011 compared to national NHSN 2006-8 data. The overall Tennessee SIR for January–June 2011 was lower than the overall SIRs for 2008–2010.
- In January–June 2011, the median (50^{th} percentile) facility-specific SIR was 0.00, indicating that half of all reporting Tennessee hospitals had a SIR of 0.00. This value is lower than the median in 2008, 2009, and 2010.
- In January–June 2011, Tennessee CLABSI SIRs were significantly lower than the 2006-8 baseline SIR in medical ICUs in major teaching hospitals (SIR=0.52, 95% CI: 0.25, 0.96), medical-surgical ICUs with ≤15 beds in non-major teaching hospitals (SIR=0.45, 95% CI: 0.18, 0.94), neurosurgical ICUs (SIR=0.36, 95% CI: 0.12, 0.84), and pediatric medical-surgical ICUs (SIR=0.29, 95% CI: 0.11, 0.63). No ICU type had a SIR that was significantly greater than 1.
- From 2008 to January–June 2011, median unit-specific SIRs decreased among medical cardiac ICUs (1.16 to 0.66), medical ICUs in non-major teaching hospitals (0.49 to 0.00), medical-surgical ICUs in major teaching hospitals (1.26 to 0.53), neurosurgical ICUs (0.91 to 0.00), pediatric medical-surgical ICUs (1.02 to 0.12), surgical cardiothoracic ICUs (1.03 to 0.97), and surgical ICUs (0.88 to 0.00). The median unit-specific SIR among trauma ICUs also decreased from 0.94 to 0.70 from July–December 2011 to January–June 2011.

Rates by Unit Type (Table 6, Figure 3)

- The following list summarizes the CLABSI rates per 1,000 central line-days in Tennessee for January–June 2011. CLABSI rates were highest in burn ICUs and lowest among surgical cardiothoracic ICUs:
  - Burn (8.8)
  - Trauma (3.6)
  - Pediatric surgical cardiothoracic (3.3)
  - Non-major teaching medical (1.6)
  - Major teaching medical-surgical (1.6)
  - Surgical (1.5)
  - Medical cardiac (1.4)
  - Non-major teaching medical-surgical with >15 beds (1.4)
  - Surgical cardiothoracic (1.4)
  - Major teaching medical (1.3)
  - Neurosurgical (0.9)
  - Pediatric medical-surgical (0.8)
  - Non-major teaching medical-surgical with ≤15 beds (0.7)
  - Neurological (0.0)
  - Pediatric medical (0.0)
- From 2010 to January–June 2011, infection rates decreased among burn ICUs (10.5 to 8.8), major teaching medical ICUs (3.1 to 1.3), major teaching medical-surgical ICUs (2.5 to 1.6), non-major teaching medical-surgical ICUs with ≤15 beds (1.3 to 0.7), neurosurgical ICUs (1.6 to 0.9), and pediatric medical-surgical ICUs (1.5 to 0.8).

Device Utilization by Unit Type (Figure 6)

- DU ratios in Tennessee in January–June 2011were higher than national 2006-8 ratios among burn ICUs, medical cardiac ICUs, non-major teaching medical-surgical ICUs with >15 beds, pediatric medical-surgical ICUs, neurological ICUs, and pediatric surgical cardiothoracic ICUs.
- From 2010 to January–June 2011, DU ratios in Tennessee increased slightly in major teaching medical-surgical ICUs with >15 beds. The DU ratio decreased substantially in pediatric surgical cardiothoracic ICUs; several other ICU types experienced slight decreases in the central line utilization ratio.

SIRs by Six-Month Reporting Interval and Unit Type (Table 7)

- The overall CLABSI SIR in Tennessee went from being significantly greater than the national 2006-8 SIR of 1 in July–December 2009 (SIR=1.15; 95% CI: 1.02, 1.31) to being significantly lower than 1 in January–June 2011 (excluding burn and trauma ICUs, SIR=0.70; 95% CI: 0.67, 0.88). From July–December 2009 to January–June 2011, CLABSI SIRs decreased in all ICU types for which 2009 data were available, except in non-major teaching medical critical care ICUs.

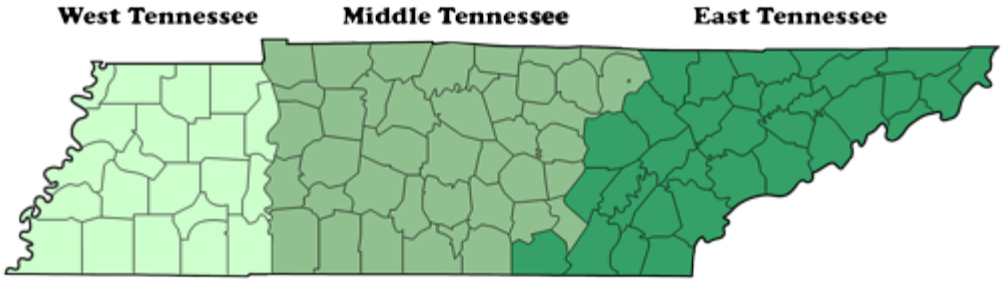
SIRs by Quarter (Figure 5)

- From January–March 2008 to April–June 2011, the overall CLABSI SIR in Tennessee

decreased from 1.14 to 0.65, with most of the reduction in the SIR occurring after the third quarter of 2009. The U.S. Department of Health and Human Services' *Action Plan to Prevent Healthcare-Associated Infections* gives a five-year prevention target of SIR = 0.5.

Rates and SIRs by Unit Type and Grand Division (Table 8)

The following map depicts the three grand divisions in Tennessee:



- CLABSI rates varied in ICU settings across the three grand divisions of Tennessee.
- CLABSI SIRs were significantly lower than 1 in:
  - West Tennessee among non-major teaching medical-surgical ICUs with >15 beds [0.4 vs. 1.5; SIR=0.25 (0.03, 0.89)]
  - Middle Tennessee among pediatric medical-surgical ICUs [0.9 vs. 3.0; SIR=0.29 (0.06, 0.86)] and surgical ICUs [0.2 vs. 2.3; SIR=0.09 (0.00, 0.50)]
  - East Tennessee among major teaching medical ICUs [1.0 vs. 2.6; SIR=0.41 (0.13, 0.95)] and major teaching medical-surgical ICUs [0.0 vs. 2.1; SIR=0.00 (0.00, 0.55)].
- Overall CLABSI SIRs for Middle and East Tennessee were significantly lower than the national 2006-8 SIR of 1. The overall SIRs and 95% confidence intervals by Grand Division are as follows:
  - East Tennessee: 0.50 (0.36, 0.68)
  - Middle Tennessee: 0.73 (0.55, 0.94)
  - West Tennessee: 0.89 (0.67, 1.16)

Overall Facility-Specific SIRs (Figures 8-9)

- One CLABSI SIR that accounts for all reporting adult/pediatric ICUs in a given facility is displayed in Figure 8. The bar representing the confidence interval is blue if the CLABSI SIR was significantly lower than the national SIR of 1 for 2006-8 and red if the CLABSI SIR was significantly higher than 1. Some hospitals have reported zero CLABSIs in specific ICUs, although the SIR may not be statistically significant due to a small number of central line-days.
- Figure 9 displays one facility-specific SIR per year for 2008–June 2011, showing each facility's progress toward preventing CLABSIs.

Facility-Specific CLABSI Rates in Adult and Pediatric ICUs (Figures 10-21, Tables 9-21)

- Facility -specific CLABSI rates are displayed by type of ICU. The bar representing the confidence interval is blue if the CLABSI rate was significantly lower than the national pooled mean rate for 2006-8 and red if the CLABSI rate was significantly higher than the national pooled mean rate. Some hospitals have reported zero CLABSIs in specific ICUs,

although the rate may not be statistically significant due to small numbers of patient days and central line-days. The following numbers and percentages of ICUs reported zero infections in January–June 2011 (facilities with <50 line-days excluded) :

- 3 of 8 medical cardiac ICUs – 38%
- 0 of 4 major teaching medical ICUs – 0%
- 13 of 19 non-major teaching medical ICUs – 68%
- 2 of 5 major teaching medical-surgical ICUs – 40%
- 29 of 34 non-major teaching medical-surgical ICUs with ≤15 beds – 85%
- 6 of 18 non-major teaching medical-surgical ICUs with >15 beds – 33%
- 1 of 1 neurological ICUs – 100%
- 4 of 7 neurosurgical ICUs – 57%
- 3 of 7 pediatric medical-surgical ICUs – 43%
- 0 of 1 pediatric surgical cardiothoracic ICUs – 0%
- 5 of 15 surgical cardiothoracic ICUs – 33%
- 6 of 11 surgical ICUs – 55%

CLABSIs in Neonatal ICUs:

Total number of Neonatal ICUs (NICUs) participating in this reporting period: 24

Microorganisms Associated with CLABSIs in Neonatal ICUs (Table 22, Figure 27)

- The most common microorganisms identified in NICU-related CLABSIs were *Staphylococcus aureus* (41.4%), coagulase-negative *Staphylococcus* (17.2%), *Escherichia coli* (10.3%), and *Pseudomonas aeruginosa* (10.3%). Methicillin-resistant *S. aureus* (MRSA) accounted for 29.6% of organisms identified, and one vancomycin-resistant *Enterococcus* (VRE) was identified among the isolates.

Tennessee and National Comparisons:

Note: When viewing data from 2008, please note that NICU data are available for July–December 2008 only. Additionally, in contrast to previous reports, NHSN no longer stratifies neonatal data by line type (central vs. umbilical).

Key Percentiles for Tennessee SIRs (Tables 23–24)

- The overall SIR across all reporting NICUs in Tennessee in January–June 2011 was statistically significantly lower than the national SIR of 1 (SIR=0.52; 95% CI: 0.35, 0.75). The overall Tennessee SIR for January–June 2011was lower than the overall SIRs for 2008–2010.
- In January–June 2011, the median (50th percentile) facility-specific SIR was 0.32, indicating that half of all reporting Tennessee hospitals had a SIR at or below 0.32. This value is lower than it was in 2010, when 50% of reporting hospitals had a SIR at or below 0.44. During 2008–June 2011, at least 25% of NICUs had a SIR of 0.
- In January–June 2011, the Tennessee CLABSI SIR in level III NICUs was significantly

lower than 2006-8 national SIR of 1 (SIR=0.50; 95% CI: 0.30, 0.78). The Tennessee CLABSI SIR in level II/III NICUs was not significantly different from 1(SIR=0.58; 95% CI: 0.27, 1.10). In both level III and level II/III NICUs, the CLABSI SIR decreased greatly from July–December 2008 through January–June 2011.

- From 2008 to January–June 2011, the median unit-specific SIR decreased among level III NICUs (0.94 to 0.62) and remained the same among level II/III NICUs (0.00).

CLABSI Rates and SIRs by Unit Type and Birth Weight Category (Table 25, Figures 22-23)

- CLABSI rates per 1,000 line-days were highest among babies with birth weight ≤750 g in level II/III NICUs (3.7). Rates were lowest among babies with birth weight >2500 g in level II/III NICUs and among babies with birth weight 1501-2500 g and 2500 g in level II/III NICUs (0.0).
- CLABSI rates per 1,000 line-days in January–June 2011 were statistically significantly lower than national 2006-8 rates among babies with birth weight 1001-1500 g (SIR=0.17; 95% CI: 0.00, 0.94), birth weight 1501-2500 g (SIR=0.17; 95% CI: 0.00, 0.95), and birth weight >2500 g (SIR=0.00; 95% CI: 0.00, 0.97) in level III NICUs.
- CLABSI rates decreased from 2010 to January–June 2011 in all NICU level/birth weight categories except among babies with birth weight ≤750 g in level III ICUs and among babies with birth weight 1001-1500 g in level II/III NICUs.

Device Utilization by ICU type (Figures 25-26)

- In level III NICUs in Tennessee, January–June 2011 device utilization (DU) ratios for central lines were higher than national 2006-8 ratios in all birth weight categories. DU ratios were slightly lower than or very similar to 2010 ratios.
- In level II/III NICUs in Tennessee, January–June 2011 DU ratios for central lines were higher than national 2006-8 ratios in all birth weight categories except >2500 g. DU ratios were slightly lower than or very similar to 2010 ratios.

CLABSI SIRs by Six-Month Reporting Interval, Unit Type, and Birth Weight Category (Table 26)

- From July–December 2009 to January–June 2011, the overall NICU SIR for Tennessee decreased from 0.84 (0.62, 1.10) to 0.52 (0.35, 0.75).
- From July–December 2009 to January–June 2011, the CLABSI SIR decreased among all birth weight categories except >2500 g (SIR=0.00) in level III NICUs. The SIR decreased among all birth weight categories except 1001-1500 g (SIR: 0.69 to 1.35) in level II/III NICUs.

CLABSI SIRs by Quarter (Figure 24)

- From July–September 2008 to April–June 2011, the overall CLABSI SIR in Tennessee NICUs decreased from 1.59 to 0.59. In the fourth quarter of 2010 and the first quarter of 2011, Tennessee NICUs came very close to reaching the U.S. Department of Health and Human Services' *Action Plan to Prevent Healthcare-Associated Infections* five-year prevention target of SIR = 0.5.

CLABSI Rates and SIRs by Unit Type and Grand Division (Table 27)

- CLABSI rates varied among NICUs in the three grand divisions of Tennessee.
- Both Middle and East Tennessee Grand Divisions had a SIR that was significantly different from 1. Level III neonatal ICUs in Middle Tennessee also had a SIR that was significantly less than 1 (SIR=0.13; 95% CI: 0.02, 0.46).
- The overall SIRs and 95% confidence intervals by Grand Division are as follows:
  - East Tennessee: 0.43 (0.18, 0.84)
  - Middle Tennessee: 0.17 (0.04, 0.50)
  - West Tennessee: 0.97 (0.56, 1.55)

Facility-Specific SIRs and Device Utilization Ratios (Figures 28-29, Tables 28-29)

- One CLABSI SIR per facility is displayed in Figure 28. The bar representing the confidence interval is blue if the CLABSI SIR was significantly lower than the national 2006-8 SIR of 1 and red if the rate was significantly higher than 1. Some hospitals have reported zero CLABSIs, although the rate may not be statistically significant due to small numbers of patient days and central line-days.
- Figure 29 displays one facility-specific SIR per year for July 2008–June 2011, showing each facility's progress toward preventing CLABSIs.
- Facility-specific CLABSI SIRs and device utilization ratios in neonatal ICUs are displayed by NICU level in Tables 38–29. One level III NICU and one level II/III NICU had CLABSI SIRs that were significantly less than 1 (highlighted in blue). No other CLABSI SIRs were significantly different from 1.
- The following numbers and percentages of ICUs reported zero infections in January–June 2011 (facilities with <50 line-days excluded):
  - 1 of 7 neonatal level III ICUs – 14%
  - 7 of 12 neonatal level II/III ICUs – 58%

CLABSIs in Specialty Care Areas (SCAs):

Total number of SCAs participating in this reporting period: 19

Microorganisms Associated with CLABSIs in SCAs (Table 30, Figure 36)

- The three most common pathogens among total positive isolates were *Enterococcus* species (17.5%), coagulase-negative *Staphylococcus* species (15.9%), and *Pseudomonas* species (12.7%). Vancomycin-resistant *Enterococcus* (VRE) accounted for 9.5% of total positive isolates, and methicillin-resistant *S. aureus* (MRSA) accounted for 3.2%.

Tennessee and National Comparisons:

Note: National 2006-8 baseline data for pediatric bone marrow transplants SCAs is not available. Therefore, SIR calculations do not include these units. Additionally, because facility-specific SCA

data are not published in Tennessee at this time, this report does not show data for Tennessee's one solid organ transplant unit.

Key Percentiles for Tennessee SIRs (Tables 31-32, Figure 32)

- The overall SIR across all reporting SCAs in Tennessee in January–June 2011 was not significantly different than the national SIR of 1 (SIR=0.88; 95% CI: 0.67, 1.14). The overall Tennessee SIR for January–June 2011 was slightly lower than the overall SIR for July–December 2010 (SIR=0.93; 95% CI: 0.71, 1.18).
- In January–June 2011, the median (50th percentile) facility-specific SIR was 0.89, indicating that half of all reporting Tennessee hospitals had a SCA SIR at or below 0.89. This value is higher than the median in July–December 2010.
- In January–June 2011, Tennessee CLABSI SIRs were significantly lower than the 2006-8 baseline SIR in bone marrow transplant SCAs (SIR=0.48, 95% CI: 0.24, 0.86) and pediatric hematology/oncology SCAs (SIR=0.42, 95% CI: 0.16, 0.92). No SCA type had a SIR that was significantly greater than 1.
- From July–December 2010 to January–June 2011, the SIR decreased among bone marrow transplant SCAs and increased among hematology/oncology and pediatric hematology/oncology SCAs.
- From July–December 2010 to January–June 2011, the median unit-specific SIRs increased among hematology/oncology SCAs (0.00 to 0.93). Key percentiles for other SCA types are not shown because there were fewer than five units of each type in Tennessee.

Rates by Unit Type and Line Type (Tables 33-34, Figures 30–31)

- The following list summarizes the CLABSI rates per 1,000 central line-days in Tennessee SCAs for January–June 2011.

CLABSI rates associated with permanent central lines were as follows:

  - Pediatric bone marrow transplant (2.7)
  - Bone marrow transplant (1.7)
  - Hematology/oncology (1.2)
  - Pediatric hematology/oncology (1.1)

CLABSI rates associated with temporary central lines were as follows:

  - Hematology/oncology (2.5)
  - Bone marrow transplant (1.7)
  - Pediatric bone marrow transplant (0.0)
  - Pediatric hematology/oncology (0.0)

- The CLABSI rate associated with temporary central lines in bone marrow transplant SCAs in Tennessee was significantly less than the NHSN 2006-8 pooled mean rate of 3.9.

Device Utilization by Unit Type and Line Type (Tables 33–34, Figures 34–35)

- Permanent central line DU ratios in Tennessee SCAs in January–June 2011were higher than national 2006-8 ratios in pediatric hematology/oncology SCAs. The permanent central line DU ratio for Tennessee was substantially lower than the national DU ratio in bone marrow transplant SCAs.
- Temporary central line DU ratios in Tennessee SCAs in January–June 2011were higher than

national 2006-8 ratios in bone marrow transplant and hematology/oncology SCAs. The temporary central line DU ratio for Tennessee was lower than the national DU ratio in pediatric hematology/oncology SCAs.

- From July–December 2010 to January–June 2011, the permanent central line DU ratio in Tennessee decreased slightly among bone marrow transplant SCAs and remained relatively constant in the other SCA types. The temporary central line DU ratio in Tennessee increased slightly among bone marrow transplant SCAs and decreased slightly among pediatric bone marrow transplant and pediatric hematology/oncology SCAs.

SIRs by Quarter (Figure 33)

- From July–September 2010 to April–June 2011, the overall CLABSI SIR in Tennessee changed very little, from 0.83 to 0.82. A slight increase occurred in the fourth quarter of 2010.

CLABSIs in Long-Term Acute Care (LTAC) Facilities:

Total number of SCAs participating in this reporting period: 9

Microorganisms Associated with CLABSIs in SCAs (Table 35, Figure 38)

- The three most common pathogens among total positive isolates were *Enterococcus* species (33.3%), *Staphylococcus aureus* (10.6%), and *Candida* species and other yeasts (9.1%). Vancomycin-resistant *Enterococcus* (VRE) accounted for 15.2% of total positive isolates, and methicillin-resistant *S. aureus* (MRSA) accounted for 10.6% (all *S. aureus* isolates were methicillin-resistant).

Tennessee and National Comparisons:

Key Percentiles for Tennessee SIRs (Table 36)

- The overall SIR across all reporting LTACs in Tennessee in January–June 2011 was not significantly different than the national SIR of 1 (SIR=0.99; 95% CI: 0.75, 1.28). The overall Tennessee SIR for January–June 2011 was slightly lower than the overall SIR for July–December 2010 (SIR=1.05; 95% CI: 0.79, 1.37).
- In January–June 2011, the median (50^{th} percentile) facility-specific SIR was 1.09, indicating that half of all reporting Tennessee hospitals had a SCA SIR at or below 1.09. This value is lower than the median in July–December 2010.
- Only one type of LTAC location (LTAC ward) was present in Tennessee during the reporting period, so the unit-specific SIR and key percentiles are the same as the overall values.

Rates and Device Utilization by Unit Type (Table 37)

- One type of LTAC location (LTAC ward) was present in Tennessee during the reporting period. The pooled mean CLABSI rate in Tennessee LTAC wards was the same as the

NHSN 2006-8 pooled mean rate (1.7 per 1,000 line-days).
- The DU ratio in LTAC wards in Tennessee was twice as high as the NHSN 2006-8 DU ratio.

SIRs by Quarter (Figure 33)

- From July–September 2010 to April–June 2011, the overall CLABSI SIR in Tennessee changed increased from 0.85 to 1.02. A large increase occurred in the fourth quarter of 2010.

SSIs Related to CBGB/C and HPRO Procedures (Combined)

Total number of facilities reporting in this period: 72

Tennessee and National Comparisons:

Key Percentiles for Tennessee SIRs (Table 38)

- The combined All SSI SIR for SSIs related to CBGB/C or HPRO procedures in Tennessee in January–June 2011was statistically significantly lower than the national SIR of 1 (SIR=0.75; 95% CI: 0.63, 0.90). This SIR was the same as that for 2010.
- In January–June 2011, the median combined All SSI SIR for CBGB/C and HPRO procedures was 0.65, indicating that half of reporting facilities had an All SSI SIR at or below 0.65. This value is higher than the median in 2009 and slightly higher than the median in 2010.
- The Complex A/R SIR for SSIs related to CBGB/C or HPRO procedures in Tennessee in January–June 2011was not statistically significantly different from 1 (SIR=0.77; 95% CI: 0.70, 1.09). This SIR was higher than that for 2010.
- In January–June 2011, the median combined All SSI SIR for CBGB/C and HPRO procedures was 0.74, indicating that half of reporting facilities had an All SSI SIR at or below 0.74. This value is the same as the median in 2009 and slightly higher than the median in 2010.

SIRs by Quarter (Figure 39)

- From July-September 2010 to April-June 2011, the combined All SSI SIR for SSIs related to CBGB/C or HPRO procedures in Tennessee decreased overall, reaching the HHS 5-Year Goal of 0.75 in April-June 2011.
- The Complex A/R SIR for SSIs related to CBGB/C or HPRO procedures increased overall between July-September 2010 and April-June 2011; however, the SIR decreased slightly between the first and second quarters of 2011.

SSIs Related to CBGB and CBGC Procedures:

Total number of facilities reporting in this period: 26

Microorganisms associated with SSIs following CBGB/C Procedures (Figure 40, Table 39)

- The most common pathogens among total positive isolates for SSIs related to CBGB/C

procedures were *Staphylococcus aureus* (38.6%) and coagulase-negative *Staphylococcus* species (14.3%). Methicillin-resistant *S. aureus* (MRSA) accounted for 10.6% of total positive isolates.

Tennessee and National Comparisons:

Key Percentiles for Tennessee SIRs (Table 40)

- The All SSI SIR for SSIs related to CBGB/C procedures in Tennessee in January–June 2011 was statistically significantly lower than the national SIR of 1 (SIR=0.70; 95% CI: 0.53, 0.91). The All SSI SIR for CBGB/C was lower than the SIR for 2009.
- In January–June 2011, the median All SSI SIR for CBGB/C procedures was 0.69, indicating that half of reporting facilities had an All SSI SIR at or below 0.69. This value is the same as the median in 2009 and slightly higher than the median in 2010.
- The Complex A/R SIR for SSIs related to CBGB/C procedures in Tennessee in January–June 2011 was not statistically significantly different than the national SIR of 1 (SIR=0.96; 95% CI: 0.70, 1.30). The Complex A/R SIR for CBGB/C was higher than that for 2009, when the SIR was statistically significantly lower than 1 (SIR=0.78; 95% CI: 0.60, 0.98).
- In January–June 2011, the median Complex A/R SIR for CBGB/C procedures was 1.60, indicating that half of reporting facilities had an All SSI SIR at or below 1.60. This value is higher than the median for both 2009 and 2010.

SIRs by Quarter (Figure 41)

- From January-March 2009 to April-June 2011, there was no major overall change in the combined All SSI SIR for SSIs related to CBGB/C procedures in Tennessee.
- The Complex A/R SIR for SSIs related to CBGB/C procedures increased overall from January-March 2009 to April-June 2011, with no clear trend in between.

Rates, Infection Sites, and Detection (Table 34, Figure 42-43)

- In January–June 2011, 69 SSIs were reported among 3,882 CBGB/C procedures in Tennessee, for a crude rate of 1.77 infections per 100 operations. This rate is lower than in 2010, when hospitals reported 8,187 coronary artery bypass graft (CBGB/C) surgeries, among which 166 surgical site infections were reported, for a crude (unadjusted) rate of 2.03 infections per 100 operations.
- Overall, SSIs related to CBGB/B procedures were most often deep primary (37.7%) and least often deep secondary infections (1.5%).
- SSIs related to CBGB/C procedures were most often identified upon readmission (72.5%).

SSIs Related to HPRO procedures

Total number of facilities reporting in this period: 72

Microorganisms associated with SSIs following CBGB/C Procedures (Figure 44, Table 44)

- The most common pathogens among total positive isolates were *Staphylococcus aureus* (51.8%) and *Enterococcus* species (12.1%). Methicillin-resistant *S. aureus* (MRSA) accounted for 29.3% of total positive isolates.

Tennessee and National Comparisons:

Key Percentiles for Tennessee SIRs (Table 45)

- The All SSI SIR for SSIs related to HPRO procedures in Tennessee in January–June 2011 was not statistically significantly different than the national SIR of 1 (SIR=0.79; 95% CI: 0.61, 1.02). The All SSI SIR for HPRO was higher than that for 2010, when the SIR was statistically significantly lower than 1 (SIR=0.74; 95% CI: 0.56, 0.96)
- In January–June 2011, the median All SSI SIR for HPRO procedures was 0.62, indicating that half of reporting facilities had an All SSI SIR at or below 0.62. This value is slightly lower than the median in 2010.
- The Complex A/R SIR for SSIs related to HPRO procedures in Tennessee in January–June 2011 was not statistically significantly different than the national SIR of 1 (SIR=0.81; 95% CI: 0.58, 1.10). The Complex A/R SIR for HPRO was higher than that for 2010, when the SIR was statistically significantly lower than 1 (SIR=0.51; 95% CI: 0.33, 0.76)
- In January–June 2011, the median Complex A/R SIR for HPRO procedures was 0.82, indicating that half of reporting facilities had an All SSI SIR at or below 0.82. This value is lower than the median in 2010.

SIRs by Quarter (Figure 45)

- The All SSI SIR for SSIs related to CBGB/C procedures increased overall from January-March 2009 to April-June 2011, and remained relatively stable in between.
- The Complex A/R SIR for SSIs related to CBGB/C procedures increased overall from January-March 2009 to April-June 2011, having been less than the HHS 5-year goal of 0.75 until the last quarter of 2011.

Rates, Infection Sites, and Detection (Table 46, Figure 46-47)

- In January–June 2011, 72 SSIs were reported among 4,772 CBGB/C procedures in Tennessee, for a crude rate of 1.34 infections per 100 operations. This is a slight increase from 2010, when Tennessee hospitals reported 4,659 hip prosthesis (HPRO) surgeries, among which 66 surgical site infections were reported, for a crude (unadjusted) rate of 1.24 infections per 100 operations.
- SSIs related to HPRO procedures were relatively evenly distributed among the three possible sites, with deep primary infections being most common (39.1%)
- SSIs related to HPRO procedures were most often identified upon readmission (81.3%).

CLABSI Figures and Tables

Adult and Pediatric Critical Care Units

Figure 3: Central Line-Associated Bloodstream Infection (CLABSI) Pooled Mean Rates per 1,000 Central Line Days by Intensive Care Unit (ICU) Type, Tennessee, 2010 and 2011, vs. National Healthcare Safety Network (NHSN), 2006-8
Note: Burn and trauma ICU data are available since July 2010; no neurological or pediatric medical ICUs were present in Tennessee in 2010

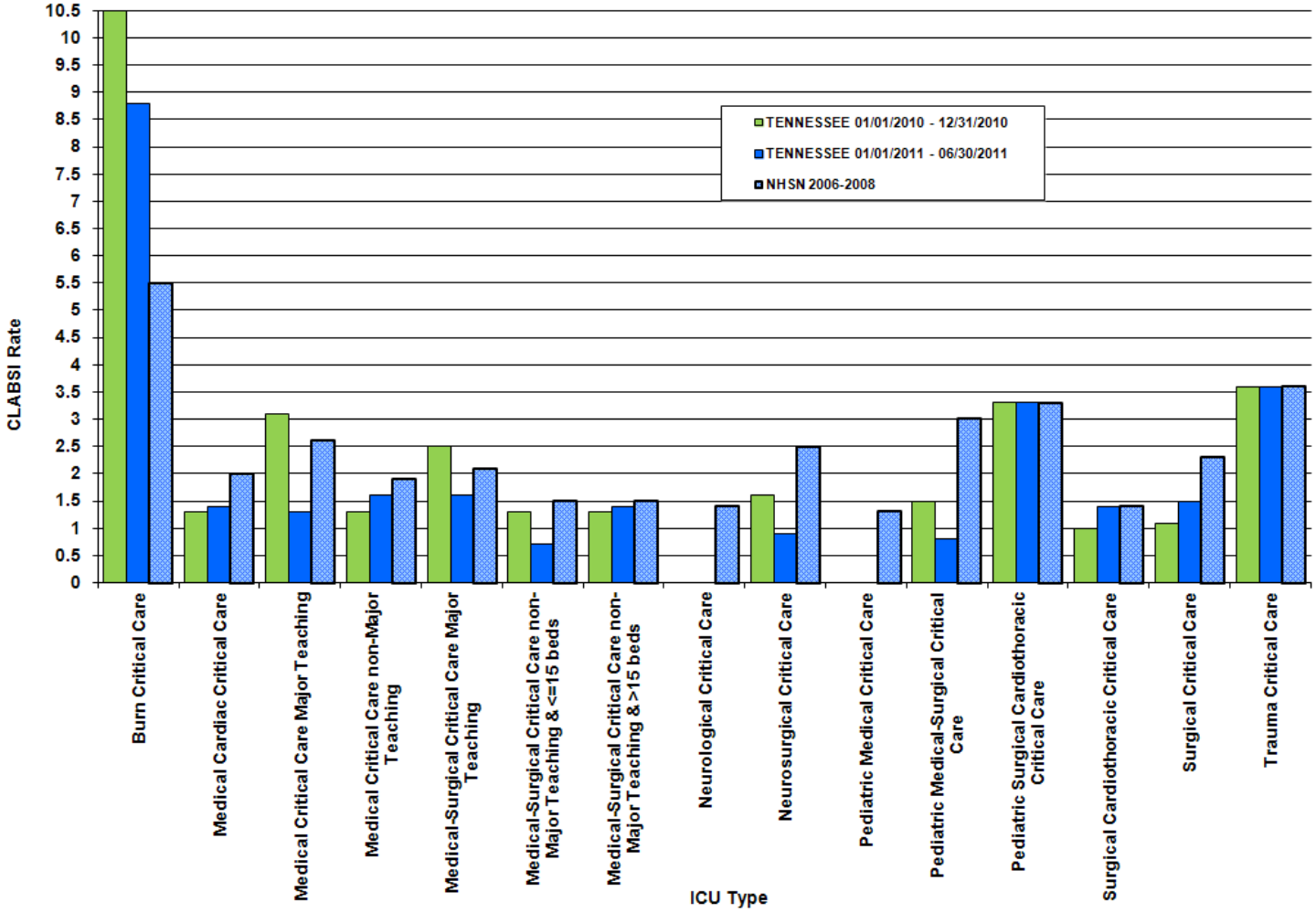


Figure 4: Standardized Infection Ratios (SIRs) for Central Line-Associated Bloodstream Infections (CLABSIs) by Intensive Care Unit (ICU) Type, Including Burn and Trauma ICUs, Tennessee, 2010 and 2011 [Reference standard: National Healthcare Safety Network (NHSN), 2006-8]
Note: Burn and trauma ICU data are available since July 2010; no neurological or pediatric medical ICUs were present in Tennessee in 2010

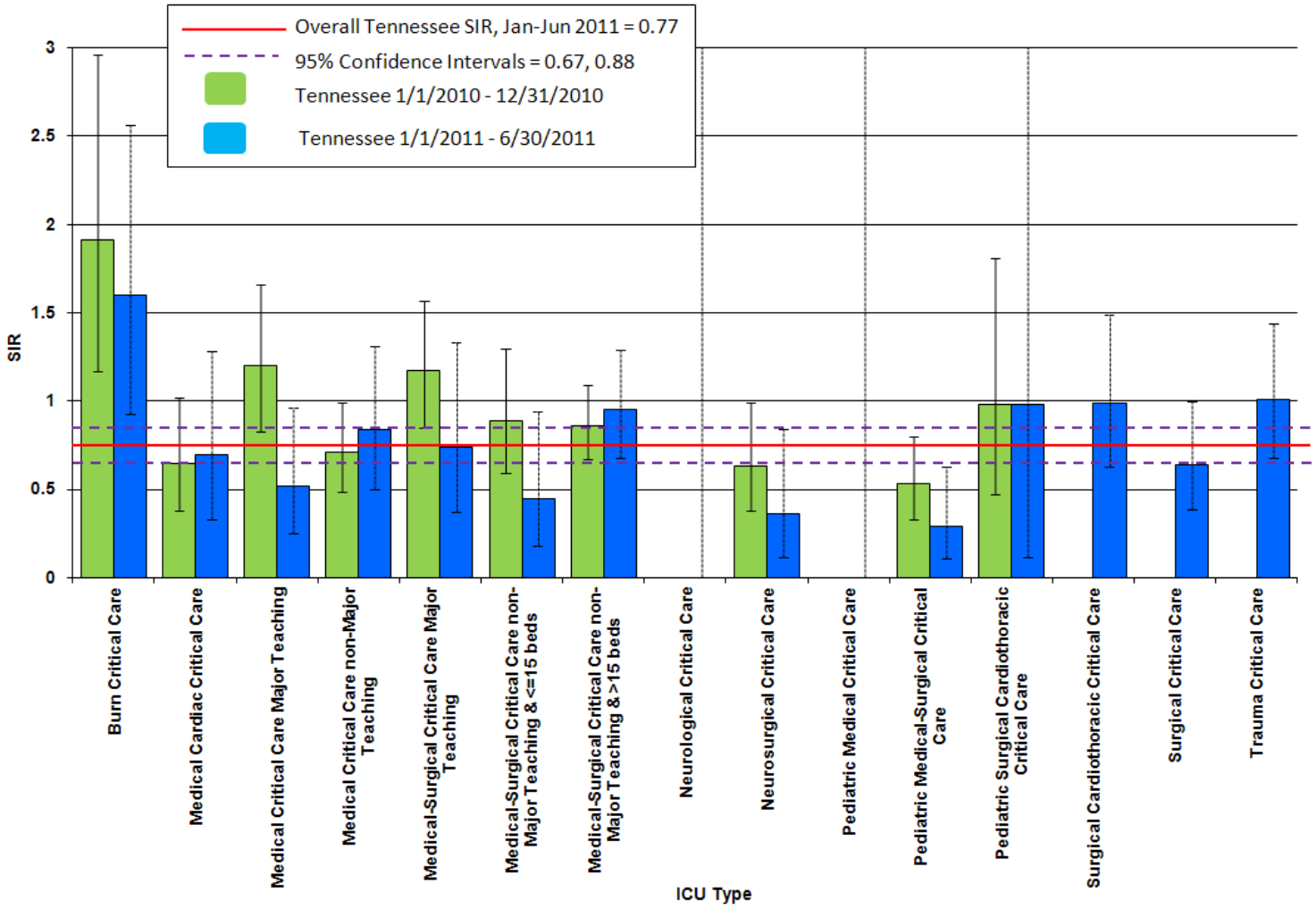


Figure 5: Standardized Infection Ratios (SIR) for Central Line-Associated Bloodstream Infections (CLABSIs) for Adult and Pediatric Intensive Care Units (ICUs) by Quarter, Excluding Burn and Trauma ICUs, Tennessee, 1/2008–06/2011 [Reference standard: National Healthcare Safety Network (NHSN), 2006-8]

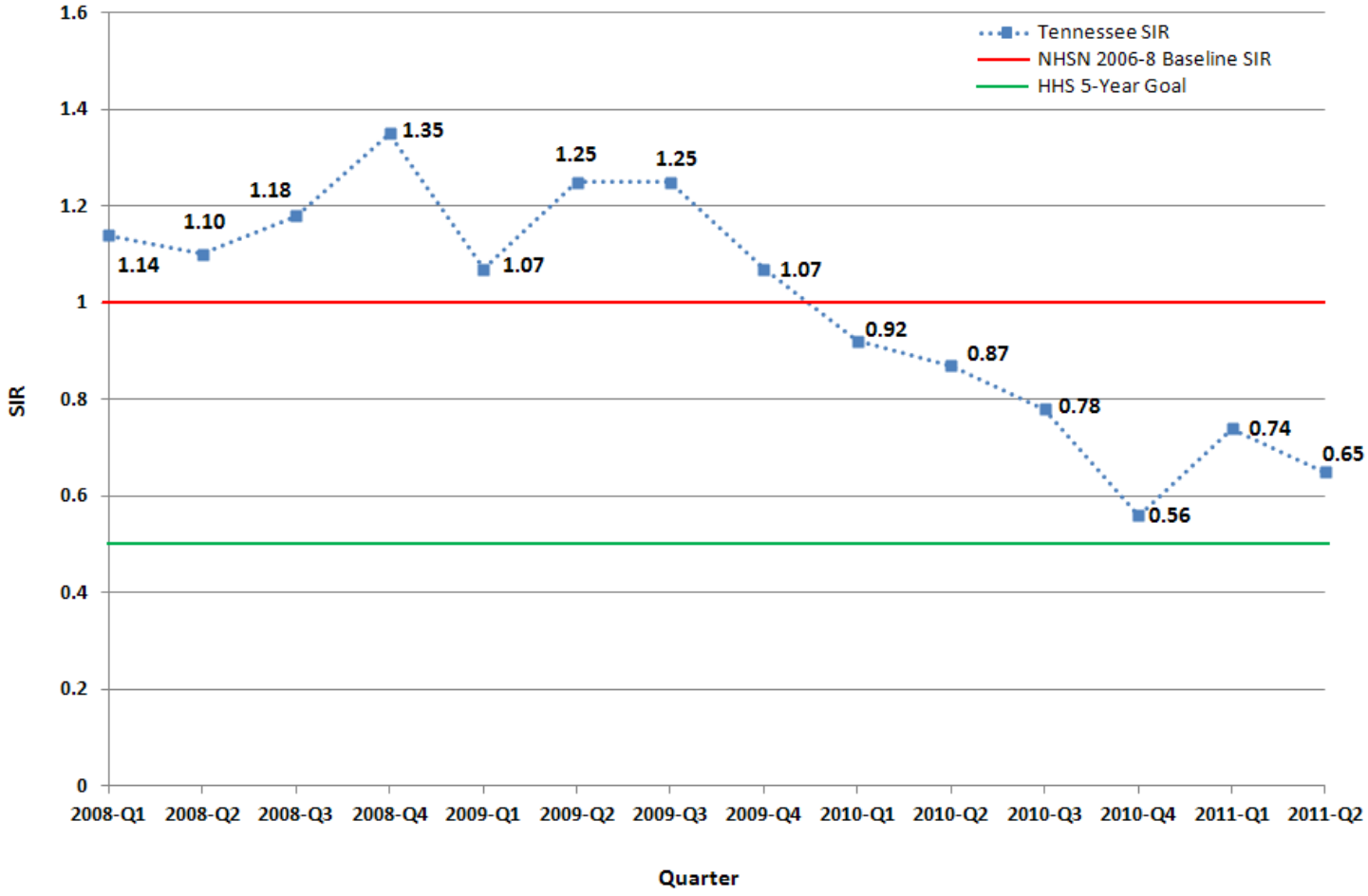
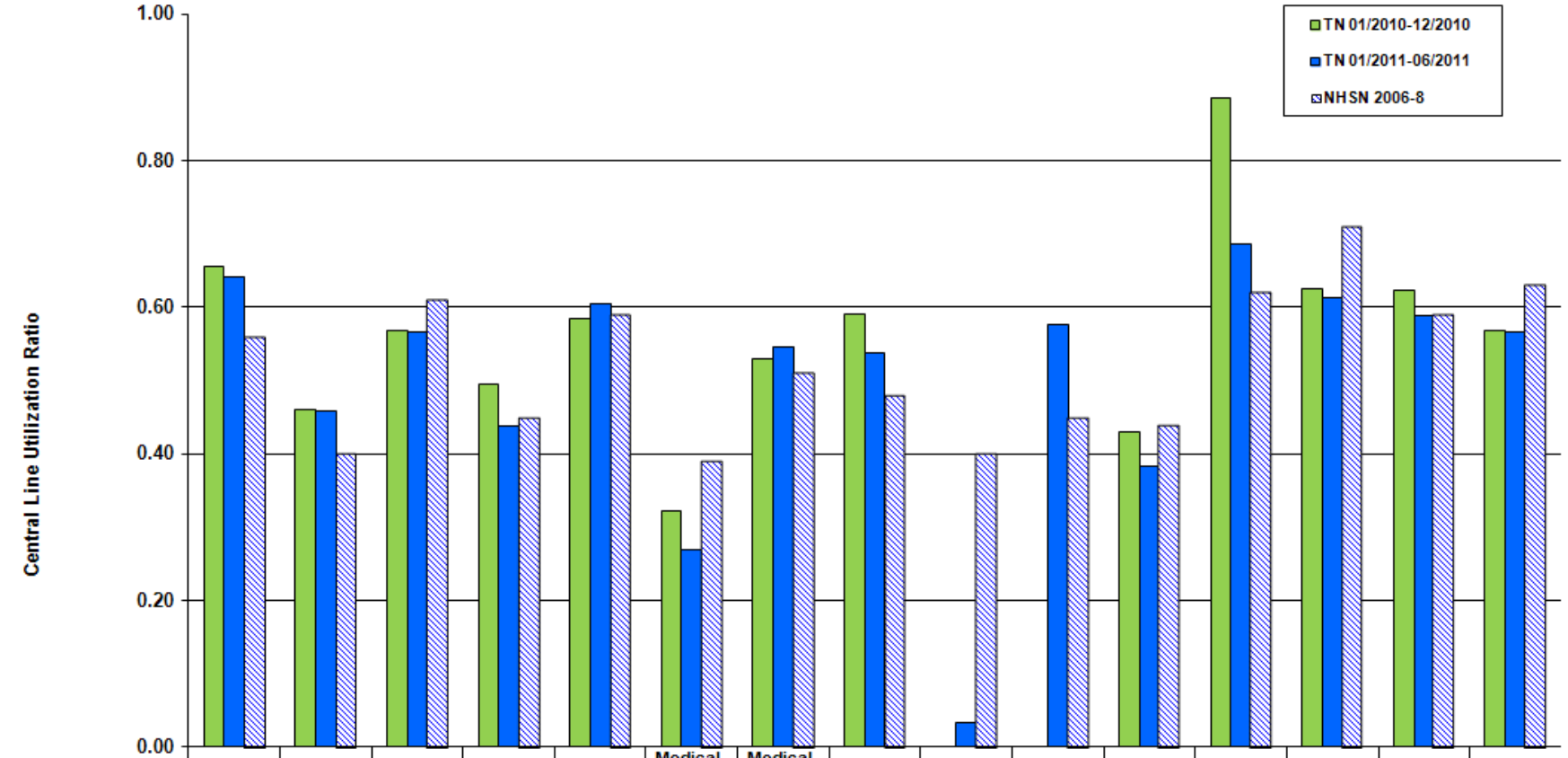


Figure 6: Central Line Utilization Ratio by Intensive Care Unit (ICU) Type, Tennessee, 2010 and 2011, vs. National Healthcare Safety Network (NHSN), 2006-8 Note: Burn and trauma ICU data are available since July 2010; no neurological or pediatric medical ICUs were present in Tennessee in 2010



	Burn Critical Care	Medical Cardiac Critical Care	Medical Critical Care, Major Teaching	Medical Critical Care, non-Major Teaching	Medical-Surgical Critical Care, Major Teaching	Medical-Surgical Critical Care, non-Major Teaching & ≤15 beds	Medical-Surgical Critical Care, non-Major Teaching & >15 beds	Pediatric Medical-Surgical Critical Care	Pediatric Medical Critical Care	Neuro-logical Critical Care	Neuro-surgical Critical Care	Pediatric Surgical Cardio-thoracic Critical Care	Surgical Cardio-thoracic Critical Care	Surgical Critical Care	Trauma Critical Care
TN 01/2010-12/2010	0.66	0.46	0.57	0.49	0.58	0.32	0.53	0.59			0.43	0.89	0.63	0.62	0.57
TN 01/2011-06/2011	0.64	0.46	0.57	0.44	0.60	0.27	0.55	0.54	0.03	0.58	0.38	0.69	0.61	0.59	0.57
NHSN 2006-8	0.56	0.40	0.61	0.45	0.59	0.39	0.51	0.48	0.40	0.45	0.44	0.62	0.71	0.59	0.63

Figure 7: Organisms Isolated from Central Line-Associated Bloodstream Infections (CLABSIs) in Adult and Pediatric Intensive Care Units, Tennessee, 01/01/2011–06/30/2011

Number of organisms = 222; number of events = 200

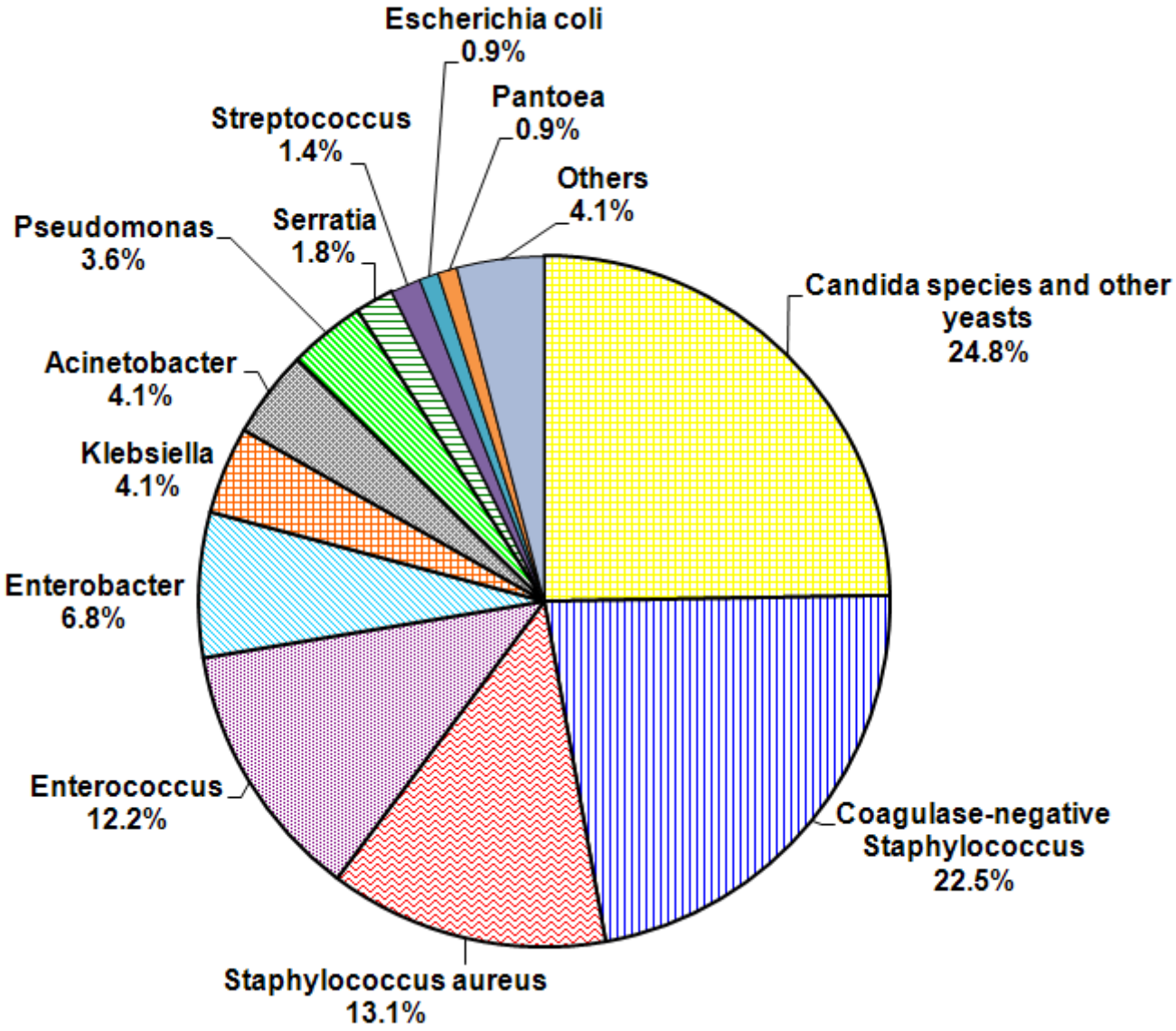


Table 2: Microorganisms Identified in Central Line-Associated Bloodstream Infections (CLABSIs) in Adult and Pediatric Intensive Care Units, Tennessee, 01/01/2011–06/30/2011

Number of organisms = 222; number of events = 200

Microorganism	Number of Isolates	Percent
Candida species and other yeasts	55	24.8
Coagulase-negative *Staphylococcus* species	50	22.5
Staphylococcus aureus	29	13.1
Methicillin-resistant *S. aureus* (MRSA) (% of total positive isolates)	20	(9.0)
Enterococcus species	27	12.2
Vancomycin-resistant *Enterococcus* (VRE) (% of total positive isolates)	7	(3.2)
Enterobacter species	15	6.8
Klebsiella species	9	4.1
Acinetobacter species	9	4.1
Pseudomonas species	8	3.6
Serratia species	4	1.8
Streptococcus species	3	1.4
Escherichia coli	2	0.9
Pantoea species	2	0.9
Other pathogens	9	4.1

Data reported as of May 15, 2012
***Other pathogens* = Agrobacterium *spp.*, Bacteroides fragilis, Fusobacterium *spp.*, Morganella morganii, Raoultella planticola, Proteus mirabilis, Salmonella *spp.*, *coagulase-positive* Staphylococcus, Veillonella parvula**

Table 3: Key Percentiles for Facility-Specific Central Line-Associated Bloodstream Infection (CLABSI) Standardized Infection Ratios (SIRs) in Adult and Pediatric Intensive Care Units (ICUs) by Reporting Year, Excluding Burn and Trauma ICUs, Tennessee [Reporting period: 01/01/2008–06/30/2011]

			SIR, 95% CONFIDENCE INTERVAL, AND KEY PERCENTILES							
STATE	YEAR	No.	SIR	LOWER LIMIT	UPPER LIMIT	10%	25%	50%	75%	90%
Tennessee	2011	90	0.70	0.59	0.81	0.00	0.00	0.00	0.79	1.68
	2010	83	0.78	0.70	0.87	0.00	0.00	0.46	0.88	1.65
	2009	79	1.16	1.06	1.26	0.00	0.00	0.71	1.30	2.40
	2008	79	1.19	1.09	1.30	0.00	0.00	0.89	1.51	2.48

Data reported as of May 15, 2012
No . = number of facilities with reporting units; SIR = Standardized Infection Ratio (observed number/ statistically 'predicted' number of CLABSI)
Red highlighting indicates SIR for reporting period is significantly higher than national 2006-2008 SIR of 1.0
Blue highlighting indicates SIR for reporting period is significantly lower than national 2006-2008 SIR of 1.0

Table 4: Key Percentiles for Facility-Specific Central Line-Associated Bloodstream Infection (CLABSI) Standardized Infection Ratios (SIRs) in Adult and Pediatric Intensive Care Units (ICUs) by Reporting Year, Including Burn and Trauma ICUs, Tennessee [Reporting period: 01/01/2008–06/30/2011]

			SIR, 95% CONFIDENCE INTERVAL, AND KEY PERCENTILES							
STATE	YEAR	No.	SIR	LOWER LIMIT	UPPER LIMIT	10%	25%	50%	75%	90%
Tennessee	2011	90	0.77	0.67	0.88	0.00	0.00	0.00	0.85	1.63
	2010	83	0.82	0.74	0.91	0.00	0.00	0.45	0.87	1.65
	2009	79	1.16	1.06	1.26	0.00	0.00	0.71	1.30	2.40
	2008	79	1.19	1.09	1.30	0.00	0.00	0.89	1.51	2.48

Data reported as of May 15, 2012
Includes burn and trauma ICU data since July 2010
No . = number of facilities with reporting units; SIR = Standardized Infection Ratio (observed number/ statistically 'predicted' number of CLABSI)
Red highlighting indicates SIR for reporting period is significantly higher than national 2006-2008 SIR of 1.0
Blue highlighting indicates SIR for reporting period is significantly lower than national 2006-2008 SIR of 1.0

Table 5: Key Percentiles for Unit-Specific Central Line-Associated Bloodstream Infection (CLABSI) Standardized Infection Ratios (SIRs) by Type of Intensive Care Unit (ICU) and Reporting Year, Tennessee [Reporting period: 01/01/2008–06/30/2011]

			SIR, 95% CONFIDENCE INTERVAL, AND KEY PERCENTILES							
ICU TYPE	YEAR	No.	SIR	LOWER LIMIT	UPPER LIMIT	10%	25%	50%	75%	90%
Burn Critical Care	2011	2	1.60	0.93	2.56	NA	NA	NA	NA	NA
	2010	2	1.91	1.17	2.96	NA	NA	NA	NA	NA
Medical Cardiac Critical Care	2011	8	0.70	0.33	1.28	0.00	0.00	0.66	1.25	1.63
	2010	8	0.65	0.38	1.02	0.00	0.00	0.36	1.06	2.30
	2009	9	1.27	0.95	1.66	0.00	0.00	1.20	1.56	2.41
	2008	9	1.20	0.89	1.60	0.51	0.79	1.16	1.50	2.59
Medical Critical Care, Major Teaching	2011	4	0.52	0.25	0.96	NA	NA	NA	NA	NA
	2010	4	1.20	0.83	1.66	NA	NA	NA	NA	NA
	2009	2	2.73	1.98	3.68	NA	NA	NA	NA	NA
	2008	2	1.89	1.28	2.70	NA	NA	NA	NA	NA
Medical Critical Care, Non-Major Teaching	2011	21	0.84	0.50	1.31	0.00	0.00	0.00	0.57	2.51
	2010	20	0.71	0.49	0.99	0.00	0.00	0.42	1.05	1.41
	2009	18	0.95	0.70	1.26	0.00	0.00	0.75	1.52	1.65
	2008	17	0.79	0.56	1.08	0.00	0.17	0.49	1.17	2.68
Medical-Surgical Critical Care, Major Teaching	2011	5	0.74	0.37	1.33	0.00	0.00	0.53	1.47	1.73
	2010	7	1.17	0.85	1.57	0.27	0.48	0.98	1.33	2.76
	2009	7	1.62	1.27	2.03	0.31	0.62	1.43	2.21	3.55
	2008	7	1.63	1.29	2.04	0.53	1.00	1.26	2.20	2.66
Medical-Surgical Critical Care, Non-Major Teaching & ≤ 15 beds	2011	39	0.45	0.18	0.94	0.00	0.00	0.00	0.00	1.49
	2010	37	0.89	0.59	1.30	0.00	0.00	0.00	0.65	2.84
	2009	35	1.03	0.70	1.45	0.00	0.00	0.00	1.37	3.69
	2008	35	0.81	0.52	1.19	0.00	0.00	0.00	1.32	2.57
Medical-Surgical Critical Care, Non-Major Teaching & >15 beds	2011	18	0.95	0.68	1.29	0.00	0.00	1.01	1.75	2.26

			SIR, 95% CONFIDENCE INTERVAL, AND KEY PERCENTILES							
ICU TYPE	YEAR	No.	SIR	LOWER LIMIT	UPPER LIMIT	10%	25%	50%	75%	90%
	2010	18	0.86	0.67	1.09	0.27	0.41	0.60	1.01	2.37
	2009	17	1.06	0.84	1.31	0.00	0.28	0.83	1.04	2.63
	2008	17	1.28	1.04	1.56	0.00	0.30	1.02	1.54	2.65
Neurological Critical Care	2011	1	0.00	0.00	3.99	NA	NA	NA	NA	NA
Neurosurgical Critical Care	2011	7	0.36	0.12	0.84	0.00	0.00	0.00	0.54	2.03
	2010	7	0.63	0.38	0.99	0.00	0.24	0.42	1.09	1.11
	2009	7	0.78	0.50	1.16	0.00	0.43	0.83	1.13	1.80
	2008	7	1.06	0.71	1.51	0.00	0.35	0.91	1.10	2.28
Pediatric Medical Critical Care	2011	1	0.00	0.00	463	NA	NA	NA	NA	NA
Pediatric Medical-Surgical Critical Care	2011	8	0.29	0.11	0.63	0.00	0.00	0.12	0.38	0.53
	2010	8	0.53	0.33	0.80	0.00	0.20	0.52	0.66	1.39
	2009	7	1.01	0.73	1.36	0.10	0.91	0.92	1.52	2.36
	2008	7	1.09	0.79	1.46	0.48	0.86	1.02	1.42	2.00
Pediatric Surgical Cardiothoracic Critical Care	2011	1	0.98	0.12	3.53	NA	NA	NA	NA	NA
	2010	2	0.98	0.47	1.81	NA	NA	NA	NA	NA
	2009	1	0.91	0.25	2.33	NA	NA	NA	NA	NA
Surgical Cardiothoracic Critical Care	2011	15	0.99	0.63	1.49	0.00	0.00	0.97	1.50	1.79
	2010	15	0.76	0.52	1.06	0.00	0.00	0.55	1.10	1.33
	2009	14	1.12	0.81	1.50	0.00	0.53	0.74	1.38	1.91
	2008	14	1.30	0.96	1.72	0.00	0.56	1.03	1.31	2.15
Surgical Critical Care	2011	11	0.64	0.39	1.00	0.00	0.00	0.00	1.20	1.90
	2010	11	0.49	0.32	0.72	0.00	0.00	0.31	0.59	0.84
	2009	11	1.00	0.74	1.31	0.00	0.35	0.89	1.52	1.76
	2008	10	1.13	0.85	1.48	0.00	0.75	0.88	1.10	1.89
Trauma Critical Care	2011	6	1.01	0.68	1.44	0.41	0.52	0.70	0.98	1.77
	2010	6	0.99	0.67	1.40	0.00	0.47	0.94	1.12	1.47

Data reported as of May 15, 2012
Burn and trauma ICU data available since July 2010
No .= number of facilities with reporting units; SIR = Standardized Infection Ratio (observed number/ statistically 'predicted' number of CLABSI)
NA = not reported if the number of facilities with reporting units is <5
***Red highlighting** indicates SIR for reporting period is significantly **higher** than national 2006-2008 SIR of 1.0*
***Blue highlighting** indicates SIR for reporting period is significantly **lower** than national 2006-2008 SIR of 1.0*

Table 6: Comparison of Tennessee and National Healthcare Safety Network (NHSN) Central Line-Associated Bloodstream Infection (CLABSI) Rates and Standardized Infection Ratios (SIRs) by Type of Intensive Care Unit (ICU) [Reporting period: 01/01/2011–06/30/2011]

	TENNESSEE 01/01/2011 - 06/30/2011					NHSN 2006-2008				SIR AND 95% CONFIDENCE INTERVAL		
ICU TYPE	No.	CLABSI	CL DAYS	POOLED MEAN*	MEDIAN RATE*	CLABSI	CL DAYS	POOLED MEAN*	MEDIAN RATE*	SIR	LOWER LIMIT	UPPER LIMIT
Burn Critical Care	2	17	1933	8.8	11.2	390	70932	5.5	3.10	1.60	0.93	2.56
Medical Cardiac Critical Care	8	10	7148	1.4	1.3	876	436409	2.0	1.30	0.70	0.33	1.28
Medical Critical Care, Major Teaching	4	10	7479	1.3	1.3	1410	549088	2.6	2.30	0.52	0.25	0.96
Medical Critical Care, Non-Major Teaching	21	19	11984	1.6	0.0	687	362388	1.9	1.00	0.84	0.50	1.31
Medical-Surgical Critical Care, Major Teaching	5	11	7046	1.6	1.1	1474	699300	2.1	1.70	0.74	0.37	1.33
Medical-Surgical Critical Care, Non-Major Teaching & ≤ 15 beds	39	7	10303	0.7	0.0	1130	755437	1.5	0.00	0.45	0.18	0.94
Medical-Surgical Critical Care, Non-Major Teaching & >15 beds	18	41	29353	1.4	1.5	1449	986982	1.5	1.10	0.95	0.68	1.29
Neurological Critical Care	1	0	684	0.0	NA	61	45153	1.4	1.00	0.00	0.00	3.99
Neurosurgical Critical Care	7	5	5647	0.9	0.0	396	160879	2.5	1.90	0.36	0.12	0.84
Pediatric Medical Critical Care	1	0	6	0.0	NA	23	17321	1.3	NA	0.00	0.00	463
Pediatric Medical-Surgical Critical Care	8	6	7078	0.8	0.4	923	314306	3.0	2.50	0.29	0.11	0.63
Pediatric Surgical Cardiothoracic Critical Care	2	10	3055	3.3	3.0	195	58626	3.3	NA	0.98	0.47	1.81
Surgical Cardiothoracic Critical Care	15	23	16668	1.4	1.4	879	632769	1.4	0.80	0.99	0.63	1.49
Surgical Critical Care	11	19	12820	1.5	0.0	1683	729989	2.3	1.70	0.64	0.39	1.00
Trauma Critical Care	6	30	8222	3.6	2.5	814	224864	3.6	3.00	1.01	0.68	1.44
TOTAL										**0.77**	**0.67**	**0.88**

Data reported as of May 15, 2012
Burn and trauma ICU data available since July 2010
No. = number of facilities with reporting units
CLDays = Central Line Days
SIR = Standardized Infection Ratio (observed number/ statistically 'predicted' number of CLABSI)
NA = not available
****per 1000 central line days***
Red highlighting indicates SIR for reporting period is significantly higher than national 2006-2008 SIR of 1.0
Blue highlighting indicates SIR for reporting period is significantly lower than national 2006-2008 SIR of 1.0

Table 7: Comparison of Tennessee Central Line-Associated Bloodstream Infection (CLABSI) Standardized Infection Ratios (SIRs) by Type of Intensive Care Unit (ICU) and Six-Month Period [Data shown for most recent two years: 07/01/2009–06/30/2011]

	Jul-Dec 2009 SIR AND 95% CONFIDENCE INTERVAL			Jan-Jun 2010 SIR AND 95% CONFIDENCE INTERVAL			Jul-Dec 2010 SIR AND 95% CONFIDENCE INTERVAL			Jan-Jun 2011 SIR AND 95% CONFIDENCE INTERVAL		
ICU TYPE	SIR	LOWER LIMIT	UPPER LIMIT	SIR	LOWER LIMIT	UPPER LIMIT	SIR	LOWER LIMIT	UPPER LIMIT	SIR	LOWER LIMIT	UPPER LIMIT
Burn Critical Care	.	.	.	.	.	.	1.91	1.17	2.96	1.60	0.93	2.56
Medical Cardiac Critical Care	1.21	0.78	1.80	0.75	0.38	1.35	0.53	0.21	1.09	0.70	0.33	1.28
Medical Critical Care, Major Teaching	2.83	1.81	4.21	1.72	1.05	2.66	0.85	0.48	1.40	0.52	0.25	0.96
Medical Critical Care, Non-Major Teaching	0.84	0.52	1.26	0.87	0.54	1.31	0.53	0.27	0.93	0.84	0.50	1.31
Medical-Surgical Critical Care, Major Teaching	1.58	1.16	2.10	1.21	0.80	1.77	1.10	0.64	1.77	0.74	0.37	1.33
Medical-Surgical Critical Care, Non-Major Teaching & ≤ 15 beds	0.95	0.53	1.57	1.13	0.68	1.77	0.60	0.26	1.18	0.45	0.18	0.94
Medical-Surgical Critical Care, Non-Major Teaching & >15 beds	1.12	0.80	1.53	0.85	0.58	1.19	0.88	0.62	1.22	0.95	0.68	1.29
Neurological Critical Care	.	.	.	.	.	.	.	.	.	0.00	0.00	3.99
Neurosurgical Critical Care	0.72	0.37	1.26	0.99	0.55	1.63	0.27	0.07	0.69	0.36	0.12	0.84
Pediatric Medical Critical Care	.	.	.	.	.	.	.	.	.	0.00	0.00	463
Pediatric Medical-Surgical Critical Care	0.95	0.59	1.45	0.47	0.20	0.93	0.56	0.30	0.96	0.29	0.11	0.63
Pediatric Surgical Cardiothoracic Critical Care	NA	NA	NA	1.09	0.50	2.07	0.52	0.01	2.92	0.98	0.47	1.81
Surgical Cardiothoracic Critical Care	1.02	0.62	1.57	0.78	0.46	1.23	0.73	0.42	1.19	0.99	0.63	1.49
Surgical Critical Care	1.11	0.75	1.59	0.54	0.30	0.89	0.44	0.22	0.78	0.64	0.39	1.00
Trauma Critical Care	.	.	.	.	.	.	0.99	0.67	1.40	1.01	0.68	1.44
TOTAL	**1.15**	**1.02**	**1.31**	**0.89**	**0.77**	**1.03**	**0.75**	**0.65**	**0.87**	**0.77**	**0.67**	**0.88**

Data reported as of May 15, 2012

Burn and trauma ICU data available since July 2010; without burn and trauma ICUs, the SIRs and 95% confidence intervals for Jul-Dec 2010 and Jan-Jun 2011 are 0.67 (0.56-0.79) and 0.70 (0.59-0.81), respectively

No. = number of facilities with reporting units

SIR = Standardized Infection Ratio (observed number/ statistically 'predicted' number of CLABSI)

NA = not available

****per 1000 central line days***

Red highlighting indicates SIR for reporting period is significantly higher than national 2006-2008 SIR of 1.0

Blue highlighting indicates SIR for reporting period is significantly lower than national 2006-2008 SIR of 1.0

Table 8: Central Line-Associated Bloodstream Infection (CLABSI) Rates by Type of of Intensive Care Unit (ICU) and Grand Division, Excluding Burn and Trauma ICUs [Reporting period: 01/01/2011–06/30/2011]

	EAST							MIDDLE							WEST						
ICU TYPE	No.	CLABSI	CL DAYS	POOLED MEAN*	SIR	Lower Limit	Upper Limit	No.	CLABSI	CL DAYS	POOLED MEAN*	SIR	Lower Limit	Upper Limit	No.	CLABSI	CL DAYS	POOLED MEAN*	SIR	Lower Limit	Upper Limit
Medical Cardiac Critical Care	5	4	4015	1.0	0.50	0.14	1.27	2	3	1667	1.8	0.90	0.18	2.62	1	3	1466	2.0	1.02	0.21	2.98
Medical Critical Care, Major Teaching	3	5	4795	1.0	0.41	0.13	0.95	1	5	2684	1.9	0.73	0.24	1.69	.	.	.	.	.	.	.
Medical Critical Care, Non-Major Teaching	10	5	4649	1.1	0.57	0.18	1.32	5	4	2851	1.4	0.74	0.20	1.89	4	10	4338	2.3	1.22	0.58	2.24
Medical-Surgical Critical Care, Major Teaching	2	0	3154	0.0	0.00	0.00	0.55	1	1	902	1.1	0.53	0.01	2.93	2	10	2990	3.3	1.59	0.76	2.92
Medical-Surgical Critical Care, Non-Major Teaching, ≤ 15 beds	15	2	4143	0.5	0.32	0.04	1.17	9	3	3228	0.9	0.62	0.13	1.82	8	0	1947	0.0	0.00	0.00	1.27
Medical-Surgical Critical Care, Non-Major Teaching, >15 beds	4	10	7745	1.3	0.88	0.42	1.62	9	29	16074	1.8	1.23	0.82	1.76	5	2	5534	0.4	0.25	0.03	0.89
Neurological Critical Care	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	0	684	0.0	0.00	0.00	3.99
Neurosurgical Critical Care	2	0	1133	0.0	0.00	0.00	1.32	2	2	2260	0.9	0.36	0.04	1.30	3	3	2254	1.3	0.54	0.11	1.58
Pediatric Medical Critical Care	1	0	6	0.0	0.00	0.00	463	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pediatric Medical-Surgical Critical Care	4	1	1455	0.7	0.23	0.01	1.30	1	3	3472	0.9	0.29	0.06	0.86	3	2	2151	0.9	0.32	0.04	1.14
Pediatric Surgical Cardiothoracic Critical Care	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	616	3.2	0.98	0.12	3.53
Surgical Cardiothoracic Critical Care	5	3	3417	0.9	0.63	0.13	1.85	4	6	4195	1.4	1.03	0.38	2.24	6	14	9056	1.5	1.11	0.61	1.87
Surgical Critical Care	6	9	5494	1.6	0.71	0.32	1.35	3	1	4789	0.2	0.09	0.00	0.50	2	9	2537	3.5	1.54	0.70	2.92
TOTAL	.	.	.	.	**0.50**	**0.36**	**0.68**	.	.	.	.	**0.73**	**0.55**	**0.94**	.	.	.	.	0.89	0.67	1.16

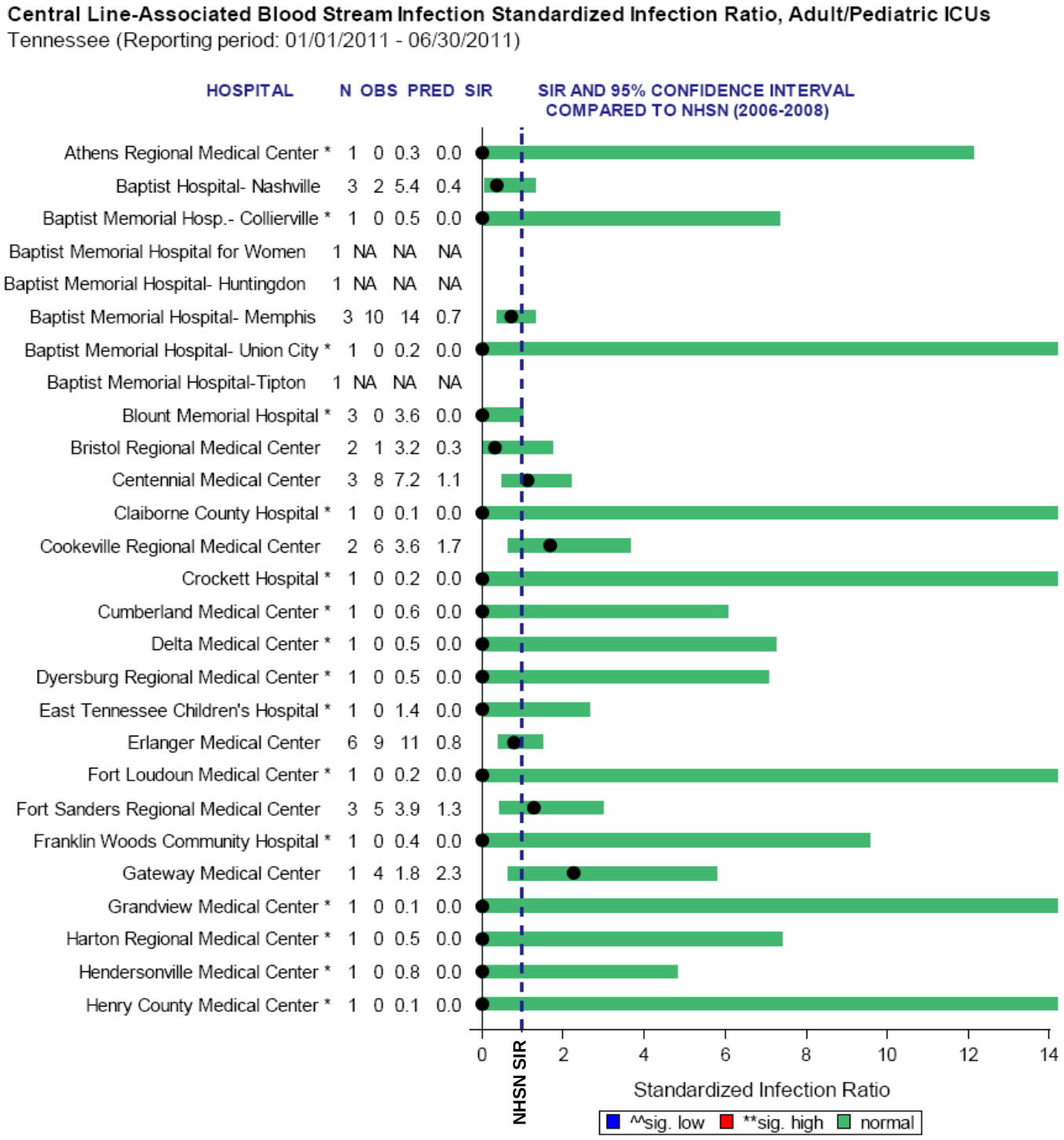
Data reported as of May 15, 2012 ****per 1000 central line days***

No. = number of facilities w/ reporting units; CL Days = Central Line Days; SIR = Standardized Infection Ratio (observed number/ statistically 'predicted' number of CLABSI)

Red highlighting indicates SIR for reporting period is significantly higher than national 2006-2008 SIR of 1.0.

Blue highlighting indicates SIR for reporting period is significantly lower than national 2006-2008 SIR of 1.0

Figure 8: Summary Measure for CLABSIs in Adult and Pediatric Intensive Care Units, One Standardized Infection Ratio (SIR) per Facility Excluding Burn and Trauma ICUs, Tennessee, 01/01/2011–06/30/2011

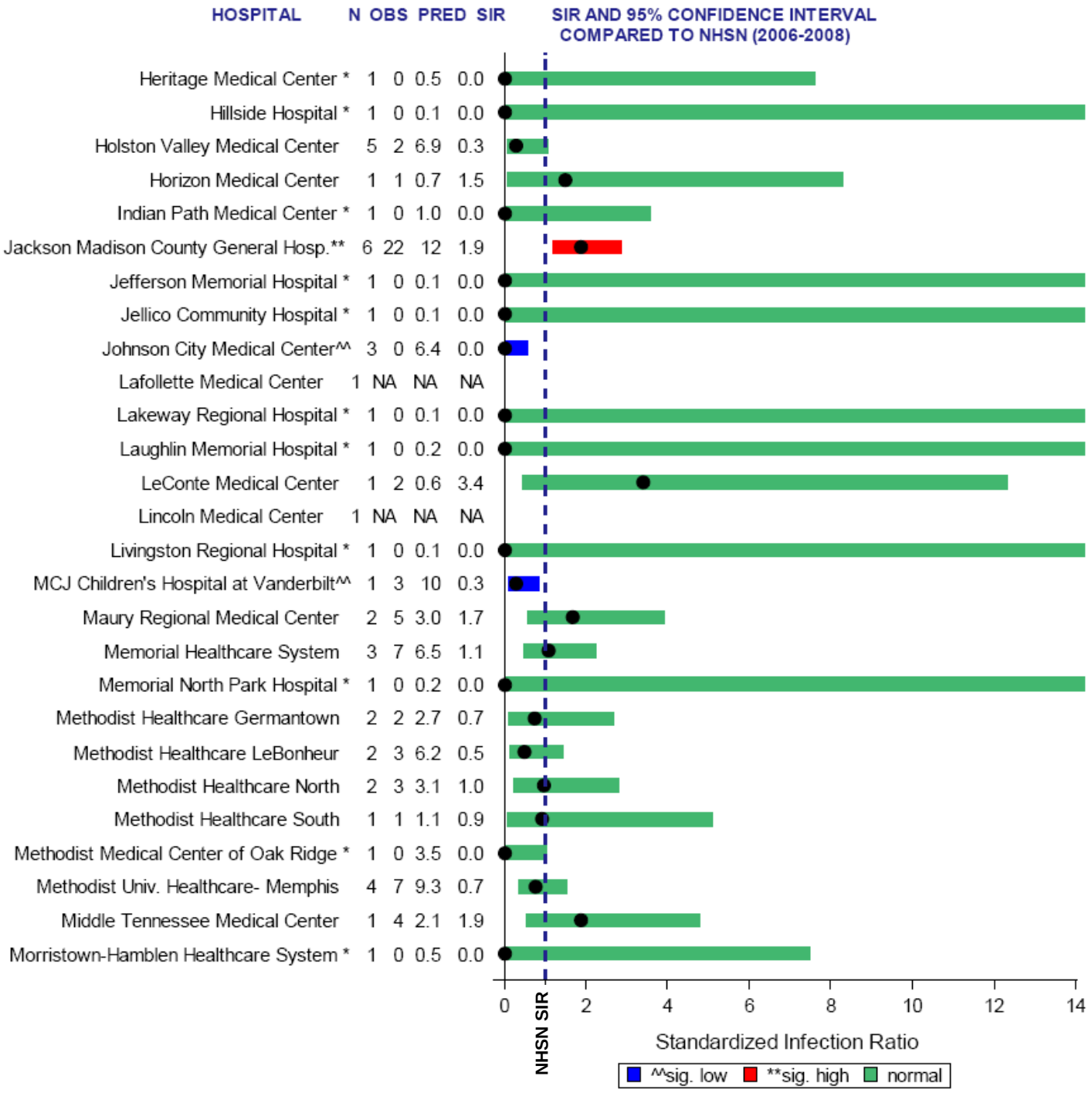


Data Reported from adult/pediatric ICUs as of May 15, 2012.
N = number of types of critical care units reportable from a given facility
Obs = observed number of CLABSI
Pred = statistically 'predicted' number of CLABSI, based on NHSN data
SIR = Standarized Infection Ratio (observed number / statistically 'predicted' number of CLABSI)
NA = data not shown for an entire hospital with <50 central line days
*** significantly higher than NHSN (2006-2008)*
^^ significantly lower than NHSN (2006-2008)
** Zero infection, but not statistically significant*

Figure 8 (cont'd)

Central Line-Associated Blood Stream Infection Standardized Infection Ratio, Adult/Pediatric ICUs

Tennessee (Reporting period: 01/01/2011 - 06/30/2011)

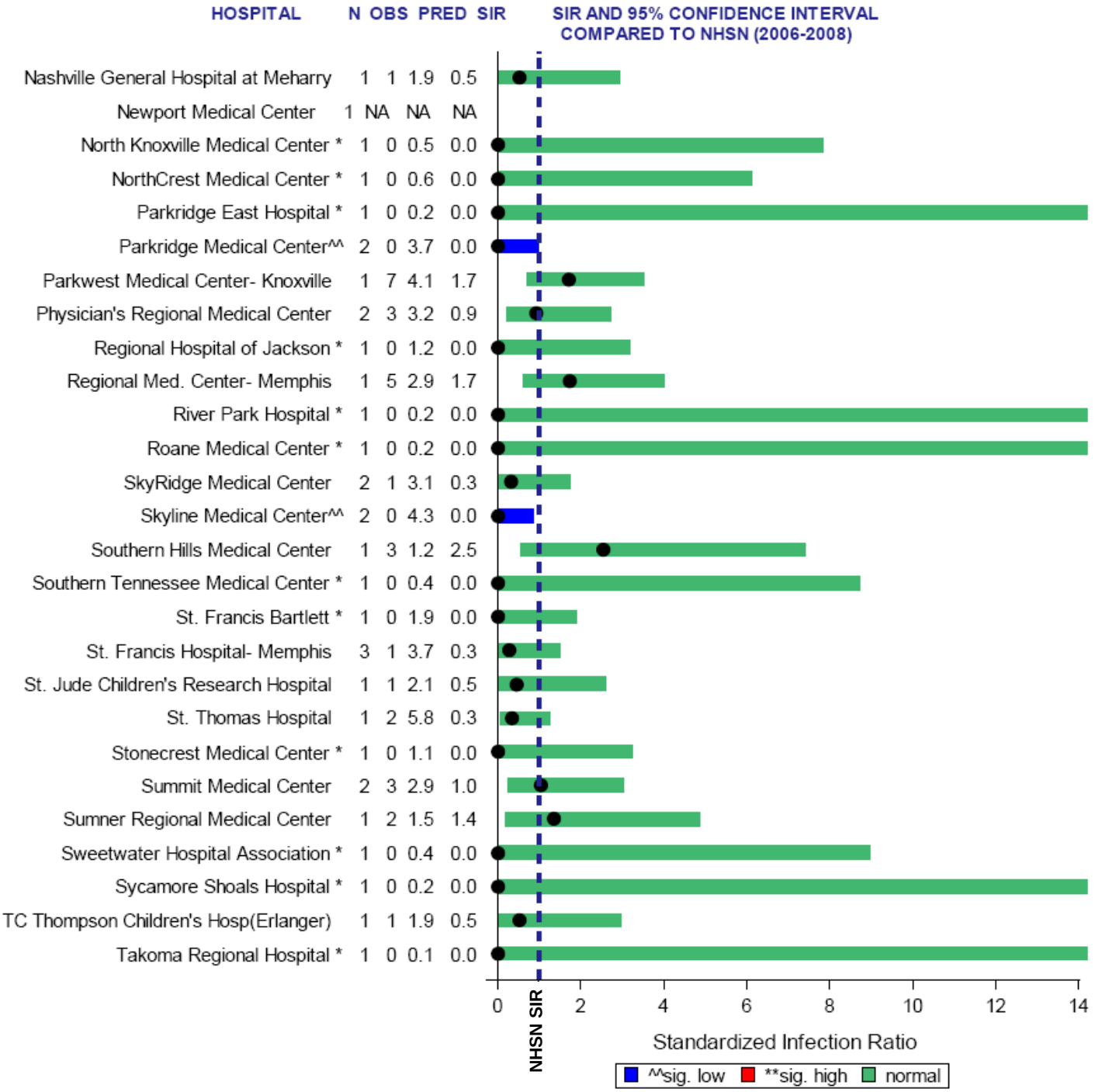


Data Reported from adult/pediatric ICUs as of May 15, 2012.
N = number of types of critical care units reportable from a given facility
Obs = observed number of CLABSI
Pred = statistically 'predicted' number of CLABSI, based on NHSN data
SIR = Standarized Infection Ratio (observed number / statistically 'predicted' number of CLABSI)
NA = data not shown for an entire hospital with <50 central line days
** *significantly higher than NHSN (2006-2008)*
^^ *significantly lower than NHSN (2006-2008)*
* *Zero infection, but not statistically significant*

Figure 8 (cont'd)

Central Line-Associated Blood Stream Infection Standardized Infection Ratio, Adult/Pediatric ICUs

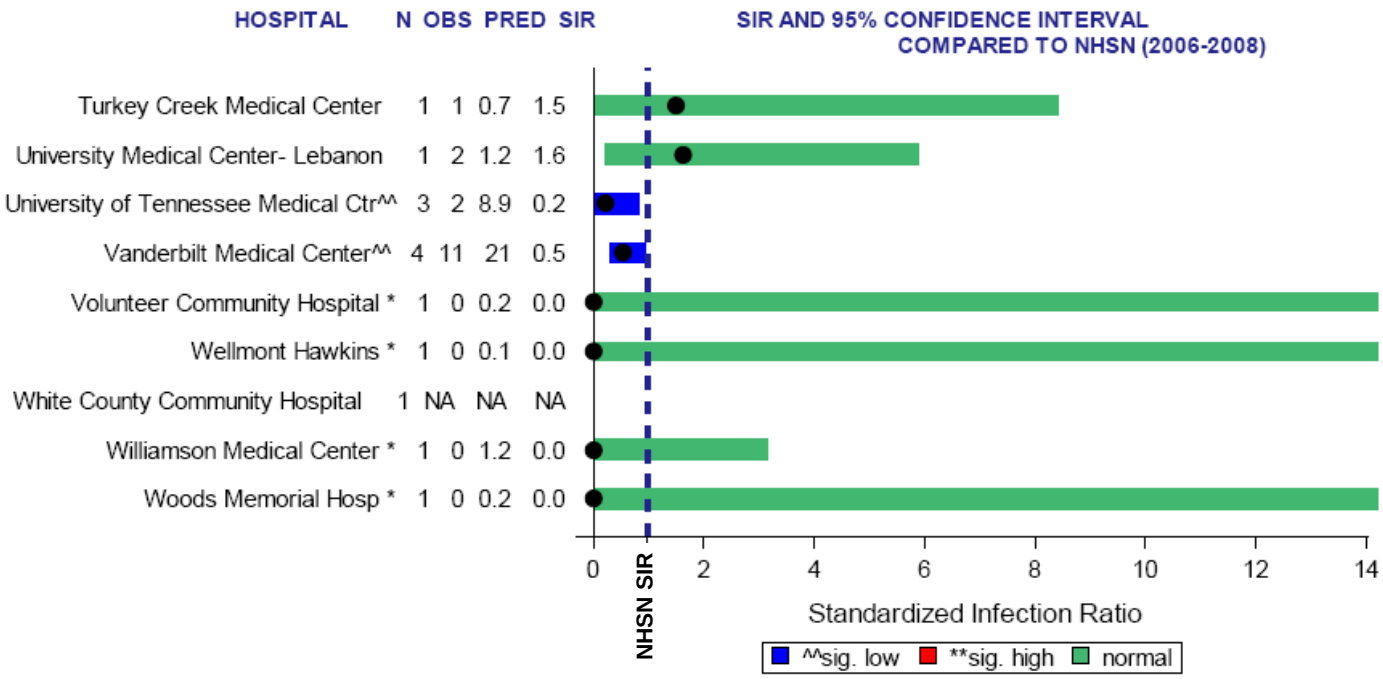
Tennessee (Reporting period: 01/01/2011 - 06/30/2011)



Data Reported from adult/pediatric ICUs as of May 15, 2012.
N = number of types of critical care units reportable from a given facility
Obs = observed number of CLABSI
Pred = statistically 'predicted' number of CLABSI, based on NHSN data
SIR = Standarized Infection Ratio (observed number / statistically 'predicted' number of CLABSI)
NA = data not shown for an entire hospital with <50 central line days
*** significantly higher than NHSN (2006-2008)*
^^ significantly lower than NHSN (2006-2008)
* Zero infection, but not statistically significant*

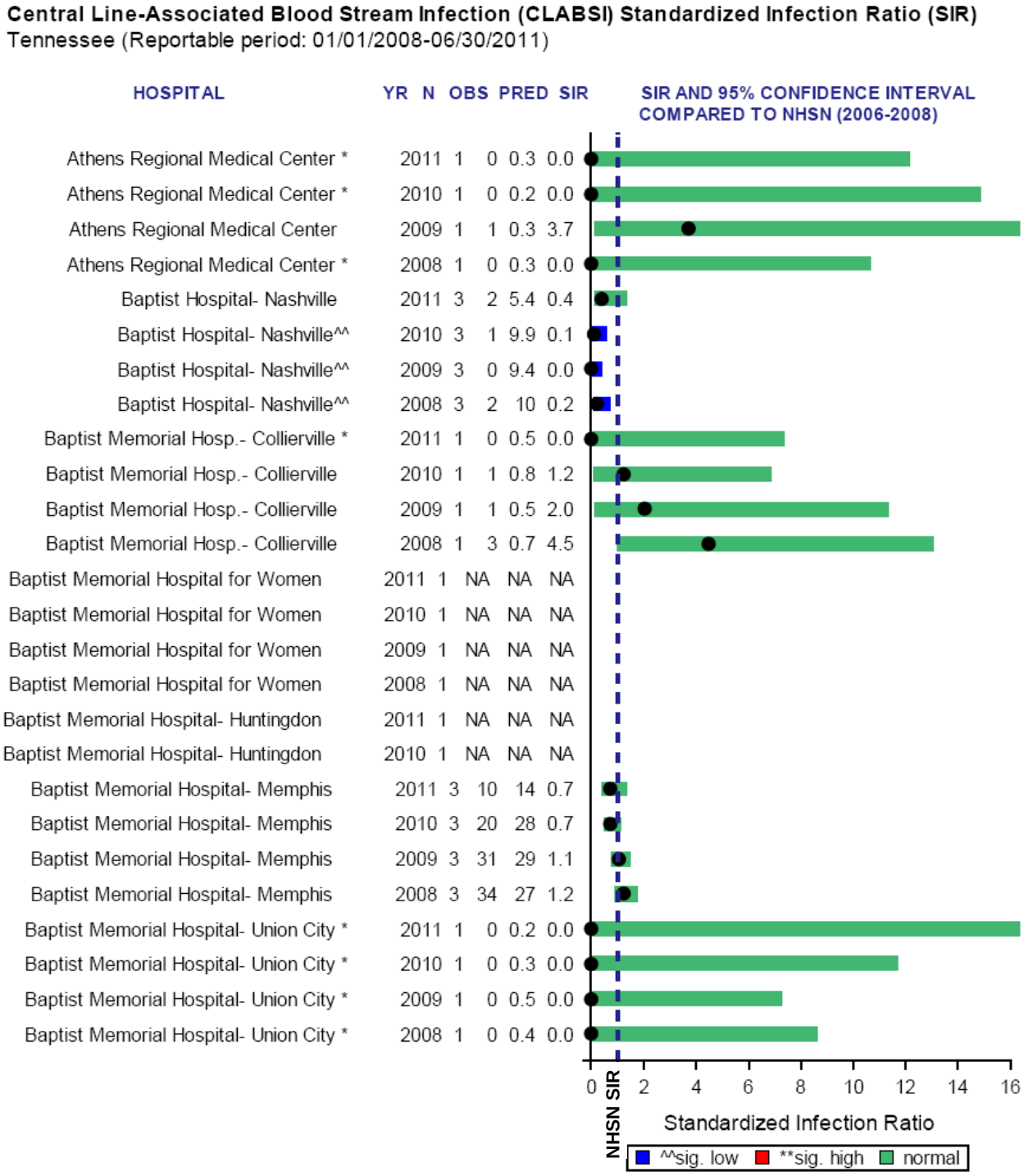
Figure 8 (cont'd)

Central Line-Associated Blood Stream Infection Standardized Infection Ratio, Adult/Pediatric ICUs
Tennessee (Reporting period: 01/01/2011 - 06/30/2011)



Data Reported from adult/pediatric ICUs as of May 15, 2012.
N = number of types of critical care units reportable from a given facility
Obs = observed number of CLABSI
Pred = statistically 'predicted' number of CLABSI, based on NHSN data
SIR = Standarized Infection Ratio (observed number / statistically 'predicted' number of CLABSI)
NA = data not shown for an entire hospital with <50 central line days
** *significantly higher than NHSN (2006-2008)*
^^ *significantly lower than NHSN (2006-2008)*
* *Zero infection, but not statistically significant*

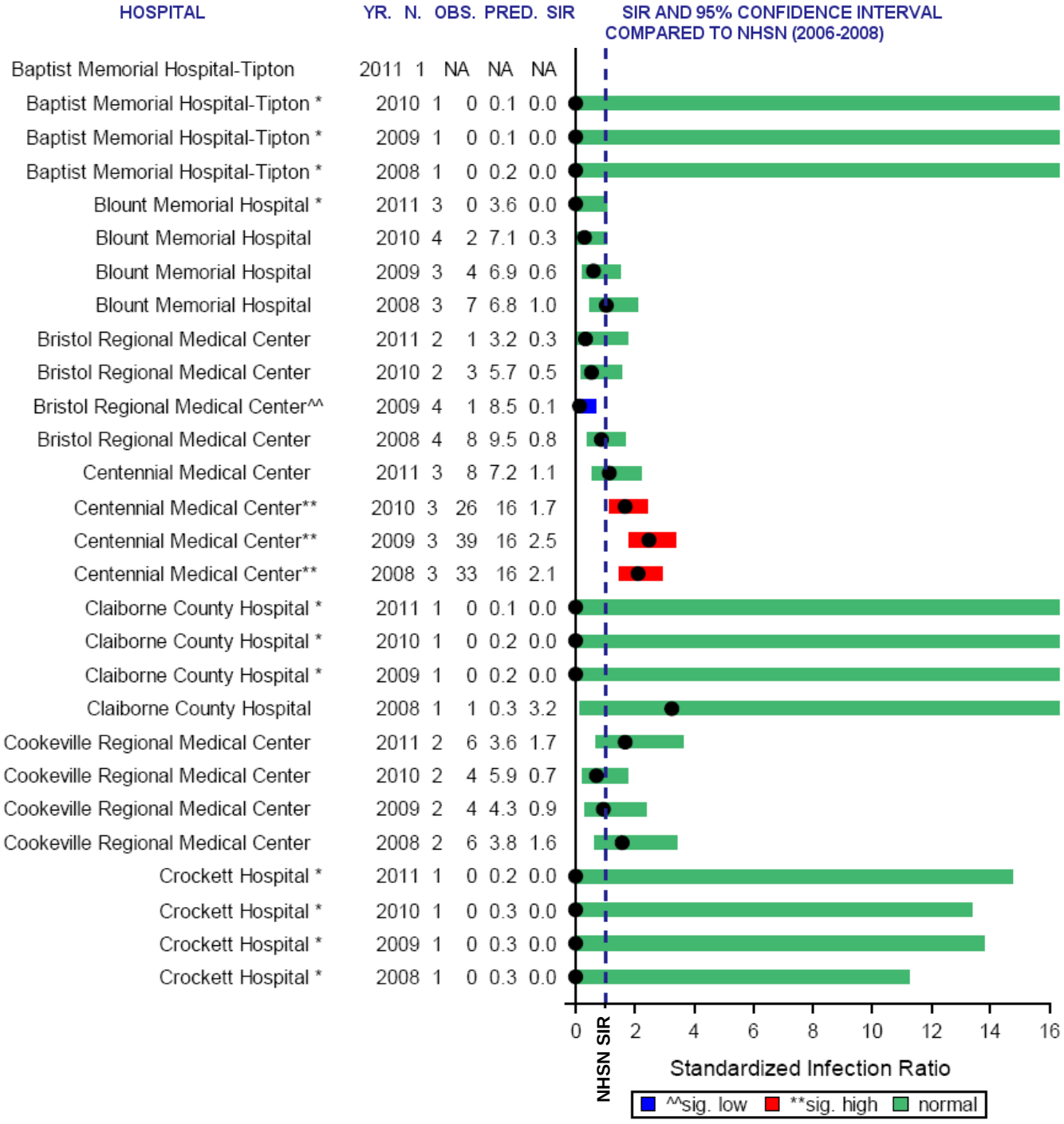
Figure 9: Summary Measure for CLABSIs in Adult and Pediatric Intensive Care Units, One Standardized Infection Ratio (SIR) per Facility per Year Excluding Burn and Trauma ICUs, Tennessee, 01/01/2008–06/30/2011



Data Reported from adult/pediatric ICUs as of May 15, 2012.
Yr = reporting year
N = number of types of critical care units reportable from a given facility
Obs = observed number of CLABSI
Pred = statistically 'predicted' number of CLABSI, based on NHSN data
SIR = Standarized Infection Ratio (observed number / statistically 'predicted' number of CLABSI)
NA = data not shown for an entire hospital with <50 central line days
** significantly higher than NHSN (2006-2008)*
^^ significantly lower than NHSN (2006-2008)*
* Zero infection, but not statistically significant*

Figure 9 (cont'd)

Central Line-Associated Blood Stream Infection (CLABSI) Standardized Infection Ratio (SIR)
Tennessee (Reportable period: 01/01/2008-06/30/2011)

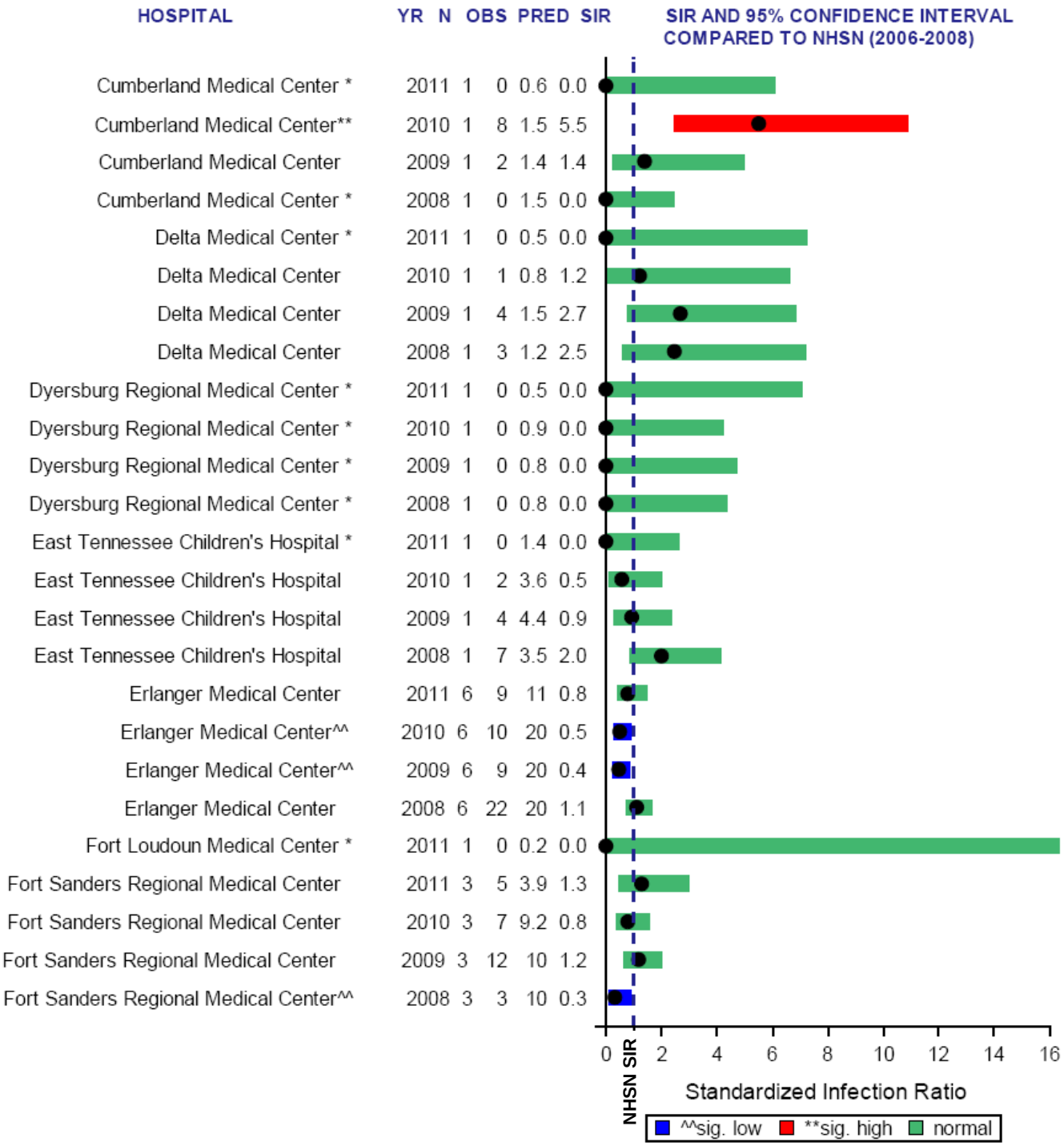


Data Reported from adult/pediatric ICUs as of May 15, 2012.
Yr = reporting year
N = number of types of critical care units reportable from a given facility
Obs = observed number of CLABSI
Pred = statistically 'predicted' number of CLABSI, based on NHSN data
SIR = Standarized Infection Ratio (observed number / statistically 'predicted' number of CLABSI)
NA = data not shown for an entire hospital with <50 central line days
*** significantly higher than NHSN (2006-2008)*
^^ significantly lower than NHSN (2006-2008)
* Zero infection, but not statistically significant*

Figure 9 (cont'd)

Central Line-Associated Blood Stream Infection (CLABSI) Standardized Infection Ratio (SIR)

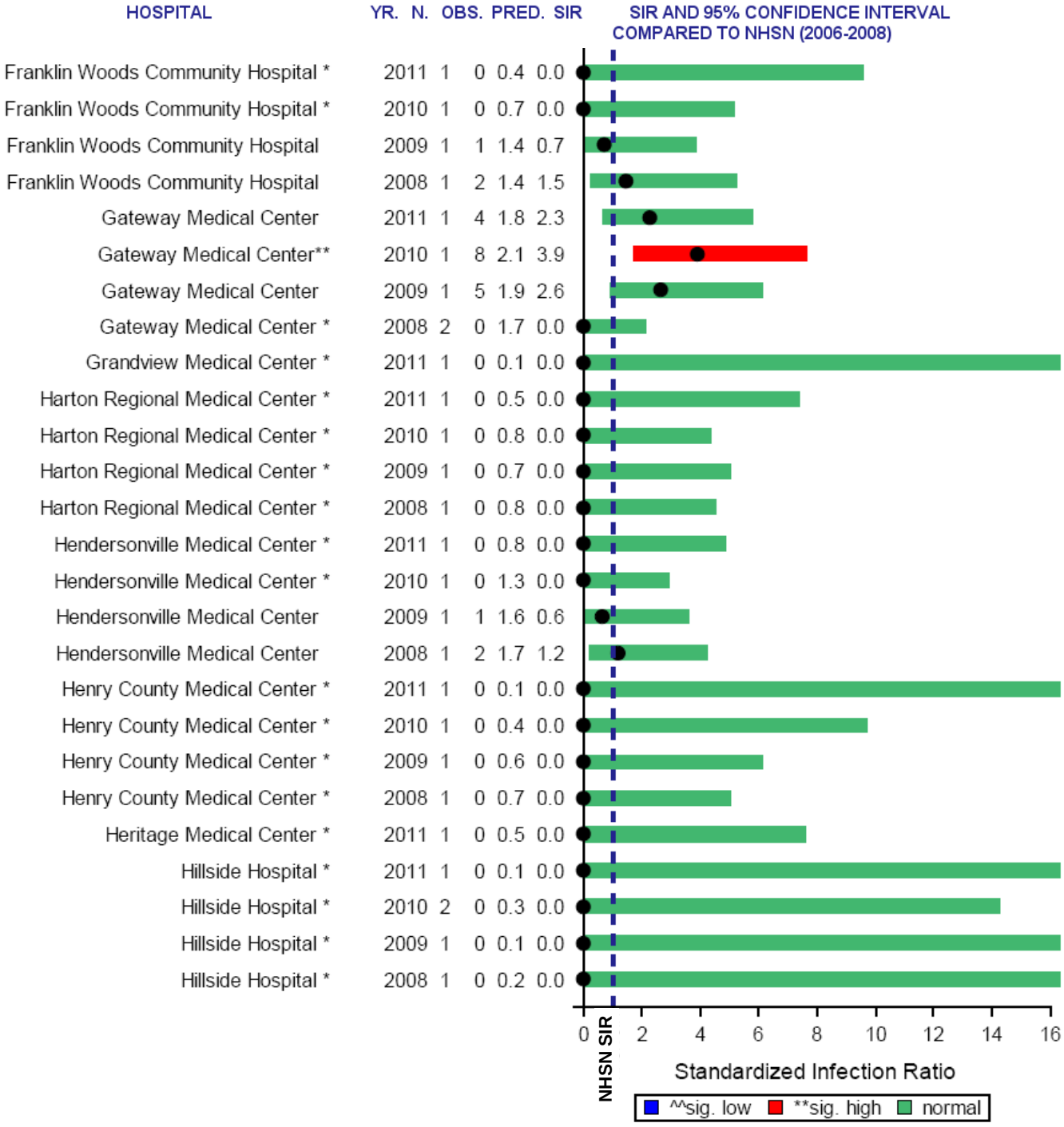
Tennessee (Reportable period: 01/01/2008-06/30/2011)



Data Reported from adult/pediatric ICUs as of May 15, 2012.
Yr = reporting year
N = number of types of critical care units reportable from a given facility
Obs = observed number of CLABSI
Pred = statistically 'predicted' number of CLABSI, based on NHSN data
SIR = Standarized Infection Ratio (observed number / statistically 'predicted' number of CLABSI)
NA = data not shown for an entire hospital with <50 central line days
*** significantly higher than NHSN (2006-2008)*
^^ significantly lower than NHSN (2006-2008)
* Zero infection, but not statistically significant*

Figure 9 (cont'd)

Central Line-Associated Blood Stream Infection (CLABSI) Standardized Infection Ratio (SIR)
Tennessee (Reportable period: 01/01/2008-06/30/2011)

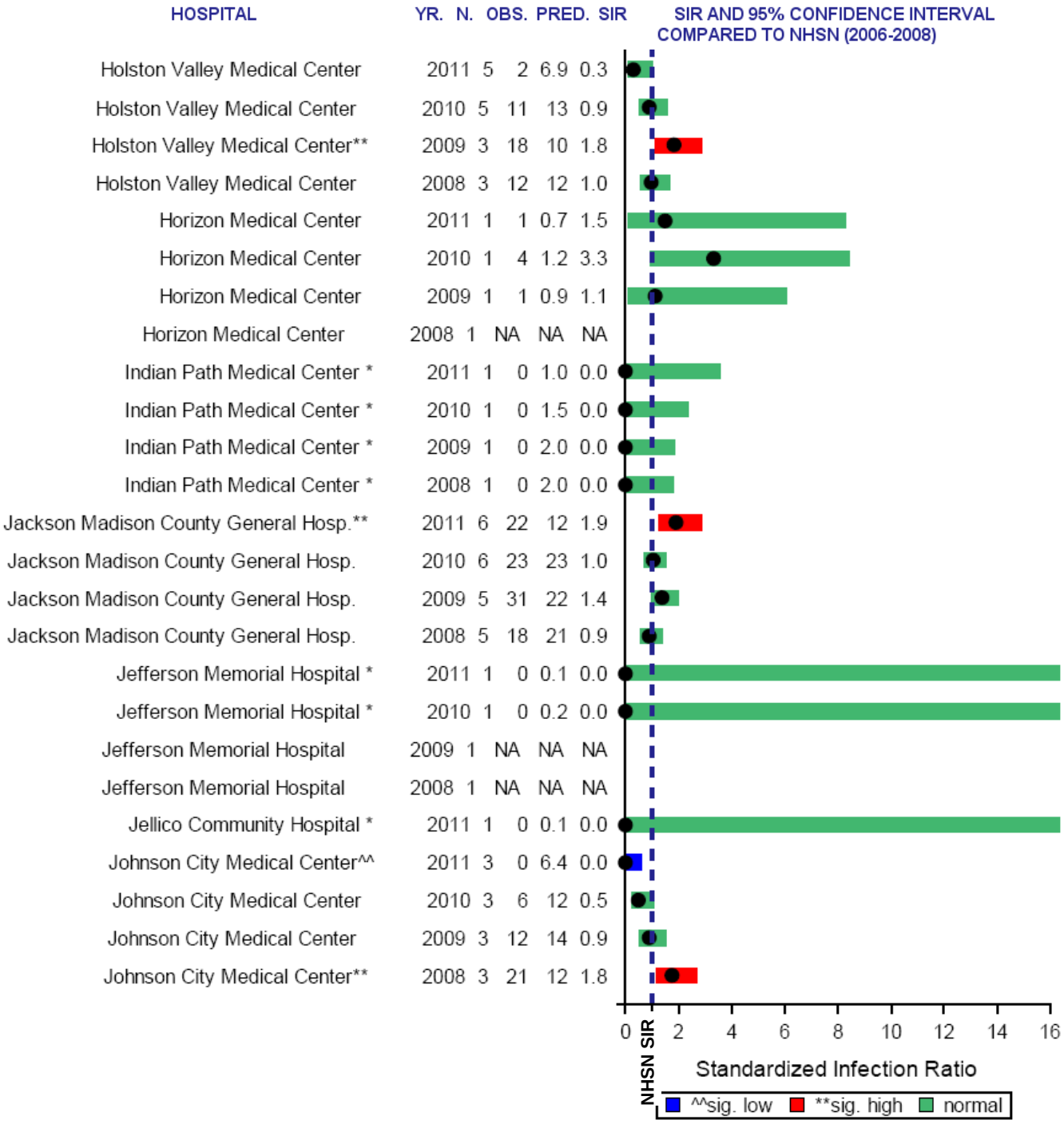


Data Reported from adult/pediatric ICUs as of May 15, 2012.
Yr = reporting year
N = number of types of critical care units reportable from a given facility
Obs = observed number of CLABSI
Pred = statistically 'predicted' number of CLABSI, based on NHSN data
SIR = Standarized Infection Ratio (observed number / statistically 'predicted' number of CLABSI)
NA = data not shown for an entire hospital with <50 central line days
*** significantly higher than NHSN (2006-2008)*
^^ significantly lower than NHSN (2006-2008)
* Zero infection, but not statistically significant*

Figure 9 (cont'd)

Central Line-Associated Blood Stream Infection (CLABSI) Standardized Infection Ratio (SIR)

Tennessee (Reportable period: 01/01/2008-06/30/2011)

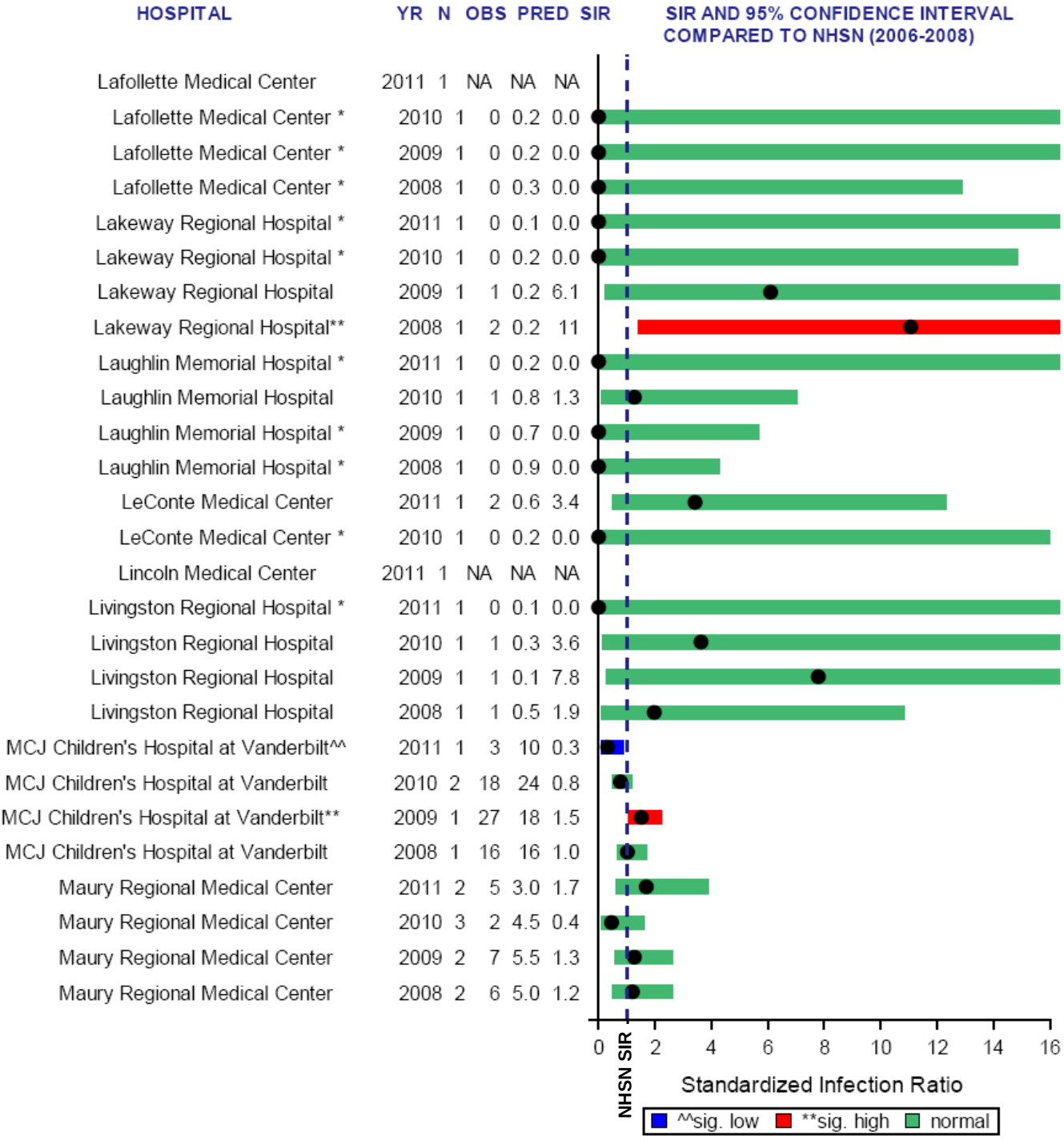


Data Reported from adult/pediatric ICUs as of May 15, 2012.
Yr = reporting year
N = number of types of critical care units reportable from a given facility
Obs = observed number of CLABSI
Pred = statistically 'predicted' number of CLABSI, based on NHSN data
SIR = Standarized Infection Ratio (observed number / statistically 'predicted' number of CLABSI)
NA = data not shown for an entire hospital with <50 central line days
** significantly higher than NHSN (2006-2008)*
^^ significantly lower than NHSN (2006-2008)*
* Zero infection, but not statistically significant*

Figure 9 (cont'd)

Central Line-Associated Blood Stream Infection (CLABSI) Standardized Infection Ratio (SIR)

Tennessee (Reportable period: 01/01/2008-06/30/2011)

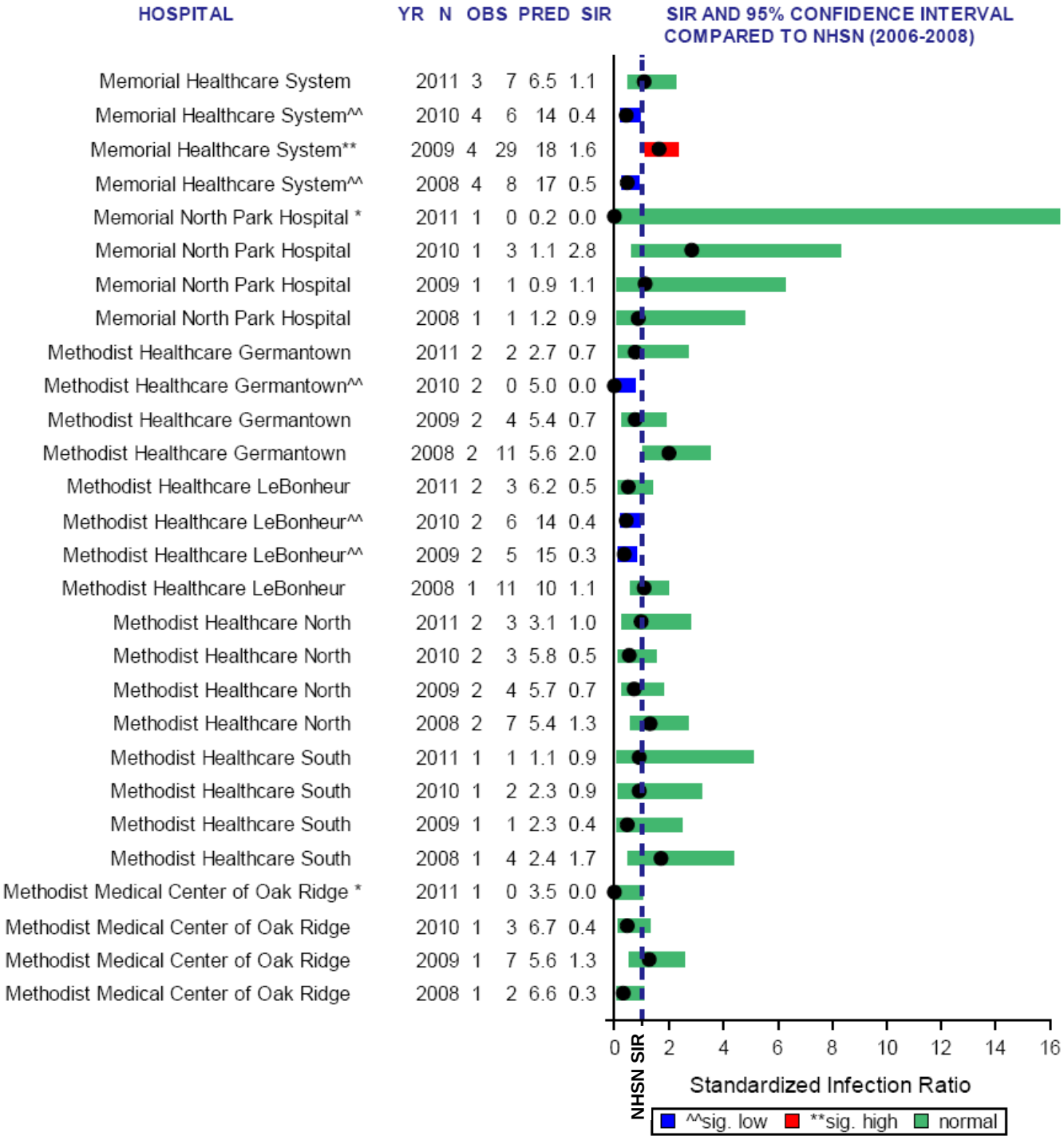


Data Reported from adult/pediatric ICUs as of May 15, 2012.
Yr = reporting year
N = number of types of critical care units reportable from a given facility
Obs = observed number of CLABSI
Pred = statistically 'predicted' number of CLABSI, based on NHSN data
SIR = Standarized Infection Ratio (observed number / statistically 'predicted' number of CLABSI)
NA = data not shown for an entire hospital with <50 central line days
** significantly higher than NHSN (2006-2008)
^^ significantly lower than NHSN (2006-2008)
* Zero infection, but not statistically significant

Figure 9 (cont'd)

Central Line-Associated Blood Stream Infection (CLABSI) Standardized Infection Ratio (SIR)

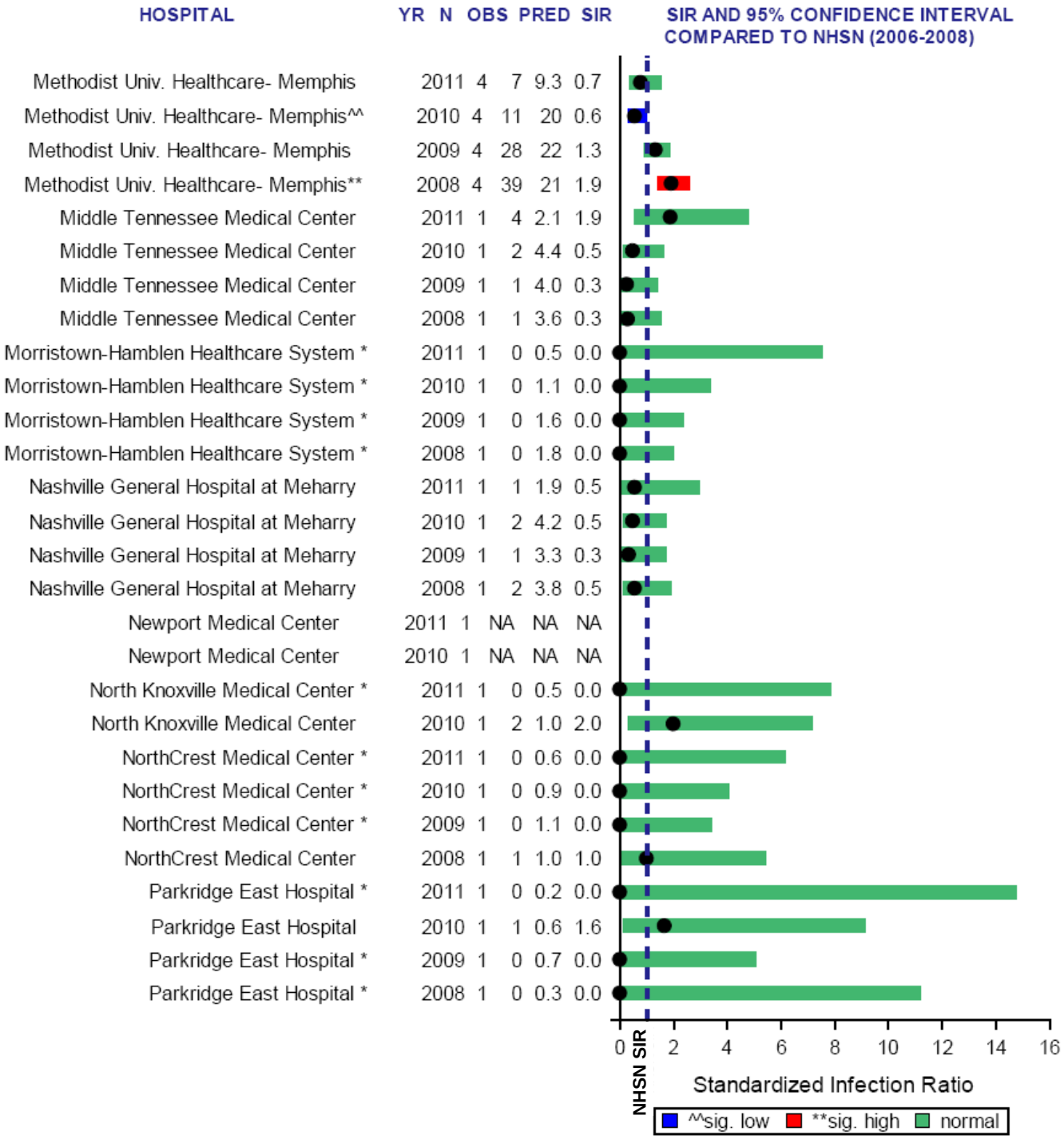
Tennessee (Reportable period: 01/01/2008-06/30/2011)



Data Reported from adult/pediatric ICUs as of May 15, 2012.
Yr = reporting year
N = number of types of critical care units reportable from a given facility
Obs = observed number of CLABSI
Pred = statistically 'predicted' number of CLABSI, based on NHSN data
SIR = Standarized Infection Ratio (observed number / statistically 'predicted' number of CLABSI)
NA = data not shown for an entire hospital with <50 central line days
** *significantly higher than NHSN (2006-2008)*
^^ *significantly lower than NHSN (2006-2008)*
* *Zero infection, but not statistically significant*

Figure 9 (cont'd)

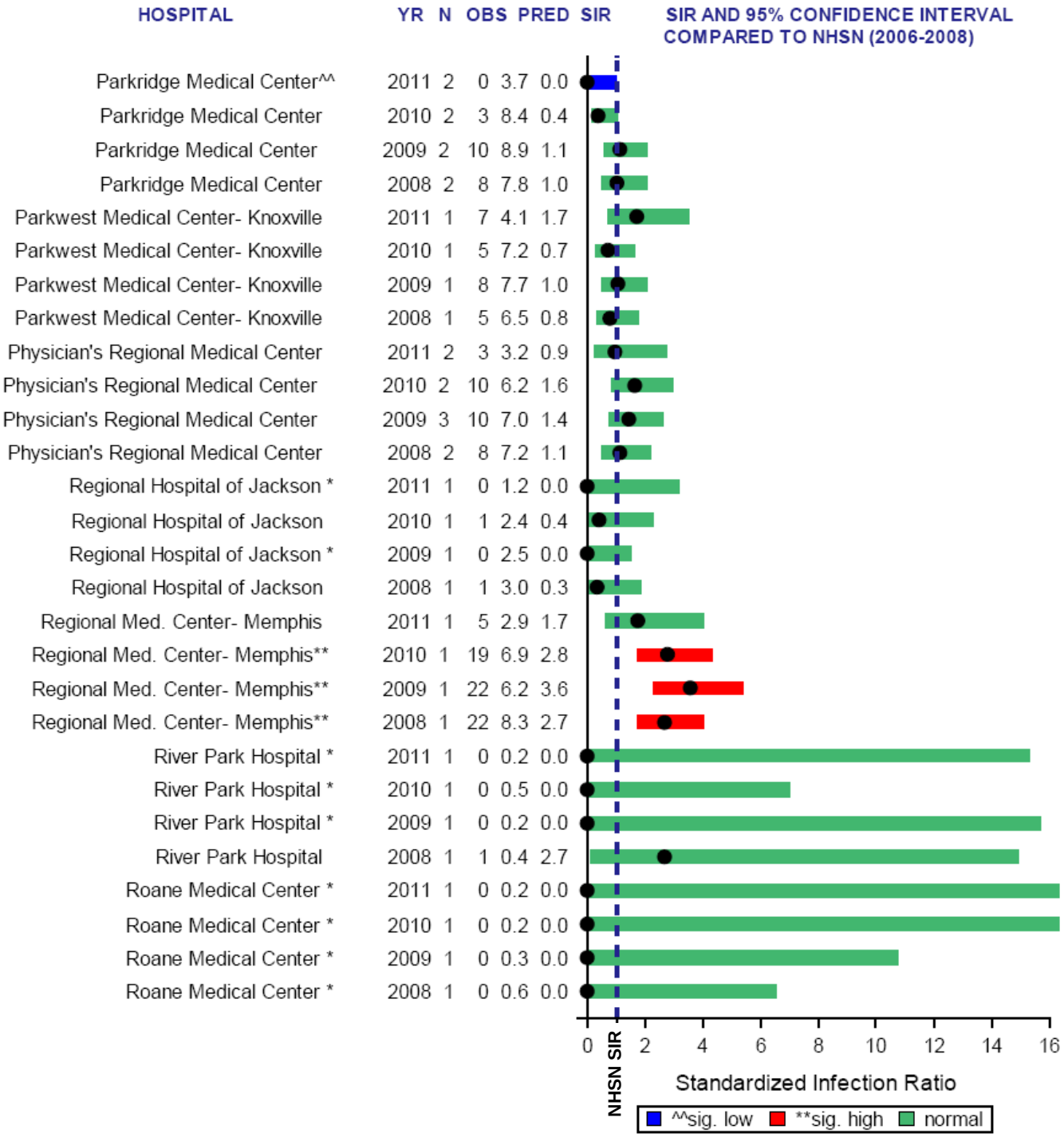
Central Line-Associated Blood Stream Infection (CLABSI) Standardized Infection Ratio (SIR)
Tennessee (Reportable period: 01/01/2008-06/30/2011)



Data Reported from adult/pediatric ICUs as of May 15, 2012.
Yr = reporting year
N = number of types of critical care units reportable from a given facility
Obs = observed number of CLABSI
Pred = statistically 'predicted' number of CLABSI, based on NHSN data
SIR = Standarized Infection Ratio (observed number / statistically 'predicted' number of CLABSI)
NA = data not shown for an entire hospital with <50 central line days
*** significantly higher than NHSN (2006-2008)*
^^ significantly lower than NHSN (2006-2008)
** Zero infection, but not statistically significant*

Figure 9 (cont'd)

Central Line-Associated Blood Stream Infection (CLABSI) Standardized Infection Ratio (SIR)
Tennessee (Reportable period: 01/01/2008-06/30/2011)

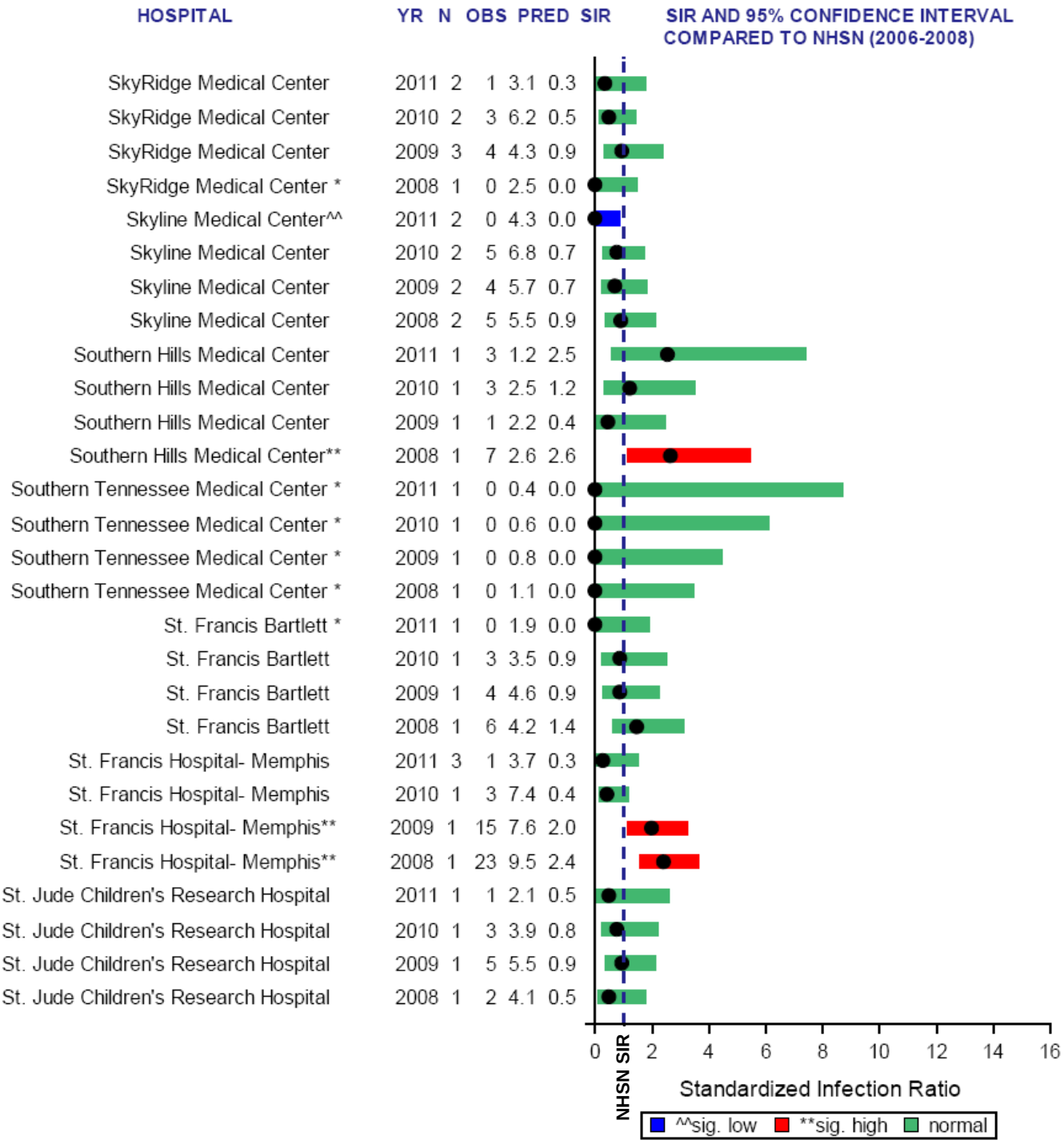


Data Reported from adult/pediatric ICUs as of May 15, 2012.
Yr = reporting year
N = number of types of critical care units reportable from a given facility
Obs = observed number of CLABSI
Pred = statistically 'predicted' number of CLABSI, based on NHSN data
SIR = Standarized Infection Ratio (observed number / statistically 'predicted' number of CLABSI)
NA = data not shown for an entire hospital with <50 central line days
*** significantly higher than NHSN (2006-2008)*
^^ significantly lower than NHSN (2006-2008)
* Zero infection, but not statistically significant*

Figure 9 (cont'd)

Central Line-Associated Blood Stream Infection (CLABSI) Standardized Infection Ratio (SIR)

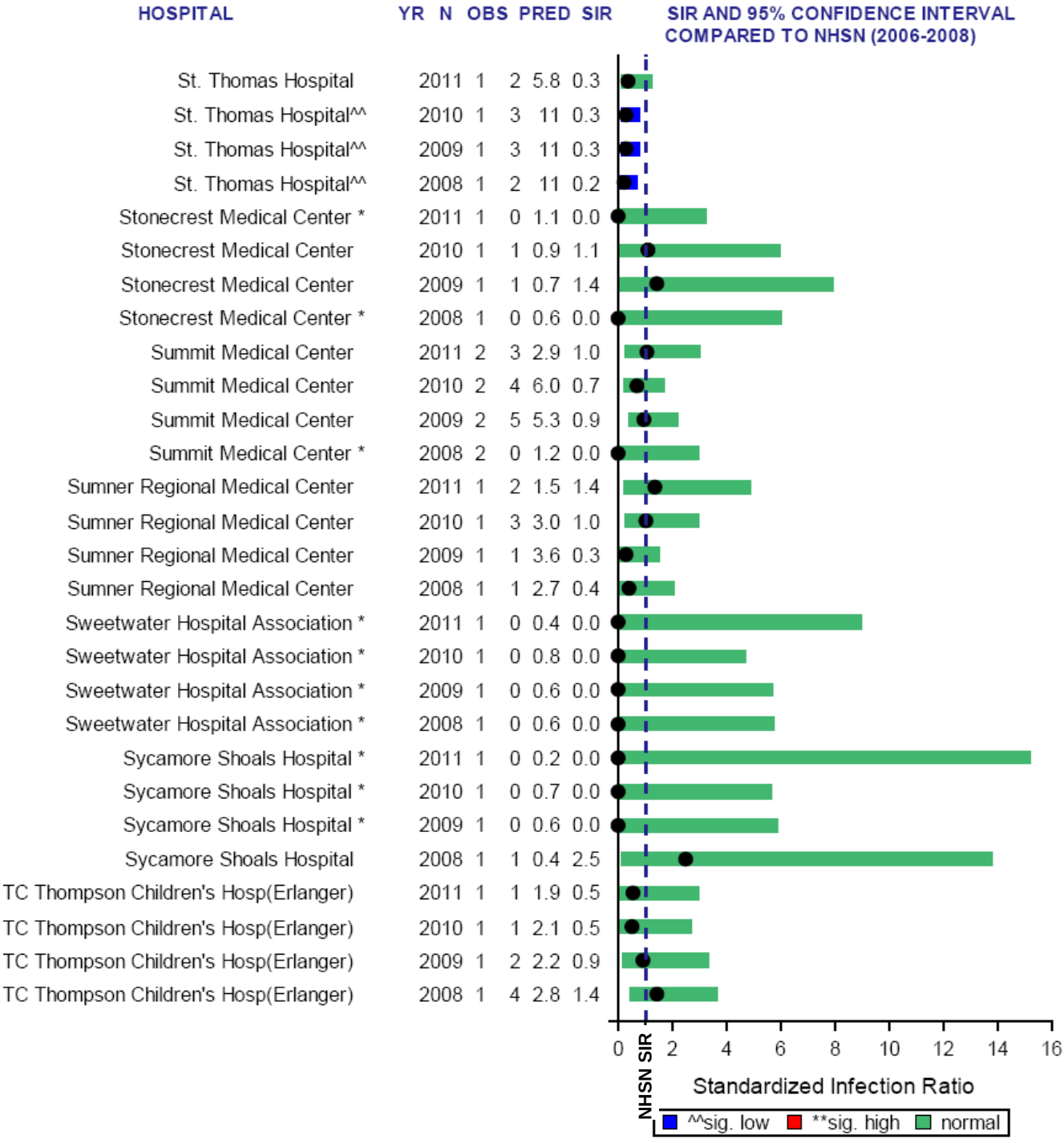
Tennessee (Reportable period: 01/01/2008-06/30/2011)



Data Reported from adult/pediatric ICUs as of May 15, 2012.
Yr = reporting year
N = number of types of critical care units reportable from a given facility
Obs = observed number of CLABSI
Pred = statistically 'predicted' number of CLABSI, based on NHSN data
SIR = Standarized Infection Ratio (observed number / statistically 'predicted' number of CLABSI)
NA = data not shown for an entire hospital with <50 central line days
** *significantly higher than NHSN (2006-2008)*
^^ *significantly lower than NHSN (2006-2008)*
* *Zero infection, but not statistically significant*

Figure 9 (cont'd)

Central Line-Associated Blood Stream Infection (CLABSI) Standardized Infection Ratio (SIR)
Tennessee (Reportable period: 01/01/2008-06/30/2011)

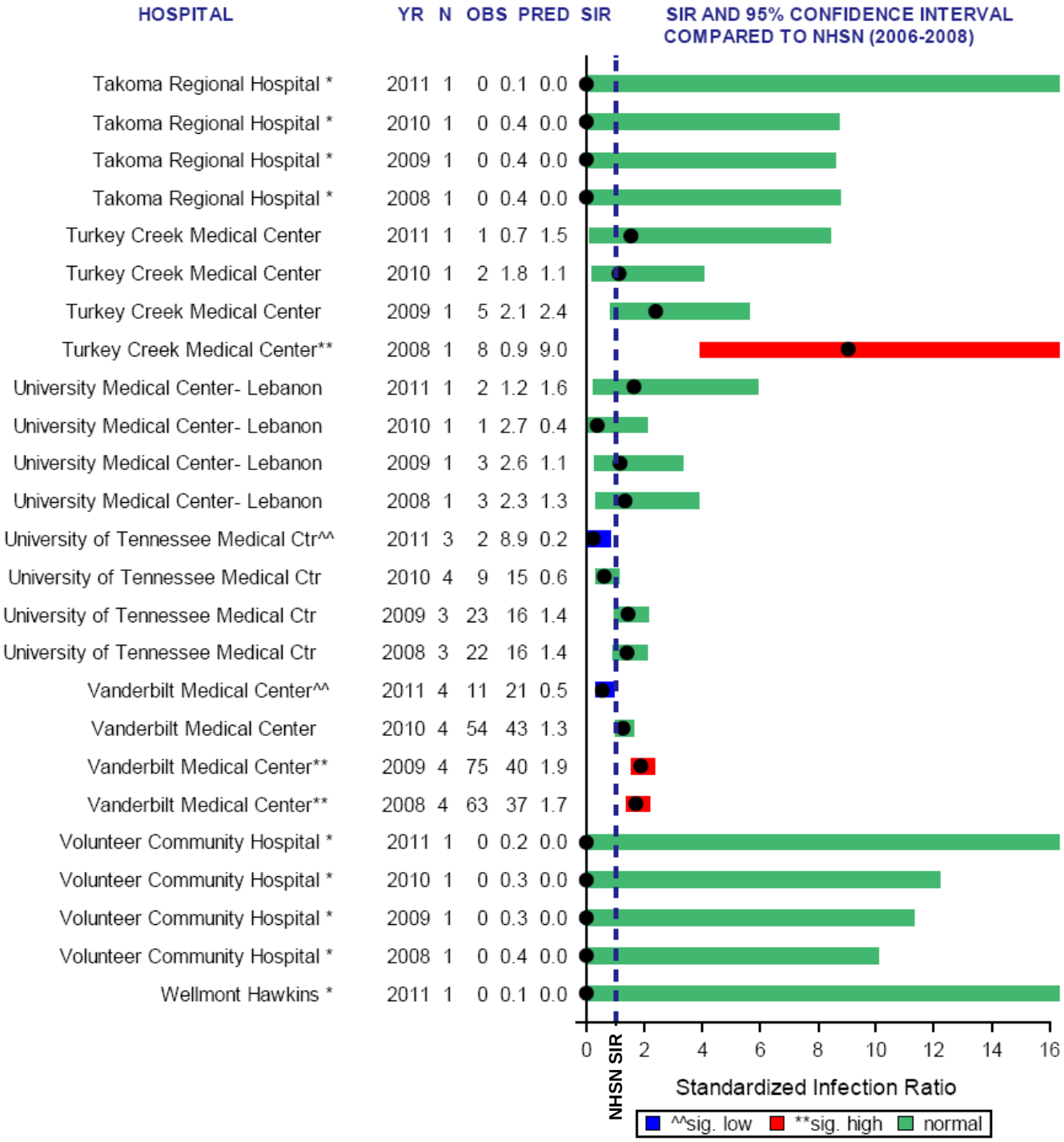


Data Reported from adult/pediatric ICUs as of May 15, 2012.
Yr = reporting year
N = number of types of critical care units reportable from a given facility
Obs = observed number of CLABSI
Pred = statistically 'predicted' number of CLABSI, based on NHSN data
SIR = Standarized Infection Ratio (observed number / statistically 'predicted' number of CLABSI)
NA = data not shown for an entire hospital with <50 central line days
** significantly higher than NHSN (2006-2008)*
^^ significantly lower than NHSN (2006-2008)*
* Zero infection, but not statistically significant*

Figure 9 (cont'd)

Central Line-Associated Blood Stream Infection (CLABSI) Standardized Infection Ratio (SIR)

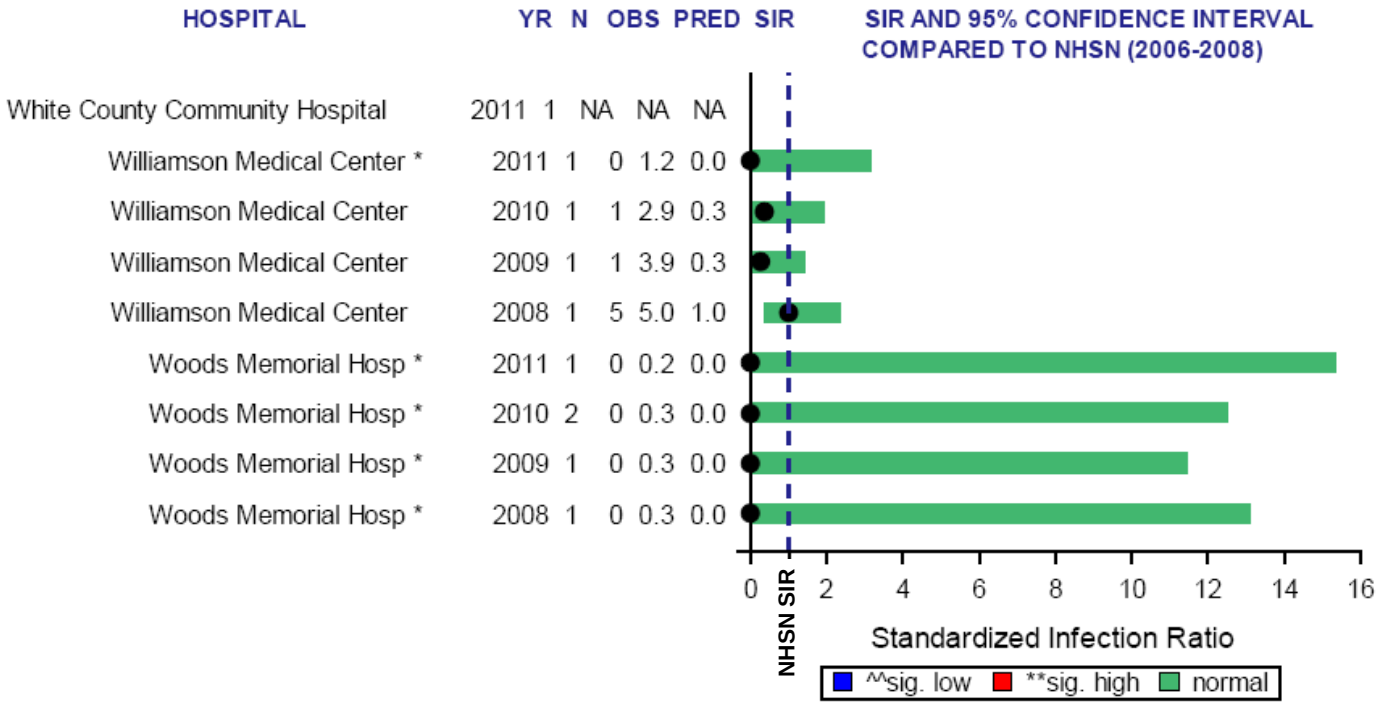
Tennessee (Reportable period: 01/01/2008-06/30/2011)



Data Reported from adult/pediatric ICUs as of May 15, 2012.
Yr = reporting year
N = number of types of critical care units reportable from a given facility
Obs = observed number of CLABSI
Pred = statistically 'predicted' number of CLABSI, based on NHSN data
SIR = Standarized Infection Ratio (observed number / statistically 'predicted' number of CLABSI)
NA = data not shown for an entire hospital with <50 central line days
*** significantly higher than NHSN (2006-2008)*
^^ significantly lower than NHSN (2006-2008)
* Zero infection, but not statistically significant*

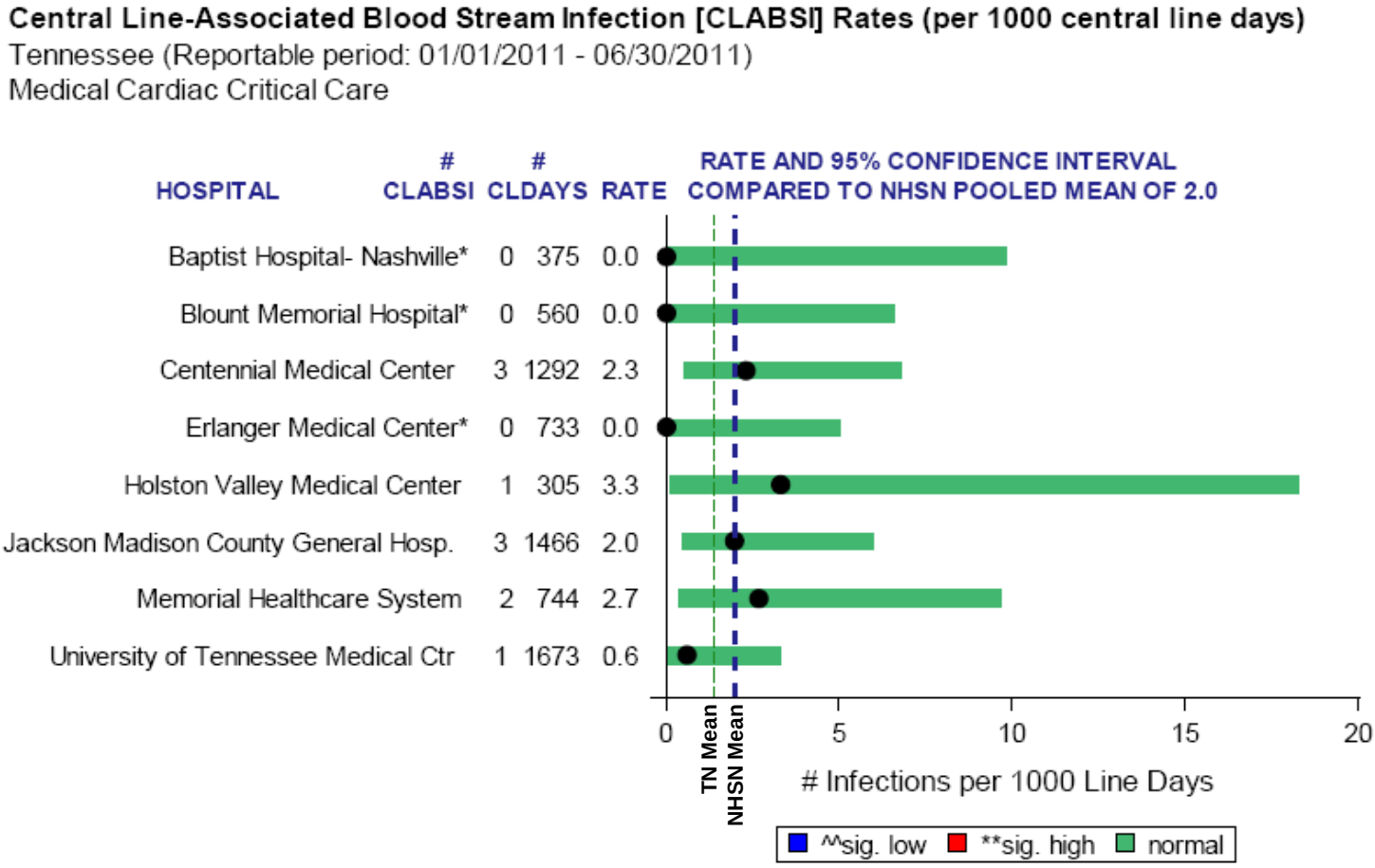
Figure 9 (cont'd)

Central Line-Associated Blood Stream Infection (CLABSI) Standardized Infection Ratio (SIR)
Tennessee (Reportable period: 01/01/2008-06/30/2011)



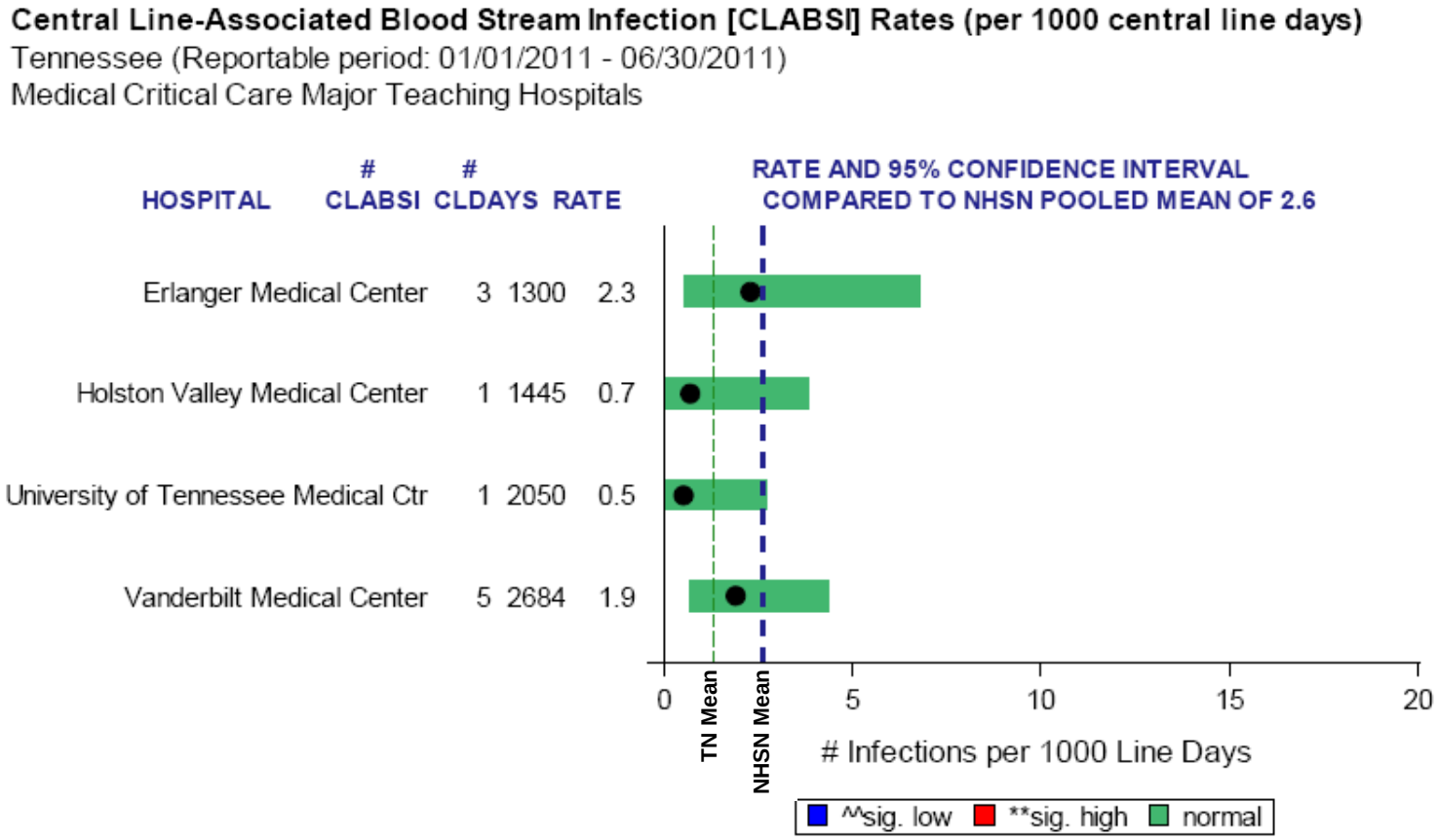
Data Reported from adult/pediatric ICUs as of May 15, 2012.
Yr = reporting year
N = number of types of critical care units reportable from a given facility
Obs = observed number of CLABSI
Pred = statistically 'predicted' number of CLABSI, based on NHSN data
SIR = Standarized Infection Ratio (observed number / statistically 'predicted' number of CLABSI)
NA = data not shown for an entire hospital with <50 central line days
** *significantly higher than NHSN (2006-2008)*
^^ *significantly lower than NHSN (2006-2008)*
* *Zero infection, but not statistically significant*

Figure 10: Central Line-Associated Bloodstream Infection Rates per 1,000 Central Line Days in Tennessee, 01/01/2011–06/30/2011, Medical Cardiac Critical Care Units



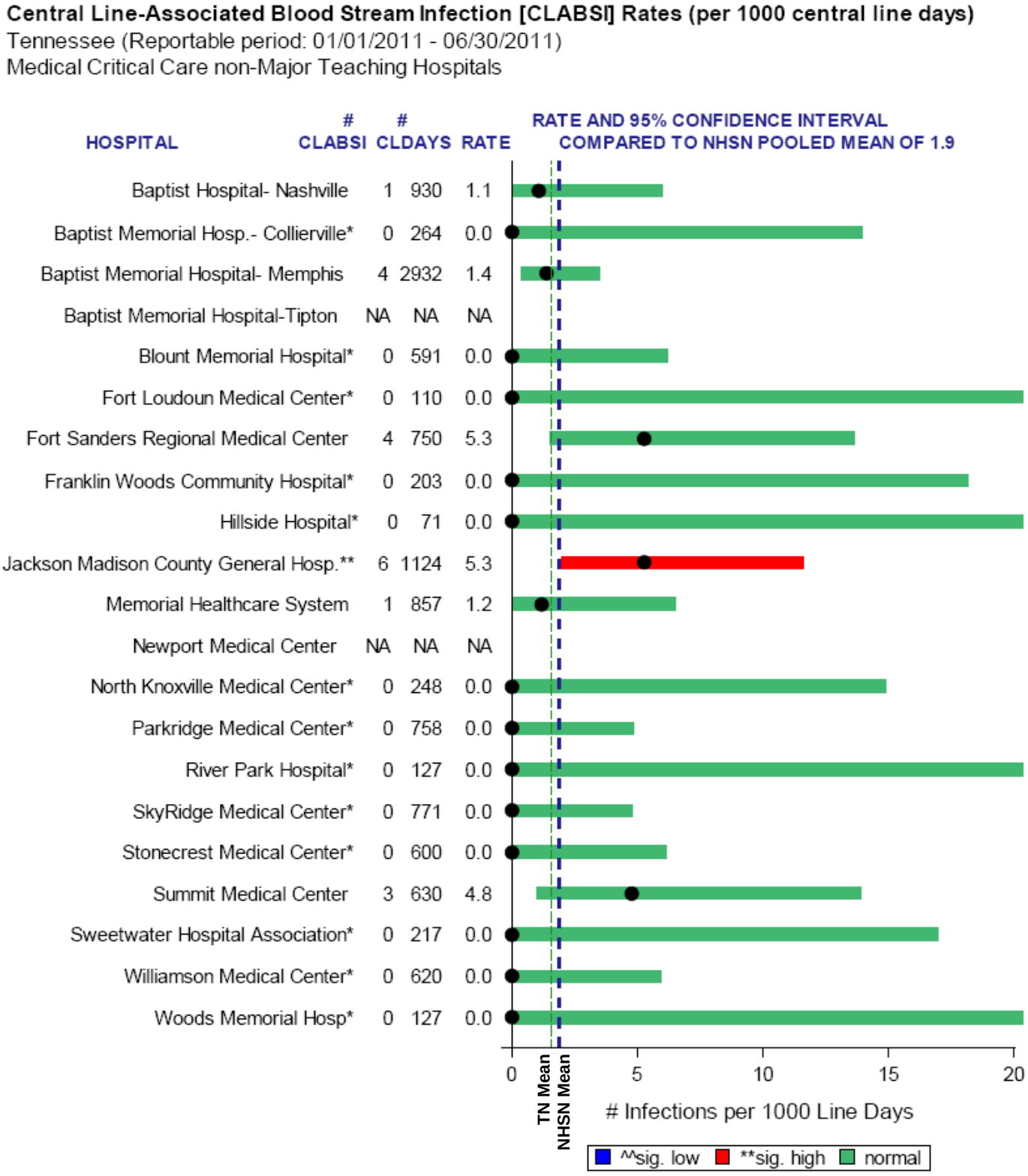
Data Reported as of May 15, 2012.
*** significantly higher than NHSN pooled mean*
^^ significantly lower than NHSN pooled mean
** Zero infections, not statistically significant*
NA Rates are not shown in critical care units with <50 central line days.
NHSN pooled mean (2006-2008)=2.0 ; TN pooled mean (01/01/2011 - 06/30/2011)=1.4

Figure 11: Central Line-Associated Bloodstream Infection Rates per 1,000 Central Line Days in Tennessee, 01/01/2011–06/30/2011, Medical Critical Care Units in Major Teaching Hospitals



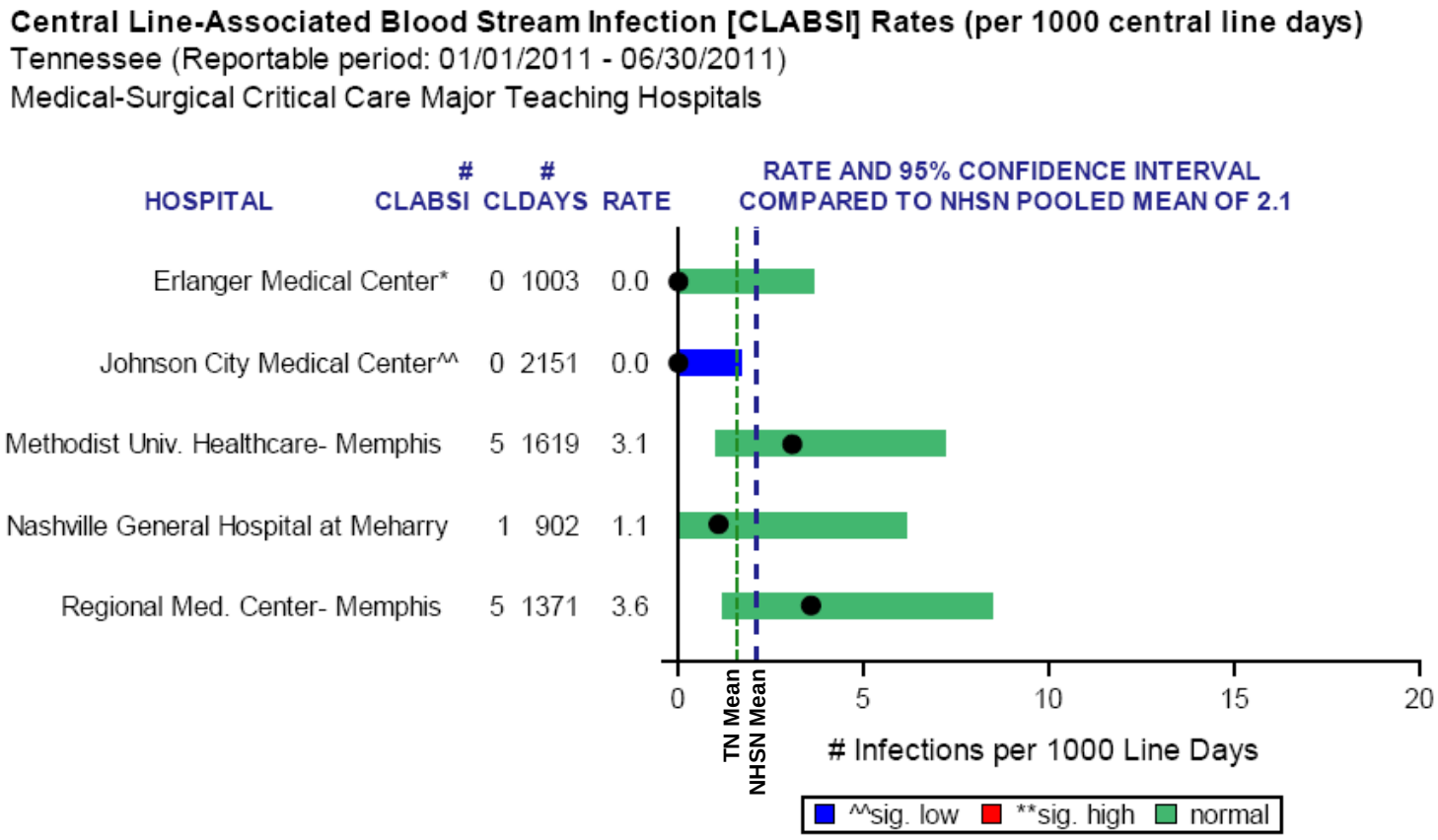
Data Reported as of May 15, 2012.
*** significantly higher than NHSN pooled mean*
^^ significantly lower than NHSN pooled mean
** Zero infections, not statistically significant*
NA Rates are not shown in critical care units with <50 central line days.
NHSN pooled mean(2006-2008)=2.6 ; TN pooled mean(01/01/2011 - 06/30/2011)=1.3

Figure 12: Central Line-Associated Bloodstream Infection Rates per 1,000 Central Line Days in Tennessee, 01/01/2011–06/30/2011, Medical Critical Care Units in Non-Major Teaching Hospitals



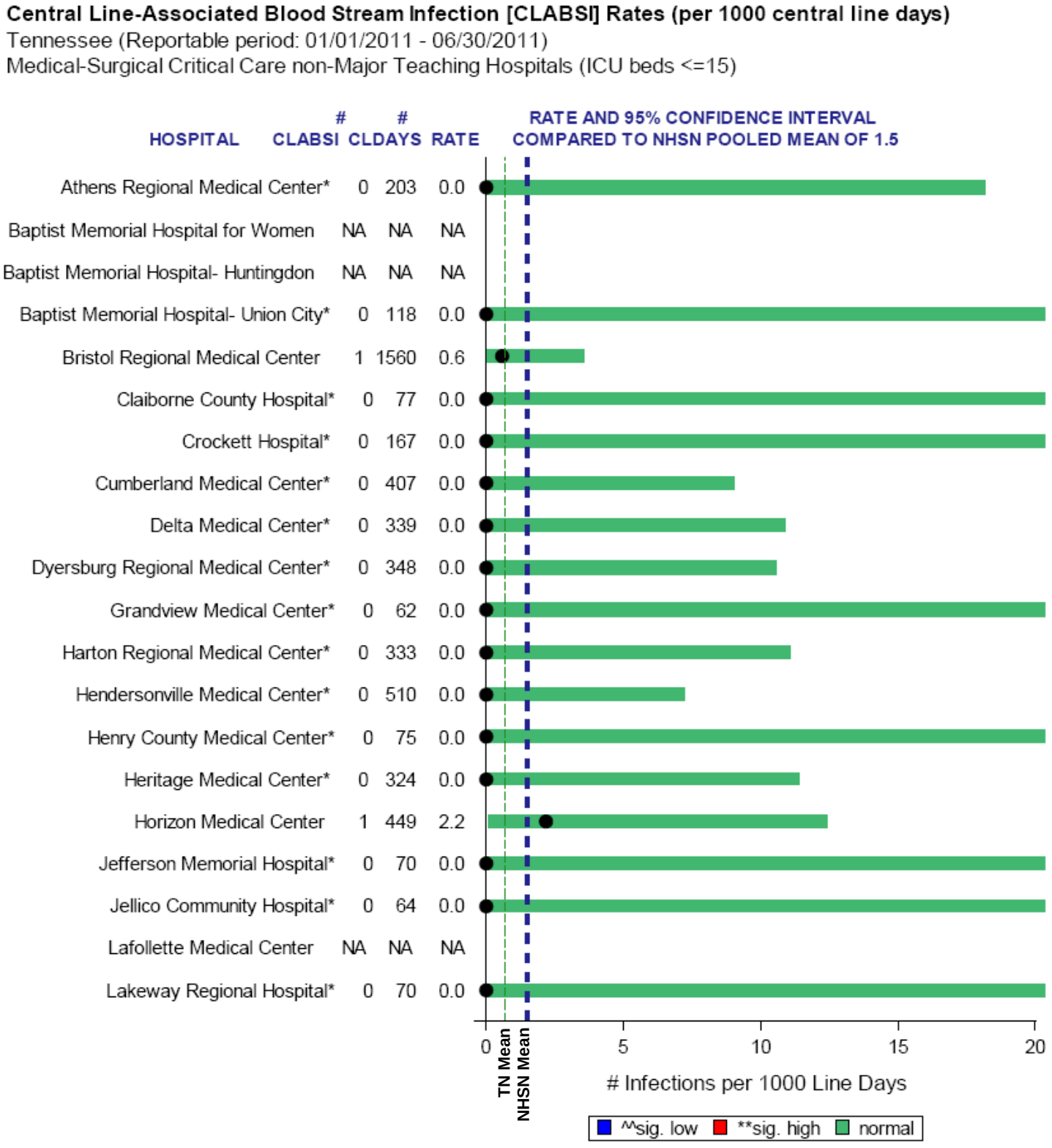
Data Reported as of May 15, 2012.
*** significantly higher than NHSN pooled mean*
^^ significantly lower than NHSN pooled mean
** Zero infections, not statistically significant*
NA Rates are not shown in critical care units with <50 central line days.
NHSN pooled mean(2006-2008)=1.9 ; TN pooled mean(01/01/2011 - 06/30/2011)=1.6

Figure 13: Central Line-Associated Bloodstream Infection Rates per 1,000 Central Line Days in Tennessee, 01/01/2011–06/30/2011, Medical-Surgical Critical Care Units in Major Teaching Hospitals



Data Reported as of May 15, 2012.
*** significantly higher than NHSN pooled mean*
^^ significantly lower than NHSN pooled mean
** Zero infections, not statistically significant*
NA Rates are not shown in critical care units with <50 central line days.
NHSN pooled mean(2006-2008)=2.1 ; TN pooled mean(01/01/2011 - 06/30/2011)=1.6

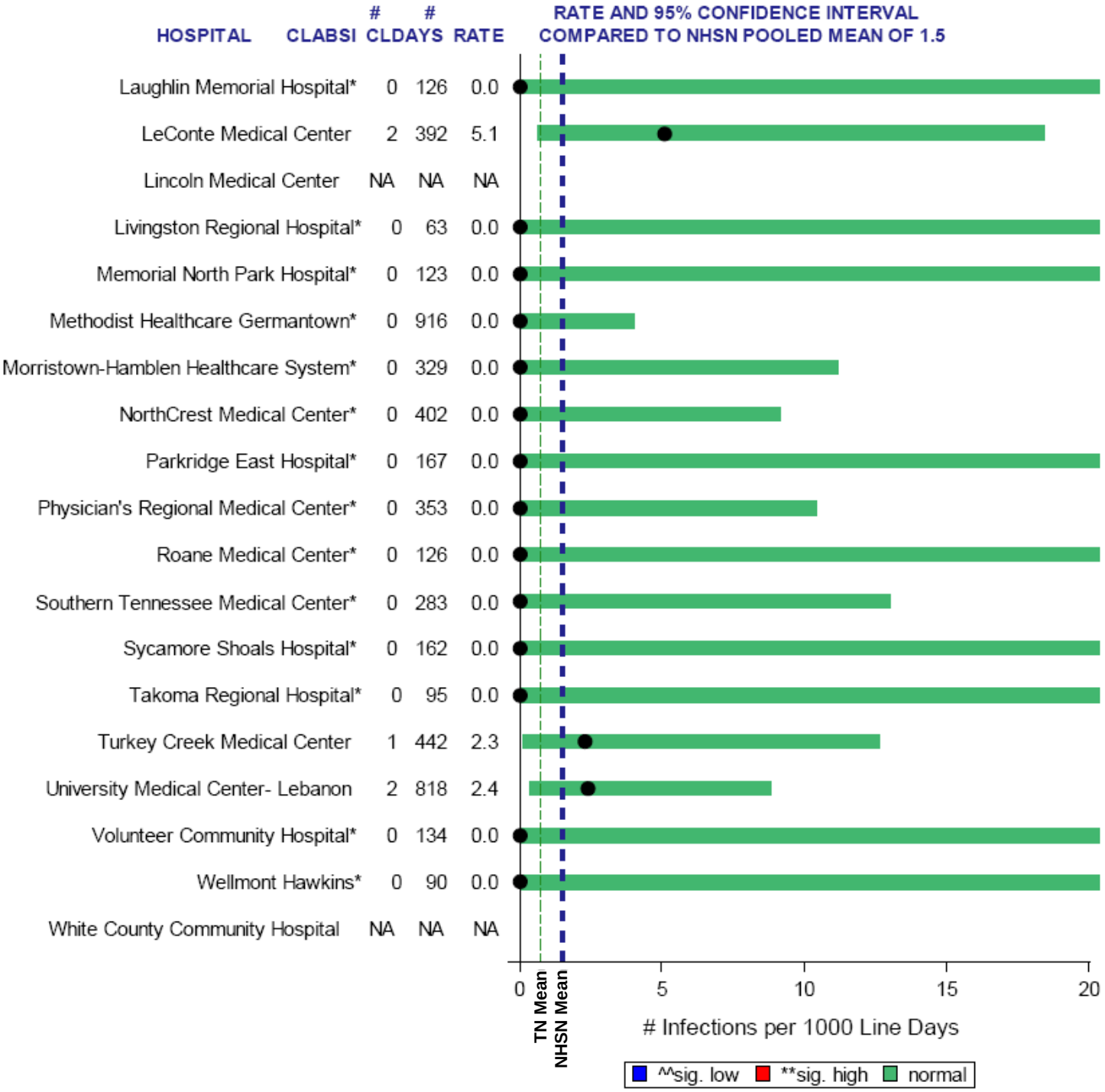
Figure 14: Central Line-Associated Bloodstream Infection Rates per 1,000 Central Line Days in Tennessee, 01/01/2011–06/30/2011, Medical-Surgical ICUs with ≤15 beds in Non-Major Teaching Hospitals



Data Reported as of May 15, 2012.
*** significantly higher than NHSN pooled mean*
^^ significantly lower than NHSN pooled mean
** Zero infections, not statistically significant*
NA Rates are not shown in critical care units with <50 central line days.
NHSN pooled mean(2006-2008)=1.5 ; TN pooled mean(01/01/2011 - 06/30/2011)=0.7

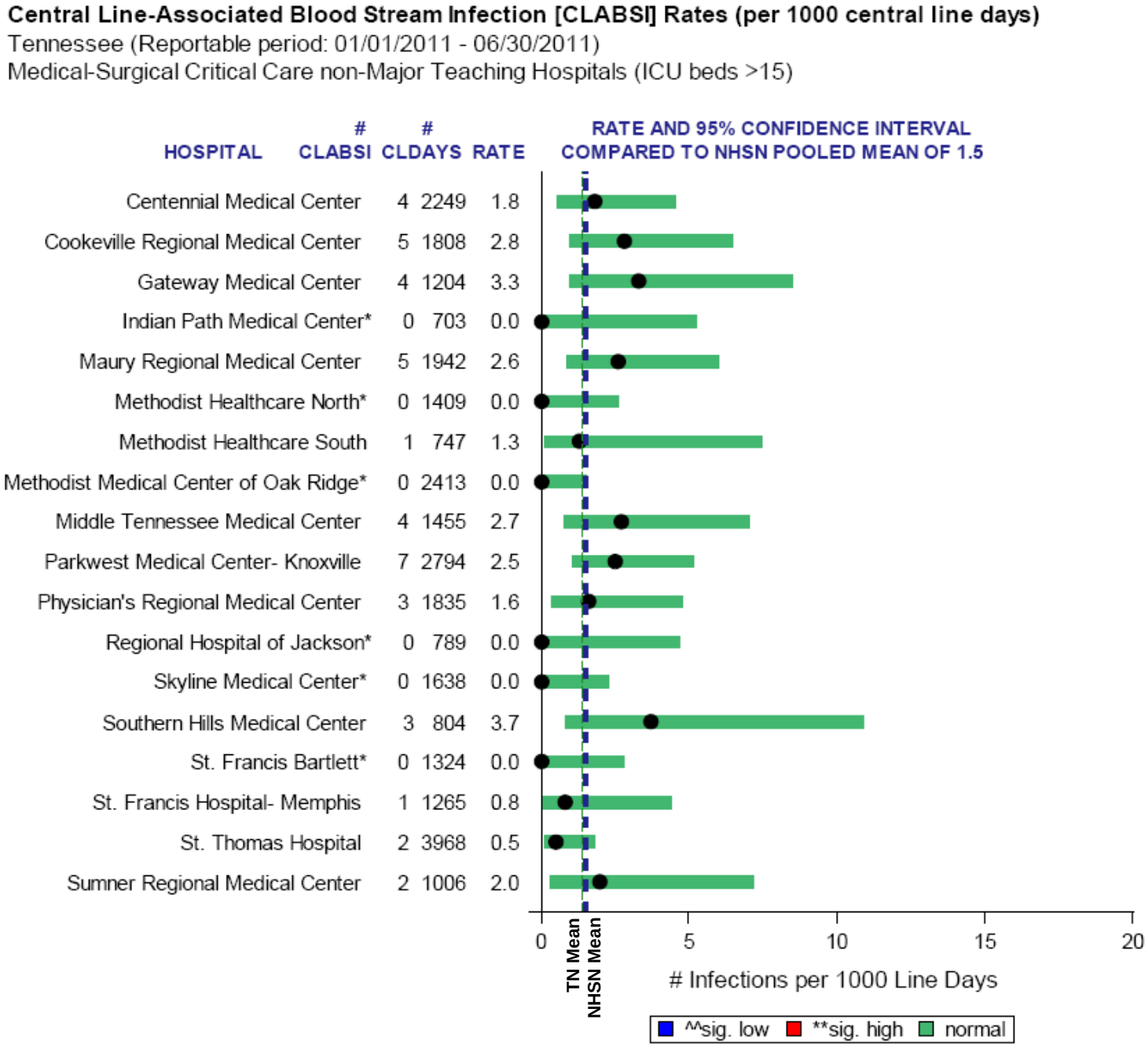
Figure 14 (cont'd)

Central Line-Associated Blood Stream Infection [CLABSI] Rates (per 1000 central line days)
Tennessee (Reportable period: 01/01/2011 - 06/30/2011)
Medical-Surgical Critical Care non-Major Teaching Hospitals (ICU beds <=15) [continued...]



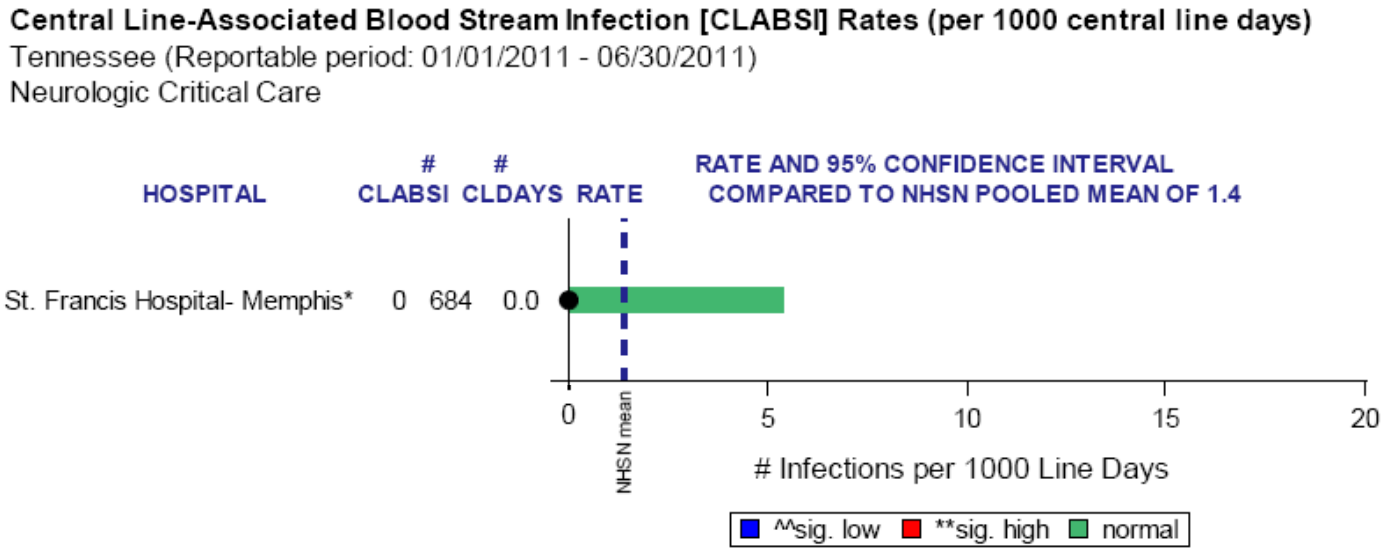
Data Reported as of May 15, 2012.
*** significantly higher than NHSN pooled mean*
^^ significantly lower than NHSN pooled mean
** Zero infections, not statistically significant*
NA Rates are not shown in critical care units with <50 central line days.
NHSN pooled mean(2006-2008)=1.5 ; TN pooled mean(01/01/2011 - 06/30/2011)=0.7

Figure 15: Central Line-Associated Bloodstream Infection Rates per 1,000 Central Line Days in Tennessee, 01/01/2011–06/30/2011, Medical-Surgical ICUs with >15 beds in Non-Major Teaching Hospitals



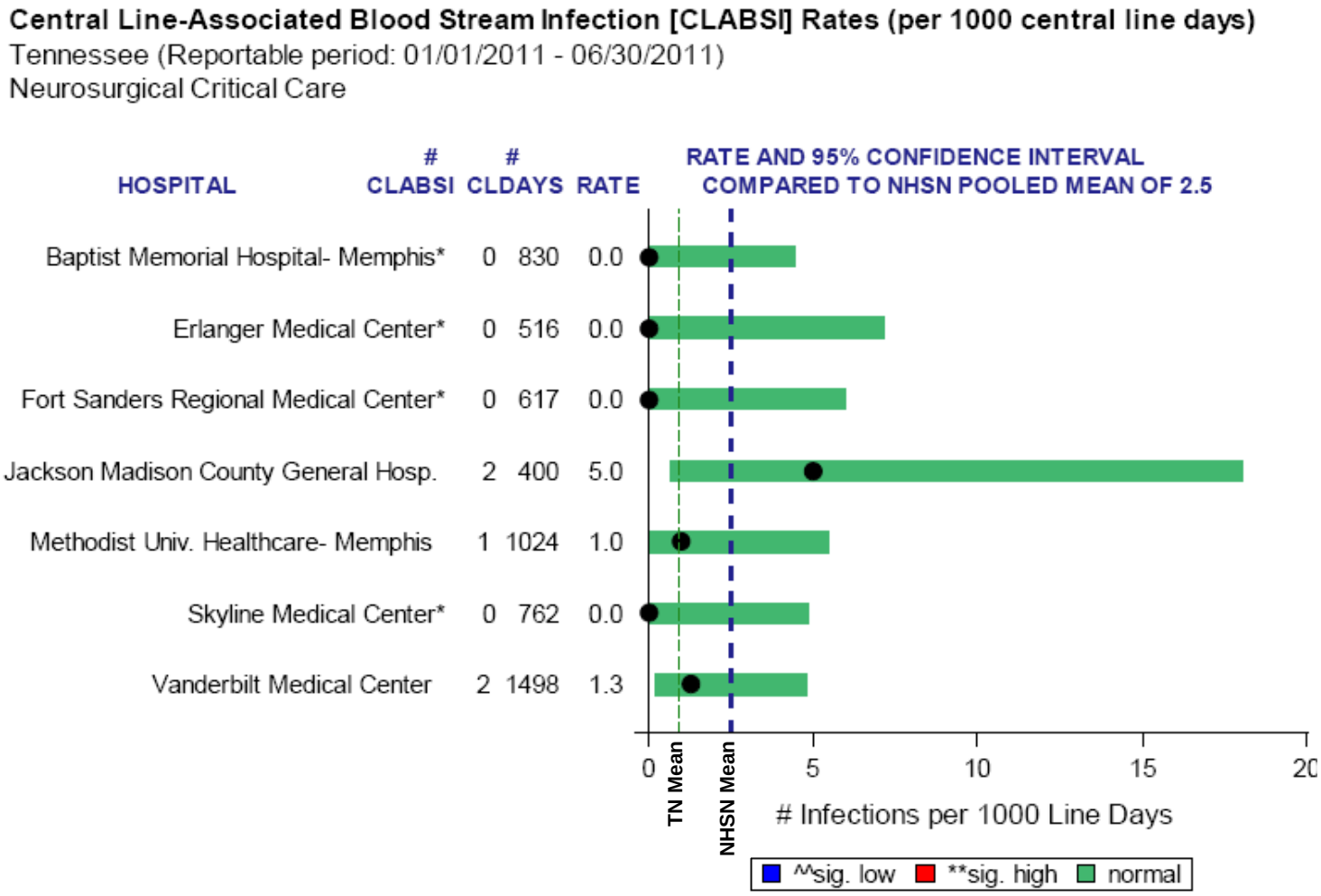
Data Reported as of May 15, 2012.
*** significantly higher than NHSN pooled mean*
^^ significantly lower than NHSN pooled mean
** Zero infections, not statistically significant*
NA Rates are not shown in critical care units with <50 central line days.
NHSN pooled mean(2006-2008)=1.5 ; TN pooled mean(01/01/2011 - 06/30/2011)=1.4

Figure 16: Central Line-Associated Bloodstream Infection Rates per 1,000 Central Line Days in Tennessee, 01/01/2011–06/30/2011, Neurological Critical Care Units



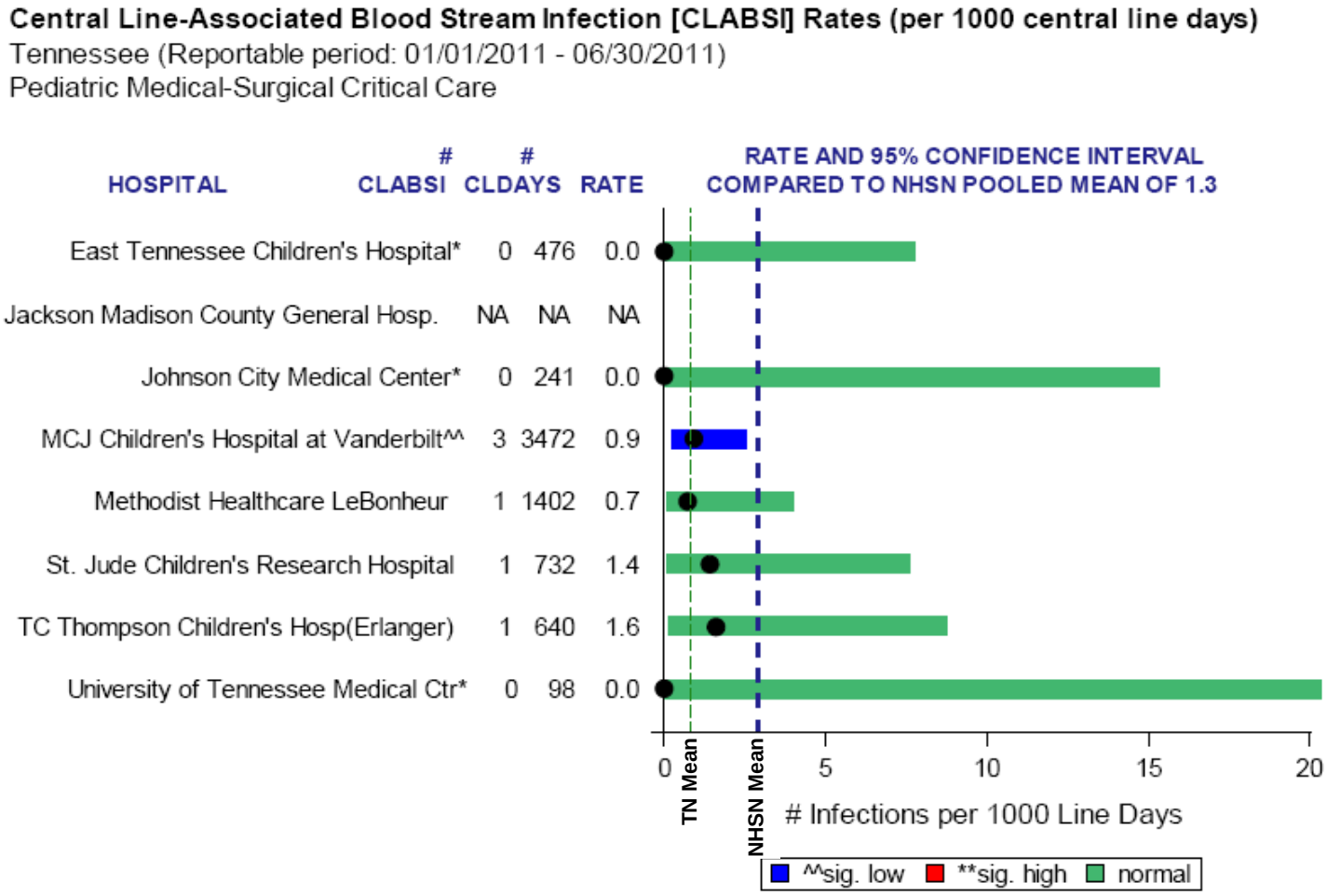
Data Reported as of May 15, 2012.
*** significantly higher than NHSN pooled mean*
^^ significantly lower than NHSN pooled mean
** Zero infections, not statistically significant*
NA Rates are not shown in critical care units with <50 central line days.
NHSN pooled mean(2006-2008)=1.4 ; TN pooled mean(01/01/2011 - 06/30/2011)=0.0

Figure 17: Central Line-Associated Bloodstream Infection Rates per 1,000 Central Line Days in Tennessee, 01/01/2011–06/30/2011, Neurosurgical Critical Care Units



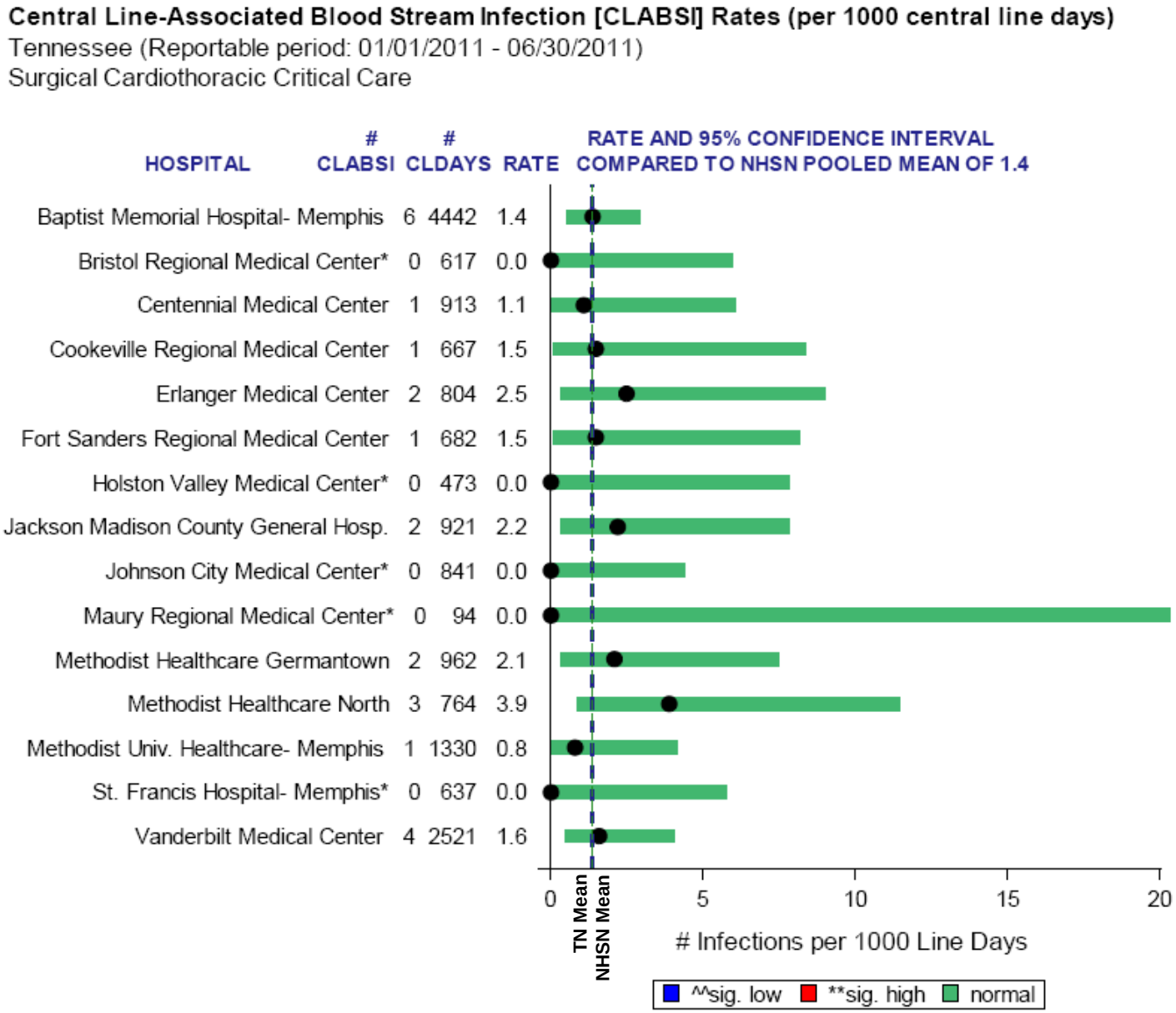
Data Reported as of May 15, 2012.
*** significantly higher than NHSN pooled mean*
^^ significantly lower than NHSN pooled mean
** Zero infections, not statistically significant*
NA Rates are not shown in critical care units with <50 central line days.
NHSN pooled mean(2006-2008)=2.5 ; TN pooled mean(01/01/2011 - 06/30/2011)=0.9

Figure 18: Central Line-Associated Bloodstream Infection Rates per 1,000 Central Line Days in Tennessee, 01/01/2011–06/30/2011, Pediatric Medical-Surgical Critical Care Units



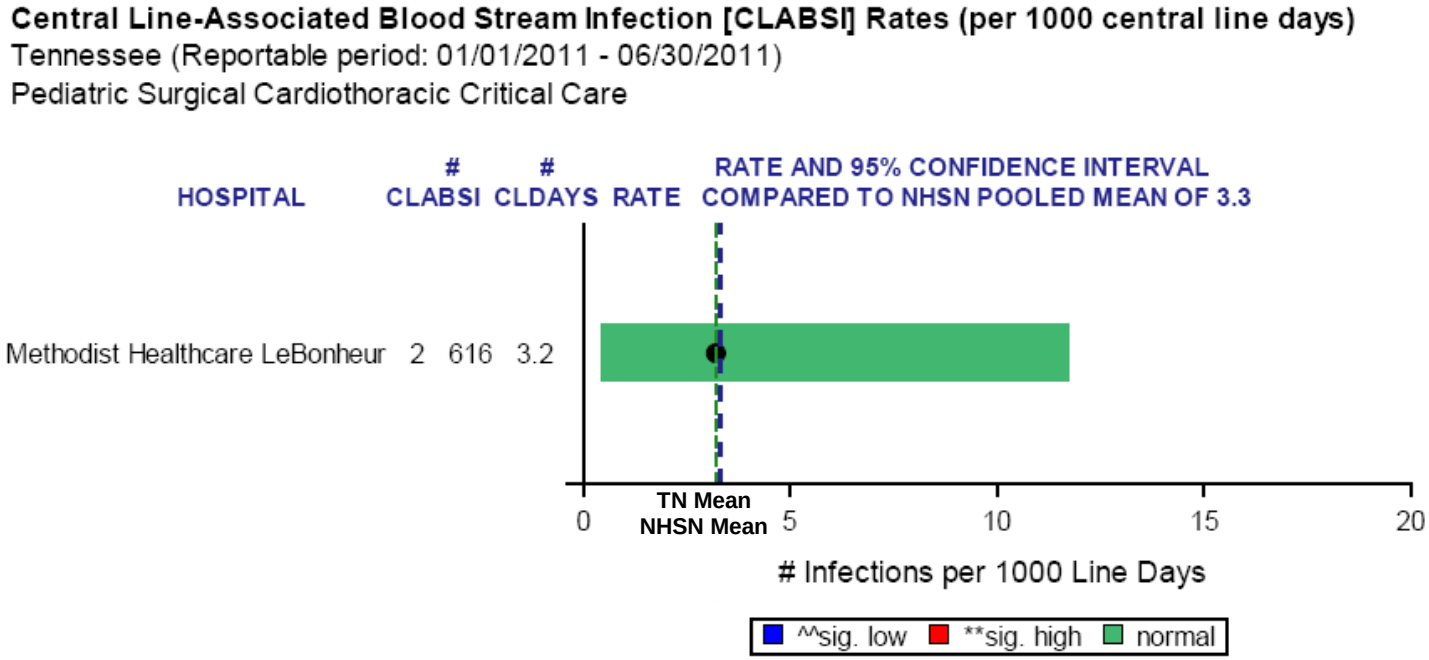
Data Reported as of May 15, 2012.
*** significantly higher than NHSN pooled mean*
^^ significantly lower than NHSN pooled mean
** Zero infections, not statistically significant*
NA Rates are not shown in critical care units with <50 central line days.
NHSN pooled mean(2006-2008)=2.9 ; TN pooled mean(01/01/2011 - 06/30/2011)=0.8

Figure 19: Central Line-Associated Bloodstream Infection Rates per 1,000 Central Line Days in Tennessee, 01/01/2011–06/30/2011, Surgical Cardiothoracic Critical Care Units



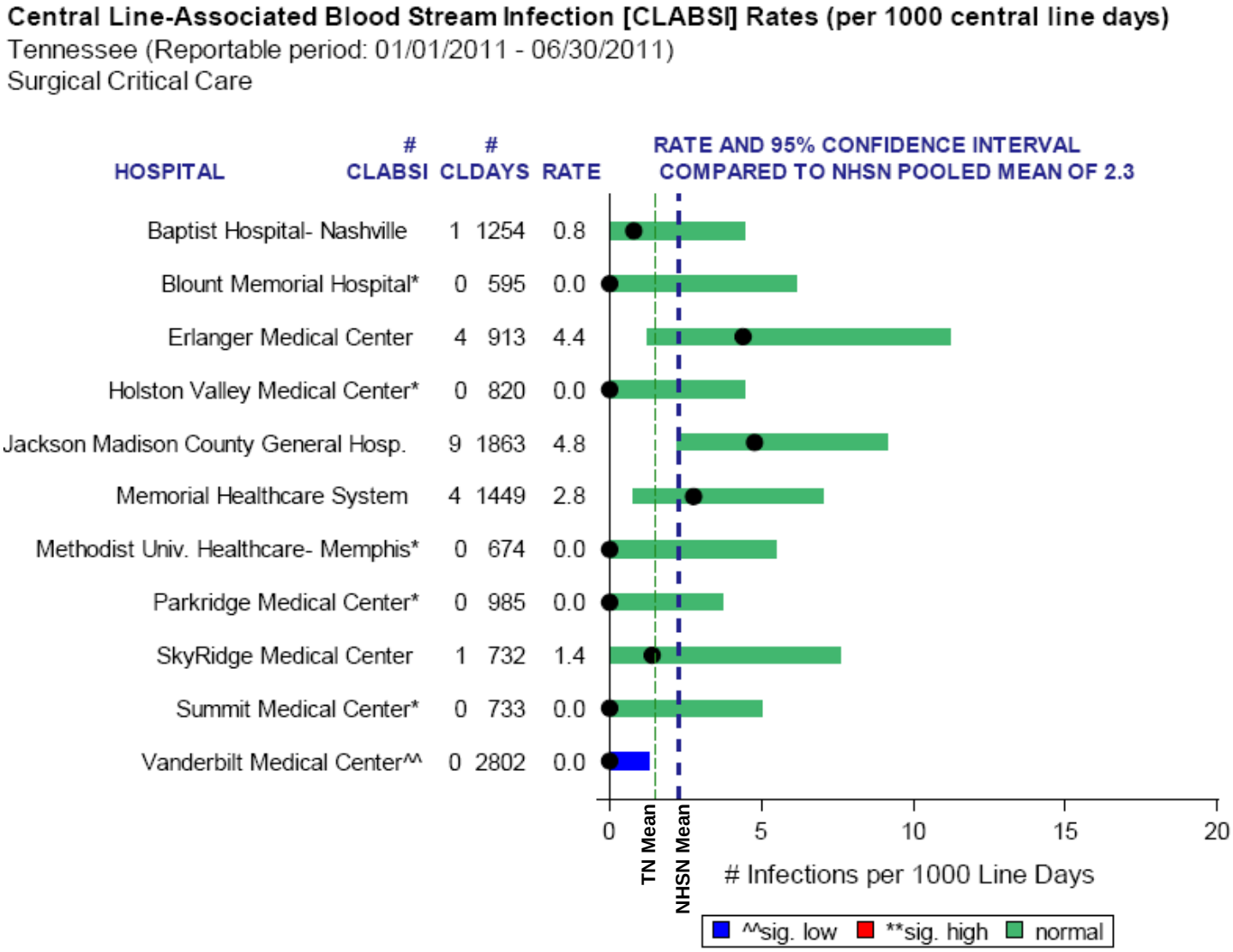
Data Reported as of May 15, 2012.
*** significantly higher than NHSN pooled mean*
^^ significantly lower than NHSN pooled mean
** Zero infections, not statistically significant*
NA Rates are not shown in critical care units with <50 central line days.
NHSN pooled mean(2006-2008)=1.4 ; TN pooled mean(01/01/2011 - 06/30/2011)=1.4

Figure 20: Central Line-Associated Bloodstream Infection Rates per 1,000 Central Line Days in Tennessee, 01/01/2011–06/30/2011, Pediatric Surgical Cardiothoracic Critical Care Units



Data Reported as of May 15, 2012.
*** significantly higher than NHSN pooled mean*
^^ significantly lower than NHSN pooled mean
** Zero infections, not statistically significant*
NA Rates are not shown in critical care units with <50 central line days.
NHSN pooled mean(2006-2008)=3.3 ; TN pooled mean(01/01/2011 - 06/30/2011)=3.2

Figure 21: Central Line-Associated Bloodstream Infection Rates per 1,000 Central Line Days in Tennessee, 01/01/2011–06/30/2011, Surgical Critical Care Units



Data Reported as of May 15, 2012.
*** significantly higher than NHSN pooled mean*
^^ significantly lower than NHSN pooled mean
** Zero infections, not statistically significant*
NA Rates are not shown in critical care units with <50 central line days.
NHSN pooled mean(2006-2008)=2.3 ; TN pooled mean(01/01/2011 - 06/30/2011)=1.5

Table 9: Measures of Central Line-Associated Bloodstream Infections (CLABSI) by Type of of Intensive Care Unit (ICU), Tennessee [Reporting period: 01/01/2011–06/30/2011]

Location = Medical Cardiac Critical Care

	INCIDENCE DENSITY RATE (LINE DAYS)				DEVICE UTILIZATION		INCIDENCE DENSITY RATE (INPATIENT DAYS)	
Hospital	RATE*	Lower Limit	Upper limit	TN %ile	DU(%)	TN %ile	INPATIENT DAYS	RATE**
Baptist Hospital- Nashville	0.0	0.0	9.8	17	27	13	1376	0.0
Blount Memorial Hospital	0.0	0.0	6.6	17	54	75	1032	0.0
Centennial Medical Center	2.3	0.5	6.8	67	40	50	3225	0.9
Erlanger Medical Center	0.0	0.0	5.0	17	59	88	1232	0.0
Holston Valley Medical Center	3.3	0.1	18.3	100	37	38	822	1.2
Jackson Madison County General Hospital	2.0	0.4	6.0	50	74	100	1968	1.5
Memorial Healthcare System	2.7	0.3	9.7	83	30	25	2446	0.8
University of Tennessee Medical Center	0.6	0.0	3.3	33	48	63	3481	0.3

Data reported as of May 15, 2012
**** per 1000 central line days***
***** per 1000 inpatient days***
TN%ile = percentile in TN (01/01/2011–06/30/2011)
DU(%) = device utilization(%)
NA = not reported due to central line days <50
Red highlighting indicates rate for reporting period is significantly higher than the national 2006-2008 rate of 2.0 CLABSIs/1000 central line days
Blue highlighting indicates rate for reporting period is significantly lower than the national 2006-2008 rate of 2.0 CLABSIs/1000 central line days

Table 10: Measures of Central Line-Associated Bloodstream Infections (CLABSI) by Type of Intensive Care Unit (ICU), Tennessee [Reporting period: 01/01/2011–06/30/2011]

Location = Medical Critical Care, Major Teaching

	INCIDENCE DENSITY RATE (LINE DAYS)				DEVICE UTILIZATION		INCIDENCE DENSITY RATE (INPATIENT DAYS)	
Hospital	RATE*	Lower Limit	Upper limit	TN %ile	DU(%)	TN %ile	INPATIENT DAYS	RATE**
Erlanger Medical Center	2.3	0.5	6.7	100	64	100	2029	1.5
Holston Valley Medical Center	0.7	0.0	3.9	50	63	67	2283	0.4
University of Tennessee Medical Center	0.5	0.0	2.7	25	63	67	3270	0.3
Vanderbilt Medical Center	1.9	0.6	4.3	75	48	33	5608	0.9

Data reported as of May 15, 2012
**** per 1000 central line days***
***** per 1000 inpatient days***
TN%ile = percentile in TN (01/01/2011–06/30/2011)
DU(%) = device utilization(%)
NA = not reported due to central line days <50
Red highlighting indicates rate for reporting period is significantly higher than the national 2006-2008 rate of 2.6 CLABSIs/1000 central line days
Blue highlighting indicates rate for reporting period is significantly lower than the national 2006-2008 rate of 2.6 CLABSIs/1000 central line days

Table 11: Measures of Central Line-Associated Bloodstream Infections (CLABSIs) by Type of Intensive Care Unit (ICU), Tennessee [Reporting period: 01/01/2011–06/30/2011]

Location = Medical Critical Care, Non-Major Teaching

	INCIDENCE DENSITY RATE (LINE DAYS)				DEVICE UTILIZATION		INCIDENCE DENSITY RATE (INPATIENT DAYS)	
Hospital	RATE*	Lower Limit	Upper limit	TN %ile	DU(%)	TN %ile	INPATIENT DAYS	RATE**
Baptist Hospital- Nashville	1.1	0.0	6.0	29	41	65	2263	0.4
Baptist Memorial Hosp.- Collierville	0.0	0.0	14.0	14	39	55	680	0.0
Baptist Memorial Hospital- Memphis	1.4	0.4	3.5	57	64	95	4562	0.9
Baptist Memorial Hospital-Tipton	NA	NA	NA	NA	11	10	169	NA
Blount Memorial Hospital	0.0	0.0	6.2	14	60	85	981	0.0
Fort Loudoun Medical Center	0.0	0.0	33.5	14	26	35	430	0.0
Fort Sanders Regional Medical Center	5.3	1.5	13.7	86	62	90	1210	3.3
Franklin Woods Community Hospital	0.0	0.0	18.2	14	18	25	1102	0.0
Hillside Hospital	0.0	0.0	52.0	14	16	20	449	0.0
Jackson Madison County General Hospital	5.3	2.0	11.6	100	70	100	1595	3.8
Memorial Healthcare System	1.2	0.0	6.5	43	37	50	2346	0.4
Newport Medical Center	NA	NA	NA	NA	6	5	576	NA
North Knoxville Medical Center	0.0	0.0	14.9	14	34	45	735	0.0
Parkridge Medical Center	0.0	0.0	4.9	14	46	70	1639	0.0
River Park Hospital	0.0	0.0	29.0	14	14	15	924	0.0
SkyRidge Medical Center	0.0	0.0	4.8	14	40	60	1949	0.0
Stonecrest Medical Center	0.0	0.0	6.1	14	55	80	1090	0.0
Summit Medical Center	4.8	1.0	13.9	71	54	75	1164	2.6
Sweetwater Hospital Association	0.0	0.0	17.0	14	34	45	641	0.0
Williamson Medical Center	0.0	0.0	5.9	14	28	40	2238	0.0
Woods Memorial Hosp	0.0	0.0	29.0	14	22	30	570	0.0

Data reported as of May 15, 2012
**** per 1000 central line days***
***** per 1000 inpatient days***
TN%ile = percentile in TN (01/01/2011–06/30/2011)
DU(%) = device utilization(%)
NA = not reported due to central line days <50
Red highlighting indicates rate for reporting period is significantly higher than the national 2006-2008 rates of 1.9 CLABSIs/1000 central line days
Blue highlighting indicates rate for reporting period is significantly lower than the national 2006-2008 rates of 1.9 CLABSIs/1000 central line days

Table 12: Measures of Central Line-Associated Bloodstream Infections (CLABSIs) by Type of Intensive Care Unit (ICU), Tennessee [Reporting period: 01/01/2011–06/30/2011]

Location = Medical-Surgical Critical Care, Major Teaching

	INCIDENCE DENSITY RATE (LINE DAYS)				DEVICE UTILIZATION		INCIDENCE DENSITY RATE (INPATIENT DAYS)	
Hospital	RATE*	Lower Limit	Upper limit	TN %ile	DU(%)	TN %ile	INPATIENT DAYS	RATE**
Erlanger Medical Center	0.0	0.0	3.7	25	60	75	1670	0.0
Johnson City Medical Center	0.0	0.0	1.7	25	68	100	3173	0.0
Methodist University Healthcare- Memphis	3.1	1.0	7.2	75	63	88	2572	1.9
Nashville General Hospital at Meharry	1.1	0.0	6.2	50	57	63	1573	0.6
Regional Medical Center- Memphis	3.6	1.2	8.5	100	51	38	2668	1.9

Data reported as of May 15, 2012
**** per 1000 central line days***
***** per 1000 inpatient days***
TN%ile = percentile in TN (01/01/2011–06/30/2011)
DU(%) = device utilization(%)
NA = not reported due to central line days <50
Red highlighting indicates rate for reporting period is significantly higher than the national 2006-2008 rate of 2.1 CLABSIs/1000 central line days
Blue highlighting indicates rate for reporting period is significantly lower than the national 2006-2008 rate of 2.1 CLABSIs/1000 central line days

Table 13: Measures of Central Line-Associated Bloodstream Infections (CLABSIs) by Type of Intensive Care Unit (ICU), Tennessee [Reporting period: 01/01/2011–06/30/2011]

Location = Medical-Surgical Critical Care, Non-Major Teaching with ≤15 beds

	INCIDENCE DENSITY RATE (LINE DAYS)				DEVICE UTILIZATION		INCIDENCE DENSITY RATE (INPATIENT DAYS)	
Hospital	RATE*	Lower Limit	Upper limit	TN %ile	DU(%)	TN %ile	INPATIENT DAYS	RATE**
Athens Regional Medical Center	0.0	0.0	18.2	17	37	72	553	0.0
Baptist Memorial Hospital for Women	NA	NA	NA	NA	22	47	51	NA
Baptist Memorial Hospital- Huntingdon	NA	NA	NA	NA	2	6	280	NA
Baptist Memorial Hospital- Union City	0.0	0.0	31.3	17	20	41	603	0.0
Bristol Regional Medical Center	0.6	0.0	3.6	33	48	84	3270	0.3
Claiborne County Hospital	0.0	0.0	47.9	17	14	28	546	0.0
Crockett Hospital	0.0	0.0	22.1	17	24	50	699	0.0
Cumberland Medical Center	0.0	0.0	9.1	17	31	63	1331	0.0
Delta Medical Center	0.0	0.0	10.9	17	53	94	637	0.0
Dyersburg Regional Medical Center	0.0	0.0	10.6	17	29	59	1196	0.0
Grandview Medical Center	0.0	0.0	59.5	17	28	56	218	0.0
Harton Regional Medical Center	0.0	0.0	11.1	17	27	53	1236	0.0
Hendersonville Medical Center	0.0	0.0	7.2	17	38	75	1352	0.0
Henry County Medical Center	0.0	0.0	49.2	17	11	19	654	0.0
Heritage Medical Center	0.0	0.0	11.4	17	35	69	937	0.0
Horizon Medical Center	2.2	0.1	12.4	50	50	91	900	1.1
Jefferson Memorial Hospital	0.0	0.0	52.7	17	11	19	637	0.0
Jellico Community Hospital	0.0	0.0	57.6	17	13	25	485	0.0
Lafollette Medical Center	NA	NA	NA	NA	6	13	636	NA
Lakeway Regional Hospital	0.0	0.0	52.7	17	12	22	595	0.0
Laughlin Memorial Hospital	0.0	0.0	29.3	17	17	34	760	0.0
LeConte Medical Center	5.1	0.6	18.4	100	40	78	972	2.1
Lincoln Medical Center	NA	NA	NA	NA	5	9	530	NA
Livingston Regional Hospital	0.0	0.0	58.6	17	10	16	660	0.0
Memorial North Park Hospital	0.0	0.0	30.0	17	13	25	938	0.0
Methodist Healthcare Germantown	0.0	0.0	4.0	17	56	97	1645	0.0
Morristown-Hamblen Healthcare System	0.0	0.0	11.2	17	13	25	2632	0.0
NorthCrest Medical Center	0.0	0.0	9.2	17	32	66	1250	0.0
Parkridge East Hospital	0.0	0.0	22.1	17	21	44	784	0.0
Physician's Regional Medical Center	0.0	0.0	10.5	17	41	81	870	0.0
Roane Medical Center	0.0	0.0	29.3	17	24	50	536	0.0
Southern Tennessee Medical Center	0.0	0.0	13.0	17	19	38	1503	0.0
Sycamore Shoals Hospital	0.0	0.0	22.8	17	15	31	1054	0.0
Takoma Regional Hospital	0.0	0.0	38.8	17	12	22	777	0.0

Hospital	INCIDENCE DENSITY RATE (LINE DAYS)				DEVICE UTILIZATION		INCIDENCE DENSITY RATE (INPATIENT DAYS)	
	RATE*	Lower Limit	Upper limit	TN %ile	DU(%)	TN %ile	INPATIENT DAYS	RATE**
Turkey Creek Medical Center	2.3	0.1	12.6	67	49	88	899	1.1
University Medical Center- Lebanon	2.4	0.3	8.8	83	69	100	1181	1.7
Volunteer Community Hospital	0.0	0.0	27.5	17	24	50	561	0.0
Wellmont Hawkins County Hospital	0.0	0.0	41.0	17	19	38	473	0.0
White County Community Hospital	NA	NA	NA	NA	1	3	3478	NA

Data reported as of May 15, 2012
**** per 1000 central line days***
***** per 1000 inpatient days***
TN%ile = percentile in TN (01/01/2011–06/30/2011)
DU(%) = device utilization(%)
NA = not reported due to central line days <50
Red highlighting indicates rate for reporting period is significantly higher than the national 2006-2008 rate of 1.5 CLABSIs/1000 central line days
Blue highlighting indicates rate for reporting period is significantly lower than the national 2006-2008 rate of 1.5 CLABSIs/1000 central line days

Table 14: Measures of Central Line-Associated Bloodstream Infections (CLABSIs) by Type of of Intensive Care Unit (ICU), Tennessee [Reporting period: 01/01/2011–06/30/2011]

Location = Medical-Surgical Critical Care, Non-Major Teaching with >15 beds

	INCIDENCE DENSITY RATE (LINE DAYS)				DEVICE UTILIZATION		INCIDENCE DENSITY RATE (INPATIENT DAYS)	
Hospital	RATE*	Lower Limit	Upper limit	TN %ile	DU(%)	TN %ile	INPATIENT DAYS	RATE**
Centennial Medical Center	1.8	0.5	4.6	42	47	36	4765	0.8
Cookeville Regional Medical Center	2.8	0.9	6.5	83	56	57	3201	1.6
Gateway Medical Center	3.3	0.9	8.5	92	58	64	2074	1.9
Indian Path Medical Center	0.0	0.0	5.2	8	41	21	1699	0.0
Maury Regional Medical Center	2.6	0.8	6.0	67	65	86	2985	1.7
Methodist Healthcare North	0.0	0.0	2.6	8	43	29	3294	0.0
Methodist Healthcare South	1.3	0.0	7.5	31	38	7	1971	0.5
Methodist Medical Center of Oak Ridge	0.0	0.0	1.5	8	66	93	3668	0.0
Middle Tennessee Medical Center	2.7	0.7	7.0	75	38	7	3822	1.0
Parkwest Medical Center- Knoxville	2.5	1.0	5.2	58	65	86	4292	1.6
Physician's Regional Medical Center	1.6	0.3	4.8	33	59	71	3136	1.0
Regional Hospital of Jackson	0.0	0.0	4.7	8	40	14	1994	0.0
Skyline Medical Center	0.0	0.0	2.3	8	50	43	3255	0.0
Southern Hills Medical Center	3.7	0.8	10.9	100	53	50	1507	2.0
St. Francis Hospital- Bartlett	0.0	0.0	2.8	8	56	57	2372	0.0
St. Francis Hospital- Memphis	0.8	0.0	4.4	25	64	79	1986	0.5
St. Thomas Hospital	0.5	0.1	1.8	17	72	100	5513	0.4
Sumner Regional Medical Center	2.0	0.2	7.2	50	47	36	2157	0.9

Data reported as of May 15, 2012
**** per 1000 central line days***
***** per 1000 inpatient days***
TN%ile = percentile in TN (01/01/2011–06/30/2011)
DU(%) = device utilization(%)
NA = not reported due to central line days <50
Red highlighting indicates rate for reporting period is significantly higher than the national 2006-2008 rate of 1.5 CLABSIs/1000 central line days
Blue highlighting indicates rate for reporting period is significantly lower than the national 2006-2008 rate of 1.5 CLABSIs/1000 central line days

Table 15: Measures of Central Line-Associated Bloodstream Infections (CLABSIs) by Type of of Intensive Care Unit (ICU), Tennessee [Reporting period: 01/01/2011–06/30/2011]

Location = Neurological Critical Care

	INCIDENCE DENSITY RATE (LINE DAYS)				DEVICE UTILIZATION		INCIDENCE DENSITY RATE (INPATIENT DAYS)	
Hospital	RATE*	Lower Limit	Upper limit	TN %ile	DU(%)	TN %ile	INPATIENT DAYS	RATE**
St. Francis Hospital- Memphis	0.0	0.0	5.4	100	58	100	1185	0.0

Data reported as of May 15, 2012
**** per 1000 central line days***
***** per 1000 inpatient days***
TN%ile = percentile in TN (01/01/2011–06/30/2011)
DU(%) = device utilization(%)
NA = not reported due to central line days <50
Red highlighting indicates rate for reporting period is significantly higher than the national 2006-2008 rate of 1.4 CLABSIs/1000 central line days
Blue highlighting indicates rate for reporting period is significantly lower than the national 2006-2008 rate of 1.4 CLABSIs/1000 central line days

Table 16: Measures of Central Line-Associated Bloodstream Infections (CLABSIs) by Type of Intensive Care Unit (ICU), Tennessee [Reporting period: 01/01/2011–06/30/2011]

Location = Neurosurgical Critical Care

	INCIDENCE DENSITY RATE (LINE DAYS)				DEVICE UTILIZATION		INCIDENCE DENSITY RATE (INPATIENT DAYS)	
Hospital	RATE*	Lower Limit	Upper limit	TN %ile	DU(%)	TN %ile	INPATIENT DAYS	RATE**
Baptist Memorial Hospital- Memphis	0.0	0.0	4.4	25	52	67	1588	0.0
Erlanger Medical Center	0.0	0.0	7.1	25	39	33	1327	0.0
Fort Sanders Regional Medical Center	0.0	0.0	6.0	25	54	100	1139	0.0
Jackson Madison County General Hospital	5.0	0.6	18.1	100	53	83	750	2.7
Methodist University Healthcare- Memphis	1.0	0.0	5.4	50	39	33	2635	0.4
Skyline Medical Center	0.0	0.0	4.8	25	43	50	1760	0.0
Vanderbilt Medical Center	1.3	0.2	4.8	75	27	17	5529	0.4

Data reported as of May 15, 2012
**** per 1000 central line days***
***** per 1000 inpatient days***
TN%ile = percentile in TN (01/01/2011–06/30/2011)
DU(%) = device utilization(%)
NA = not reported due to central line days <50
Red highlighting indicates rate for reporting period is significantly higher than the national 2006-2008 rate of 2.5 CLABSIs/1000 central line days
Blue highlighting indicates rate for reporting period is significantly lower than the national 2006-2008 rate of 2.5 CLABSIs/1000 central line days

Table 17: Measures of Central Line-Associated Bloodstream Infections (CLABSIs) by Type of Intensive Care Unit (ICU), Tennessee [Reporting period: 01/01/2011–06/30/2011]

Location = Pediatric Medical-Surgical Critical Care

	INCIDENCE DENSITY RATE (LINE DAYS)				DEVICE UTILIZATION		INCIDENCE DENSITY RATE (INPATIENT DAYS)	
Hospital	RATE*	Lower Limit	Upper limit	TN %ile	DU(%)	TN %ile	INPATIENT DAYS	RATE**
East Tennessee Children's Hospital	0.0	0.0	7.7	20	45	50	1059	0.0
Jackson Madison County General Hospital	NA	NA	NA	NA	4	13	411	NA
Johnson City Medical Center	0.0	0.0	15.3	20	32	38	757	0.0
MCJ Children's Hospital at Vanderbilt	0.9	0.2	2.5	60	63	88	5516	0.5
Methodist Healthcare LeBonheur	0.7	0.0	4.0	40	52	75	2696	0.4
St. Jude Children's Research Hospital	1.4	0.0	7.6	80	89	100	827	1.2
TC Thompson Children's Hospital (Erlanger)	1.6	0.0	8.7	100	46	63	1392	0.7
University of Tennessee Medical Center	0.0	0.0	37.6	20	20	25	495	0.0

Data reported as of May 15, 2012
**** per 1000 central line days***
***** per 1000 inpatient days***
TN%ile = percentile in TN (01/01/2011–06/30/2011)
DU(%) = device utilization(%)
NA = not reported due to central line days <50
Red highlighting indicates rate for reporting period is significantly higher than the national 2006-2008 rate of 2.9 CLABSIs/1000 central line days
Blue highlighting indicates rate for reporting period is significantly lower than the national 2006-2008 rate of 2.9 CLABSIs/1000 central line days

Table 18: Measures of Central Line-Associated Bloodstream Infections (CLABSIs) by Type of Intensive Care Unit (ICU), Tennessee [Reporting period: 01/01/2011–06/30/2011]

Location = Pediatric Medical Critical Care

	INCIDENCE DENSITY RATE (LINE DAYS)				DEVICE UTILIZATION		INCIDENCE DENSITY RATE (INPATIENT DAYS)	
Hospital	RATE*	Lower Limit	Upper limit	TN %ile	DU(%)	TN %ile	INPATIENT DAYS	RATE**
Holston Valley Medical Center	NA	NA	NA	NA	3	100	181	NA

Data reported as of May 15, 2012
**** per 1000 central line days***
***** per 1000 inpatient days***
TN%ile = percentile in TN (01/01/2011–06/30/2011)
DU(%) = device utilization(%)
NA = not reported due to central line days <50
Red highlighting indicates rate for reporting period is significantly higher than the national 2006-2008 rate of 1.3 CLABSIs/1000 central line days
Blue highlighting indicates rate for reporting period is significantly lower than the national 2006-2008 rate of 1.3 CLABSIs/1000 central line days

Table 19: Measures of Central Line-Associated Bloodstream Infections (CLABSIs) by Type of Intensive Care Unit (ICU), Tennessee [Reporting period: 01/01/2011–06/30/2011]

Location = Pediatric Surgical Cardiothoracic Critical Care

	INCIDENCE DENSITY RATE (LINE DAYS)				DEVICE UTILIZATION		INCIDENCE DENSITY RATE (INPATIENT DAYS)	
Hospital	RATE*	Lower Limit	Upper limit	TN %ile	DU(%)	TN %ile	INPATIENT DAYS	RATE**
Methodist Healthcare LeBonheur	3.2	0.4	11.7	100	69	100	897	2.2

Data reported as of May 15, 2012
**** per 1000 central line days***
***** per 1000 inpatient days***
TN%ile = percentile in TN (01/01/2011–06/30/2011)
DU(%) = device utilization(%)
NA = not reported due to central line days <50
Red highlighting indicates rate for reporting period is significantly higher than the national 2006-2008 rate of 3.3 CLABSIs/1000 central line days
Blue highlighting indicates rate for reporting period is significantly lower than the national 2006-2008 rate of 3.3 CLABSIs/1000 central line days

Table 20: Measures of Central Line-Associated Bloodstream Infections (CLABSIs) by Type of Intensive Care Unit (ICU), Tennessee [Reporting period: 01/01/2011–06/30/2011]

Location = Surgical Cardiothoracic Critical Care

	INCIDENCE DENSITY RATE (LINE DAYS)				DEVICE UTILIZATION		INCIDENCE DENSITY RATE (INPATIENT DAYS)	
Hospital	RATE*	Lower Limit	Upper limit	TN %ile	DU(%)	TN %ile	INPATIENT DAYS	RATE**
Baptist Memorial Hospital- Memphis	1.4	0.5	2.9	36	68	71	6515	0.9
Bristol Regional Medical Center	0.0	0.0	6.0	9	46	21	1356	0.0
Centennial Medical Center	1.1	0.0	6.1	27	99	100	918	1.1
Cookeville Regional Medical Center	1.5	0.0	8.4	55	49	36	1357	0.7
Erlanger Medical Center	2.5	0.3	9.0	91	67	64	1203	1.7
Fort Sanders Regional Medical Center	1.5	0.0	8.2	45	77	86	889	1.1
Holston Valley Medical Center	0.0	0.0	7.8	9	76	79	625	0.0
Jackson Madison County General Hospital	2.2	0.3	7.8	82	80	93	1149	1.7
Johnson City Medical Center	0.0	0.0	4.4	9	45	14	1877	0.0
Maury Regional Medical Center	0.0	0.0	39.2	9	46	21	204	0.0
Methodist Healthcare Germantown	2.1	0.3	7.5	73	48	29	2012	1.0
Methodist Healthcare North	3.9	0.8	11.5	100	43	7	1769	1.7
Methodist University Healthcare- Memphis	0.8	0.0	4.2	18	58	50	2308	0.4
St. Francis Hospital- Memphis	0.0	0.0	5.8	9	55	43	1164	0.0
Vanderbilt Medical Center	1.6	0.4	4.1	64	65	57	3863	1.0

Data reported as of May 15, 2012
**** per 1000 central line days***
***** per 1000 inpatient days***
TN%ile = percentile in TN (01/01/2011–06/30/2011)
DU(%) = device utilization(%)
NA = not reported due to central line days <50
Red highlighting indicates rate for reporting period is significantly higher than the national 2006-2008 rate of 1.4 CLABSIs/1000 central line days
Blue highlighting indicates rate for reporting period is significantly lower than the national 2006-2008 rate of 1.4 CLABSIs/1000 central line days

Table 21: Measures of Central Line-Associated Bloodstream Infections (CLABSIs) by Type of Intensive Care Unit (ICU), Tennessee [Reporting period: 01/01/2011–06/30/2011]

Location = Surgical Critical Care

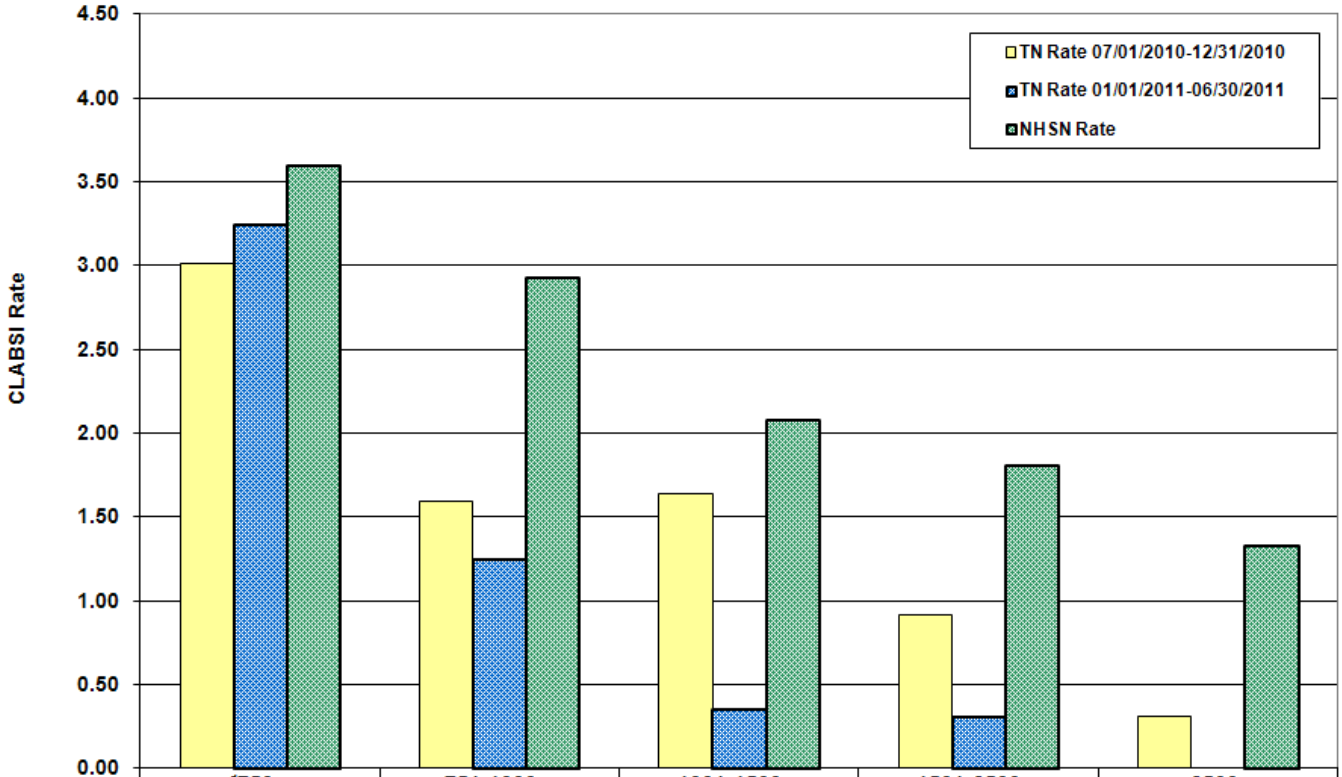
	INCIDENCE DENSITY RATE (LINE DAYS)				DEVICE UTILIZATION		INCIDENCE DENSITY RATE (INPATIENT DAYS)	
Hospital	RATE*	Lower Limit	Upper limit	TN %ile	DU(%)	TN %ile	INPATIENT DAYS	RATE**
Baptist Hospital- Nashville	0.8	0.0	4.4	33	56	33	2220	0.5
Blount Memorial Hospital	0.0	0.0	6.2	17	55	22	1079	0.0
Erlanger Medical Center	4.4	1.2	11.2	83	57	44	1615	2.5
Holston Valley Medical Center	0.0	0.0	4.5	17	74	89	1106	0.0
Jackson Madison County General Hospital	4.8	2.2	9.2	100	75	100	2470	3.6
Memorial Healthcare System	2.8	0.8	7.1	67	57	44	2544	1.6
Methodist University Healthcare- Memphis	0.0	0.0	5.5	17	59	56	1149	0.0
Parkridge Medical Center	0.0	0.0	3.7	17	62	78	1584	0.0
SkyRidge Medical Center	1.4	0.0	7.6	50	52	11	1395	0.7
Summit Medical Center	0.0	0.0	5.0	17	60	67	1212	0.0
Vanderbilt Medical Center	0.0	0.0	1.3	17	52	11	5408	0.0

Data reported as of May 15, 2012
**** per 1000 central line days***
***** per 1000 inpatient days***
TN%ile = percentile in TN (01/01/2011–06/30/2011)
DU(%) = device utilization(%)
NA = not reported due to central line days <50
Red highlighting indicates rate for reporting period is significantly higher than the national 2006-2008 rate of 2.3 CLABSIs/1000 central line days
Blue highlighting indicates rate for reporting period is significantly lower than the national 2006-2008 rate of 2.3 CLABSIs/1000 central line days

CLABSI Figures and Tables

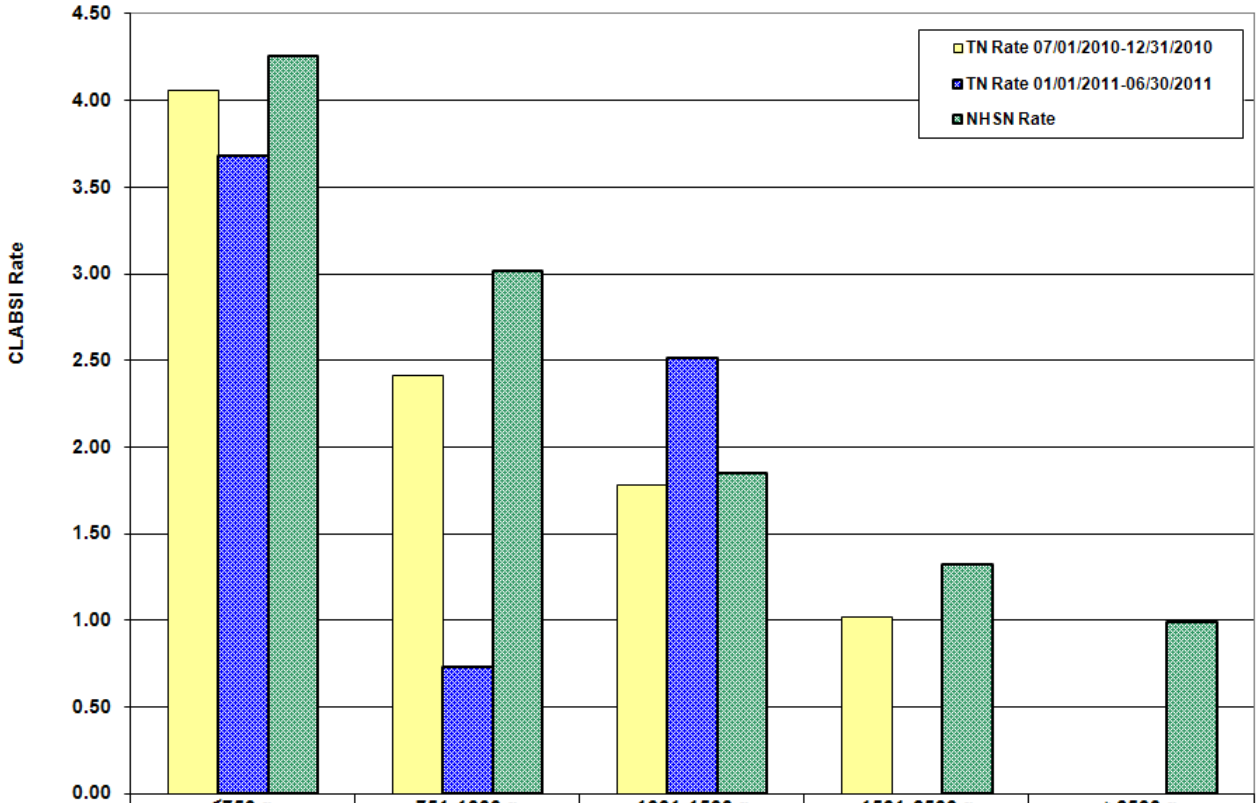
Neonatal Critical Care Units

Figure 22: Central Line-Associated Bloodstream Infection (CLABSI) Pooled Mean Rates per 1,000 Central Line Days in Level III Neonatal Intensive Care Units by Birth Weight Category, Tennessee, 2010 and 2011, vs. National Healthcare Safety Network (NHSN), 2006-8



	≤750 g	751-1000 g	1001-1500 g	1501-2500 g	>2500 g
TN Rate 07/01/2010-12/31/2010	3.01	1.59	1.64	0.92	0.31
TN Rate 01/01/2011-06/30/2011	3.24	1.25	0.35	0.31	0.00
NHSN Rate	3.60	2.93	2.08	1.81	1.33

Figure 23: Central Line-Associated Bloodstream Infection (CLABSI) Pooled Mean Rates per 1,000 Central Line Days in Level II/III Neonatal Intensive Care Units by Birth Weight Category, Tennessee, 2010 and 2011, vs. National Healthcare Safety Network (NHSN), 2006-8



	≤750 g	751-1000 g	1001-1500 g	1501-2500 g	>2500 g
TN Rate 07/01/2010-12/31/2010	4.06	2.41	1.78	1.02	0.00
TN Rate 01/01/2011-06/30/2011	3.68	0.73	2.51	0.00	0.00
NHSN Rate	4.26	3.02	1.85	1.32	0.99

Birth Weight

Figure 24: Central Line-Associated Bloodstream Infection (CLABSI) Standardized Infection Ratios (SIRs) for Neonatal Intensive Care Units (NICUs) by Quarter, Tennessee, 07/01/2008–06/30/2011 [Reference standard: National Healthcare Safety Network (NHSN), 2006-8]

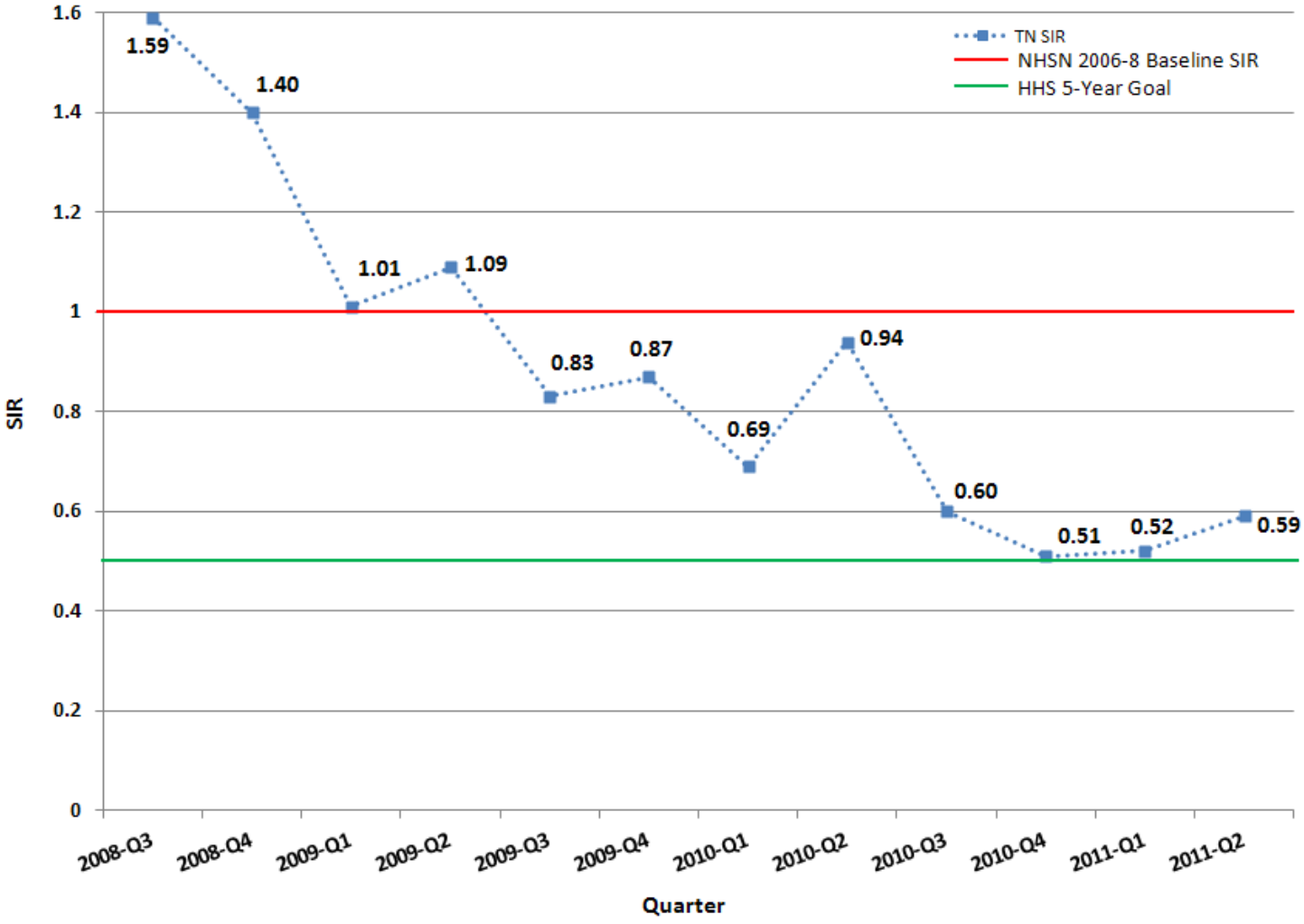
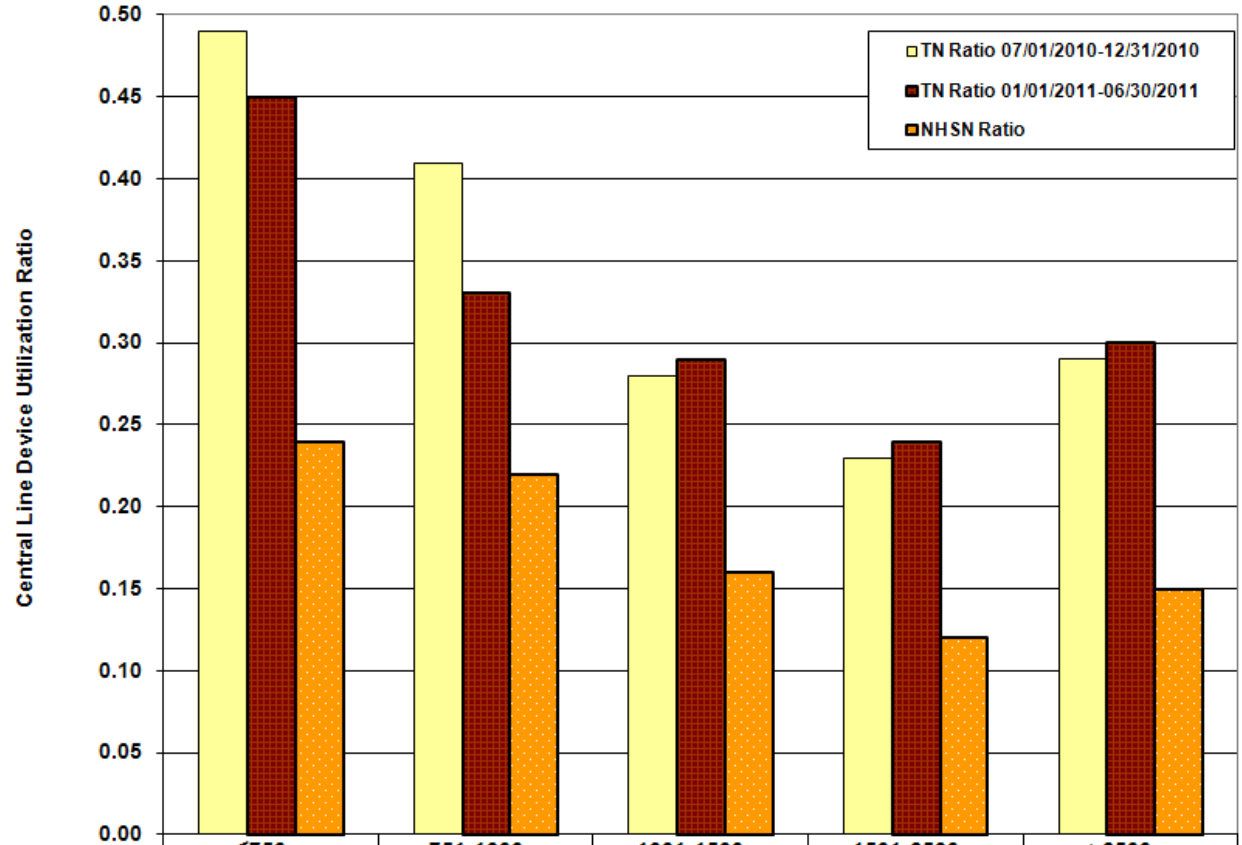


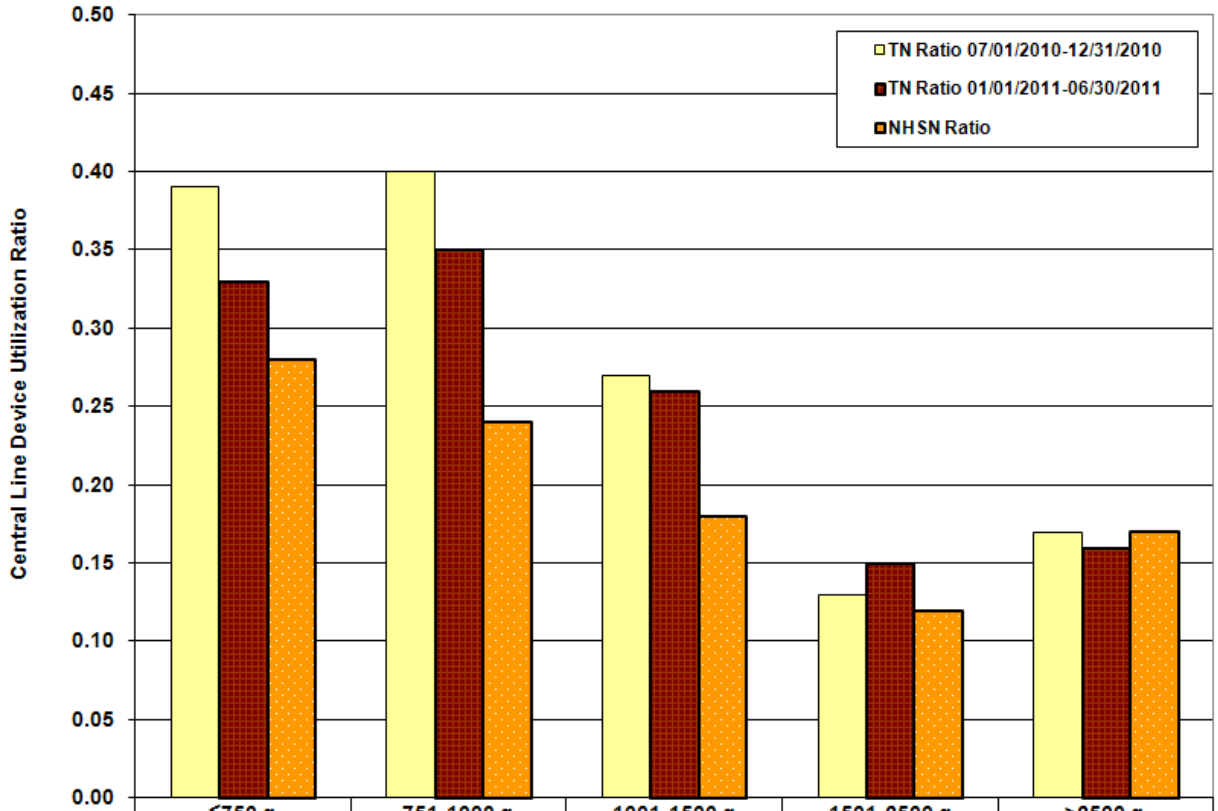
Figure 25: Central Line Utilization Ratios in Level III Neonatal Intensive Care Units (NICUs), Tennessee, 2010 and 2011, vs. National Healthcare Safety Network (NHSN), 2006-8



	≤750 g	751-1000 g	1001-1500 g	1501-2500 g	>2500 g
TN Ratio 07/01/2010-12/31/2010	0.49	0.41	0.28	0.23	0.29
TN Ratio 01/01/2011-06/30/2011	0.45	0.33	0.29	0.24	0.30
NHSN Ratio	0.24	0.22	0.16	0.12	0.15

Birth Weight

Figure 26: Central Line Utilization Ratios in Level II/III Neonatal Intensive Care Units (NICUs), Tennessee, 2010 and 2011, *vs.* National Healthcare Safety Network (NHSN), 2006-8



	≤750 g	751-1000 g	1001-1500 g	1501-2500 g	>2500 g
TN Ratio 07/01/2010-12/31/2010	0.39	0.40	0.27	0.13	0.17
TN Ratio 01/01/2011-06/30/2011	0.33	0.35	0.26	0.15	0.16
NHSN Ratio	0.28	0.24	0.18	0.12	0.17

Figure 27: Organisms Isolated from Central Line-Associated Bloodstream Infections (CLABSIs) in Neonatal Intensive Care Units, Tennessee, 01/01/2011–06/30/2011

Number of organisms = 29; number of events: 28

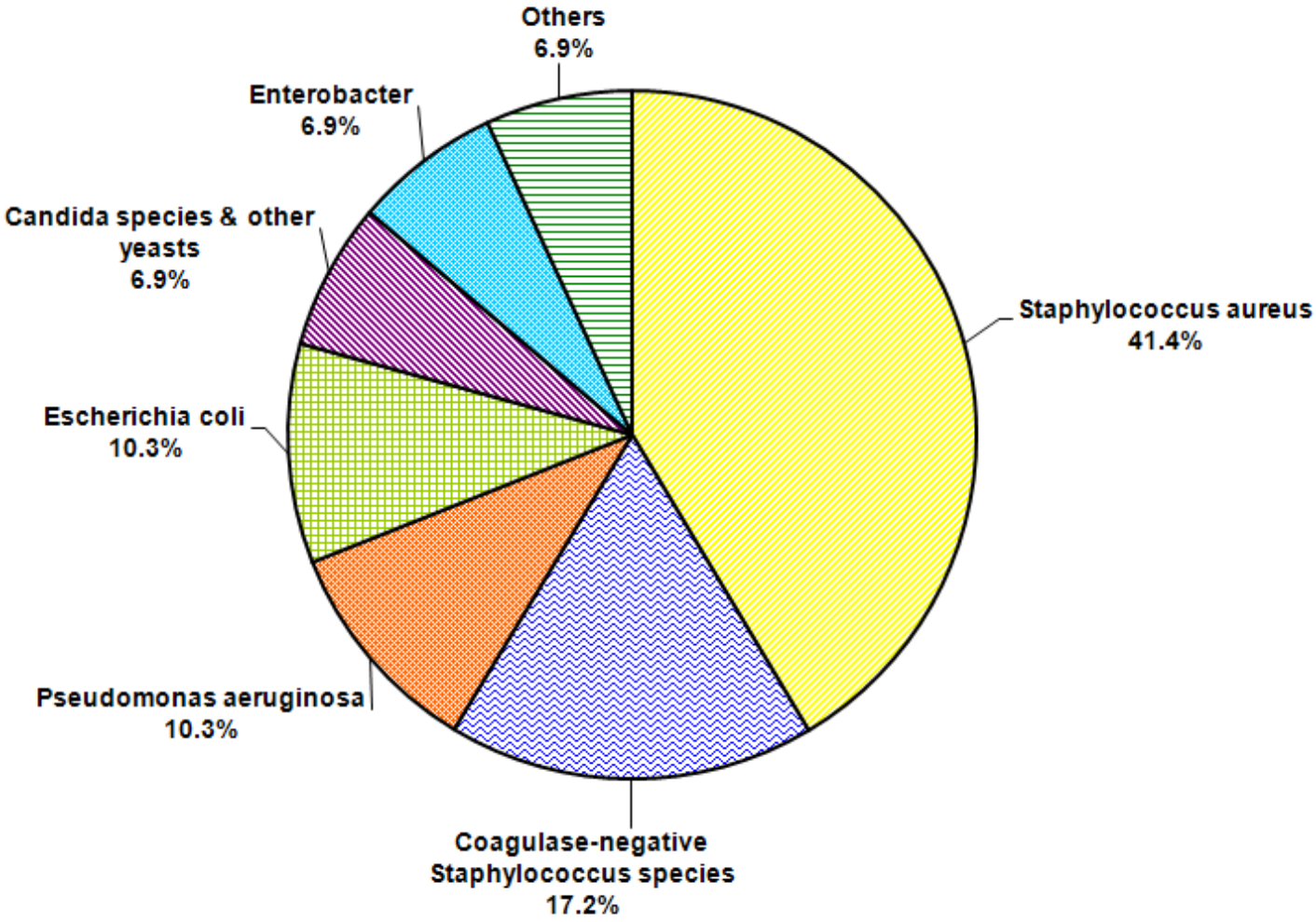


Table 22: Microorganisms Identified in Central Line -Associated Bloodstream Infections (CLABSIs), Neonatal Intensive Care Units, 01/01/2011–06/30/2011

Number of organisms = 29; number of events = 28

Microorganism	Number of Isolates	Percent
Staphylococcus aureus	12	41.4
Methicillin-resistant *S. aureus* (MRSA) (% of total positive isolates)	8	(29.6)
Coagulase-negative *Staphylococcus* species	5	17.2
Escherichia coli	3	10.3
Pseudomonas aeruginosa	3	10.3
Candida species & other yeasts	2	6.9
Enterobacter species	2	6.9
Other pathogens	2	6.9

Data reported as of May 15, 2012
***Other pathogens* = Enterococcus casseliflavus *(vancomycin-resistant)*, Klebsiella pneumoniae**

Table 23: Key Percentiles for Facility-Specific Central Line-Associated Bloodstream Infection (CLABSI) Standardized Infection Ratios (SIRs) by Reporting Year, Tennessee NICUs [Reporting period: 07/01/2008–06/30/2011]

			SIR, 95% CONFIDENCE INTERVAL, AND KEY PERCENTILES							
STATE	YEAR	No.	SIR	LOWER LIMIT	UPPER LIMIT	10%	25%	50%	75%	90%
Tennessee	2011	24	0.52	0.35	0.75	0.00	0.00	0.32	0.80	1.56
	2010	24	0.69	0.54	0.86	0.00	0.00	0.44	0.96	1.24
	2009	25	1.01	0.84	1.21	0.00	0.00	0.17	1.12	2.20
	2008	25	1.51	1.22	1.85	0.00	0.00	0.70	1.77	2.49

Data reported as of May 15, 2012
No . = number of facilities with reporting units; SIR = Standardized Infection Ratio (observed number/ statistically 'predicted' number of CLABSI)
Red highlighting indicates SIR for reporting period is significantly higher than national 2006-2008 SIR of 1.0
Blue highlighting indicates SIR for reporting period is significantly lower than national 2006-2008 SIR of 1.0

Table 24: Key Percentiles for Unit-Specific Central Line-Associated Bloodstream Infection (CLABSI) Standardized Infection Ratios (SIRs) by NICU Type and Reporting Year, Tennessee [Reporting period: 07/01/2008–06/30/2011]

			SIR, 95% CONFIDENCE INTERVAL, AND KEY PERCENTILES							
CCU TYPE	YEAR	No.	SIR	LOWER LIMIT	UPPER LIMIT	10%	25%	50%	75%	90%
Neonatal ICU Level III	2011	7	0.50	0.30	0.78	0.00	0.32	0.62	0.62	1.56
	2010	7	0.64	0.47	0.84	0.35	0.45	0.57	1.24	1.26
	2009	7	0.93	0.74	1.16	0.00	0.34	0.73	1.39	2.31
	2008	8	1.38	1.04	1.79	0.00	0.34	0.94	1.61	1.91
Neonatal ICU Level II/III	2011	17	0.58	0.27	1.10	0.00	0.00	0.00	1.03	1.32
	2010	17	0.80	0.52	1.18	0.00	0.00	0.00	0.90	1.08
	2009	18	1.23	0.89	1.67	0.00	0.00	0.00	0.60	2.20
	2008	17	1.79	1.25	2.49	0.00	0.00	0.00	2.44	2.51

Data reported as of May 15, 2012
No . = number of facilities with reporting units; SIR = Standardized Infection Ratio (observed number/ statistically 'predicted' number of CLABSI)
Red highlighting indicates SIR for reporting period is significantly higher than national 2006-2008 SIR of 1.0
Blue highlighting indicates SIR for reporting period is significantly lower than national 2006-2008 SIR of 1.0

Table 25: Comparison of Tennessee and National Healthcare Safety Network (NHSN) Central Line-Associated Bloodstream Infection (CLABSI) Rates and Standardized Infection Ratios (SIRs) by NICU Type [Reporting period: 01/01/2011–06/30/2011]

		TENNESSEE 01/01/2011 - 06/30/2011					NHSN 2006-2008			SIR AND 95% CONFIDENCE INTERVAL		
CCU TYPE	Birth Weight Category	No.	CLABSI	CL DAYS	POOLED MEAN*	MEDIAN RATE*	CLABSI	CL DAYS	POOLED MEAN*	SIR	LOWER LIMIT	UPPER LIMIT
Neonatal ICU Level III	≤ 750 grams	7	14	4325	3.2	3.2	559	155220	3.6	0.90	0.49	1.51
	751-1000 grams	7	3	2405	1.2	0.0	413	140785	2.9	0.43	0.09	1.24
	1001-1500 grams	7	1	2864	0.3	0.0	306	147305	2.1	0.17	0.00	0.94
	1501-2500 grams	7	1	3220	0.3	0.0	223	122883	1.8	0.17	0.00	0.95
	>2500 grams	7	0	2859	0.0	0.0	170	128245	1.3	0.00	0.00	0.97
	TOTAL	.	.	.	.	.	.	.	.	**0.50**	**0.30**	**0.78**
Neonatal ICU Level II/III	≤ 750 grams	17	4	1088	3.7	0.0	329	77283	4.3	0.86	0.24	2.21
	751-1000 grams	17	1	1373	0.7	0.0	199	65801	3.0	0.24	0.01	1.34
	1001-1500 grams	17	4	1596	2.5	0.0	145	78352	1.9	1.35	0.37	3.47
	1501-2500 grams	17	0	1735	0.0	0.0	82	62268	1.3	0.00	0.00	1.61
	>2500 grams	17	0	1498	0.0	0.0	65	65559	1.0	0.00	0.00	2.48
	TOTAL	.	.	.	.	.	.	.	.	0.58	0.27	1.10
TOTAL		.	.	.	.	.	.	.	.	**0.52**	**0.35**	**0.75**

Data reported as of May 15, 2012
No. = number of facilities with reporting units
CLDays = Central Line Days
SIR = Standardized Infection Ratio (observed number/ statistically 'predicted' number of CLABSI)
****per 1000 central line days***
Red highlighting indicates SIR for reporting period is significantly higher than national 2006-2008 SIR of 1.0
Blue highlighting indicates SIR for reporting period is significantly lower than national 2006-2008 SIR of 1.0

Table 26: Comparison of Tennessee Central Line-Associated Bloodstream Infection (CLABSI) Standardized Infection Ratios (SIRs) by NICU Type and Six-Month Period [Data shown for most recent two years: 07/01/2009–06/30/2011]

		Jul-Dec 2009 SIR AND 95% CONFIDENCE INTERVAL			Jan-Jun 2010 SIR AND 95% CONFIDENCE INTERVAL			Jul-Dec 2010 SIR AND 95% CONFIDENCE INTERVAL			Jan-Jun 2011 SIR AND 95% CONFIDENCE INTERVAL		
CCU TYPE		SIR	LOWER LIMIT	UPPER LIMIT	SIR	LOWER LIMIT	UPPER LIMIT	SIR	LOWER LIMIT	UPPER LIMIT	SIR	LOWER LIMIT	UPPER LIMIT
Neonatal ICU Level III	≤ 750 grams	0.99	0.58	1.59	0.77	0.33	1.52	0.89	0.44	1.59	0.90	0.49	1.51
	751-1000 grams	0.90	0.43	1.66	0.47	0.13	1.21	0.60	0.22	1.31	0.43	0.09	1.24
	1001-1500 grams	0.30	0.04	1.07	1.28	0.55	2.52	0.39	0.08	1.15	0.17	0.00	0.94
	1501-2500 grams	0.37	0.05	1.35	0.48	0.10	1.39	0.54	0.11	1.59	0.17	0.00	0.95
	>2500 grams	0.00	0.00	0.86	0.00	0.00	0.93	0.43	0.05	1.55	0.00	0.00	0.97
	TOTAL	0.70	0.47	0.99	0.65	0.41	0.98	0.62	0.40	0.92	0.50	0.30	0.78
Neonatal ICU Level II/III	≤ 750 grams	1.54	0.66	3.03	1.20	0.44	2.61	0.68	0.14	1.98	0.86	0.24	2.21
	751-1000 grams	1.81	0.83	3.43	0.99	0.32	2.30	0.54	0.07	1.95	0.24	0.01	1.34
	1001-1500 grams	0.69	0.08	2.50	1.57	0.58	3.41	0.29	0.01	1.61	1.35	0.37	3.47
	1501-2500 grams	0.00	0.00	1.33	1.51	0.31	4.41	0.00	0.00	1.96	0.00	0.00	1.61
	>2500 grams	1.15	0.14	4.16	0.00	0.00	2.24	0.00	0.00	2.60	0.00	0.00	2.48
	TOTAL	1.19	0.74	1.82	1.14	0.70	1.76	0.40	0.15	0.88	0.58	0.27	1.10
TOTAL		**0.84**	**0.62**	**1.10**	**0.81**	**0.59**	**1.10**	**0.56**	**0.38**	**0.80**	**0.52**	**0.35**	**0.75**

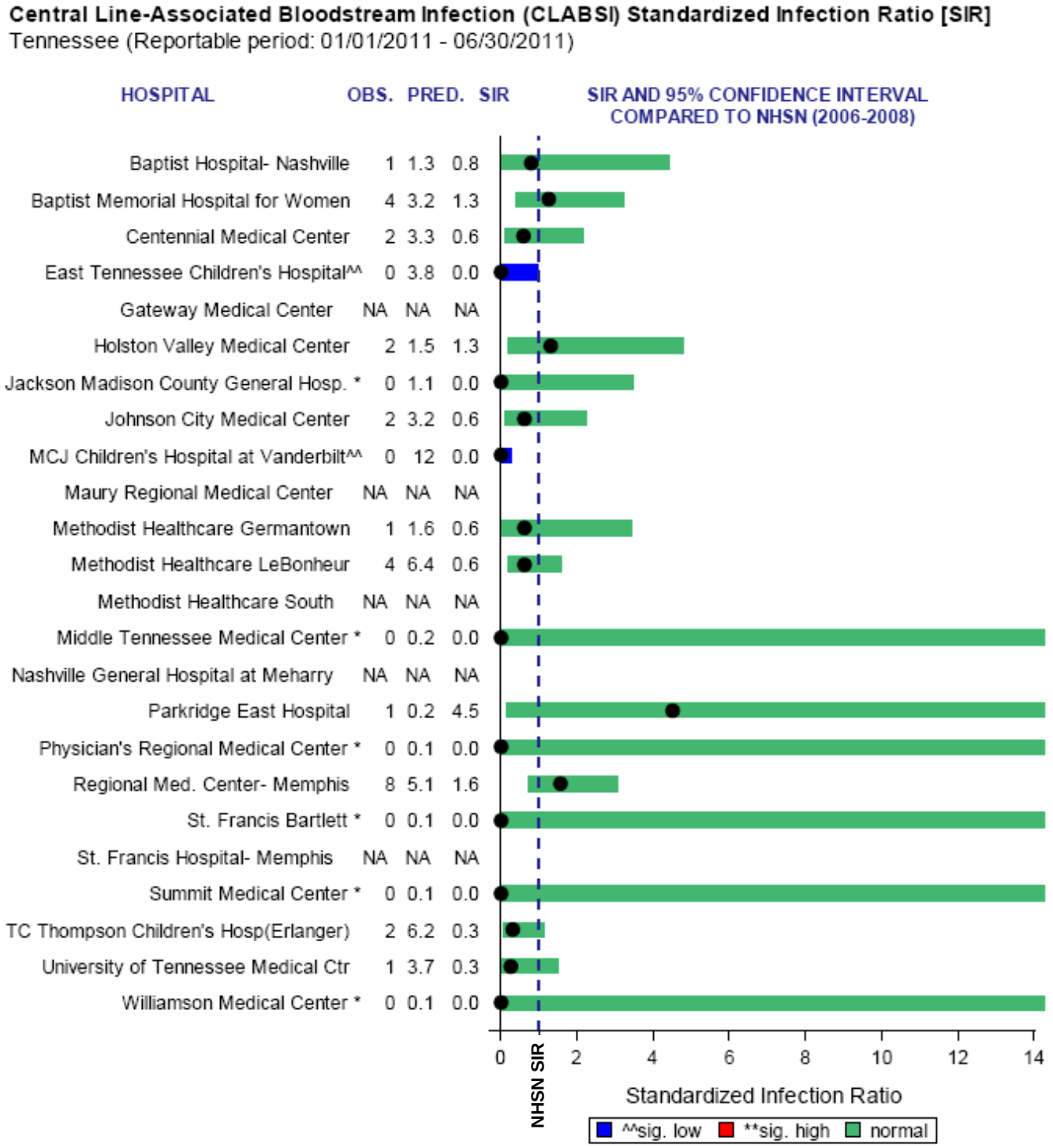
Data reported as of May 15, 2012
No. = number of facilities with reporting units
SIR = Standardized Infection Ratio (observed number/ statistically 'predicted' number of CLABSI)
Red highlighting indicates SIR for reporting period is significantly higher than national 2006-2008 SIR of 1.0
Blue highlighting indicates SIR for reporting period is significantly lower than national 2006-2008 SIR of 1.0

Table 27: Central Line-Associated Bloodstream Infection (CLABSI) Rates and Standardized Infection Ratios by NICU Type and Grand Division, Tennessee [Reporting period: 01/01/2011–06/30/2011]

	EAST							MIDDLE							WEST						
Critical Care Unit	No.	CLABSI/ UCABSI	LINE DAYS	POOLED MEAN*	SIR	Lower Limit	Upper Limit	No.	CLABSI/ UCABSI	LINE DAYS	POOLED MEAN*	SIR	Lower Limit	Upper Limit	No.	CLABSI/ UCABSI	LINE DAYS	POOLED MEAN*	SIR	Lower Limit	Upper Limit
Neonatal ICU Level III	2	4	3582	1.1	0.42	0.12	1.08	2	2	6828	0.3	0.13	0.02	0.46	3	13	5263	2.5	0.99	0.53	1.69
Neonatal ICU Level II/III	5	4	4306	0.9	0.43	0.12	1.10	7	1	981	1.0	0.56	0.01	3.12	5	4	2003	2.0	0.91	0.25	2.34
TOTAL	.	.	.	.	0.43	0.18	0.84	.	.	.	.	0.17	0.04	0.50	.	.	.	.	0.97	0.56	1.55

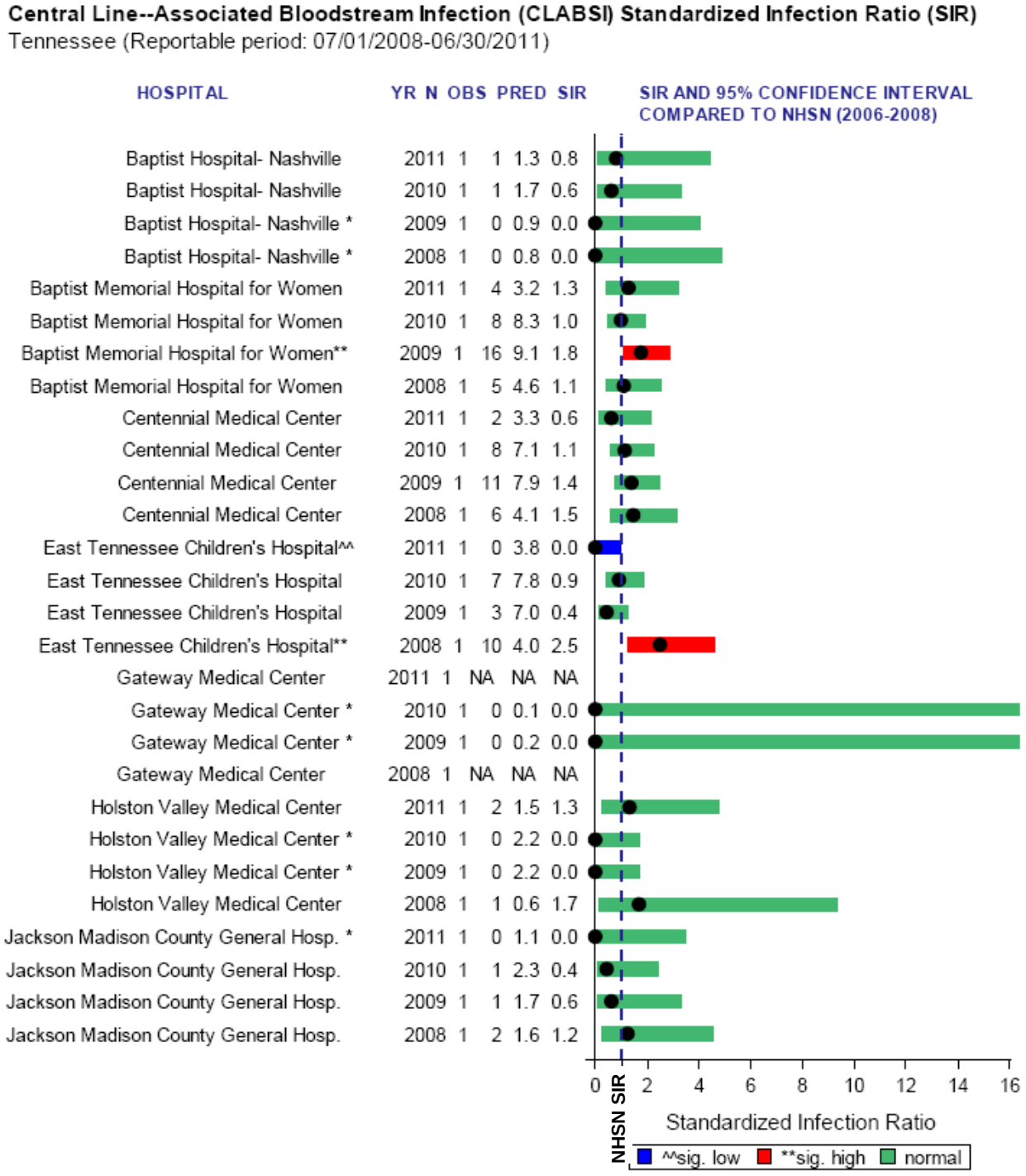
Data reported as of May 15, 2012
No. = number of facilities with reporting units
SIR = Standardized Infection Ratio (observed number/ statistically 'predicted' number of CLABSI)
****per 1000 line days***
Red highlighting indicates SIR for reporting period is significantly higher than national 2006-2008 SIR of 1.0
Blue highlighting indicates SIR for reporting period is significantly lower than national 2006-2008 SIR of 1.0

Figure 28: Summary Measure for CLABSIs in Neonatal Critical Care Units, One Standardized Infection Ratio (SIR) per Facility. Tennessee, 01/01/2011–06/30/2011



Data Reported from neonatal ICUs as of May 15, 2012.
Obs. = observed number of CLABSI
Pred. = statistically 'predicted' number of CLABSI, based on NHSN data
SIR = Standarized Infection Ratio (observed number / statistically 'predicted' number of CLABSI)
NA = data not shown for an entire hospital with <50 central line days
** *significantly higher than NHSN (2006-2008)*
^^ *significantly lower than NHSN (2006-2008)*
* *Zero infection, but not statistically significant*

Figure 29: Summary Measure for CLABSIs in Neonatal Critical Care Units, One Standardized Infection Ratio (SIR) per Facility per Year, Tennessee, 07/01/2008–06/30/2011

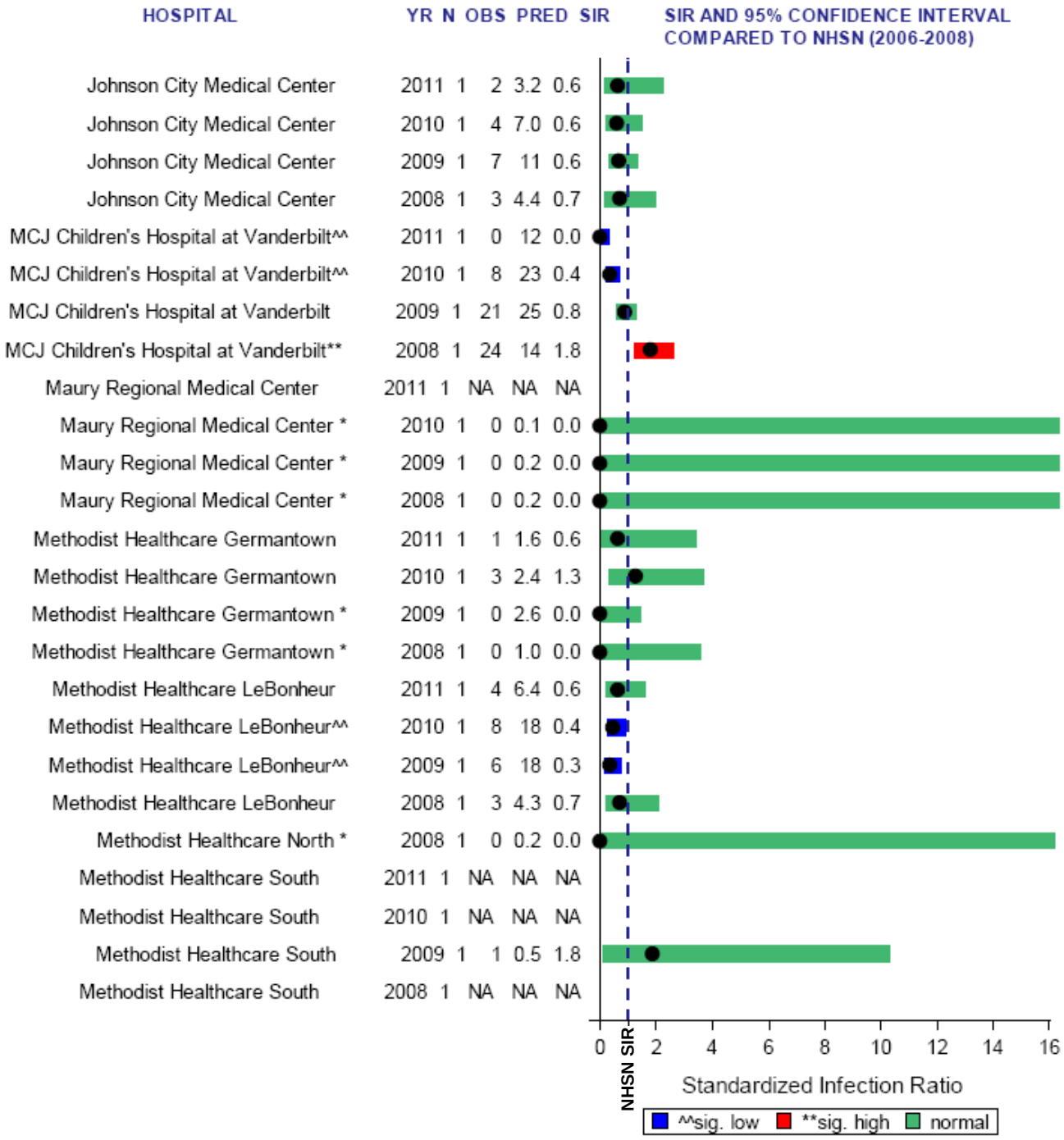


Data Reported from neonatal ICUs as of May 15, 2012.
Yr = reporting year
N = number of types of critical care units reportable from a given facility
Obs = observed number of CLABSI
Pred = statistically 'predicted' number of CLABSI, based on NHSN data
SIR = Standarized Infection Ratio (observed number / statistically 'predicted' number of CLABSI/UCABSI)
NA = data not shown for an entire hospital with <50 central line days
** *significantly higher than NHSN (2006-2008)*
^^ *significantly lower than NHSN (2006-2008)*
* *Zero infection, but not statistically significant*

Figure 29 (cont'd)

Central Line--Associated Bloodstream Infection (CLABSI) Standardized Infection Ratio (SIR)

Tennessee (Reportable period: 07/01/2008-06/30/2011)

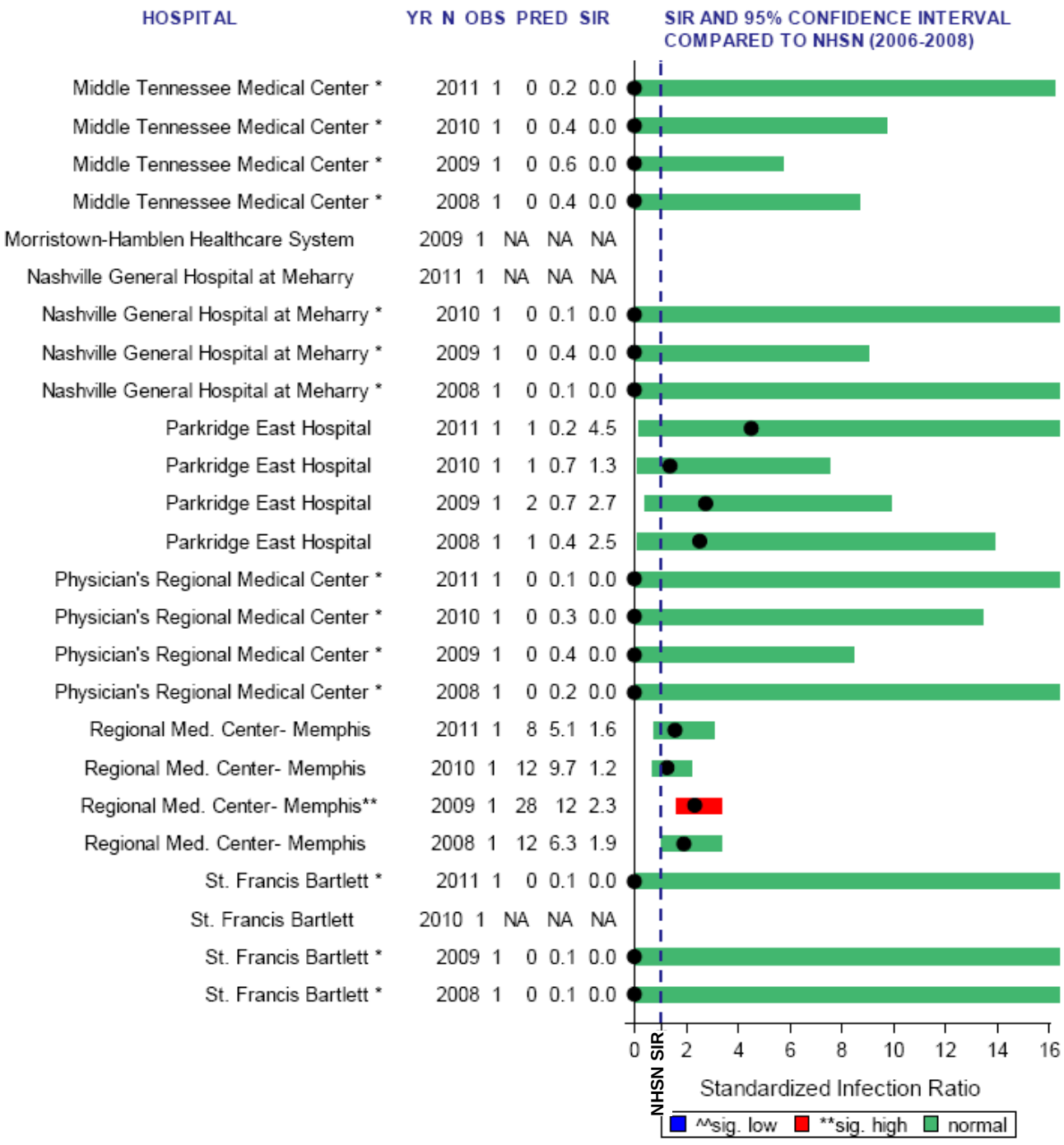


Data Reported from neonatal ICUs as of May 15, 2012.
Yr = reporting year
N = number of types of critical care units reportable from a given facility
Obs = observed number of CLABSI
Pred = statistically 'predicted' number of CLABSI, based on NHSN data
SIR = Standarized Infection Ratio (observed number / statistically 'predicted' number of CLABSI/UCABSI)
NA = data not shown for an entire hospital with <50 central line days
** *significantly higher than NHSN (2006-2008)*
^^ *significantly lower than NHSN (2006-2008)*
* *Zero infection, but not statistically significant*

Figure 29 (cont'd)

Central Line--Associated Bloodstream Infection (CLABSI) Standardized Infection Ratio (SIR)

Tennessee (Reportable period: 07/01/2008-06/30/2011)

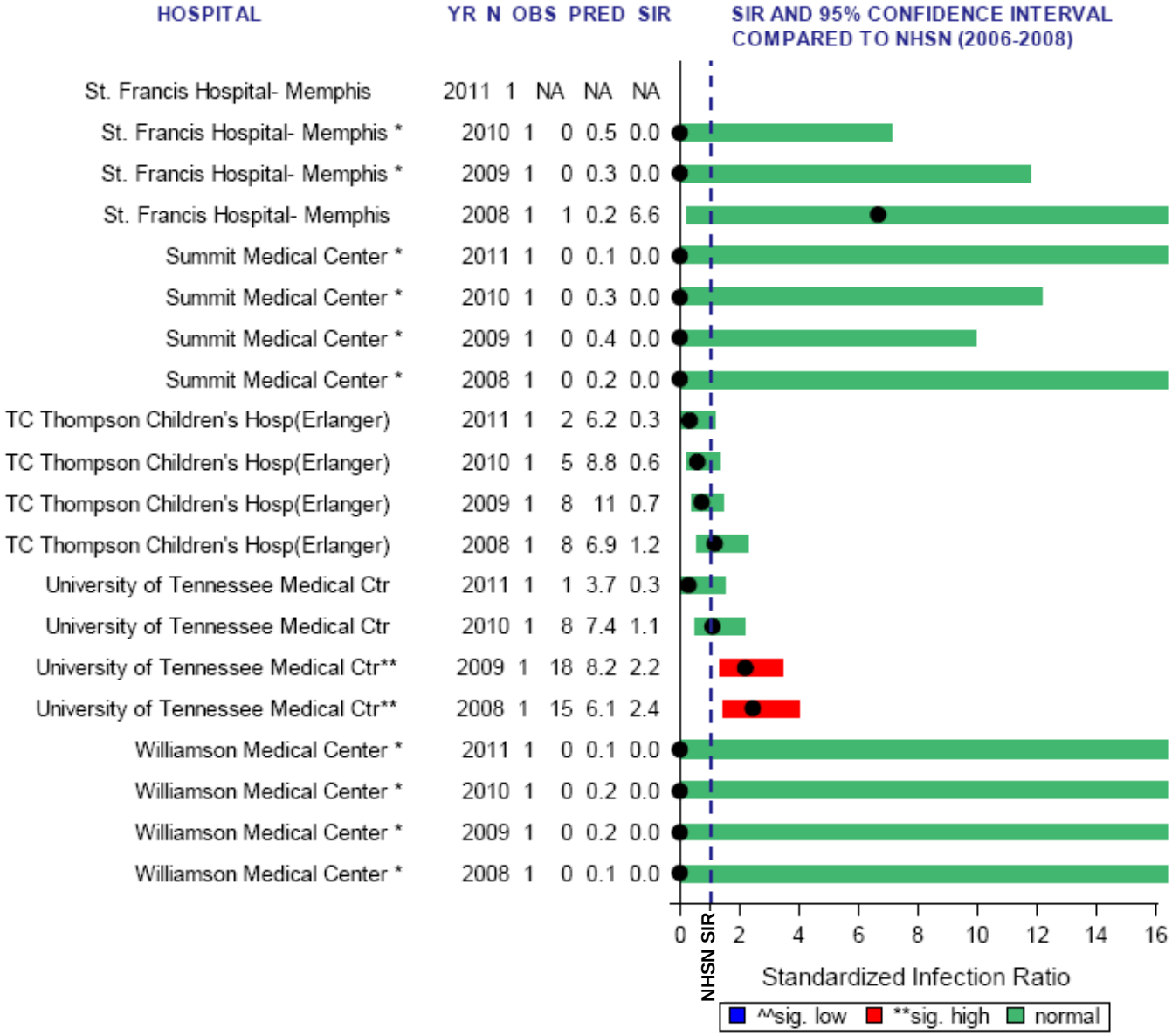


Data Reported from neonatal ICUs as of May 15, 2012.
Yr = reporting year
N = number of types of critical care units reportable from a given facility
Obs = observed number of CLABSI
Pred = statistically 'predicted' number of CLABSI, based on NHSN data
SIR = Standarized Infection Ratio (observed number / statistically 'predicted' number of CLABSI/UCABSI)
NA = data not shown for an entire hospital with <50 central line days
** *significantly higher than NHSN (2006-2008)*
^^ *significantly lower than NHSN (2006-2008)*
* *Zero infection, but not statistically significant*

Figure 29 (cont'd)

Central Line--Associated Bloodstream Infection (CLABSI) Standardized Infection Ratio (SIR)

Tennessee (Reportable period: 07/01/2008-06/30/2011)



Data Reported from neonatal ICUs as of May 15, 2012.
Yr = reporting year
N = number of types of critical care units reportable from a given facility
Obs = observed number of CLABSI
Pred = statistically 'predicted' number of CLABSI, based on NHSN data
SIR = Standarized Infection Ratio (observed number / statistically 'predicted' number of CLABSI/UCABSI)
NA = data not shown for an entire hospital with <50 central line days
** *significantly higher than NHSN (2006-2008)*
^^ *significantly lower than NHSN (2006-2008)*
* *Zero infection, but not statistically significant*

Table 28: Central Line-Associated Bloodstream Infection (CLABSI) Standardized Infection Ratios (SIRs) and Device Utilization (DU) Ratios in Level III Neonatal ICUs [Reporting period: 01/01/2011–06/30/2011]

Hospital	CLABSI			
	SIR	Lower Limit	Upper limit	DU(%)
Centennial Medical Center	0.60	0.07	2.16	18
Johnson City Medical Center	0.62	0.07	2.23	31
MCJ Children's Hospital at Vanderbilt	0.00	0.00	0.30	42
Methodist Healthcare Germantown	0.62	0.02	3.44	16
Methodist Healthcare LeBonheur	0.62	0.17	1.59	55
Regional Medical Center- Memphis	1.56	0.68	3.08	25
TC Thompson Children's Hosp(Erlanger)	0.32	0.04	1.16	24

Data reported as of May 15, 2012
TN%ile = percentile in TN
DU(%) = device utilization(%)
NA = not reported due to central line days <50
Red highlighting indicates SIR for reporting period is significantly higher than national 2006-2008 SIR of 1.0
Blue highlighting indicates SIR for reporting period is significantly lower than national 2006-2008 SIR of 1.0

Table 29: Central Line-Associated Bloodstream Infection (CLABSI) Standardized Infection Ratios (SIRs) and Device Utilization (DU) Ratios in Level II/III Neonatal ICUs [Reporting period: 01/01/2011–06/30/2011]

Hospital	CLABSI			
	SIR	Lower Limit	Upper limit	DU(%)
Baptist Hospital- Nashville	0.80	0.02	4.44	25
Baptist Memorial Hospital for Women	1.26	0.34	3.24	31
East Tennessee Children's Hospital	0.00	0.00	0.98	25
Gateway Medical Center	NA	NA	NA	2
Holston Valley Medical Center	1.32	0.16	4.78	35
Jackson Madison County General Hospital	0.00	0.00	3.47	11
Maury Regional Medical Center	NA	NA	NA	5
Methodist Healthcare South	NA	NA	NA	1
Middle Tennessee Medical Center	0.00	0.00	16.2	15
Nashville General Hospital at Meharry	NA	NA	NA	11
Parkridge East Hospital	4.51	0.11	25.1	11
Physician's Regional Medical Center	0.00	0.00	39.9	9
St. Francis Hospital- Bartlett	0.00	0.00	38.2	13
St. Francis Hospital- Memphis	NA	NA	NA	4
Summit Medical Center	0.00	0.00	29.0	100
University of Tennessee Medical Center	0.27	0.01	1.49	23
Williamson Medical Center	0.00	0.00	40.9	13

Data reported as of May 15, 2012
TN%ile = percentile in TN
DU(%) = device utilization(%)
NA = not reported due to central line days <50
Red highlighting indicates SIR for reporting period is significantly higher than national 2006-2008 SIR of 1.0
Blue highlighting indicates SIR for reporting period is significantly lower than national 2006-2008 SIR of 1.0

CLABSI Figures and Tables

Specialty Care Areas

Figure 30: Central Line-Associated Bloodstream Infection (CLABSI) Pooled Mean Rates per 1,000 Central Line Days by Specialty Care Area (SCA) Type, Permanent Central Lines, Tennessee, 2010 and 2011, vs. National Healthcare Safety Network (NHSN), 2006-8
Note: NHSN 2006-8 baseline data not available for pediatric bone marrow transplant SCAs

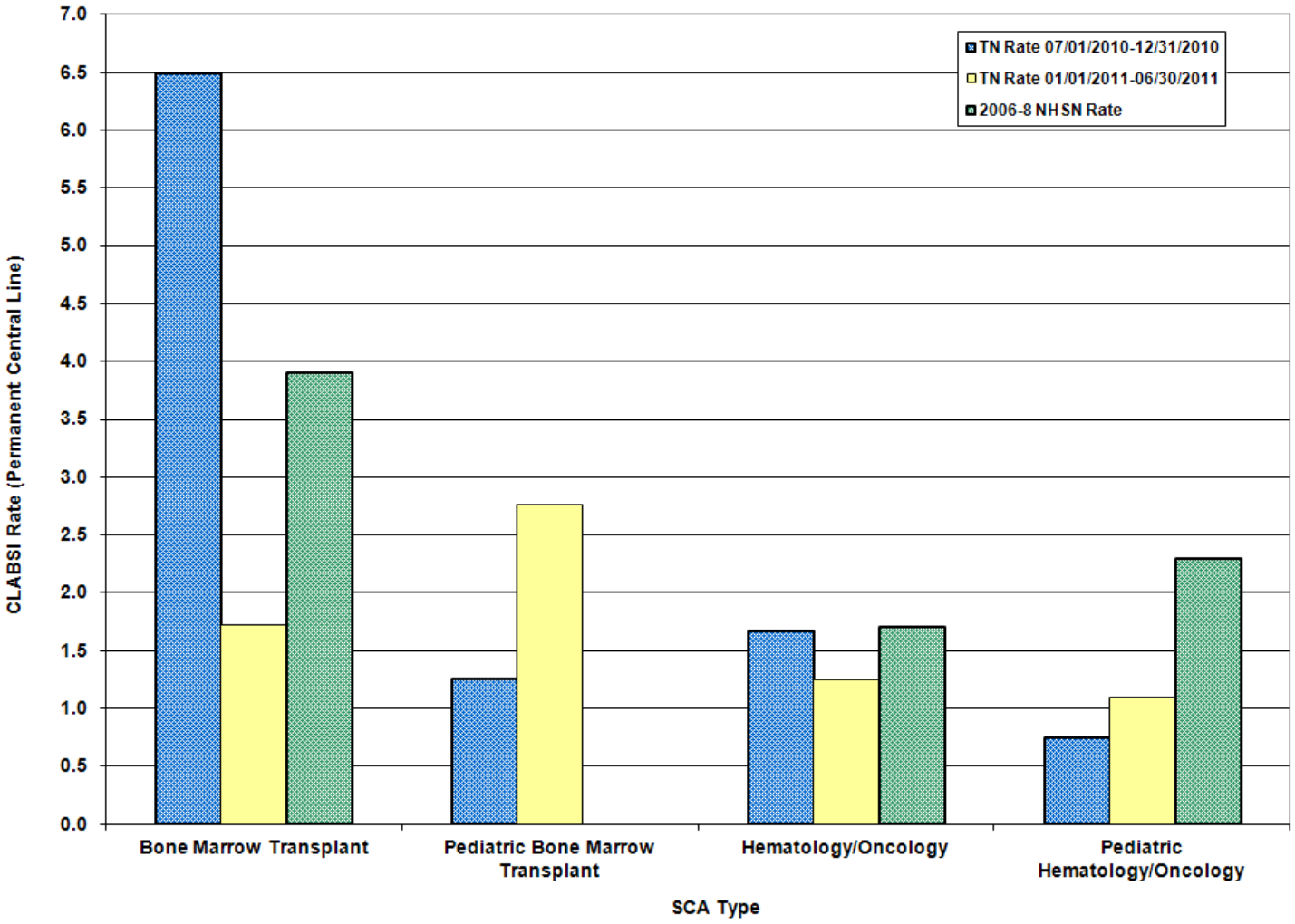


Figure 31: Central Line-Associated Bloodstream Infection (CLABSI) Pooled Mean Rates per 1,000 Central Line Days by Specialty Care Area (SCA) Type, Temporary Central Lines, Tennessee, 2010 and 2011, vs. National Healthcare Safety Network (NHSN), 2006-8
Note: NHSN 2006-8 baseline data not available for pediatric bone marrow transplant SCAs

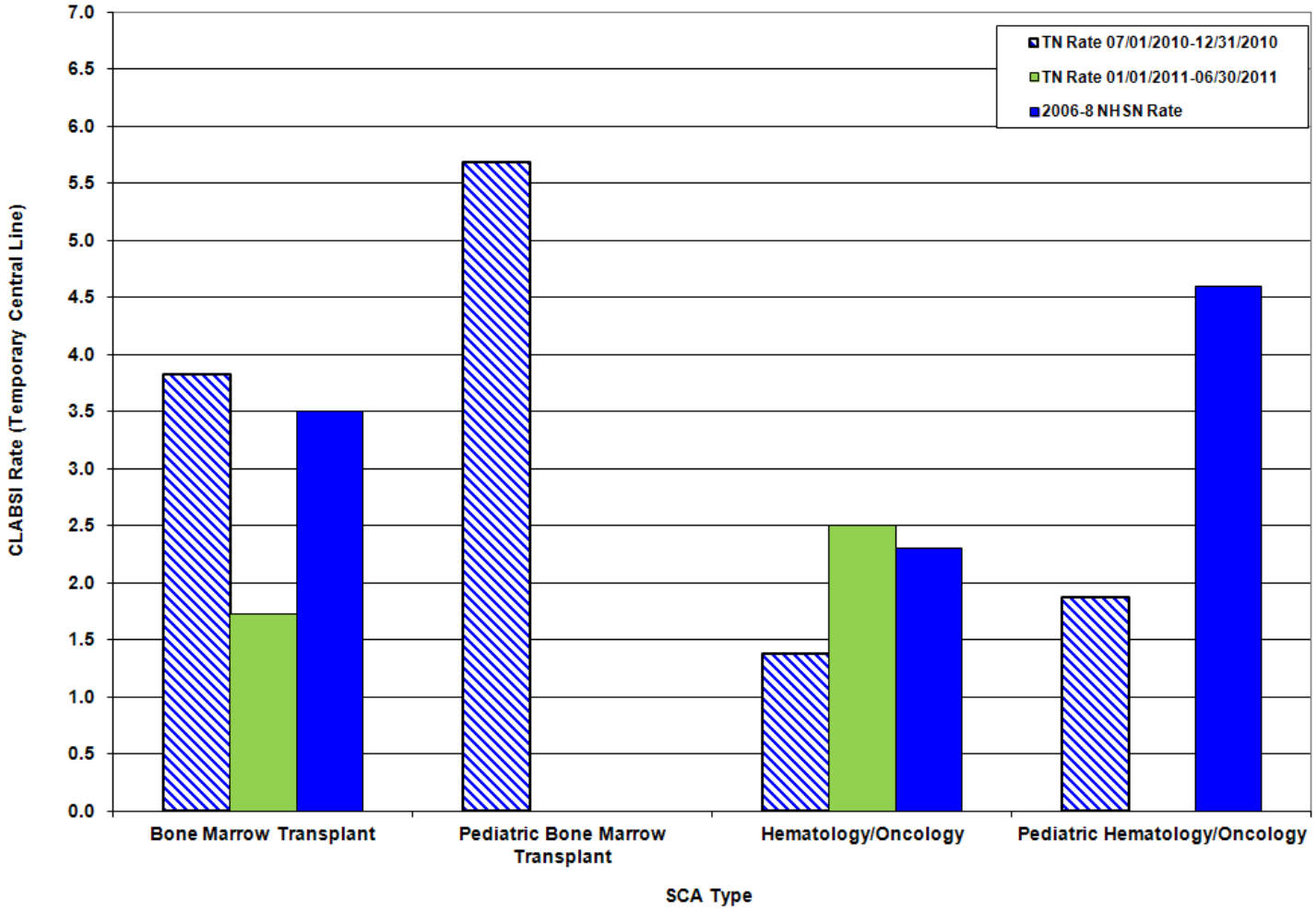


Figure 32: Standardized Infection Ratios (SIRs) for Central Line-Associated Bloodstream Infections (CLABSIs) by Specialty Care Area (SCA) Type, Tennessee, 2010 and 2011 [Reference standard: National Healthcare Safety Network (NHSN), 2006-8]
Note: NHSN 2006-8 baseline data not available for pediatric bone marrow transplant SCAs

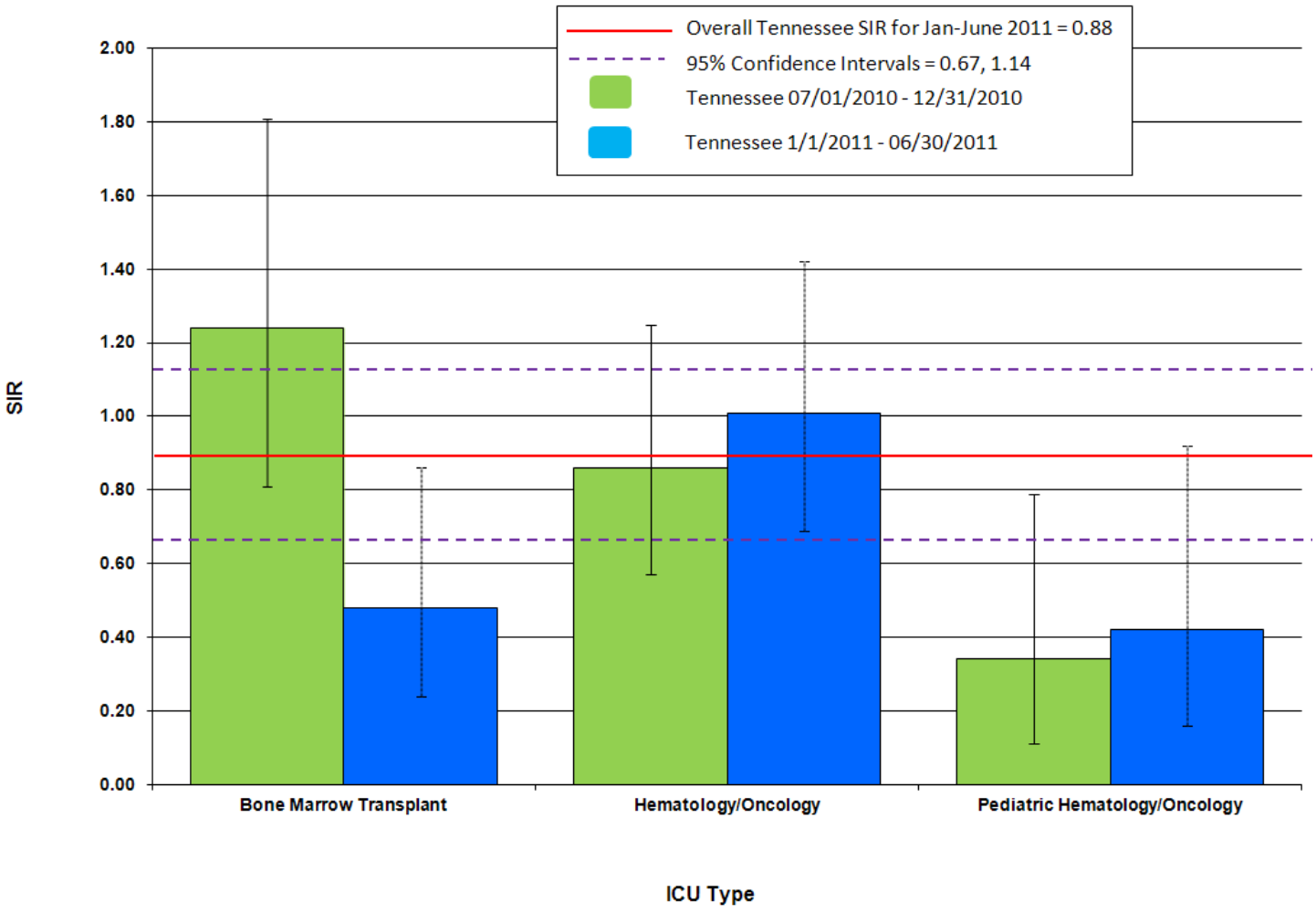


Figure 33: Standardized Infection Ratios (SIR) for Central Line-Associated Bloodstream Infections (CLABSIs) for Specialty Care Areas (SCAs) by Quarter, Tennessee, 07/2010–06/2011 [Reference standard: National Healthcare Safety Network (NHSN), 2006-8]
Note: NHSN 2006-8 baseline data not available for pediatric bone marrow transplant SCAs

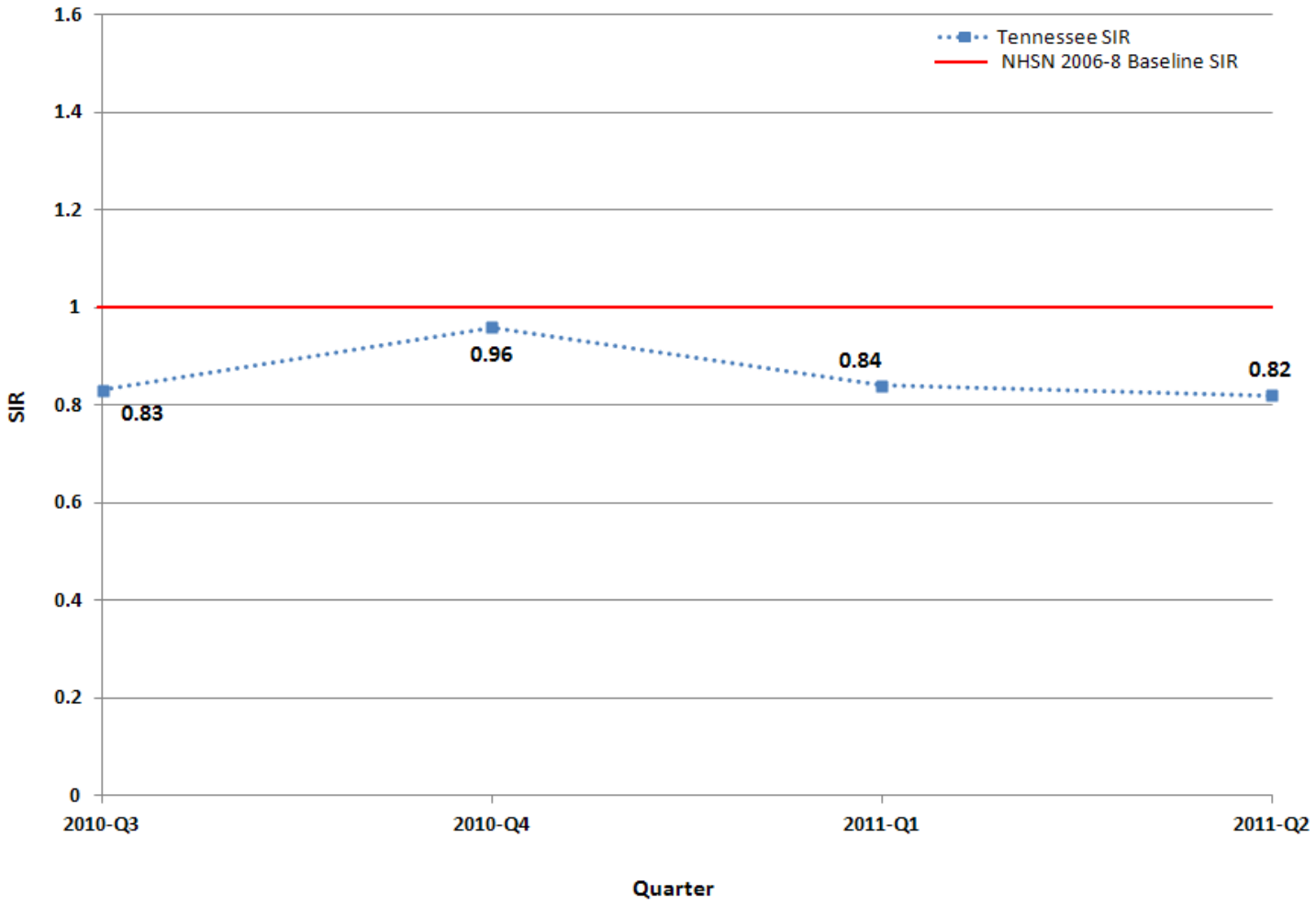


Figure 34: Central Line Utilization Ratio by Specialty Care Area (SCA), Permanent Central Lines, Tennessee, 2010 and 2011, vs. National Healthcare Safety Network (NHSN), 2006-8
Note: NHSN 2006-8 baseline data not available for pediatric bone marrow transplant SCAs

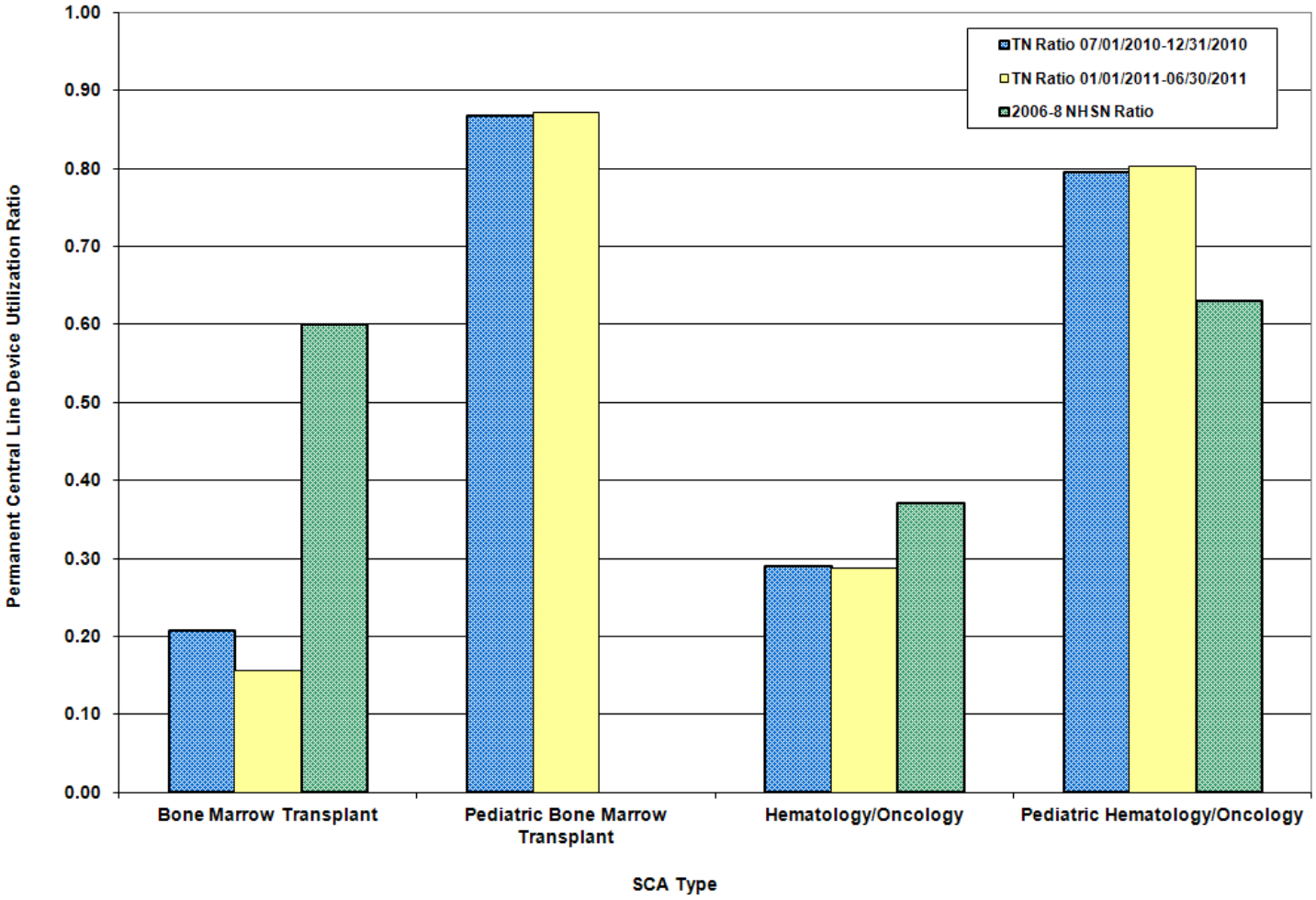


Figure 35: Central Line Utilization Ratio by Specialty Care Area (SCA), Temporary Central Lines, Tennessee, 2010 and 2011, vs. National Healthcare Safety Network (NHSN), 2006-8
Note: NHSN 2006-8 baseline data not available for pediatric bone marrow transplant SCAs

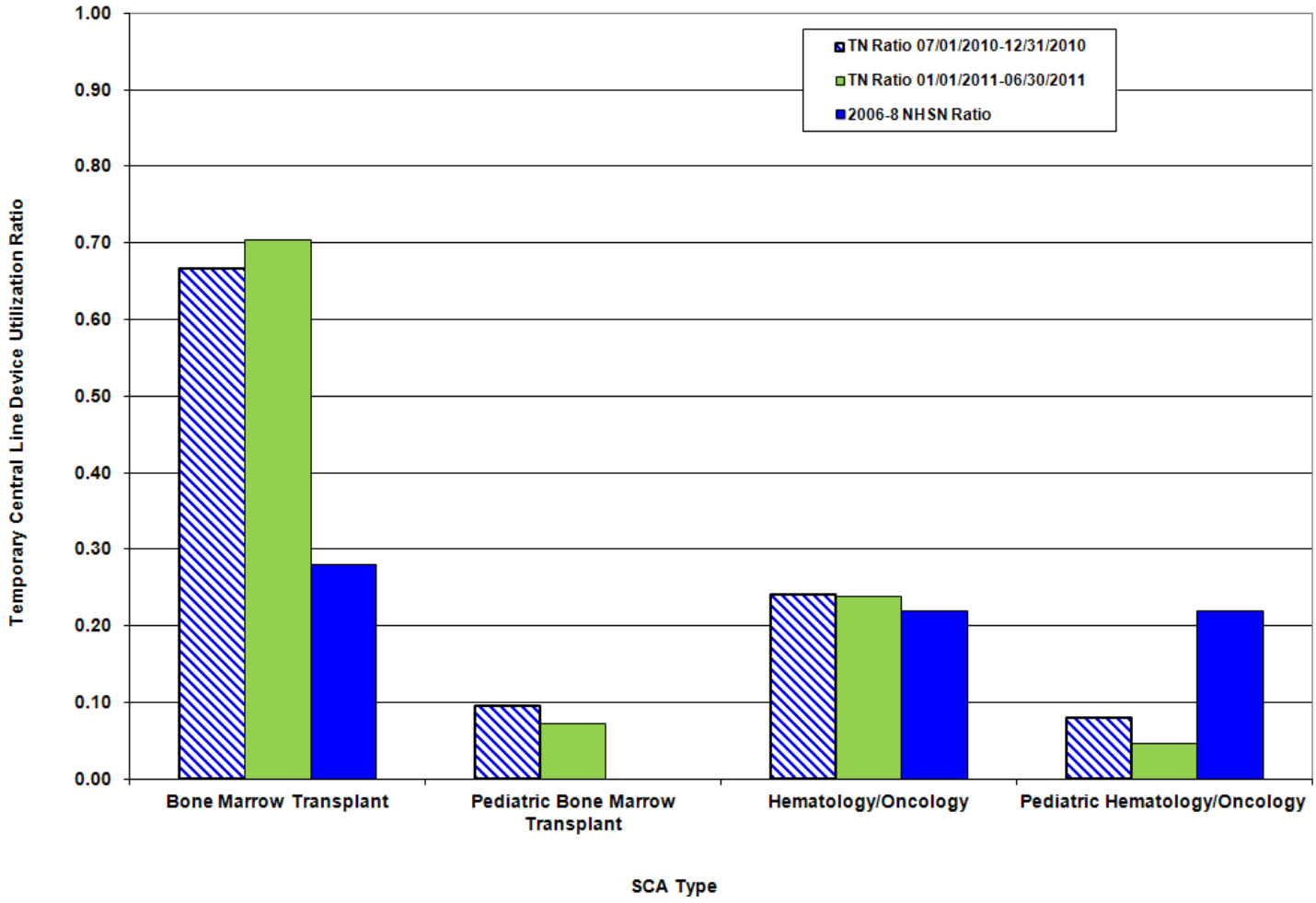


Figure 36: Organisms Isolated from Central Line-Associated Bloodstream Infections (CLABSIs) in Specialty Care Areas, Tennessee, 01/01/2011–06/30/2011

Number of organisms = 63; number of events = 61

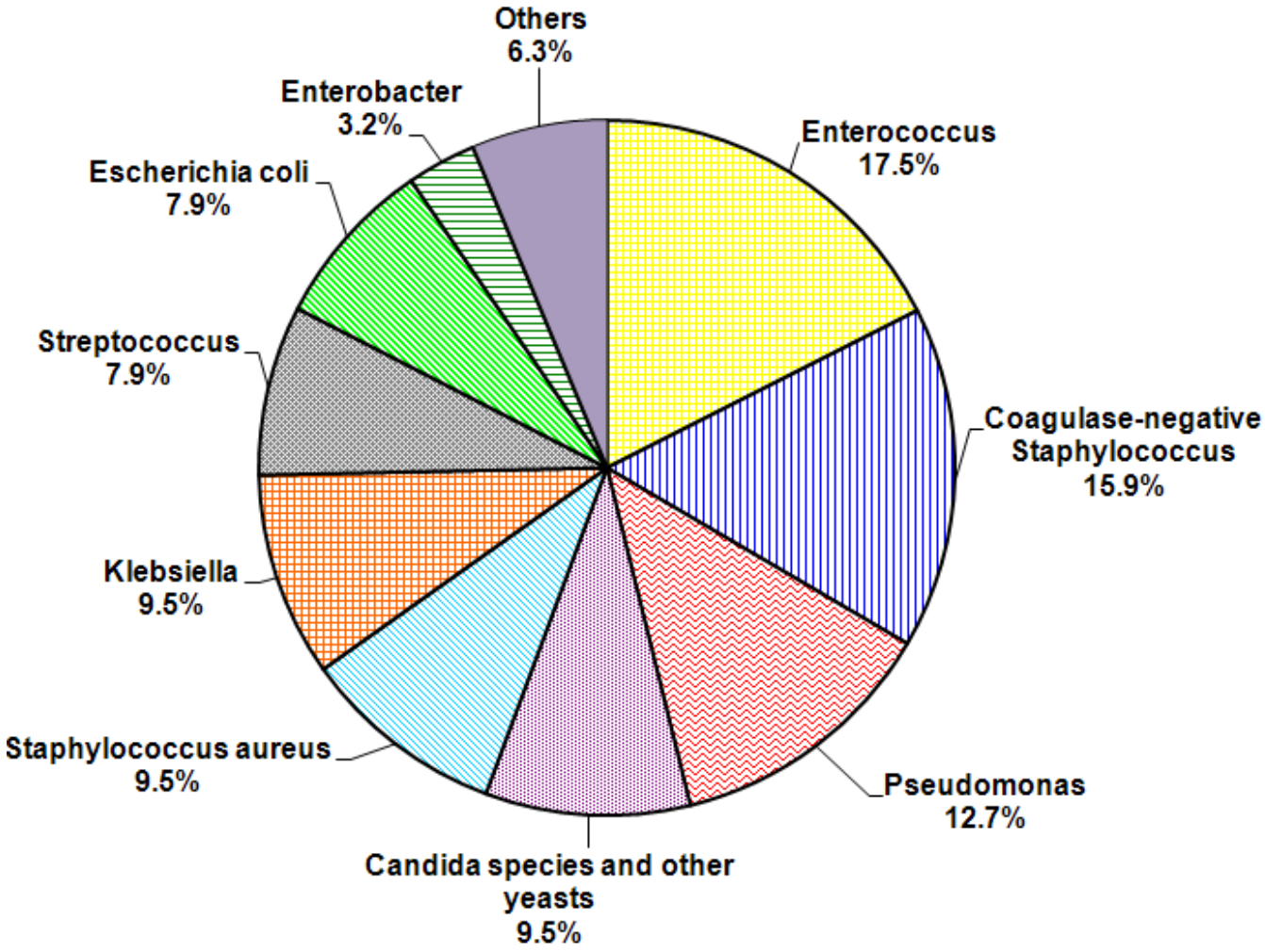


Table 30: Microorganisms Identified in Central Line-Associated Bloodstream Infections (CLABSIs) in Specialty Care Areas, Tennessee, 01/01/2011–06/30/2011

Number of organisms = 63; number of events = 61

Microorganism	Number of Isolates	Percent
Enterococcus species	11	17.5
Vancomycin-resistant *Enterococcus* (VRE) (% of total positive isolates)	6	(9.5)
Coagulase-negative *Staphylococcus* species	10	15.9
Pseudomonas species	8	12.7
Candida species and other yeasts	6	9.5
Staphylococcus aureus	6	9.5
Methicillin-resistant *S. aureus* (MRSA) (% of total positive isolates)	2	(3.2)
Klebsiella species	6	9.5
Escherichia coli	5	7.9
Streptococcus species	5	7.9
Enterobacter species	2	3.2
Other pathogens	4	6.3

Data reported as of May 15, 2012
***Other pathogens* = Pantoea *spp*., Pediococcus pentosaceus, Rothia dentocariosa, Xanthomonas *spp*.**

Table 31: Key Percentiles for Facility-Specific Central Line-Associated Bloodstream Infection (CLABSI) Standardized Infection Ratios (SIRs) in Specialty Care Areas (SCAs) by Reporting Year, Tennessee [Reporting period: 07/01/2010–06/30/2011]

			SIR, 95% CONFIDENCE INTERVAL, AND KEY PERCENTILES							
STATE	YEAR	No.	SIR	LOWER LIMIT	UPPER LIMIT	10%	25%	50%	75%	90%
Tennessee	2011	13	0.88	0.67	1.14	0.35	0.66	0.89	0.96	1.17
	2010	13	0.93	0.71	1.18	0.00	0.00	0.59	1.06	1.59

Data reported as of May 15, 2012
No . = number of facilities with reporting units
SIR = Standardized Infection Ratio (observed number/ statistically 'predicted' number of CLABSI)
Red highlighting indicates SIR for reporting period is significantly higher than national 2006-2008 SIR of 1.0
Blue highlighting indicates SIR for reporting period is significantly lower than national 2006-2008 SIR of 1.0
NHSN 2006-8 baseline data not available for pediatric bone marrow transplant SCAs (not included in SIR calculations)

Table 32: Key Percentiles for Unit-Specific Central Line-Associated Bloodstream Infection (CLABSI) Standardized Infection Ratios (SIRs) by Type of Specialty Care Area (SCA) and Reporting Year, Tennessee [Reporting period: 07/01/2010–06/30/2011]

			SIR, 95% CONFIDENCE INTERVAL, AND KEY PERCENTILES							
SCA TYPE	YEAR	No.	SIR	LOWER LIMIT	UPPER LIMIT	10%	25%	50%	75%	90%
Bone Marrow Transplant	2011	3	0.48	0.24	0.86	NA	NA	NA	NA	NA
	2010	3	1.24	0.81	1.81	NA	NA	NA	NA	NA
Pediatric Bone Marrow Transplant	2011	2	.	.	.	.	.	.	.	.
	2010	2	.	.	.	.	.	.	.	.
Hematology/Oncology	2011	11	1.01	0.69	1.42	0.00	0.00	0.93	0.98	1.33
	2010	11	0.86	0.57	1.25	0.00	0.00	0.00	0.76	1.72
Pediatric Hematology/Oncology	2011	2	0.42	0.16	0.92	NA	NA	NA	NA	NA
	2010	2	0.34	0.11	0.79	NA	NA	NA	NA	NA
Solid Organ Transplant	2011	1	NA	NA	NA	NA	NA	NA	NA	NA
	2010	1	NA	NA	NA	NA	NA	NA	NA	NA

Data reported as of May 15, 2012
No .= number of facilities with reporting units
SIR = Standardized Infection Ratio (observed number/ statistically 'predicted' number of CLABSI)
NA = not reported if the number of facilities with reporting units is <5; SIR not shown for Solid Organ Transplant SCA because N = 1
. = NHSN 2006-8 baseline data not available
Red highlighting indicates SIR for reporting period is significantly higher than national 2006-2008 SIR of 1.0
Blue highlighting indicates SIR for reporting period is significantly lower than national 2006-2008 SIR of 1.0

Table 33: Comparison of Tennessee and National Healthcare Safety Network (NHSN) Permanent Central Line-Associated Bloodstream Infection (CLABSI) Rates by Specialty Care Area (SCA) Type [Reporting period: 01/01/2011–06/30/2011]

	TENNESSEE 01/01/2011 - 06/30/2011						NHSN 2006-2008				
SCA TYPE	No.	CLABSI	PCL DAYS	POOLED MEAN*	MEDIAN RATE*	DU (%)	CLABSI	PCL DAYS	POOLED MEAN*	MEDIAN RATE*	DU (%)
Bone Marrow Transplant	3	2	1160	1.7	0.0	16	235	60546	3.9	1.8	60
Pediatric Bone Marrow Transplant	2	9	3252	2.7	2.8	87	.	.	.	.	.
Hematology/Oncology	11	12	9623	1.2	0.3	29	158	95535	1.7	0.9	37
Pediatric Hematology/Oncology	2	6	5451	1.1	1.0	80	75	32255	2.3	.	63
Solid Organ Transplant	1	NA	NA	NA	NA	NA	11	3953	2.8	.	10

Data reported as of May 15, 2012
No. = number of facilities with reporting units
PCLDays = Permanent Central Line Days
DU = device utilization
. = NHSN 2006-8 baseline data not available
NA = data not shown for Solid Organ Transplant SCA because N = 1
****per 1000 line days***
Red highlighting indicates pooled mean rate for reporting period is significantly higher than national 2006-2008 pooled mean rate
Blue highlighting indicates pooled mean rate for reporting period is significantly lower than national 2006-2008 pooled mean rate

Table 34: Comparison of Tennessee and National Healthcare Safety Network (NHSN) Temporary Central Line-Associated Bloodstream Infection (CLABSI) Rates by Specialty Care Area (SCA) Type [Reporting period: 01/01/2011–06/30/2011]

	TENNESSEE 01/01/2011 - 06/30/2011						NHSN 2006-2008				
SCA TYPE	No.	CLABSI	TCL DAYS	POOLED MEAN*	MEDIAN RATE*	DU (%)	CLABSI	TCL DAYS	POOLED MEAN*	MEDIAN RATE*	DU (%)
Bone Marrow Transplant	3	9	5215	1.7	1.8	70	96	27290	3.5	NA	28
Pediatric Bone Marrow Transplant	2	0	268	0.0	0.0	7	.	.	.	.	.
Hematology/Oncology	11	20	7995	2.5	2.4	29	117	51950	2.3	1.3	22
Pediatric Hematology/Oncology	2	0	318	0.0	0.0	5	47	10287	4.6	.	22
Solid Organ Transplant	1	NA	NA	NA	NA	NA	66	32591	2.0	.	50

Data reported as of May 15, 2012
No. = number of facilities with reporting units
TCLDays = Temporary Central Line Days
DU = device utilization
. = NHSN 2006-8 baseline data not available
NA = data not shown for Solid Organ Transplant SCA because N = 1
****per 1000 line days***
Red highlighting indicates pooled mean rate for reporting period is significantly higher than national 2006-2008 pooled mean rate
Blue highlighting indicates pooled mean rate for reporting period is significantly lower than national 2006-2008 pooled mean rate

CLABSI Figures and Tables

Long-Term Acute Care Facilities

Figure 37: Standardized Infection Ratio (SIR) for Central Line-Associated Bloodstream Infections (CLABSIs) for Long-Term Acute Care (LTAC) Facilities by Quarter, Tennessee, 07/2010–06/2011 [Reference standard: National Healthcare Safety Network (NHSN), 2006-8]

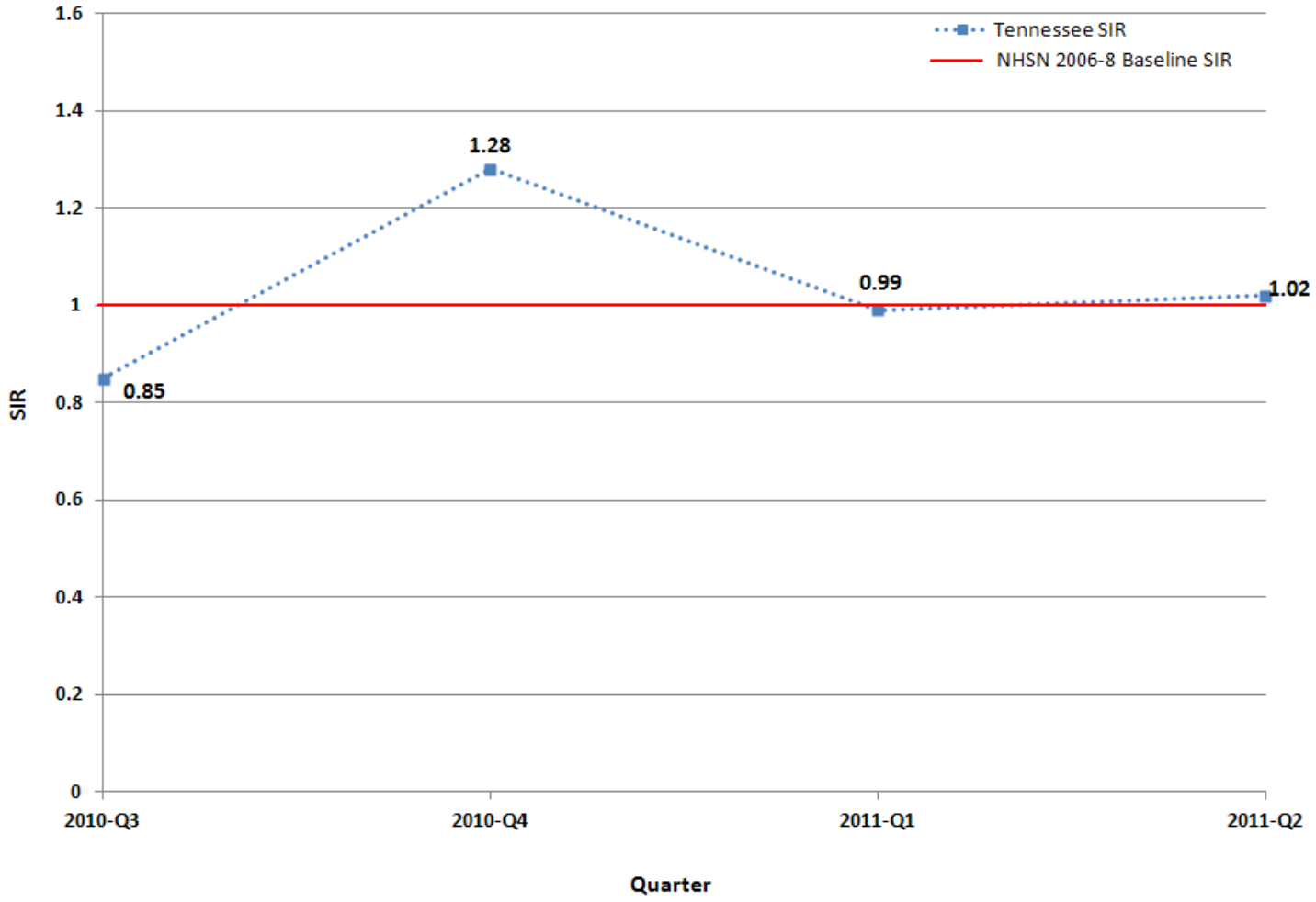


Figure 38: Organisms Isolated from Central Line-Associated Bloodstream Infections (CLABSIs) in Long-Term Acute Care Facilities, Tennessee, 01/01/2011–06/30/2011

Number of organisms = 65; number of events = 56

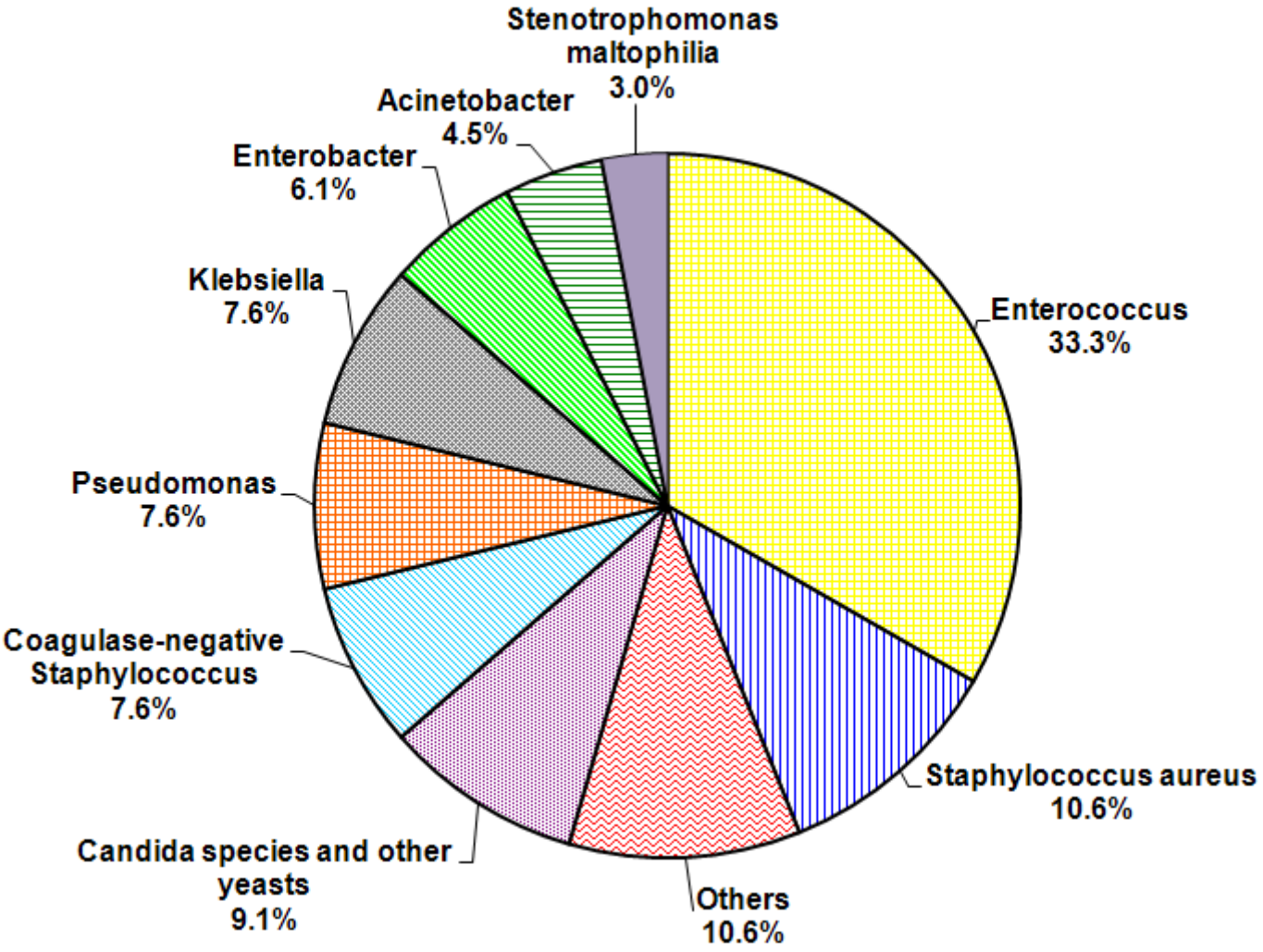


Table 35: Microorganisms Identified in Central Line-Associated Bloodstream Infections (CLABSIs) in Long-Term Acute Care Facilities, Tennessee, 01/01/2011–06/30/2011

Number of organisms = 66; number of events = 57

Microorganism	Number of Isolates	Percent
Enterococcus species	22	33.3
Vancomycin-resistant *Enterococcus* (VRE) (% of total positive isolates)	10	(15.2)
Staphylococcus aureus	7	10.6
Methicillin-resistant *S. aureus* (MRSA) (% of total positive isolates)	7	(10.6)
Candida species and other yeasts	6	9.1
Coagulase-negative *Staphylococcus* species	5	7.6
Klebsiella species	5	7.6
Pseudomonas species	5	7.6
Enterobacter species	4	6.1
Acinetobacter species	3	4.5
Stenotrophomonas maltophilia	2	3.0
Other pathogens	5	7.6
Other skin contaminants	2	3.0

Data reported as of May 15, 2012
***Other pathogens =Aerobe not otherwise specified,* Escherichia coli*, group B* Streptococcus*,* Proteus mirabilis*,* Serratia marcescens
***Other skin contaminants =* Bacillus *species,* Corynebacterium striatum**

Table 36: Key Percentiles for Facility-Specific Central Line-Associated Bloodstream Infection (CLABSI) Standardized Infection Ratios (SIRs) in Long-Term Acute Care (LTAC) Facilities by Reporting Year, Tennessee [Reporting period: 07/01/2010–06/30/2011]

			SIR, 95% CONFIDENCE INTERVAL, AND KEY PERCENTILES							
STATE	YEAR	No.	SIR	LOWER LIMIT	UPPER LIMIT	10%	25%	50%	75%	90%
Tennessee	2011	9	0.99	0.75	1.28	0.14	0.28	1.09	1.71	1.79
	2010	9	1.05	0.79	1.37	0.00	0.45	1.26	1.42	2.66

Data reported as of May 15, 2012
No . = number of facilities with reporting units; SIR = Standardized Infection Ratio (observed number/ statistically 'predicted' number of CLABSI)
Red highlighting indicates SIR for reporting period is significantly higher than national 2006-2008 SIR of 1.0
Blue highlighting indicates SIR for reporting period is significantly lower than national 2006-2008 SIR of 1.0

Table 37: Comparison of Tennessee and National Healthcare Safety Network (NHSN) Central Line-Associated Bloodstream Infection (CLABSI) Rates by Long-Term Acute Care (LTAC) Location [Reporting period: 01/01/2011–06/30/2011]

	TENNESSEE 01/01/2011 - 06/30/2011						NHSN 2006-2008				
SCA TYPE	No.	CLABSI	CL DAYS	POOLED MEAN*	MEDIAN RATE*	DU (%)	CLABSI	CL DAYS	POOLED MEAN*	MEDIAN RATE*	DU (%)
LTAC Ward	9	57	33451	1.7	1.9	67	298	172576	1.7	.	33

Data reported as of May 15, 2012
No. = number of facilities with reporting units
DU = device utilization
. = NHSN 2006-8 baseline data not available
****per 1000 line days***
Red highlighting indicates pooled mean rate for reporting period is significantly higher than national 2006-2008 pooled mean rate
Blue highlighting indicates pooled mean rate for reporting period is significantly lower than national 2006-2008 pooled mean rat

SSI Figures and Tables

CBGB/CBGC and HPRO Procedures

January 1, 2009 – June 30, 2011

Table 38: Coronary Artery Bypass Graft (CBGB/C) and Hip Prosthesis (HPRO) Combined All and Complex Admission/Readmission Surgical Site Infection (SSI) Standardized Infection Ratios (SIRs) by Six-Month Period, Tennessee, 07/01/2010–06/30/2011

				SIR, 95% CONFIDENCE INTERVAL, AND KEY PERCENTILES							
STATE	SIR TYPE	YEAR	No.	SIR	LOWER LIMIT	UPPER LIMIT	10%	25%	50%	75%	90%
Tennessee	All Procedures	2011	72	0.75	0.63	0.90	0.00	0.40	0.65	0.86	1.21
		2010	66	0.75	0.62	0.90	0.00	0.37	0.57	0.97	1.36
	Complex A/R	2011	72	0.88	0.70	1.09	0.00	0.36	0.74	1.24	1.96
		2010	66	0.61	0.46	0.80	0.00	0.00	0.41	1.11	1.98

Data reported as of April 3, 2012
No . = number of facilities with reporting units; SIR = Standardized Infection Ratio (observed number/ statistically 'predicted' number of SSI)
Red highlighting indicates SIR for reporting period is significantly higher than national 2006-2008 SIR of 1.0
Blue highlighting indicates SIR for reporting period is significantly lower than national 2006-2008 SIR of 1.0

Figure 39: Combined Coronary Artery Bypass Graft (CBGB/C) and Hip Prosthesis (HPRO) All and Complex Admission/Readmission Surgical Site Infection (SSI) Standardized Infection Ratios (SIRs) by Quarter, Tennessee, 07/01/2010–06/30/2011

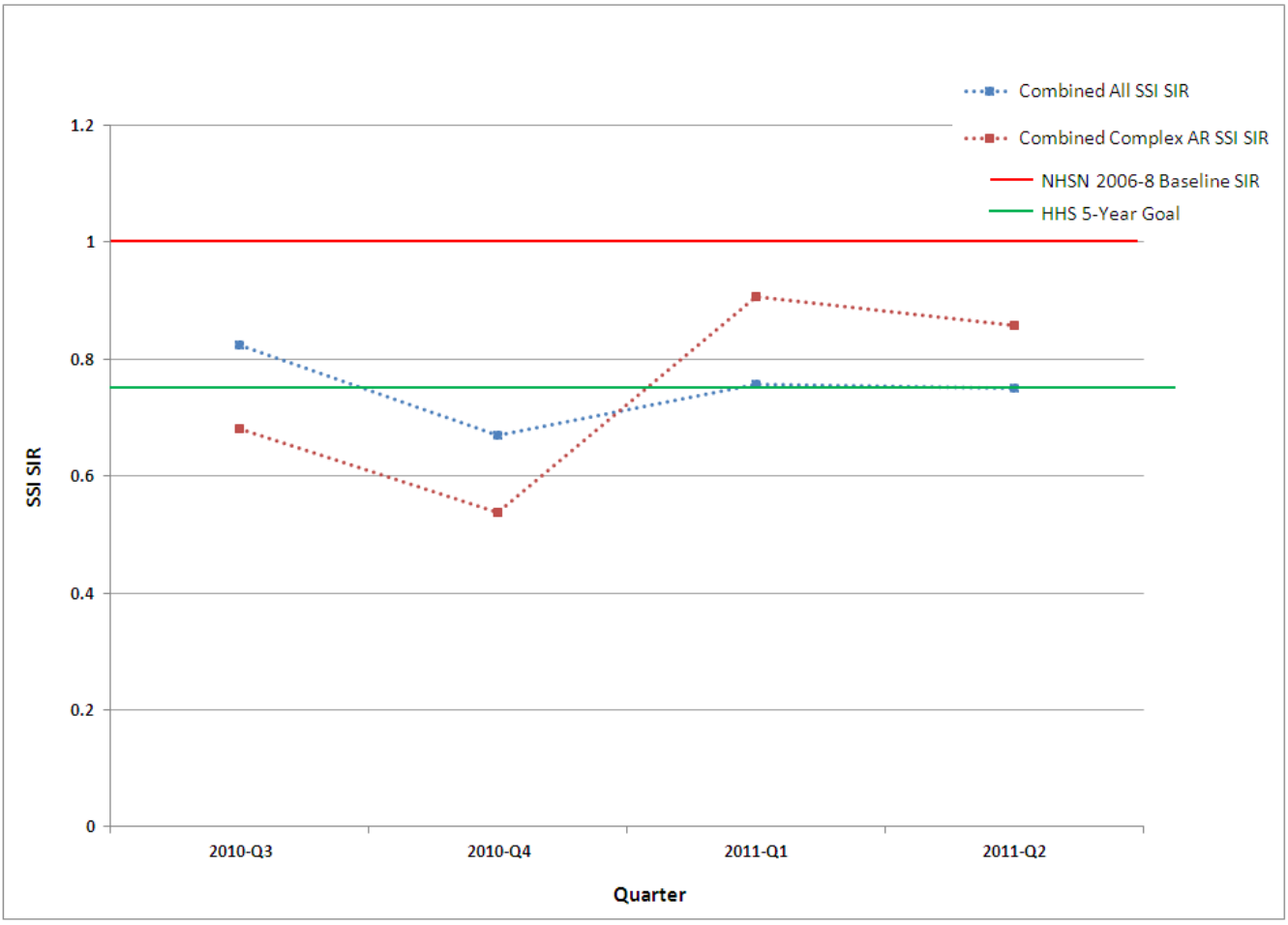


Figure 40: Organisms Isolated from Coronary Artery Bypass Graft (CBGB/C) Surgical Site Infections (SSIs), Tennessee, 01/01/2011–06/30/2011

Number of organisms = 70; number of events = 69

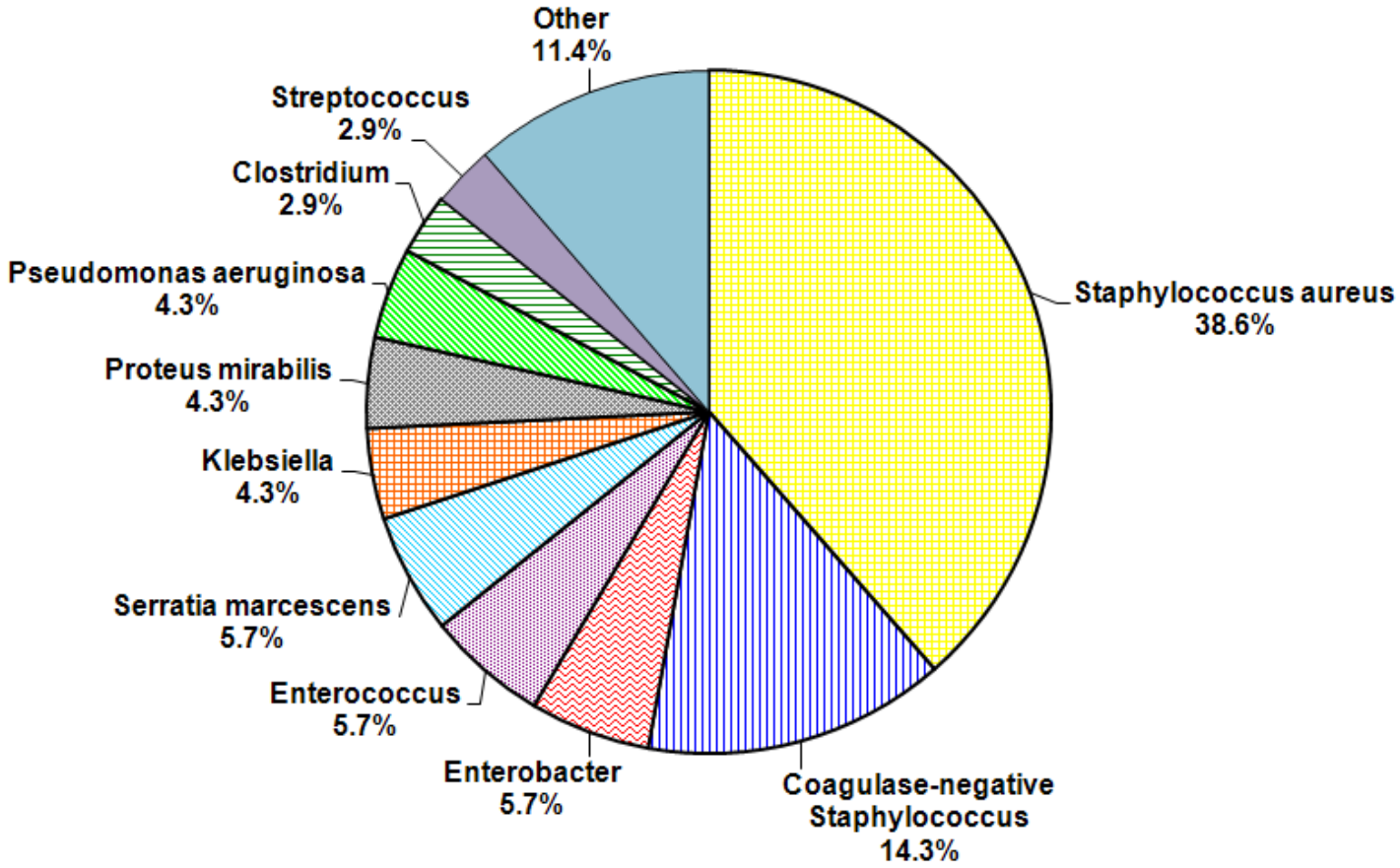


Table 39: Microorganisms Identified in Coronary Artery Bypass Graft (CBGB/C) Surgical Site Infections (SSIs), Tennessee, 01/01/2011–06/30/2011

Number of organisms = 70; number of events = 69

Microorganism	Number of Isolates	Percent
Staphylococcus aureus	27	38.6
Methicillin-resistant *S. aureus* (MRSA) (% of total positive isolates)	12	(17.1)
Coagulase-negative *Staphylococcus* species	10	14.3
Enterobacter species	4	5.7
Enterococcus species	4	5.7
Vancomycin-resistant *Enterococcus* (VRE) (% of total positive isolates)	1	(1.4)
Serratia marcescens	4	5.7
Klebsiella species	3	4.3
Proteus mirabilis	3	4.3
Pseudomonas aeruginosa	3	4.3
Clostridium species	2	2.9
Streptococcus species	2	2.9
Other pathogens	8	11.4

Data reported as of April 3, 2012
***Other pathogens* = Candida albicans, Citrobacter diversus, Coccidioides *species*, Corynebacterium *species*, Escherichia coli, Haemophilus influenzae *type unspecified*, Morganella morganii, Propionibacterium acnes**
No culture results were available for 1 event

Table 40: Coronary Artery Bypass Graft (CBGB/C) All and Complex Admission/Readmission Surgical Site Infection (SSI) Standardized Infection Ratios (SIRs) by Year, Tennessee, 01/01/2009–06/30/2011

				SIR, 95% CONFIDENCE INTERVAL, AND KEY PERCENTILES							
STATE	SIR TYPE	YEAR	No.	SIR	LOWER LIMIT	UPPER LIMIT	10%	25%	50%	75%	90%
Tennessee	All Procedures	2011	26	0.70	0.53	0.91	0.00	0.00	0.69	0.91	1.68
		2010	26	0.66	0.55	0.80	0.11	0.34	0.65	0.97	1.72
		2009	23	0.74	0.61	0.88	0.00	0.38	0.69	1.13	1.36
	Complex A/R	2011	26	0.96	0.70	1.30	0.00	0.33	1.06	1.60	2.98
		2010	26	0.72	0.55	0.91	0.00	0.18	0.68	1.04	1.83
		2009	23	0.78	0.60	0.98	0.00	0.13	0.73	1.10	1.78

Data reported as of April 3, 2012
No . = number of facilities with reporting units; SIR = Standardized Infection Ratio (observed number/ statistically 'predicted' number of SSI)
Red highlighting indicates SIR for reporting period is significantly higher than national 2006-2008 SIR of 1.0
Blue highlighting indicates SIR for reporting period is significantly lower than national 2006-2008 SIR of 1.0

Table 41: Crude (Unadjusted) Rate of Coronary Artery Bypass Graft (CBGB/C) Surgical Site Infection (SSI) by Year, Tennessee, 01/01/2009–06/30/2011

State	Year	No. of Hospitals	No. of Procedures	No. of SSI	TN Rate*
Tennessee	2011	26	3882	69	**1.77**
	2010	26	8187	166	**2.03**
	2009	23	7813	153	**1.96**

Data reported as of March2 3, 2012
****Per 100 operations***

Table 42: Coronary Artery Bypass Graft (CBGB/C) All Surgical Site Infection (SSI) Standardized Infection Ratios (SIRs) by Six-Month Period, Tennessee, 01/01/2009–06/30/2011

				SIR, 95% CONFIDENCE INTERVAL, AND KEY PERCENTILES		
STATE	YEAR	Half	No.	SIR	LOWER LIMIT	UPPER LIMIT
Tennessee	2011	1	26	0.70	0.53	0.91
	2010	2	26	0.76	0.58	0.97
	2010	1	26	0.58	0.43	0.76
	2009	2	23	0.73	0.55	0.94
	2009	1	23	0.75	0.58	0.96

Data reported as of April 3, 2012
No . = number of facilities with reporting units; SIR = Standardized Infection Ratio (observed number/ statistically 'predicted' number of SSI)
Red highlighting indicates SIR for reporting period is significantly higher than national 2006-2008 SIR of 1.0
Blue highlighting indicates SIR for reporting period is significantly lower than national 2006-2008 SIR of 1.0

Table 43: Coronary Artery Bypass Graft (CBGB/C) Complex Admission/Readmission Surgical Site Infection (SSI) Standardized Infection Ratios (SIRs) by Six-Month Period, Tennessee, 01/01/2009–06/30/2011

				SIR, 95% CONFIDENCE INTERVAL, AND KEY PERCENTILES		
STATE	YEAR	Half	No.	SIR	LOWER LIMIT	UPPER LIMIT
Tennessee	2011	1	26	0.96	0.70	1.30
	2010	2	26	0.73	0.50	1.04
	2010	1	26	0.70	0.48	0.98
	2009	2	23	0.92	0.65	1.26
	2009	1	23	0.65	0.44	0.93

Data reported as of April 3, 2012
No . = number of facilities with reporting units; SIR = Standardized Infection Ratio (observed number/ statistically 'predicted' number of SSI)
Red highlighting indicates SIR for reporting period is significantly higher than national 2006-2008 SIR of 1.0
Blue highlighting indicates SIR for reporting period is significantly lower than national 2006-2008 SIR of 1.

Figure 41: Coronary Artery Bypass Graft (CBGB/C) All and Complex Admission/Readmission Surgical Site Infection (SSI) Standardized Infection Ratios (SIRs) by Quarter, Tennessee, 01/01/2009–06/30/2011

Figure 42: Coronary Artery Bypass Graft (CBGB/C) Surgical Site Infections by Site, Tennessee, 01/01/2011-06/30/2011

Number of Events = 69

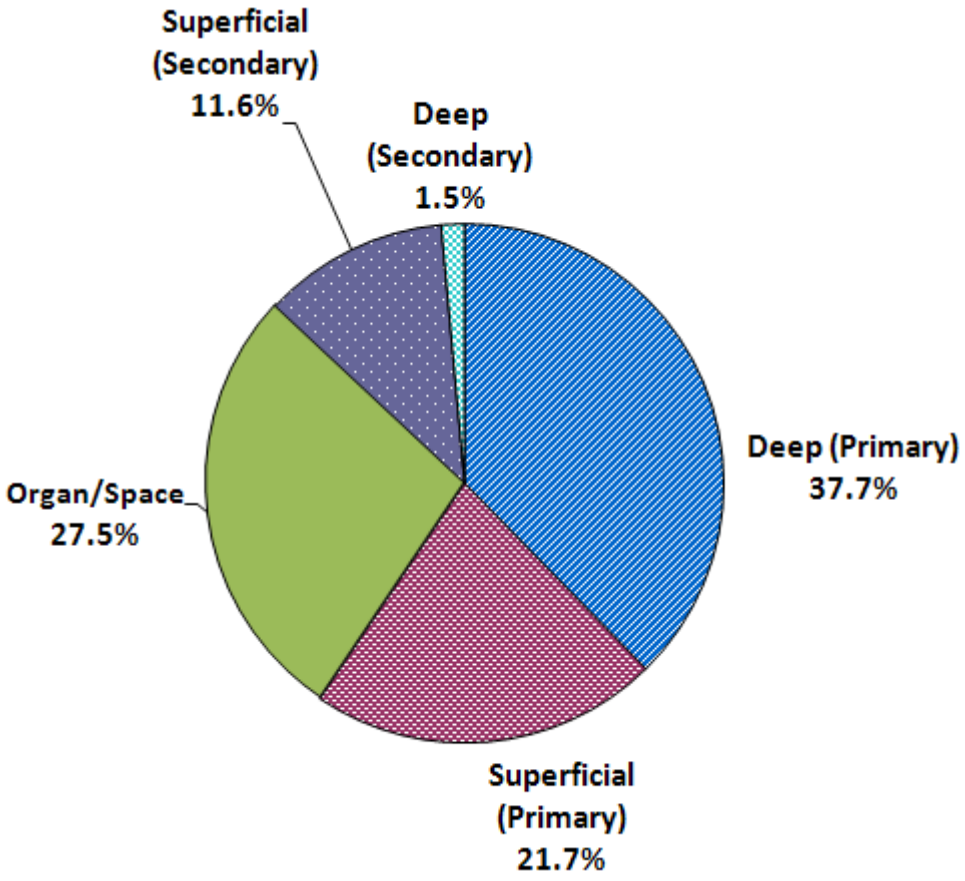


Figure 43: Coronary Artery Bypass Graft (CBGB/C) Surgical Site Infection Detection, Tennessee, 01/01/2011-06/30/2011

Number of Events = 69

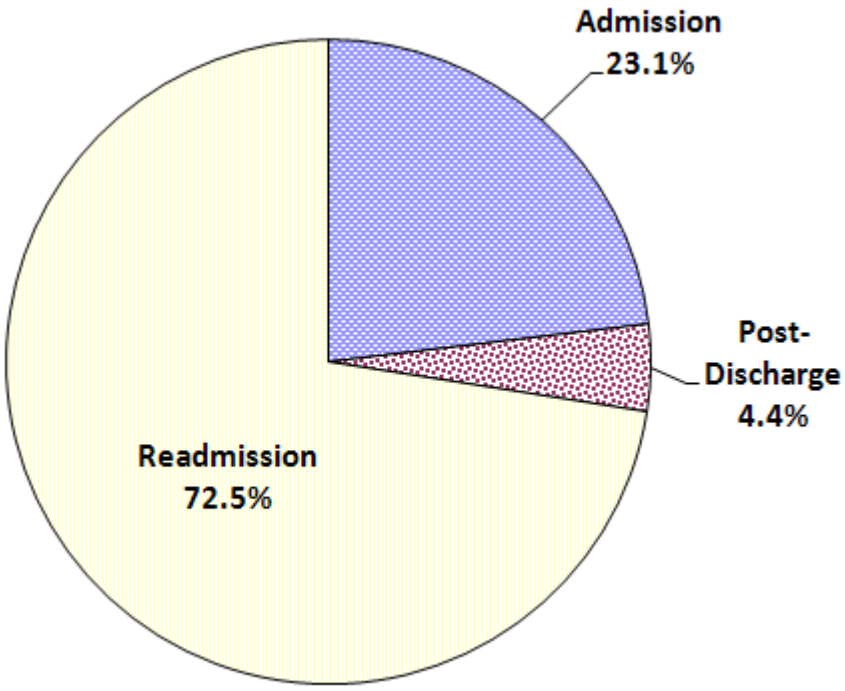


Figure 44: Organisms Isolated from Hip Prosthesis (HPRO) Surgical Site Infections (SSIs), Tennessee, 01/01/2011–06/30/2011

Number of organisms = 58; number of events = 64

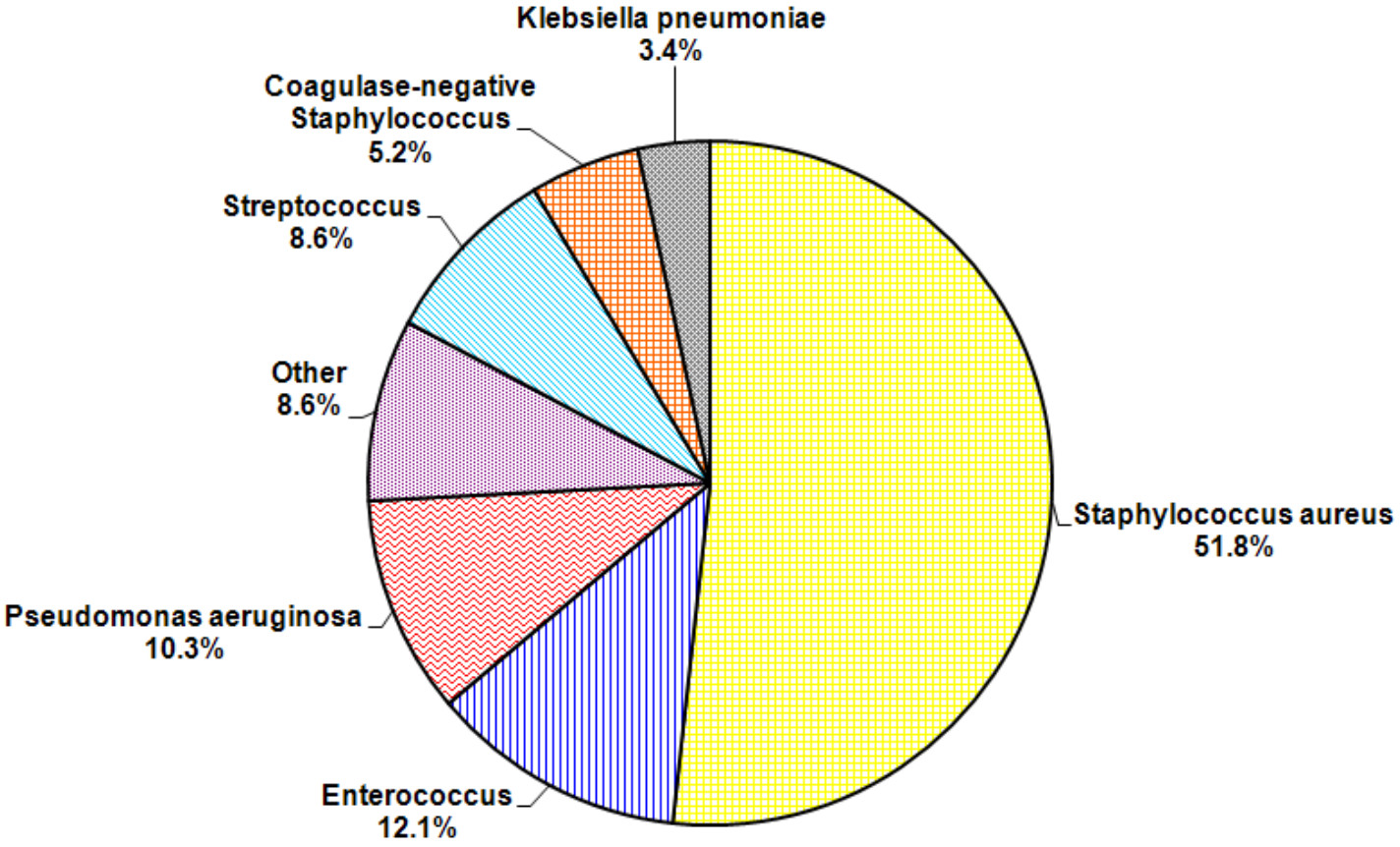


Table 44: Microorganisms Identified in Hip Prosthesis (HPRO) Surgical Site Infections (SSIs), Tennessee, 01/01/2011–06/30/2011

Number of organisms = 58; number of events = 64

Microorganism	Number of Isolates	Percent
Staphylococcus aureus	30	51.8
Methicillin-resistant *S. aureus* (MRSA) (% of total positive isolates)	17	(29.3)
Enterococcus species	7	12.1
Vancomycin-resistant *Enterococcus* (VRE) (% of total positive isolates)	1	(1.7)
Pseudomonas aeruginosa	6	10.3
Streptococcus species	5	8.6
Coagulase-negative *Staphylococcus* species	3	5.2
Klebsiella pneumoniae	2	3.4
Other pathogens	5	8.6

Data reported as of April 3, 2012
***Other pathogens* = Citrobacter *species,* Clostridium difficile, Enterobacter cloacae, Proteus mirabilis**
No culture results were available for 15 events

Table 45: Hip Prosthesis All and Complex Admission/Readmission Surgical Site Infection (SSI) Standardized Infection Ratios (SIRs) by Year, Tennessee, 07/01/2010–06/30/2011

				SIR, 95% CONFIDENCE INTERVAL, AND KEY PERCENTILES							
STATE	SIR TYPE	YEAR	No.	SIR	LOWER LIMIT	UPPER LIMIT	10%	25%	50%	75%	90%
Tennessee	All Procedures	2011	72	0.79	0.61	1.02	0.00	0.38	0.62	1.09	1.62
		2010	66	0.74	0.56	0.96	0.00	0.27	0.63	1.02	1.73
	Complex A/R	2011	72	0.81	0.58	1.10	0.00	0.00	0.82	0.92	1.82
		2010	66	0.51	0.33	0.76	0.00	0.00	1.16	0.82	1.79

Data reported as of April 3, 2012
No . = number of facilities with reporting units; SIR = Standardized Infection Ratio (observed number/ statistically 'predicted' number of SSI)
Red highlighting indicates SIR for reporting period is significantly higher than national 2006-2008 SIR of 1.0
Blue highlighting indicates SIR for reporting period is significantly lower than national 2006-2008 SIR of 1.0

Table 46: Crude (Unadjusted) Rate of Hip Prosthesis Surgical Site Infection (SSI) by Year, Tennessee, 07/01/2010–06/30/2011

State	Year	No. of Hospitals	No. of Procedures	No. of SSI	TN Rate*
Tennessee	2011	72	4772	64	**1.34**
	2010	66	4659	58	**1.24**

Data reported as of March2 3, 2012
****Per 100 operations***

Figure 45: Hip Prosthesis (HPRO) All and Complex Admission/Readmission Surgical Site Infection (SSI) Standardized Infection Ratios (SIRs) by Quarter, Tennessee, 07/01/2010–06/30/2011

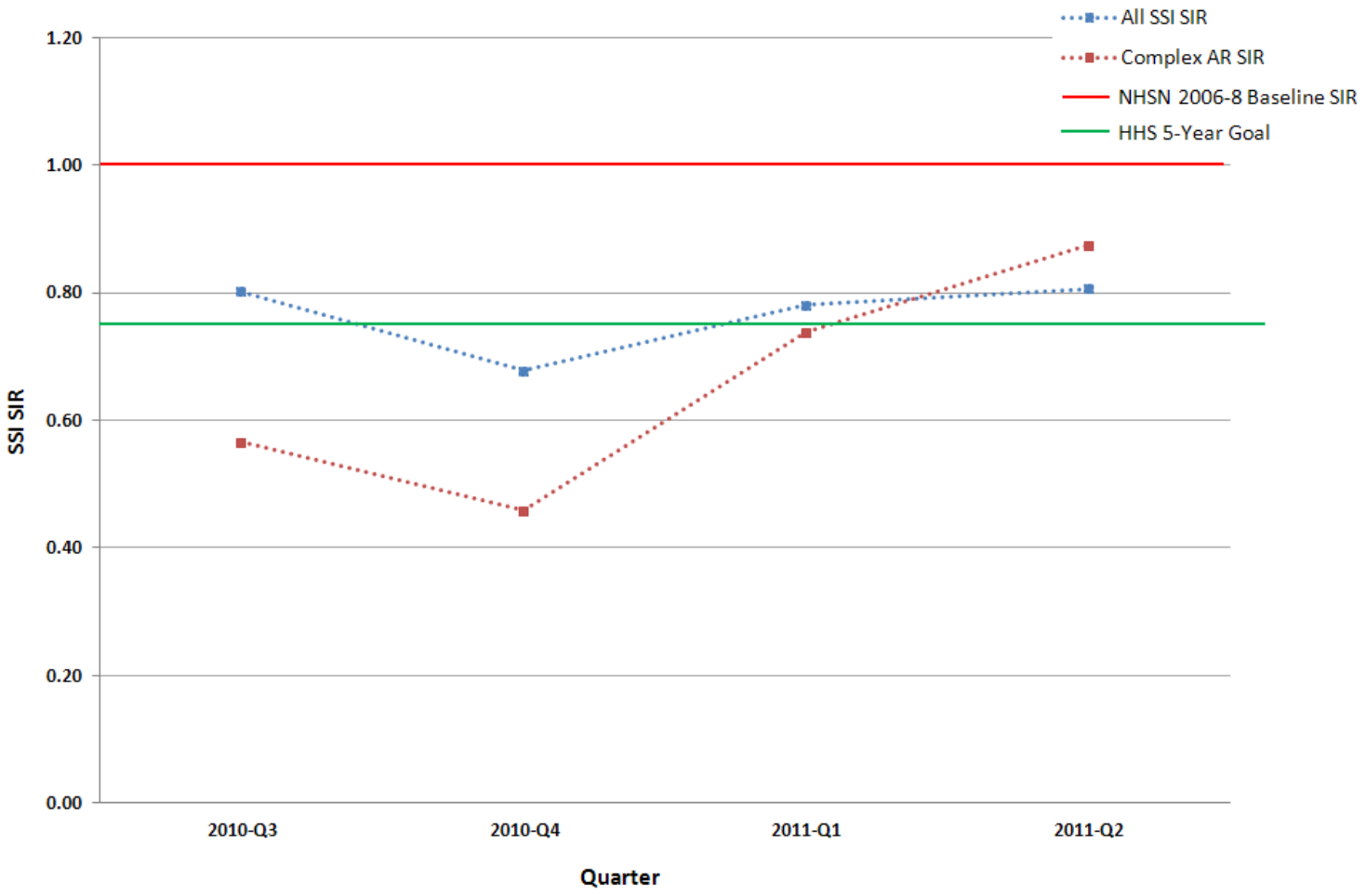


Figure 46: Hip Prosthesis (HPRO) Surgical Site Infections by Site, Tennessee, 01/01/2011-06/30/2011

Number of Events = 64

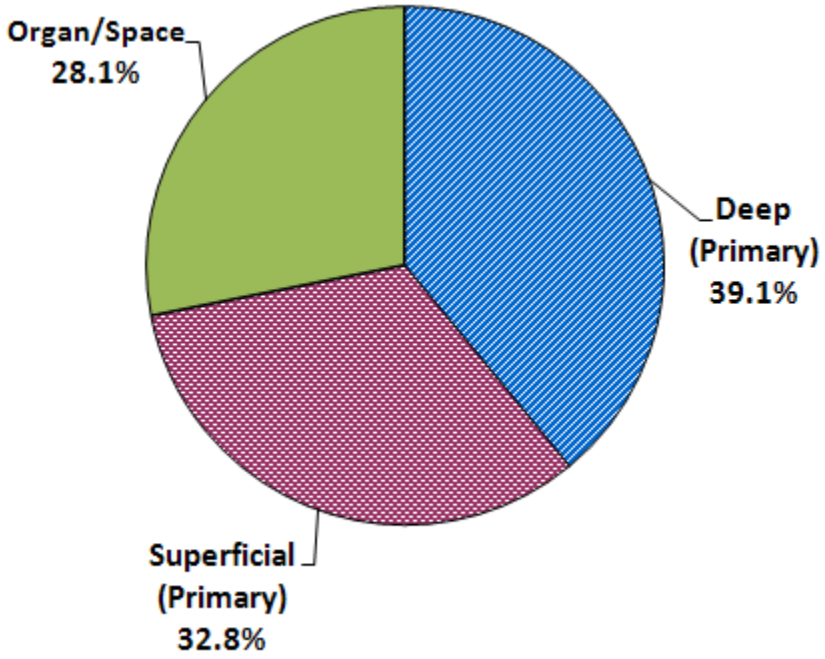


Figure 47: Hip Prosthesis (HPRO) Surgical Site Infection Detection, Tennessee, 01/01/2011-06/30/2011

Number of Events = 64