
# 2014

# Report on Healthcare Associated Infections (HAI) to the General Assembly

## Submitted August 2016

Submitted to the Connecticut General Assembly
By the Infectious Disease Section,
Healthcare Associated Infections Program
Connecticut Department of Public Health

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**LIST OF ABBREVIATIONS USED IN THIS DOCUMENT**

| ABBREVIATION | DEFINITION |
|---|---|
| **ACH** | Acute care hospital |
| **CAUTI** | Catheter-associated urinary tract infection |
| **CDC** | Centers for Disease Control and Prevention |
| **CDI** | *Clostridium difficile* infection |
| **CHA** | Connecticut Hospital Association |
| **CLABSI** | Central line-associated bloodstream infection |
| **CMS** | Centers for Medicaid and Medicare Services |
| **COLO** | NHSN code for surgical site infection following colon surgical procedures |
| **CUSP** | Comprehensive Unit-based Safety Program |
| **DHHS** | Department of Health and Human Services |
| **DPH** | Connecticut Department of Public Health |
| **DU** | Device utilization |
| **FacWideIN** | Facility-wide inpatient |
| **HAI** | Healthcare associated infection |
| **HO** | Hospital-onset |
| **HYST** | NHSN code for surgical site infection following abdominal hysterectomies |
| **ICU** | Intensive care unit |
| **IP** | Infection Preventionist |
| **IPPS** | Inpatient Prospective Payment System |
| **IRF** | Inpatient rehabilitation facility |
| **LTACH** | Long-term acute care hospital |
| **MRSA** | Methicillin-resistant *Staphylococcus aureus* |
| **NHSN** | National Healthcare Safety Network |
| **NICU** | Neonatal intensive care unit |
| **PICU** | Pediatric intensive care unit |
| **QI** | Quality improvement |
| **QIP** | Quality Incentive Program |
| **SIR** | Standardized infection ratio |
| **SSI** | Surgical site infection |

## EXECUTIVE SUMMARY

This is the sixth annual report to the Connecticut General Assembly on Healthcare Associated Infections (HAI), pursuant to C.G.S. 19a-490 o. It is an update on which HAI are reportable, with data on trends and progress on reducing HAI in Connecticut healthcare facilities. The Connecticut Department of Public Health (DPH) HAI website provides additional reports, data, and educational materials at http://www.ct.gov/dph/cwp/view.asp?a=3136&q=417318.

From 2008 to 2011, Connecticut acute care hospitals (ACH) were mandated to report central line-associated blood stream infections (CLABSI) from one adult intensive care unit (ICU) per hospital and all pediatric ICU (PICU), via the Centers for Disease Control and Prevention's (CDC) secure online data collection system, the National Healthcare Safety Network (NHSN). In 2011, the Connecticut HAI Advisory Committee ("the HAI Advisory Committee") recommended that the state HAI reporting mirror federal Centers for Medicaid and Medicare Services (CMS) health facility quality improvement (QI) reporting, which expanded HAI surveillance considerably to include additional ICU for CLABSI reporting as well as two new types of HAI: catheter-associated urinary tract infections (CAUTI) in all ACH adult and PICU locations, and surgical site infections (SSI) following colon surgical procedures and abdominal hysterectomies. In 2012, CMS, and concurrently Connecticut, further broadened its requirements for the reporting of HAI data via NHSN beyond ACH for the first time. This change newly required long-term acute care hospitals (LTACH) to report CLABSI and CAUTI in adult and pediatric ICU and wards, and inpatient rehabilitation facilities (IRF) to report CAUTI in adult and pediatric ward locations. Reporting of methicillin-resistant *Staphylococcus aureus* (MRSA) bacteremia and *Clostridium difficile* infection (CDI) based on hospital microbiology laboratory results were also added to requirements for ACH, LTACH, and IRF. In future years, HAI surveillance in Connecticut is anticipated to continue to expand in response to the expansion of CMS reporting; these expansions are expected to include new HAI measures as well as additional healthcare facility types across the continuum of care.

Connecticut, other states, and the CDC use a statistical measure called the standardized infection ratio (SIR) to assess the burden of HAI and to track progress in prevention. For the purposes of this report, the SIR compares the number of HAI in the state to the number of infections predicted based on national HAI data across the United States. A statistically significant SIR below one means the state is performing better than predicted based on national data; a statistically significant SIR above one means the state is performing worse than predicted.

### *Acute Care Hospital Data*

- Connecticut is doing well in reducing CLABSI. From 2009 to 2014, the SIR in ACH ICU decreased from 0.91 to 0.42. PICU CLABSI has made similar progress, and Connecticut has surpassed the federal Department of Health and Human Services' (DHHS) 2013 National Prevention Target: a 50% reduction in CLABSI (equivalent to an SIR of 0.50).
- As far as reducing CAUTI, Connecticut has room to improve. While the CAUTI SIR decreased from 1.84 to 1.68 from 2012 to 2014, Connecticut ACH did not achieve the National Prevention Target by the end of the extended target period of 2014: a 25% reduction in CAUTI (equivalent to an SIR of 0.75).
- Connecticut's ACH SSI SIR following colon surgical procedures increased from 1.2 in 2012 to 1.52 in 2014, and failed to achieve the 2013 National Prevention Target: a 25% reduction in CAUTI (equivalent to an SIR of 0.75).

- Connecticut's ACH SSI SIR following abdominal hysterectomies decreased from 1.45 in 2012 to 1.06 in 2014, although the trend of decline has not been constant. Further, Connecticut failed to achieve the 2013 National Prevention Target: a 25% reduction in CAUTI (equivalent to an SIR of 0.75).
- Connecticut ACH have done well in reducing MRSA bacteremia; from 2013 to 2014, the MRSA SIR decreased from 0.74 to 0.65, already surpassing the National Prevention Target: a 25% reduction in MRSA bacteremia (equivalent to a 0.75 SIR). Connecticut's SIR may continue to drop by the end of the extended target period, which ends in 2015.
- Connecticut ACH have observed an increase in CDI, from an SIR of 1.02 in 2013 rising to 1.08 in 2014. Connecticut failed to achieve the 2013 National Prevention Target of a 30% reduction in CDI (equivalent to an SIR of 0.70).
- These data are used by prevention collaboratives (groups of health facilities sharing best practices for prevention) in the state led by the Connecticut Hospital Association (CHA) and Qualidigm, a Connecticut-based national consulting and research company, working with Connecticut DPH. These HAI surveillance data show that Connecticut DPH, our partners, and the medical community need to continue efforts to prevent HAI in Connecticut, and to concentrate resources on certain high priority areas for higher-impact outcomes.

***Long-Term Acute Care Hospital Data***

- Data for LTACH are being published by CT DPH for the first time in this report, which includes data for the calendar year of 2014.
- Connecticut LTACH observed a CLABSI SIR of 0.67, however this was not statistically significant, indicating that a similar number of CLABSI were observed as were predicted based on national data. A higher burden of CLABSI were observed in critical care locations versus ward locations, although this difference was also not statistically significant.
- Connecticut LTACH observed a CAUTI SIR of 1.44, which was statistically significant, indicating that a higher number of CAUTI were observed than were predicted based on national data. A higher burden of CAUTI were observed in critical care versus ward locations, although this difference was not statistically significant.
- No national prevention targets exist for LTACH at this time, which makes benchmarking challenging; this is expected to change in the near future.

***Inpatient Rehabilitation Facility Data***

- Data for IRF are being published by CT DPH for the first time in this report, which includes data for the calendar year of 2014.
- Connecticut IRF observed a CAUTI SIR of 1.23, however this was not statistically significant, indicating that a similar number of CAUTI were observed as were predicted based on national data.
- No national prevention targets exist for IRF at this time, which makes benchmarking challenging; this is expected to change in the near future.

***Data for Action***

Although Connecticut has seen some successes in reducing HAI, data shows that we need to make further progress in the prevention of these infections. While the reduction in CLABSI has been a bright

spot, we have not done well in reducing CAUTI. We have also not done well in reducing SSI following the two types of procedures that we track: colon surgical procedures and abdominal hysterectomies. Despite progress made in reducing MRSA bacteremia, we need to make better improvements in reducing *C. difficile*, a serious infection demonstrated by the increase in CDI LabID events.

## HOW HEALTHCARE ASSOCIATED INFECTIONS MEASURES ARE MADE MANDATORILY REPORTABLE

In 2006, the Connecticut Legislature established the HAI Advisory Committee and directed Connecticut DPH to develop a state public health HAI program to raise awareness of HAI, promote transparency for healthcare consumers, and promote the collection, analysis, and sharing of data to foster and guide infection prevention action in healthcare settings. Tracking, measuring, and reporting of HAI data are important to understand statewide trends, identify patterns of infection, and ensure readiness for the possible emergence of new or unusual microorganisms.

The HAI Advisory Committee meets quarterly to provide recommendations to Connecticut DPH on HAI public reporting and public awareness. It consists of 11 voting members and approximately 40 regular non-member participants. Among these committed individuals are hospital epidemiologists, infection preventionists (IP), healthcare consumers and advocates, QI professionals, and professional healthcare associations. Non-voting participants attend meetings and participate in discussion, but do not have the authority to vote on formal motions set before the HAI Advisory Committee. All substantive business, such as recommendations to Connecticut DPH regarding which HAI should be publicly reported, must be conducted through formal motion and majority vote by the voting members. These deliberations are informed by the most current science of HAI surveillance and prevention in the medical and public health literature, sharing of best practices among states and the CDC, and the practical experience and perspective of the members of the HAI Advisory Committee.

Once the HAI Advisory Committee makes a recommendation regarding selection and surveillance methods of new HAI measures, in accordance with Connecticut General Statutes Section 19a-490 o, their recommendation is considered by the Connecticut DPH Reportable Diseases Advisory Committee ("the Reportable Diseases Advisory Committee") for inclusion in a Connecticut DPH list published annually in the Connecticut Epidemiologist Newsletter, "Reportable Diseases, Emergency Illnesses and Health Conditions." This list is revised and published each year in compliance with C.G.S. 19a-2a and Section 19a-36-A2 of the Public Health Code. When the recommendation is accepted by the Connecticut DPH Commissioner (as it has each time a recommendation to include a particular HAI measure has been made), it is then placed on the annual reportable conditions list with reporting instructions.

The 2014 members of the HAI Advisory Committee were:

- Department of Public Health Commissioner or Commissioner's designee
  Wendy Furniss, Chief, Healthcare Safety & Quality Branch, Connecticut DPH, Hartford, CT
- Two representatives from the Connecticut Hospital Association
  Alison Hong, MD, Director, Quality and Patient Safety, CT Hospital Association, Wallingford, CT
  Carl Schiessel, CT Hospital Association, Wallingford, CT
- Two representatives from organizations representing health care consumers
  Valerie Wyzykowski, Office of Healthcare Advocate, State of CT, Hartford, CT
  Jean Rexford, Executive Director, Connecticut Center for Patient Safety, Hartford, CT
- Two representatives who are hospital-based infectious disease specialists or epidemiologists
  Louise Dembry, MD, Hospital Epidemiologist, Yale-New Haven Hospital, New Haven, CT
  Brenda Grant, RN, MPH, CIC, Infection Preventionist, Stamford Hospital, Stamford, CT
- One representative from the Connecticut State Medical Society
  Jack Ross, MD, Chief, Infectious Diseases & Epidemiology, Hartford Hospital, Hartford, CT
- One representative from a labor organization representing hospital-based nurses
  Dale Cunningham, American Federation of Teachers, Rocky Hill, CT
- Two members from the public

Raymond Andrews, Trustee, The Donaghue Medical Research Foundation, West Hartford, CT
Lynne Garner, PhD, President and Trustee, The Donaghue Medical Research Foundation, West Hartford, CT

## HEALTHCARE ASSOCIATED INFECTIONS SUBJECT TO REPORTING IN CONNECTICUT

After a yearlong period of planning, which culminated in the establishment of Connecticut DPH HAI Program, and the hiring of HAI Program staff, reporting of HAI data from ACH to Connecticut DPH began in 2008. The HAI Advisory Committee recommended that reporting from ACH would initially be required only for CLABSI in adult and pediatric ICU.

Beginning in 2011, CMS expanded "pay for reporting" HAI reporting requirements for the Inpatient Prospective Payment System (IPPS) for ACH and the Quality Incentive Program (QIP) for hemodialysis centers as a condition of receiving annual supplemental payments. CMS continues to require that these data be reported using NHSN. Additionally, this expansion aimed to add new classes of facilities beyond ACH, new locations within hospitals, and new types of HAI to the reporting expectations; CMS reporting requirements are expected to continue to expand in the foreseeable future.

That same year, the HAI Advisory Committee recommended that the Connecticut HAI reporting mandate mirror the CMS reporting mandate. This resulted in an expansion in the HAI surveillance measures that were to be reported by ACH to Connecticut DPH and subsequently to the public. Therefore, in 2012, reporting expanded to include CAUTI and SSI following colon surgical procedures and abdominal hysterectomies. As of January 2013, two new HAI measures were made reportable to Connecticut DPH: MRSA bacteremia and CDI LabID events in each ACH. LabID events report patient-specific data on these two infections generated from hospital microbiology laboratory results, and are reported for all inpatients, facility-wide (FacWideIN), with the exception of inpatient neonatal intensive care unit (NICU) data for CDI. At this time, new HAI reporting requirements were also added mandating IRF to report CAUTI in all bedded inpatient locations as well as MRSA bacteremia and CDI LabID events, and mandating LTACH to report both CAUTI and CLABSI in all bedded inpatient care locations as well as MRSA bacteremia and CDI LabID events. Finally, CMS – and, therefore, Connecticut DPH - added locations required to report HAI data in ACH to all ICU types, including NICU.

## HOW HEALTHCARE ASSOCIATED INFECTIONS DATA ARE COLLECTED

The HAI reporting mandate requires healthcare facilities to report specific HAI-related data to NHSN, which is a secure, internet-based surveillance system that healthcare facilities may use to track and report HAI data. NHSN includes standardized definitions, built-in analytical tools, user training and support, and integrated data quality checks. Only persons who have completed training on the standard definitions and surveillance methodology may perform NHSN data entry, and all protocols must be followed precisely. These protocols provide a rigorous national and state standard to ensure consistent collection of comparable data. The CDC makes NHSN available to all United States healthcare facilities at no charge, and, as of the writing of this report, is currently collecting data from more than 17,000 facilities (over 5,000 of which are hospitals) in all fifty states, the District of Columbia, and the Commonwealth of Puerto Rico.

Participation in NHSN requires a considerable commitment by each participating healthcare facility. Qualified IP, or other staff trained in infection prevention, trained in nursing, microbiology, epidemiology, and/or medical technology, conduct HAI surveillance, and all have obtained additional education in infection prevention and control. These individuals collect HAI data from a variety of sources maintained by facilities, such as laboratory culture results, patient medical records, and

flowcharts, such as those maintained on ICU patients. When facility IP determine that a patient has a condition that meets the NHSN definition of an HAI, then the infection is reported to Connecticut DPH via NHSN. These data are stored on the secure NHSN server which is protected from inappropriate disclosure by both software security features and federal law. Once data are entered, they are immediately available to the facility for viewing, analysis, and updating. Facility NHSN users must confer rights to the DPH HAI Program, which allows it to view and analyze the data for the purpose of public reporting. All patient and facility information is protected by state and federal law and are stored on secure computers.

The Connecticut DPH and CDC NHSN staffs ensure correct use of NHSN by Connecticut healthcare facilities as well as foster data accuracy by providing training to healthcare facility staff regarding how to apply the surveillance protocols that define an NHSN-reportable HAI, as well as how to collect, enter, and analyze the data. The data in this report reflect all data for the calendar year of 2014 entered into NHSN by Connecticut ACH, LTACH, and IRF on or after February 2, 2016.

## HEALTHCARE ASSOCIATED INFECTIONS DATA CLEANING AND VALIDATION

Data must be validated to ensure timeliness, completeness, accuracy, and compliance with NHSN reporting protocols. The DPH HAI Program works to ensure that Connecticut facilities are interpreting and applying these definitions consistently by applying its own data validation process to review the data for completeness and accuracy. There are a number of points at which these data are checked for validity. NHSN has a series of internal logic checks that prevent users from entering inaccurate data. Further data checks are conducted by the DPH HAI Program utilizing output from NHSN itself aimed at identifying data quality issues. DPH HAI Program staff also periodically contact facility reporting partners to review their facilities' data, and to encourage data quality "alerts" be resolved by the NHSN users at that facility. Finally, as resources permit, DPH HAI Program epidemiologists visit ACH in the state to perform data validation studies, which include audits of patient medical records. These chart reviews are intended to identify patient outcomes that have been misclassified according to NHSN definitions; inconsistencies are discussed with hospital IP and addressed accordingly within NHSN to ensure adherence to the reporting guidelines. On average, this process occurs every two to three years for a particular measure, or as program capacity allows, and may be expanded to include other facility types in the future. In total, this iterative approach to data cleaning and validation acts as a broad safety net to ensure that publicly-reported facility HAI data are of the best possible quality.

## INTERPRETING HEALTHCARE ASSOCIATED INFECTIONS DATA

### *The Standardized Infection Ratio*

The SIR is a summary statistical measure used to track HAI at a national, state, or facility level over time. The SIR adjusts for the fact that each healthcare facility treats different populations of patients. For example, the experience with HAI at a facility with a large burn unit (a location where patients are increased risk of acquiring infections due to the nature of their illness compared to other patients) cannot be directly compared to a facility without a burn unit. The SIR is calculated by dividing the number of observed infections by the number of predicted infections.

$$\textbf{Standardized infection ratio (SIR)} = \frac{\textbf{Observed number of infections}}{\textbf{Predicted number of infections}}$$

The predicted number of infections is an estimated number of HAI based on national NHSN HAI baseline data, and is adjusted for risk factors that have been found to be significantly associated with differences in infection rates. The baseline data, or referent period, for each infection type are the following:

| HAI Measure | Facility Type | Referent Period |
|---|---|---|
| CLABSI | ACH | January 2006 – December 2008 |
| CLABSI | LTACH | January 2013 – December 2013 |
| CAUTI | ACH | January 2009 – December 2009 |
| CAUTI | LTACH | January 2013 – December 2013 |
| SSI | All | January 2006 – December 2008 |
| MRSA bacteremia | All | January 2010 – December 2011 |
| *C. difficile* infection | All | January 2010 – December 2011 |

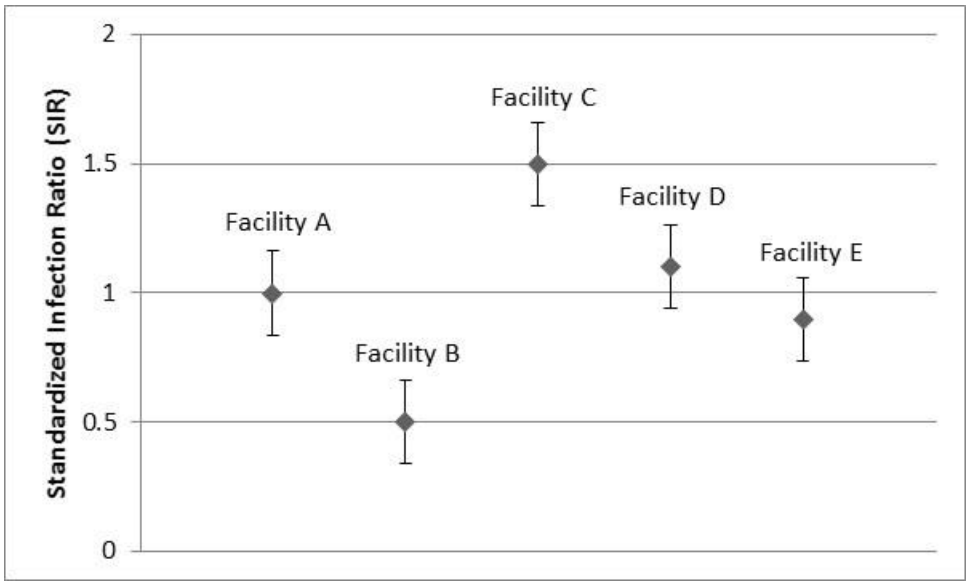
NHSN is currently working to create a new set of baselines for benchmarking and tracking progress, which will use data entered into the system for the calendar year of 2015. This new set of baselines will account for the significant changes made to NHSN definitions and criteria since the original baselines were established; will result in more consistent methods for calculating predicted infections; and will aim at more aggressive HAI reduction goals in light of the considerable progress that HAI reduction efforts have achieved since 2006.

***How to Interpret the Standardized Infection Ratio***

- If the **SIR is equal to 1**, then the number of observed infections is the same as the number of predicted infections.
- If the **SIR is less than 1**, then there were fewer infections observed than predicted.
- If the **SIR is greater than 1**, then there were more infections observed than predicted.

However, the value of the SIR alone is insufficient without a measure of statistical significance. Statistical tests are used to determine whether the difference between the number of observed infections and the number of predicted infections is due to chance alone. If it is extremely unlikely that this difference is due to chance, then the difference is considered to be statistically significant. One measure of statistical significance is the 95% confidence interval. An SIR with a confidence interval that does not include the reference value of 1 is considered to be statistically significant, while an SIR with a confidence interval with upper and lower bounds that fall on either side of 1 is not considered statistically significant. The SIR value of 1 is equal to the national baseline for each measure. Even if the SIR itself is less than or greater than 1, if it is not statistically significant, the number of observed infections is considered to be similar to the number of predicted infections based on national data.

The example below shows SIR for three healthcare facilities along with their 95% confidence intervals.




Facilities A, D, and E: If the 95% confidence interval crosses the reference line of 1.0, the SIR is not statistically significant, and we can conclude that the facility has observed a similar number of infections to what was predicted based on national data. This is true regardless of whether the SIR falls above or below the reference line of 1.0.

Facility B: If the upper bound of the 95% confidence interval falls below the reference line of 1.0, the SIR is statistically significant, and we can conclude that the facility has observed fewer infections than were predicted based on national data.

Facility C: If the lower bound of the 95% confidence interval falls above the reference line of 1.0, the SIR is statistically significant, and we can conclude that the facility has observed more infections than were predicted based on national data.

## HEALTHCARE ASSOCIATED INFECTIONS SURVEILLANCE RESULTS: ACUTE CARE HOSPITALS

In 2014, the average number of IP per ACH was slightly over 2, and the average number of beds per ACH was approximately 252; the average number of beds per IP was 115.8. Patient admissions over the year averaged 14,141 per ACH, and average patient days was 65,144. Thirty Connecticut ACH reported HAI data into NHSN in 2014.[1] Of these 30 hospitals, 16 categorized themselves as major teaching hospitals, which train medical students and post-graduate residents but not fellows (Table 1). Two categorized themselves as graduate teaching hospitals, which train post-graduate residents and fellows, and one categorized itself as an undergraduate teaching hospital, which trains undergraduate medical students.

**Table 1: 2014 Connecticut reporting acute care hospitals by teaching type**

| Teaching Type | # (%) |
|---|---|
| **Graduate Teaching** | 2 (6.7) |
| **Major Teaching** | 16 (53.3) |
| **Non-teaching** | 11 (36.7) |
| **Undergraduate Teaching** | 1 (3.3) |
| **Total** | 30 (100) |

### *Central Line-Associated Bloodstream Infections, All Intensive Care Units*

A central line is a flexible tube that is placed through the skin into a large vein in a patient's chest, arm, neck, or groin and ends in or close to the heart or one of the major blood vessels near the heart. Central lines are tubes used to administer fluids, nutrition, chemotherapy, antibiotics, blood and blood products, monitor the cardiovascular system, or to draw blood when repeated draws are needed. While they are an essential part of providing medical care for many patients, and are beneficial and often lifesaving, their use also may place patients at risk for infection because the line can serve as a way for bacteria to cross the barrier posed by intact skin and into the blood, particularly when they are not inserted correctly or kept clean. These infections are serious, costly, and most can be prevented by following accepted practices for inserting and caring for central lines.

During 2014, 84 CLABSI occurring in Connecticut ACH ICU were observed, approximately 58% fewer than were predicted; 99 CLABSI were observed in 2013. This resulted in a statistically signficant SIR of 0.42, indicating that fewer CLABSI occurred in Connecticut's ICU than were predicted based on national data (Table 2).

**Table 2: 2014 CLABSI SIR, all Connecticut acute care hospital ICU**

| Observed # CLABSI | Predicted # CLABSI | # Central Line Days | SIR | SIR 95% Confidence Interval |
|---|---|---|---|---|
| 84 | 200.43 | 95,010 | 0.42 | 0.34, 0.52 |

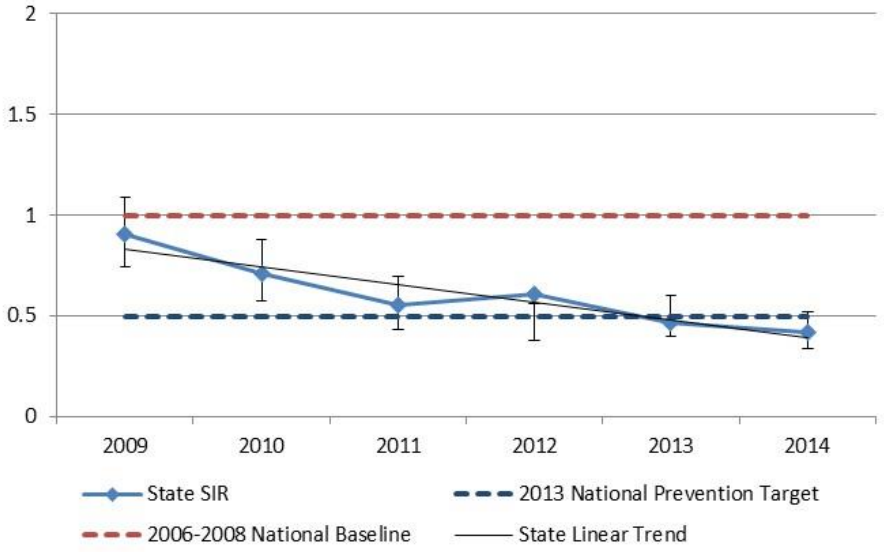
Connecticut has shown a general decrease in CLABSI in ACH since 2009, with an SIR of 0.91 in 2009 to an SIR of 0.42 in 2014. A small rise in the CLABSI SIR was observed during 2012, however it is believed that this may have been in part due to a change in reporting law mandating HAI surveillance in Connecticut

[1] For the purposes of HAI surveillance, Yale-New Haven Hospital and Yale-New Haven Saint Raphael's campuses are reported as separate facilities.

to reflect CMS reporting (from only one ICU in each ACH reporting CLABSI to all ICU reporting this measure).

The DHHS National Prevention Target for CLABSI in ACH was to achieve an SIR of 0.50 by the end of 2013, representing a 50% reduction from the national baseline period of 2006-2008. Connecticut's 2013 CLABSI SIR of 0.47 was lower than the National Prevention Target, demonstrating that the impressive efforts of Connecticut healthcare facilities have yielded major successes against CLABSI in performing surveillance and implementing control measures (Figure 1). New targets for SSI prevention are being developed at the federal level, and will be utilized in coming years to track further progress in Connecticut and across the nation.

**Figure 1: 2009-2014 CLABSI SIR, all Connecticut acute care hospital ICU**




*The vertical bars accompanying each data point represent the 95% confidence interval*

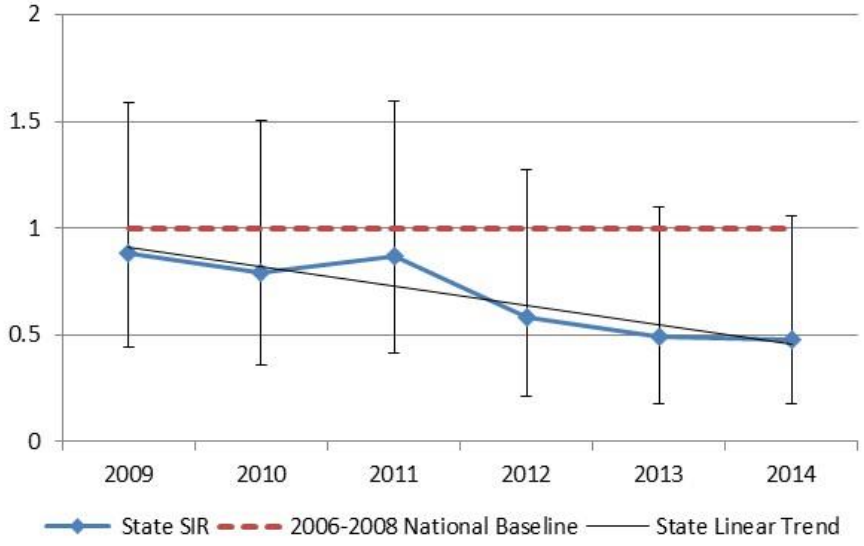
***Central Line-Associated Bloodstream Infections, Pediatric and Neonatal Intensive Care Units***

There are currently two PICU in Connecticut ACH. During 2014, five CLABSI occurring in PICU were observed, approximately 52% fewer than predicted and the same number that were observed in 2013. This resulted in an SIR of 0.48 (Table 3). While this SIR is not statistically significant, indicating that the number of CLABSI observed in Connecticut's PICU was similar to the number predicted based on national data, it is very encouraging. Between 2009 and 2014, the CLBSI SIR in PICU decreased overall, from 0.89 to 0.48, although this decrease is not statistically significant (Figure 2). Despite the large drop in the SIR, lack of statisical significance is unsurprising considering the small numbers of patients cared for in this setting; small amounts of data result in wide confidence intervals, making assessment of statistical signficance difficult to attain.

**Table 3: 2014 CLABSI SIR, Connecticut acute care hospital PICU**

| Observed # CLABSI | Predicted # CLABSI | # Central Line Days | SIR | SIR 95% Confidence Interval |
|---|---|---|---|---|
| 5 | 10.45 | 3,484 | 0.48 | 0.18, 1.06 |

**Figure 2: 2009-2014 CLABSI SIR, Connecticut acute care hospital PICU**



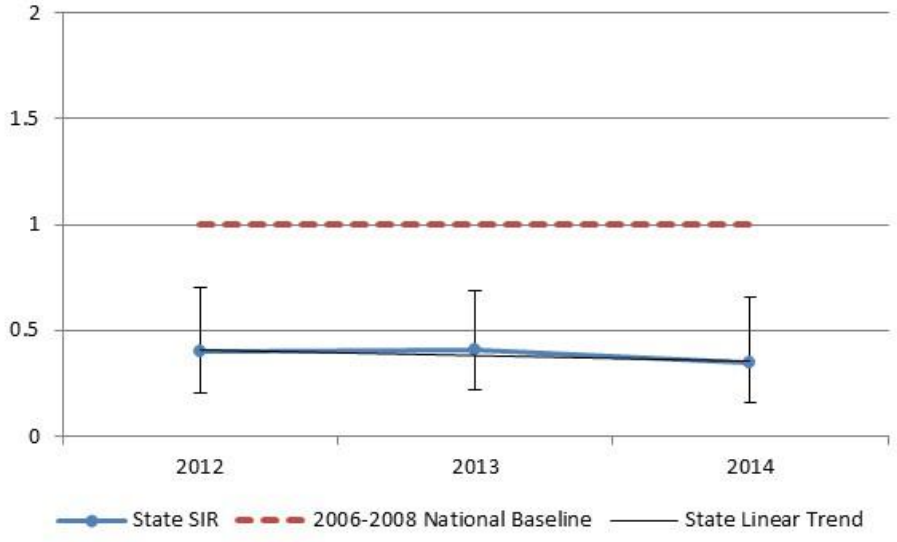

*The vertical bars accompanying each data point represent the 95% confidence interval*

Connecticut ACH began collecting CLABSI data from its 12 NICU in 2012. During 2014, eight CLABSI occurring in NICU were observed, approximately 65% fewer than predicted; 12 were observed in 2013. This resulted in a statistically significant SIR of 0.35, indicating that fewer CLABSI occurred in Connecticut's NICU than were predicted based on national data. CLABSI data from Connecticut's NICU demonstrate the effectiveness of the efforts of our neonatal care community in reducing these serious infections in this vulnerable patient population.

**Table 4: 2014 CLABSI SIR, Connecticut acute care hospital NICU**

| Observed # CLABSI | Predicted # CLABSI | # Central Line Days | SIR | SIR 95% Confidence Interval |
|---|---|---|---|---|
| 8 | 23.21 | 10,290 | 0.35 | 0.16, 0.65 |

**Figure 3: 2012-2014 CLABSI SIR, Connecticut acute care hospital NICU**




*The vertical bars accompanying each data point represent the 95% confidence interval*

***Central Line Device Utilization***

The central line device utilization (DU) ratio measures the proportion of total patient days in which central lines are used. It is calculated by dividing the number of patients with at least one central line by all patients in a patient care location (such as an ICU) during the specified reporting period. DU is a measure of the degree of invasive care interventions in a patient location, and can serve as a marker for severity of illness among the patients in that location. Because central line use is a necessary condition for the development of a CLABSI, reducing central line use, as well as the duration of use (when the patient's condition permits it), may lead to a reduction in CLABSI. CLABSI prevention guidelines include recommendations to remove central lines as soon as they are no longer needed by the patient. In adult and pediatric ICU, central line DU ratio data are stratified by ICU type, and in NICU, central line DU ratio data are stratified by ICU level and by birthweight category; ICU type and birthweight are both considered risk factors for increased DU. NICU are classified according to the intensity of care they provide for their patients; each level has particular capabilities for providing care to infants based on factors such as gestational age, birthweight, need for invasive devices, and general health. Level II NICU are defined by NHSN as step down neonatal nurseries, and Level II/III NICU are defined by NHSN as neonatal critical care units, which house both Level II and III newborns and infants.

In 2014, Connecticut ACH observed statistically significantly lower DU ratios in six ICU types and statistically significantly higher DU ratios in four ICU types when compared to 2014 national DU ratios (Table 5). Connecticut's 2014 central line DU ratio was statistically significantly lower than the national ratio for four of the five birthweight categories in level II/III NICU, and in all birthweight categories in level III NICU (Tables 6 and 7). These data are encouraging, as they suggest that Connecticut ICU HCP are making progress in following national recommendations on CLABSI prevention. Such success in implementing practice recommendations is consistent with the excellent progress Connecticut ACH are making in preventing CLABSI.

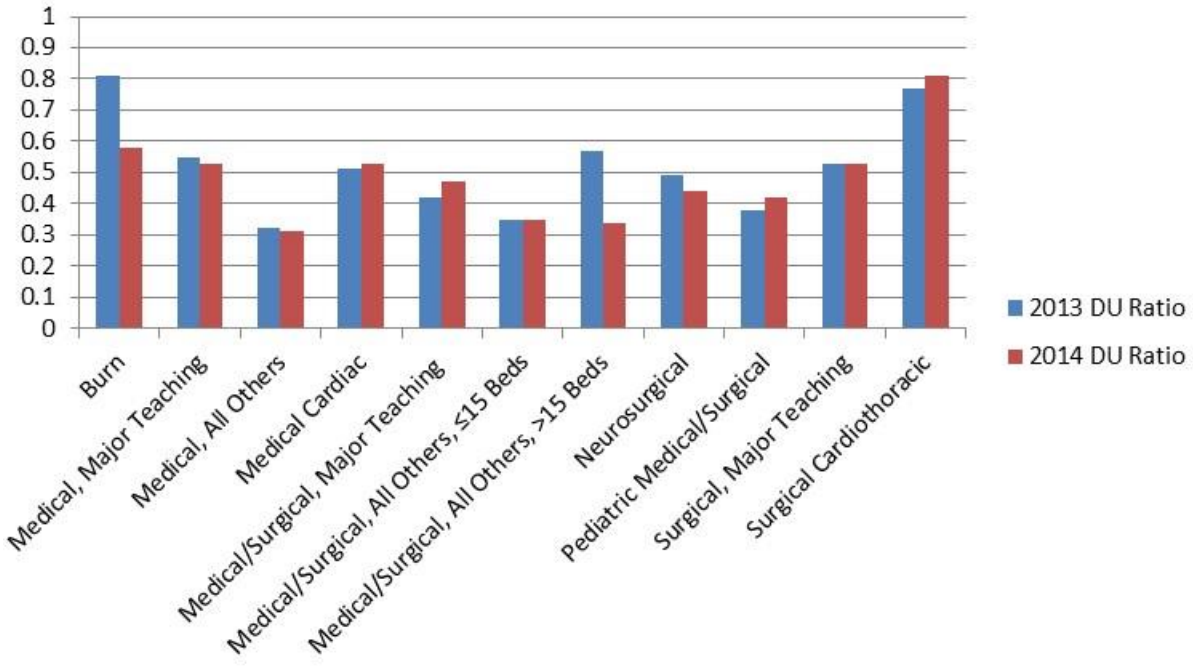
**Table 5: 2014 central line DU ratios, Connecticut acute care hospital adult and pediatric ICU**

| ICU Type | # Central Line Days | # Patient Days | State DU Ratio* | National DU Ratio 2014 |
|---|---|---|---|---|
| **Burn (n=1)** | 271 | 465 | 0.58** | 0.45 |
| **Medical, Major Teaching (n=5)** | 15,279 | 29,088 | 0.53** | 0.56 |
| **Medical, All Others (n=4)** | 2,474 | 7,912 | 0.31** | 0.46 |
| **Medical Cardiac (n=4)** | 6,686 | 12,650 | 0.53** | 0.43 |
| **Medical/Surgical, Major Teaching (n=10)** | 21,114 | 44,858 | 0.47** | 0.54 |
| **Medical/Surgical, All Others, ≤15 Beds (n=9)** | 7,484 | 21,254 | 0.35 | 0.36 |
| **Medical/Surgical, All Others, >15 Beds (n=2)** | 1,919 | 5,617 | 0.34** | 0.48 |
| **Neurosurgical (n=2)** | 4,573 | 10,408 | 0.44** | 0.42 |
| **Pediatric Medical/Surgical (n=2)** | 3,484 | 8,336 | 0.42** | 0.45 |
| **Surgical, Major Teaching (n=5)** | 8,431 | 16,010 | 0.53** | 0.57 |
| **Surgical Cardiothoracic (n=4)** | 13,005 | 16,016 | 0.81** | 0.66 |

** # central line days/# patient days*

*** Difference between state DU ratio and national DU ratio is statistically significant*

**Figure 4: 2013-2014 central line DU ratios by ICU type, Connecticut acute care hospital adult and pediatric ICU**



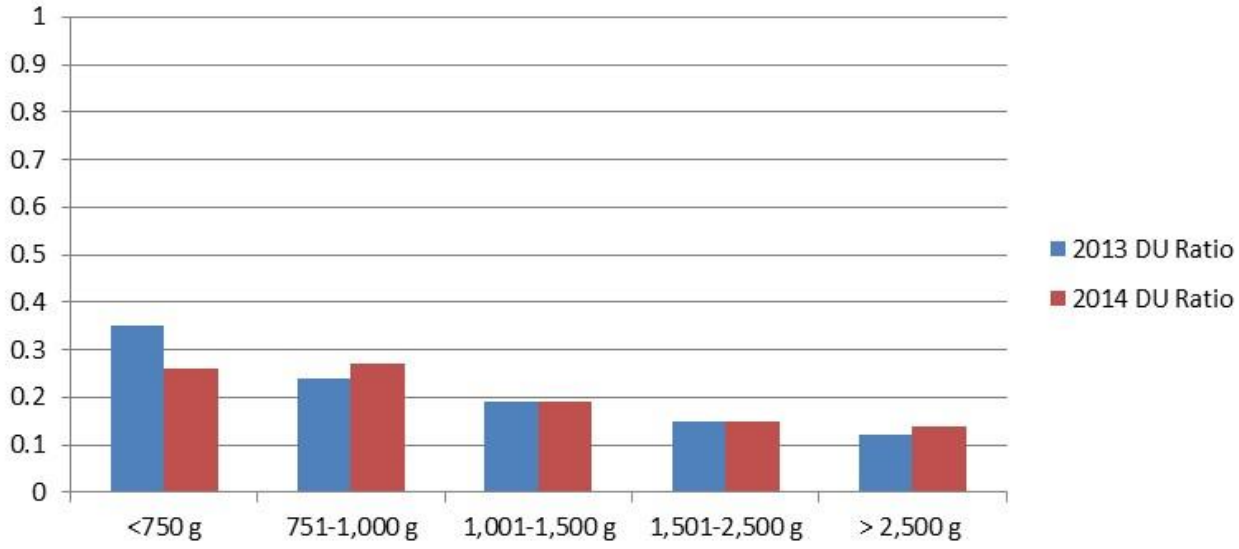

*DU ratio: # central line days/# patient days*

**Table 6: 2014 central line DU ratios by birthweight, Connecticut acute care hospital level II/III NICU**

| Birthweight category | # Central Line Days | # Patient Days | State DU Ratio* | National DU Ratio 2014 |
|---|---|---|---|---|
| **<750 g** | 678 | 2,609 | 0.26** | 0.39 |
| **751-1,000 g** | 777 | 2,886 | 0.27** | 0.33 |
| **1,001-1,500 g** | 1,002 | 5,205 | 0.19** | 0.24 |
| **1,501-2,500 g** | 1,310 | 8,966 | 0.15** | 0.13 |
| **> 2,500 g** | 1,065 | 7,478 | 0.14** | 0.16 |

*Six level II/III NICU locations reported in 2014*
** # central line days/# patient days*
*** Difference between state DU ratio and national DU ratio is statistically significant*

**Figure 5: 2013-2014 central line DU ratios by birthweight, Connecticut acute care hospital level II/III NICU**



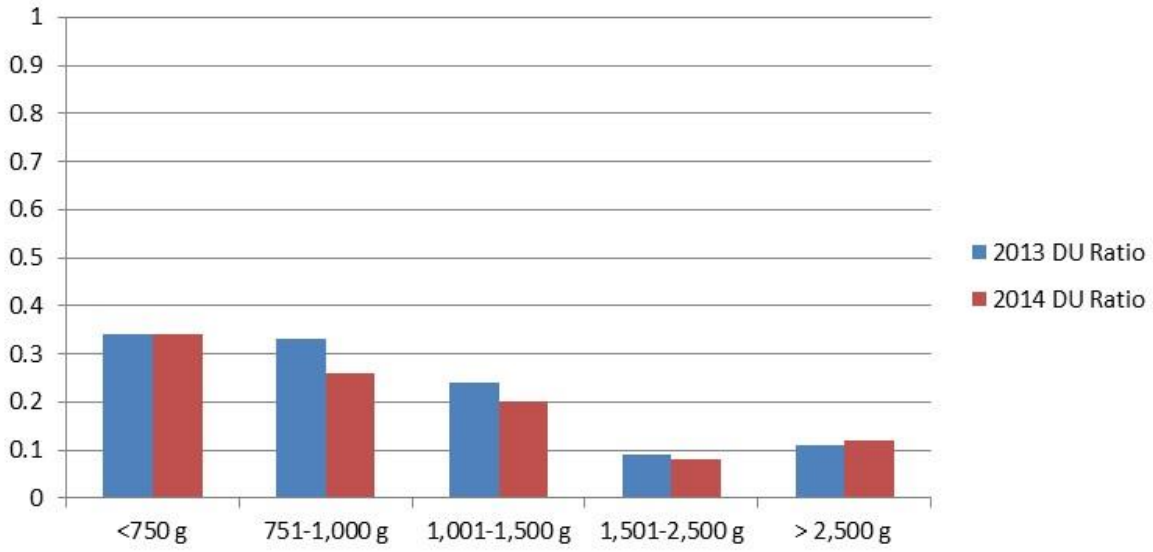

*DU ratio: # central line days/# patient days*

**Table 7: 2014 central line DU ratios by birthweight, Connecticut acute care hospital level III NICU**

| Birthweight category | # Central Line Days | # Patient Days | State DU Ratio* | National DU Ratio 2014 |
|---|---|---|---|---|
| **<750 g** | 1,345 | 3,974 | 0.34** | 0.39 |
| **751-1,000 g** | 990 | 3,781 | 0.26** | 0.33 |
| **1,001-1,500 g** | 1,322 | 6,739 | 0.20** | 0.25 |
| **1,501-2,500 g** | 928 | 11,149 | 0.08** | 0.18 |
| **> 2,500 g** | 873 | 7,304 | 0.12** | 0.23 |

*Six level III NICU locations reported in 2014*
** # central line days/# patient days*
*** Difference between state DU ratio and national DU ratio is statistically significant*

**Figure 6: 2013-2014 central line DU ratios by birthweight, Connecticut acute care hospital level III NICU**




*DU ratio: # central line days/# patient days*

***Catheter-Associated Urinary Tract Infections, All Intensive Care Units***

Urinary tract infections are a common type of HAI in ACH. CAUTI may occur when indwelling urinary catheters (generally called a Foley catheter) are incorrectly placed, left in too long, or not kept clean; pathogens may travel through the catheter to infect the kidneys or bladder. These CAUTI have been associated with increased illness, death, cost, and longer stays in the hospital. While these devices are often very important for medical monitoring of the patient's health status as well as patient comfort and hygiene, sometimes catheters are not necessary, and removal of such catheters can prevent this HAI.

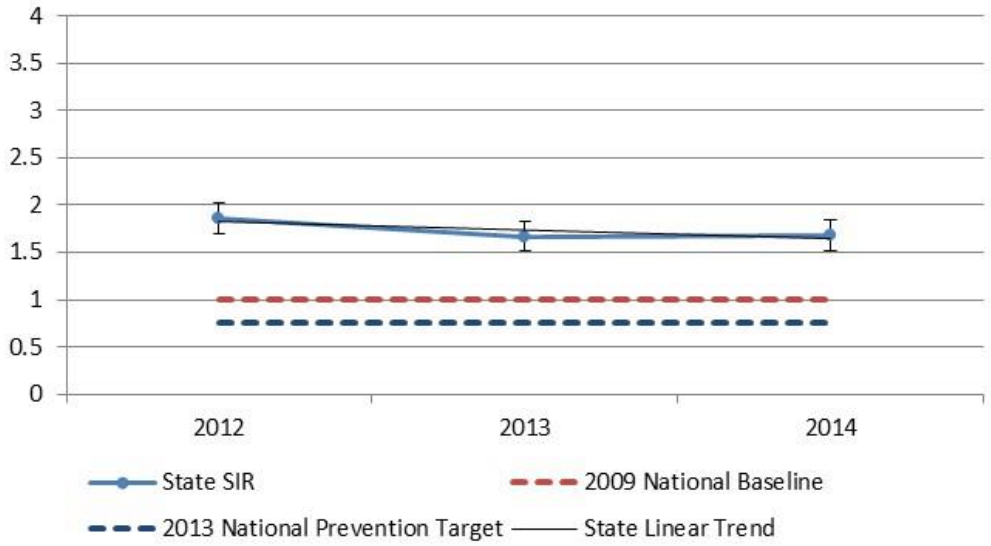
During 2014, Connecticut ACH observed 396 CAUTI, approximately 68% more than were predicted. This resulted in a statistically significant SIR of 1.68, indicating that more CAUTI were observed than were predicted based on national data (Table 8). Although this does not represent a statistical increase from the 2013 CAUTI SIR, it does represent a decrease from the 2012 CAUTI SIR of 1.84.

The DHHS National Prevention Target for CAUTI in ACH is to achieve an SIR of 0.75 by the end of 2014, representing a 25% reduction in CAUTI from the national baseline period of 2009. Unfortunately, Connecticut's 2014 CAUTI SIR of 1.68 was much higher than the National Prevention Target, despite collaborative efforts made by ACH; still more concerted efforts by facilities will be necessary to meet future goals. New targets for CAUTI prevention are being developed at the federal level, and will be utilized in coming years to track further progress in Connecticut and across the nation.

**Table 8: 2014 CAUTI SIR, all Connecticut acute care hospital ICU**

| Observed # CAUTI | Predicted # CAUTI | # Urinary Catheter Days | SIR | SIR 95% Confidence Interval |
|---|---|---|---|---|
| 396 | 236.05 | 105,463 | 1.68 | 1.52, 1.85 |

**Figure 7: 2012-2014 CAUTI SIR, all Connecticut acute care hospital ICU**



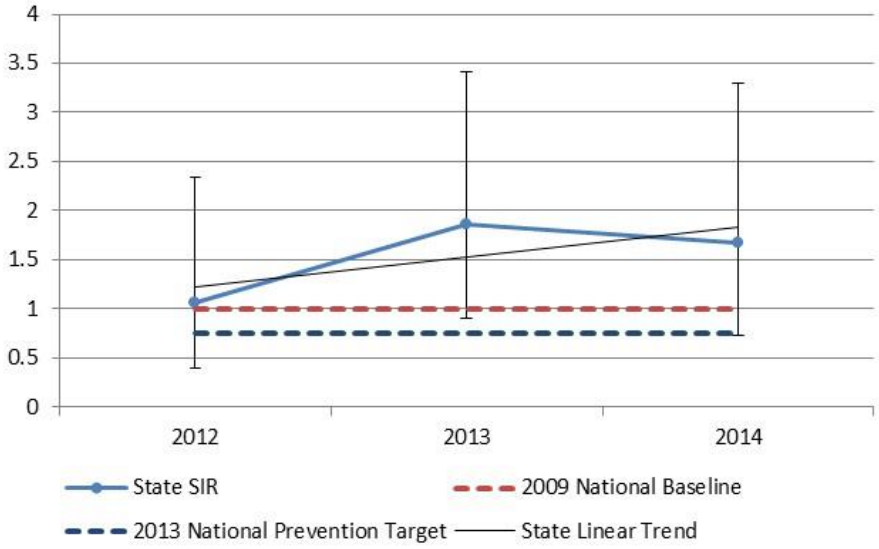

***Catheter-Associated Urinary Tract Infections, Pediatric Intensive Care Units***

A very small percentage (1.7%) of Connecticut's ICU CAUTI occurred in children. Seven CAUTI were observed in ACH PICU, approximately three more than predicted. This resulted in an SIR of 1.67, which, though high, was not statistically significant, indicating that the number of CAUTI occurring in Connecticut's PICU is similar to the number predicted based on national data (Table 9).

**Table 9: 2014 CAUTI SIR, Connecticut acute care hospital PICU**

| Observed # CAUTI | Predicted # CAUTI | # Urinary Catheter Days | SIR | SIR 95% Confidence Interval |
|---|---|---|---|---|
| 7 | 4.20 | 1,501 | 1.67 | 0.73, 3.30 |

**Figure 8: 2012-2014 CAUTI SIR, Connecticut acute care hospital PICU**



***Urinary Catheter Device Utilization***

The urinary catheter DU ratio measures the proportion of total patient days in which urinary catheters are used. It is calculated by dividing the number of patients with an indwelling urinary catheter by all patients in a patient care location (usually an ICU) during the specified reporting period. DU is a measure of the degree of invasive care interventions in a patient location, and can serve as a marker for severity of illness among the patients in that location. Because urinary catheter use is a necessary condition for the development of a CAUTI, reducing urinary catheter use and the duration of use (when the patient's condition permits it) may lead to lower rates of CAUTI. CAUTI prevention guidelines include recommendations to remove urinary catheters as soon as they are no longer needed by the patient.

Six of the 11 types of ICU found in Connecticut's ACH analyzed in Table 10 had DU ratios that were statistically significantly higher than the national DU ratio. This may be one possible factor contributing to the state's high CAUTI SIR. It should be noted that, between 2013 and 2014, the DU ratio decreased in seven of the 11 types of ICU, although these decreases may not be statistically significant (Figure 9). This can be credited to a concerted effort on behalf of hospital staff to remove unnecessary urinary catheters in patients, thus reducing their chances of developing an infection in relation to the catheter.

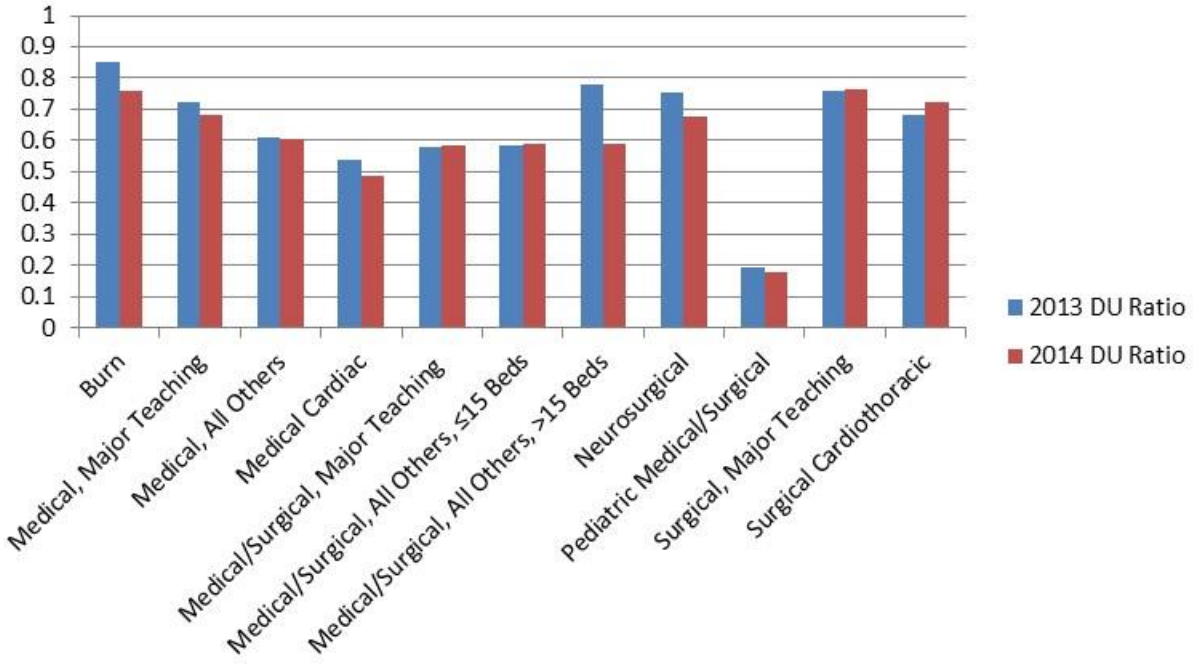
**Table 10: 2014 urinary catheter DU ratios, Connecticut acute care hospital adult and pediatric ICU**

| ICU Type | # Urinary Catheter Days | # Patient Days | State DU Ratio* | National DU Ratio 2014 |
|---|---|---|---|---|
| **Burn (n=1)** | 352 | 465 | 0.76** | 0.45 |
| **Medical, Major Teaching (n=5)** | 19,811 | 29,088 | 0.68** | 0.62 |
| **Medical, All Others (n=4)** | 4,800 | 7,912 | 0.61 | 0.61 |
| **Medical Cardiac (n=4)** | 6,145 | 12,650 | 0.49 | 0.49 |
| **Medical/Surgical, Major Teaching (n=10)** | 26,163 | 44,858 | 0.58** | 0.63 |
| **Medical/Surgical, All Others, ≤15 Beds (n=9)** | 12,539 | 21,254 | 0.59** | 0.53 |
| **Medical/Surgical, All Others, >15 Beds (n=2)** | 3,298 | 5,617 | 0.59** | 0.62 |
| **Neurosurgical (n=2)** | 7,019 | 10,408 | 0.67** | 0.60 |
| **Pediatric Medical/Surgical (n=2)** | 1,501 | 8,336 | 0.18** | 0.20 |
| **Surgical, Major Teaching (n=5)** | 12,227 | 16,010 | 0.76** | 0.70 |
| **Surgical Cardiothoracic (n=4)** | 11,608 | 16,016 | 0.73** | 0.63 |

** # urinary catheter days/# patient days*

*** Difference between state DU ratio and national DU ratio is statistically significant*

**Figure 9: 2013-2014 Connecticut acute care hospital urinary catheter DU ratios by ICU type**




*DU ratio: # urinary catheter days/# patient days*

***Surgical Site Infections***

SSI occur when microorganisms infect a body site where surgery was performed. They are a significant cause of post-surgical morbidity and possible mortality, and can result in the need for hospital readmissions or extended courses of antibiotics.

In 2014, 174 infections following colon (COLO) surgical procedures were observed in Connecticut's ACH, approximately 52% more than were predicted. This resulted in a statistically significant SIR of 1.52, indicating that more SSI following colon procedures were observed than were predicted based on national data. Thirty-seven infections following abdominal hysterectomies (HYST) were observed during 2014, 6% more than were predicted. This resulted in an SIR of 1.06 which was not statistically significant, indicating that the number of SSI following abdominal hysterectomies observed in Connecticut ACH during 2014 was similar to the number predicted based on national data (Table 11). Neither the increase in SSI following colon surgical procedures nor the decrease in SSI following abdominal hysterectomies since 2013 are statistically significant – as indicated by the overlapping confidence intervals (Figure 10, Figure 11) – and the HAI Program is not aware of any particular reason for these trends. However, these data will continue to be followed over time, and increases in SSI will be investigated further if indicated.

**Table 11: 2014 Connecticut acute care hospital SSI SIR, by procedure type**

| Surgical Procedure | Procedure Count | Observed # SSI* | Predicted # SSI | State SIR | SIR 95% Confidence Interval |
|---|---|---|---|---|---|
| **Colon** | 3,714 | 174 | 114.85 | 1.52 | 1.30, 1.75 |
| **Abdominal hysterectomy** | 3,976 | 37 | 34.98 | 1.06 | 0.76, 1.44 |

**In accordance with the CMS reporting requirement, these data include deep incisional primary and organ/space infections that occurred within 30 days of of inpatient procedures in patients that were 18 years of age or older at the time of surgery*

**Figure 10: 2012-2014 COLO SIR, all Connecticut acute care hospitals**

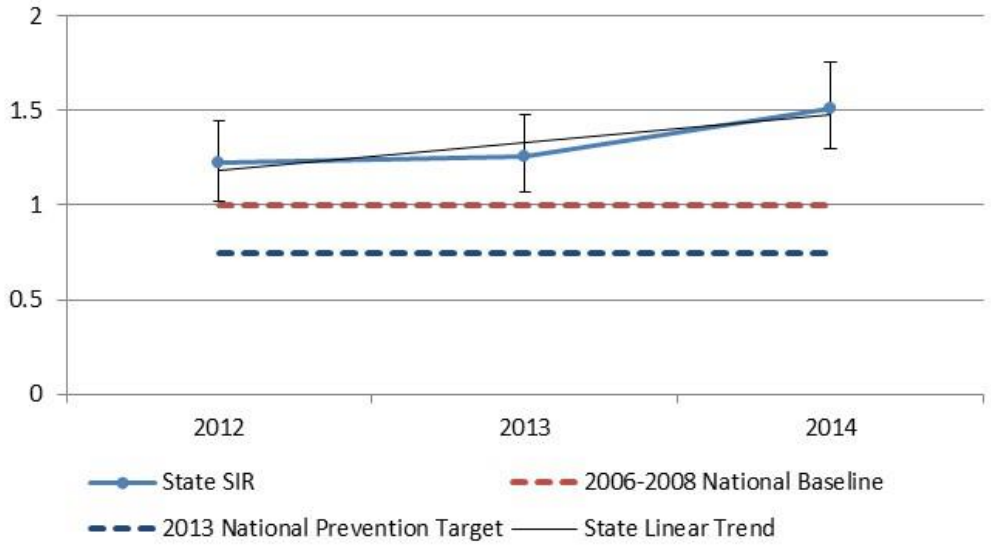
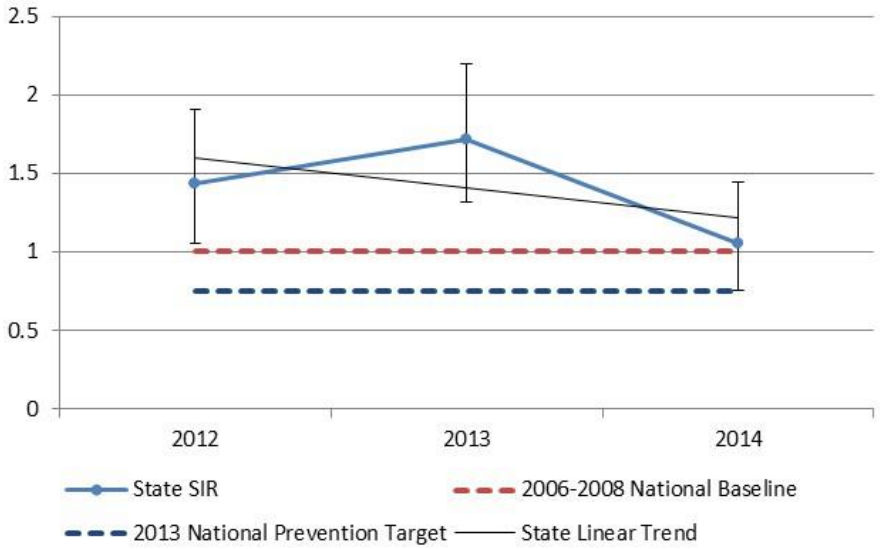



**Figure 11: 2012-2014 HYST SIR, all Connecticut acute care hospitals**



The DHHS National Prevention Target for SSI in ACH was to achieve an SIR of 0.75 by the end of 2013, representing a 25% reduction in SSI from the national baseline period of 2006-2008. Connecticut's 2013 SSI SIR for infections following colon surgical procedures of 1.26 was higher than the National Prevention Target; Connecticut's 2013 SSI SIR for infections following abdominal hysterectomies of 1.72 was much higher than the National Prevention Target. Connecticut ACH already collaborate to reduce these infections, but continued concerted efforts by facilities will help Connecticut to achieve future goals. New targets for SSI prevention are being developed at the federal level, and will be utilized in coming years to track further progress in Connecticut and across the nation.

### *Hospital-onset Methicillin-Resistant* Staphylococcus aureus *Bacteremia and* Clostridium difficile *Infections*

The incidence of hospital onset (HO) MRSA bacteremia[2] and (CDI)[3] became reportable to Connecticut DPH by ACH in 2013. HO means the specimen is collected greater than three days after admission to the hospital. These data are based solely on culture results from laboratories.

In 2014, 87 cases of HO MRSA bacteremia were observed in Connecticut's ACH, approximately 36% fewer than were predicted. This resulted in a statistically significant SIR of 0.65, indicating that fewer cases of HO MRSA bacteremia were observed than were predicted based on national data (Table 12). For CDI, 1,514 HO cases were observed in 2014, approximately 8% more than predicted. This resulted in a statistically significant SIR of 1.08, indicating that more cases of CDI were observed than were predicted based on national data.

**Table 12: 2014 MRSA and CDI SIR, all Connecticut acute care hospital ICU**

| Infection Type | Observed # of HO | Predicted # HO | # Patient Days | SIR | SIR 95% Confidence Interval |
|---|---|---|---|---|---|
| **MRSA** | 87 | 134.61 | 1,961,177 | 0.65 | 0.52, 0.79 |
| **CDI** | 1,509 | 1,394.28 | 1,814,866* | 1.08 | 1.03, 1.14 |

**NICU; specialty care nursery; babies in labor, delivery, recovery, and post-partum; well-baby nursery; and well-baby clinic counts were subtracted from count per surveillance protocol*

The DHHS National Prevention Target for CDI in ACH was to achieve an SIR of 0.70 by the end of 2013, representing a 30% reduction in CDI from the national baseline period of 2010-2011. Connecticut's 2013 CDI SIR of 1.02 was higher than the National Prevention Target; continued concerted efforts by facilities will help Connecticut to move towards future goals. New targets for CDI prevention are being developed at the federal level, and will be utilized in coming years to track further progress in Connecticut and across the nation.

The DHHS National Prevention Target for MRSA bacteremia in ACH is to achieve an SIR of 0.75 by the end of 2015, representing a 25% reduction in MRSA bacteremia from the national baseline of 2010-2011. Connecticut's 2014 MRSA bacteremia SIR of 0.65 was lower than the National Prevention Target, demonstrating healthcare facility successes in performing surveillance and implementing control measures. New targets for MRSA bacteremia prevention are being developed at the federal level, and will be utilized in coming years to track further progress in Connecticut and across the nation.

[2] Broadly defined as a positive laboratory test result for MRSA from a blood source

[3] Broadly defined as a positive laboratory test result for *C. difficile* toxin A and/or B from an unformed stool sample

## PARTNERSHIPS AND HAI PREVENTION IN ACUTE CARE HOSPITALS

HAI surveillance to gather actionable data is a first step that healthcare facilities and Connecticut DPH are taking to improve patient safety. These data are used to inform and direct prevention activities that include participating in collaboratives with other facilities to share and follow best practices as well as implementing facility-based initiatives to improve hand hygiene, disinfection procedures for medical equipment, and other preventive measures.

Working in partnership with CHA and Qualidigm, Connecticut DPH collaborates with ACH to facilitate sharing local and national best practices, tools and resources, and strategies for implementing prevention initiatives and garnering leadership support. Connecticut DPH has either hosted or participated in a number of seminars on infection prevention and approaches for promoting QI. Connecticut DPH Commissioner Mullen has been regularly communicating with ACH chief executive officers through circular letters and memos regarding HAI reporting initiatives.

All ACH licensed by Connecticut DPH have a hospital-wide program for the prevention, control, and investigation of infectious diseases. Nurses, physicians, medical technologists, and other professionals who have acquired special training in infection control or epidemiology manage these programs. Through their infection prevention and control programs, ACH strive to improve the care and safety of patients by following the recommendations and standards of agencies such as Connecticut DPH and CDC.

The efforts of these infection prevention and control programs have resulted in the development of several national HAI prevention programs that offer participants opportunities for shared learning, support, and tools to help eliminate HAI. The best known of these is the Comprehensive Unit-based Safety Program (CUSP) developed by staff of the Johns Hopkins Center for Patient Safety under the leadership of Dr. Peter Pronovost, a native of Connecticut. This program uses carefully crafted QI and workplace culture change methods to achieve the goal of consistently and sustainably incorporating proven best practices to prevent CLABSI (including the well-known Central Line Insertion Care Team Checklist, found at http://www.ahrq.gov/professionals/education/curriculum-tools/clabsitools/clabsitoolsap5.html). CUSP has been used to reduce CLABSI at Johns Hopkins as well as in a consortium of most of the hospitals in the state of Michigan. This Michigan Keystone Center project has sustained a 70 percent reduction in CLABSI over several years in a wide variety of hospitals, and has been successfully used in Connecticut.

CHA has led several prevention collaboratives based on CUSP in the past, along with additional prevention collaboratives aimed at CLABSI, CAUTI, and SSI. CHA has also worked with ACH on an ambitious statewide initiative to eliminate all-cause preventable harm using high reliability science to create a culture of safety. All ACH in the state have participated in Partnership for Patients, a national initiative to reduce preventable patient harm by 20% and avoidable readmissions by 40%. Engagement in these collaboratives builds upon ACH's prior work. Working collaboratively, ACH have committed to eliminating CLABSI, CAUTI, and SSI.

In 2013, two important prevention collaboratives were launched in Connecticut. The first, which enrolled 33 long-term care facilities, was developed in partnership with the Public Health Foundation and uses QI methodology to improve infection control processes in the long-term care setting, with a specific focus on reducing CDI. The use of QI methods in healthcare is a cutting-edge activity that Connecticut DPH is promoting throughout its agency as well as the public health system in Connecticut as a whole. The second collaborative was made up of communities of healthcare providers across the

continuum of care (including ACH, long-term care, home health agencies, clinicians, and other providers of care) that serve the same patients. This project, facilitated by Qualidigm together with the CMS-designated Quality Improvement Organization for Connecticut, is developing innovative methods of reducing antibiotic resistance through stewardship programs.

Successful implementation of these models is dependent upon executive leadership guiding overall institutional commitment to foster, promote, and support collaborative goals of improvement. Hospitals have also implemented prevention activities specific to their facility to eliminate HAI based on needs identified within their facilities, frequently focusing on hand hygiene.

## 2013 DEPARTMENT OF HEALTH AND HUMAN SERVICES NATIONAL ACTION PLAN TO PREVENT HEALTHCARE-ASSOCIATED INFECTIONS IN ACUTE CARE HOSPITALS: STATEWIDE AND NATIONAL PROGRESS

**Table 13: Connecticut and national acute care hospital performance: 2013 DHHS Action Plan metrics**

| Metric | Data Source | Baseline Period | Baseline Data | 2013 National Target | 2013 National Data** | Target Met Nationally? | 2013 State Data | Target Met By State? |
|---|---|---|---|---|---|---|---|---|
| **CLABSI** | NHSN | 2006-2008 | 1.00 SIR | ↓ 50% or 0.50 SIR | 0.54 | ✖ | 0.47 | ★ |
| **Hospitalizations with *C. difficile*** | HCUP | 2008 | 11.6 hospitalizations per 1,000 discharges | ≥ ↓ 30% rate | 13.3 hospitalizations per 1,000 discharges | ✖ | 14.9 hospitalizations per 1,000 discharges | ✖ |
| **CDI** | NHSN | 2010-2011 | 1.00 SIR | ≥ ↓ 30% or 0.70 SIR | 0.90 | ✖ | 1.02 | ✖ |
| **MRSA incidence rate^** | EIP | 2007-2008 | 27.08 infections per 100,000 persons | ≥ ↓ 50% rate | 18.28 infections per 100,000 persons | ✖ | 21.09 infections per 100,000 persons | ✖ |
| **COLO SSI** | NHSN | 2006-2008 | 1.00 SIR | ≥ ↓ 25% or 0.75 SIR | 0.92 | ✖ | 1.26 | ✖ |
| **HYST SSI** | NHSN | 2006-2008 | 1.00 SIR | ≥ ↓ 25% or 0.75 SIR | 0.86 | ✖ | 1.72 | ✖ |
| **Metric** | **Data Source** | **Baseline Period** | **Baseline Data** | **2014 National Target** | **2014 National Data**** | **Target Met Nationally?** | **2014 State Data** | **Target Met By State?** |
| **CAUTI** | NHSN | 2009 | 1.00 SIR | ≥ ↓ 25% or 0.75 SIR | 1.00* | ✖ | 1.68* | ✖ |
| **Metric** | **Data Source** | **Baseline Period** | **Baseline Data** | **2015 National Target** | **2014 National Data**** | **Target Met Nationally?** | **2014 State Data** | **Target Met By State?** |
| **MRSA bacteremia^^** | NHSN | 2010-2011 | 1.00 SIR | ≥ ↓ 25% or 0.75 SIR | 0.87* | Not expected to achieve target* | 0.65* | Expected to achieve target* |

★ *Target met* ✖ *Target not met*

*HCUP: Healthcare Cost and Utilization Project* *EIP: Emerging Infections Program*

*^ Healthcare-associated* *^^ Healthcare facility-wide inpatient*

**HHS has extended the five-year target period to the end of 2014 for CAUTI and the end of 2015 for MRSA bacteremia. The state and national SIR for MRSA bacteremia represent interim figures based on data from calendar year 2014.*

***National 2013 and 2014 data for all measures using NHSN as a data source are taken from CDC's National and State HAI Progress Reports from 2013 and 2014, available at: http://www.cdc.gov/HAI/pdfs/progress-report/hai-progress-report.pdf.*

*National 2013 data for MRSA incidence rate (healthcare-associated) are taken from http://www.cdc.gov/abcs/reports-findings/survreports/mrsa13.pdf.*

*National 2013 data for hospitalizations with* C. difficile *are taken from http://hcupnet.ahrq.gov/.*

Federal and state governments are engaged in a coordinated effort to implement the DHHS National Action Plan to Prevent Healthcare-Associated Infections ("the DHHS Action Plan") available at http://health.gov/hcq/prevent-hai-action-plan.asp. This plan sets forth specific and ambitious goals for HAI reduction by the end of 2013 and beyond, and is being updated to include new targets for 2020. This plan is also set to expand beyond the acute care setting to the full continuum of care. ACH metrics currently being tracked as part of the DHHS Action Plan are summarized in Table 13.

National and statewide performance, reflected by the data presented in Table 13, indicate that these goals are very ambitious; most of the targets have not been met at the state or the national level. However, these data also show that progress has been made both nationally and in Connecticut. This progress has been fostered by the DHHS Action Plan itself as well as its resources, and the commitment to the DHHS Action Plan by the medical and public health communities. Despite this, Connecticut ACH have fallen short in reducing CAUTI, *C. difficile* hospitalizations, MRSA incidence, and SSI following colon surgical procedures and abdominal hysterectomies; patient safety stakeholders, including those at public health agencies and ACH, across the state will need to continue to focus attention on preventing HAI in future years. Such activities should include continued promotion of prevention collaboratives (such as those led with federal funding support from Qualidigm and the CHA) as well as technical support from Connecticut DPH to prioritize facilities reporting high levels of HAI.

## HEALTHCARE ASSOCIATED INFECTIONS SURVEILLANCE RESULTS: LONG-TERM ACUTE CARE HOSPITALS

LTACH furnish extended medical and rehabilitative care to clinically complex patients, such as those with multiple acute or chronic conditions, who need hospital-level care for relatively extended periods. (American Hospital Association, http://www.aha.org/advocacy-issues/postacute/ltach/index.shtml). Such conditions could include trauma (e.g., severe automobile accidents) or chronic serious medical conditions (e.g., cancer, cerebral palsy). These conditions require a higher level of care than is generally available at long-term care facilities like skilled nursing facilities or nursing homes, and are similar in terms of the intensity of care needed – albeit for a longer period of time – as is generally available at ACH. In 2014, the average number of beds per LTACH was slightly over 163; patient admissions over the year averaged 695.3 per LTACH, and average patient days was 49,227.3. Five Connecticut LTACH reported HAI data into NHSN in 2014.[4]

### *Central Line-Associated Bloodstream Infections, All Bedded Inpatient Care Locations*

CLABSI are a required HAI measure for LTACH in Connecticut; for more information about CLABSI, please see page 9.

During 2014, 12 CLABSI occurring in Connecticut LTACH were observed, approximately 33% fewer than were predicted. This resulted in an SIR of 0.67 which was not statistically significant, indicating that the number of CLABSI occurring in Connecticut's LTACH is similar to the number predicted based on national data (Table 14).

**Table 14: 2014 CLABSI SIR, all Connecticut long-term acute care hospital bedded inpatient care locations**

| Observed # CLABSI | Predicted # CLABSI | # Central Line Days | SIR | SIR 95% Confidence Interval |
|---|---|---|---|---|
| 12 | 17.84 | 17,111 | 0.67 | 0.36, 1.14 |

### *Central Line-Associated Bloodstream Infections, Critical Care Locations and Wards*

LTACH provide two levels of care, which are typically provided in different patient care areas. Because the intensity of care is associated with different levels of patient risk for the development of HAI, LTACH CLABSI data are stratified into two categories: critical care and ward location data. Ward location data are further stratified into adult ward and pediatric ward locations.

There are currently four critical care locations in Connecticut's LTACH. During 2014, seven CLABSI occurring in critical care locations were observed, approximately 22% fewer than predicted. This resulted in an SIR of 0.88 (Table 15). While this SIR is not statistically significant, indicating that the number of CLABSI observed in Connecticut's LTACH critical care locations was similar to the number predicted based on national data, it is very encouraging.

[4] Although there are five LTACH in Connecticut, the analyses presented in this section include data for just three facilities; planned administrative changes will allow the remaining two facilities to be analyzed together with other LTACH in future reports.

**Table 15: 2014 CLABSI SIR, Connecticut long-term acute care hospital critical care locations**

| Observed # CLABSI | Predicted # CLABSI | # Central Line Days | SIR | SIR 95% Confidence Interval |
|---|---|---|---|---|
| 7 | 7.94 | 6,107 | 0.88 | 0.39, 1.74 |

During 2014, five CLABSI occurring in Connecticut's 17 LTACH adult ward locations were observed, approximately 49% fewer than predicted. This resulted in an SIR of 0.51 which was not statistically significant, indicating that the number of CLABSI occurring in Connecticut's LTACH ward locations is similar to the number predicted based on national data (Table 16).

**Table 16: 2014 CLABSI SIR, Connecticut long-term acute care hospital adult ward locations**

| Observed # CLABSI | Predicted # CLABSI | # Central Line Days | SIR | SIR 95% Confidence Interval |
|---|---|---|---|---|
| 5 | 9.89 | 10,984 | 0.51 | 0.19, 1.12 |

During 2014, no CLABSI occurring in Connecticut's single LTACH pediatric ward location were observed; because fewer than one CLABSI was predicted, no SIR or confidence interval could be calculated.

***Central Line Device Utilization***

The central line DU ratio measures the proportion of total patient days in which central lines are used; for more information about the central line DU ratio, please see page 12.

Both LTACH location types analyzed in Table 17 have DU ratios that are statistically significantly lower than the national DU ratio, which is highly encouraging.

**Table 17: 2014 central line DU ratios, all Connecticut long-term acute care hospital bedded inpatient care locations**

| Type of LTACH location | # Central Line Days | # Patient Days | State DU Ratio* | National DU Ratio 2014 |
|---|---|---|---|---|
| **Critical Care (n=4)** | 6,107 | 16,676 | 0.37** | 0.64 |
| **Ward (n=18)** | 11,004 | 136,798 | 0.08** | 0.57 |

** # central line days/# patient days*

*** Difference between state DU ratio and national DU ratio is statistically significant*

***Catheter-Associated Urinary Tract Infections, All Bedded Inpatient Care Locations***

CAUTI are a required HAI measure for LTACH in Connecticut; for more information about CAUTI, please see page 15. During 2014, Connecticut LTACH observed 46 CAUTI, approximately 44% more than were predicted. This resulted in a statistically significant SIR of 1.44, indicating that more CAUTI were observed than were predicted based on national data (Table 18).

**Table 18: 2014 CAUTI SIR, all Connecticut long-term acute care hospital bedded inpatient care locations**

| Observed # CAUTI | Predicted # CAUTI | # Urinary Catheter Days | SIR | SIR 95% Confidence Interval |
|---|---|---|---|---|
| 46 | 31.99 | 14,974 | 1.44 | 1.07, 1.90 |

***Catheter-Associated Urinary Tract Infections, Critical Care Locations and Wards***

As in the case of CLABSI data, LTACH CAUTI data are stratified into two categories: critical care and ward location data.

About one third of Connecticut's LTACH CAUTI occurred in critical care locations. Sixteen CAUTI were observed, approximately six more than predicted. This resulted in an SIR of 1.57, which, though high, was not statistically significant, indicating that the number of CAUTI occurring in Connecticut's LTACH critical care locations is similar to the number predicted based on national data (Table 19).

**Table 19: 2014 CAUTI SIR, Connecticut long-term acute care hospital critical care locations**

| Observed # CAUTI | Predicted # CAUTI | # Urinary Catheter Days | SIR | SIR 95% Confidence Interval |
|---|---|---|---|---|
| 16 | 10.19 | 4,075 | 1.57 | 0.93, 2.50 |

About two thirds of Connecticut's LTACH CAUTI occurred in ward locations. Thirty CAUTI were observed, approximately eight more than predicted. This resulted in an SIR of 1.38, which was not statistically significant, indicating that the number of CAUTI occurring in Connecticut's LTACH wards is similar to the number predicted based on national data (Table 20).

It should be noted that, while critical care and ward location data separately do not achieve statistical significance, analyzing the two together does. This is because the number of observations is great enough to make it likely that the elevated CAUTI SIR in all LTACH bedded inpatient care locations is not due to chance alone.

**Table 20: 2014 CAUTI SIR, Connecticut long-term acute care hospital ward locations**

| Observed # CAUTI | Predicted # CAUTI | # Urinary Catheter Days | SIR | SIR 95% Confidence Interval |
|---|---|---|---|---|
| 30 | 21.80 | 10,899 | 1.38 | 0.95, 1.94 |

***Urinary Catheter Device Utilization***

The urinary catheter DU ratio measures the proportion of total patient days in which urinary catheters are used; for more information about the urinary catheter DU ratio, please see page 17.

Both LTACH location types analyzed in Table 21 have DU ratios that are statistically significantly lower than the national DU ratio, which is highly encouraging.

**Table 21: 2014 urinary catheter DU ratios, all Connecticut long-term acute care hospital bedded inpatient care locations**

| Type of LTACH location | # Urinary Catheter Days | # Patient Days | State DU Ratio* | National DU Ratio 2014 |
|---|---|---|---|---|
| **Critical Care (n=4)** | 4,075 | 16,676 | 0.24** | 0.52 |
| **Ward (n=18)** | 10,899 | 136,798 | 0.08** | 0.39 |

** # urinary catheter days/# patient days*

*** Difference between state DU ratio and national DU ratio is statistically significant*

Overall, these data show that LTACH are performing well in terms of CLABSI but less well regarding CAUTI, a trend mirroring that of Connecticut's ACH. LTACH in Connecticut must examine these data patterns, assess their own facility's data, and develop targeted prevention strategies to decrease HAI.

## HEALTHCARE ASSOCIATED INFECTIONS SURVEILLANCE RESULTS: INPATIENT REHABILITATION FACILITIES

An IRF, is as its name implies, is a healthcare setting in which patients stay overnight and live in a medically-dedicated building for a period of time. Although the majority of IRF are located on the campus of, or a campus associated with, an ACH, some are free-standing, independent facilities. IRF offer programs for rehabilitation, consisting of clinical care from physicians, nurses, and other highly trained healthcare professionals, who implement a goal-oriented, organized program aimed at increasing patient capacity to live independently or in a less intensive medical facility setting. In 2014, the average number of beds per IRF was nearly 21; patient admissions over the year averaged 318.9 per IRF, and average patient days was 4,390.5.

### *Catheter-Associated Urinary Tract Infections, All Bedded Inpatient Care Locations*

CAUTI are a required HAI measure for IRF in Connecticut; for more information about CAUTI, please see page 15. During 2014, Connecticut IRF observed 11 CAUTI, approximately 23% more than were predicted. This resulted in an SIR of 1.23 which was not statistically significant, indicating that the number of CAUTI occurring in Connecticut's IRF bedded inpatient care locations is similar to the number predicted based on national data (Table 22).

**Table 22: 2014 CAUTI SIR, all Connecticut inpatient rehabilitation facility bedded inpatient care locations**

| Observed # CAUTI | Predicted # CAUTI | # Urinary Catheter Days | SIR | SIR 95% Confidence Interval |
|---|---|---|---|---|
| 11 | 8.97 | 2,642 | 1.23 | 0.65, 2.13 |

### *Urinary Catheter Device Utilization*

The urinary catheter DU ratio measures the proportion of total patient days in which urinary catheters are used; for more information about the urinary catheter DU ratio, please see page 17.

Large freestanding IRF have statistically significantly higher DU ratios in comparison to national data (Table 23), which may be one possible factor contributing to the state's high CAUTI SIR. However, Connecticut IRF located within hospitals have statistically significantly lower DU ratios in comparison to national data, which is encouraging, particularly as this category of IRF has a much larger patient volume than other Connecticut IRF.

**Table 23: 2014 urinary catheter DU ratios, all Connecticut inpatient rehabilitation facility bedded inpatient care locations**

| Type of IRF Location | # Urinary Catheter Days | # Patient Days | State DU Ratio* | National DU Ratio 2014 |
|---|---|---|---|---|
| **Within Hospital (n=7)** | 1,644 | 25,709 | 0.06** | 0.08 |
| **Freestanding** | | | | |
| **Small (≤25 location beds) (n=0)** | - | - | - | 0.07 |
| **Medium (26-40 location beds) (n=0)** | - | - | - | 0.08 |
| **Large (>40 location beds) (n=1)** | 998 | 8,851 | 0.11** | 0.08 |

** # urinary catheter days/# patient days*

*** Difference between state DU ratio and national DU ratio is statistically significant*

*- Comparison between state DU ratio and national DU ratio is not possible as there are <1 Connecticut IRF in this category*

## FUTURE STEPS: EXPANSION OF HAI REPORTING IN CONNECTICUT

CMS is aligning their payment incentive programs (e.g., IPPS and QIP) with the overall federal metrics described earlier in this report. CMS' plans are outlined in the following table prepared by the CDC Division of Healthcare Quality Promotion. Connecticut's five LTACH are reporting CLABSI and CAUTI from all locations within each facility; the eight IRF (all but one of which are associated with ACH) are currently reporting CAUTI only. Each of the 44 outpatient hemodialysis centers in the state are to report data elements required by the NHSN Dialysis Event module (i.e., bloodstream infections, antibiotic starts, and vascular access site infections). This reporting to Connecticut DPH began in the autumn of 2013 for data entered into NHSN starting in January 2013.[5] ACH continue to report SSI, CAUTI, and CLABSI from ICU and NICU, but as of January 1, 2013, have expanded reporting to include MRSA and CDI LabID events via NHSN.

Following the plan summarized in the table below, additional reporting requirements for both measures and facility types will be added in future years, to ensure that Connecticut mirrors the future expansion in CMS reporting.[6] Each fall, the measures required by CMS will be presented to the Reportable Diseases Advisory Committee for review, and inclusion in the list promulgated each January. CMS metrics with October start dates will generally be deferred three months to start state reporting in January, to align with the publication of the annual list of reportable public health conditions.

**Table 24: Healthcare facility HAI current or proposed reporting requirements to CMS via NHSN**

| CMS Reporting Program | HAI Event | Reporting Specifications | Reporting Start Date |
|---|---|---|---|
| Hospital Inpatient Quality Reporting (IQR) Program | CLABSI | Adult, Pediatric, and Neonatal ICUs | January 2011 |
| | CAUTI | Adult and Pediatric ICUs | January 2012 |
| | SSI: COLO | Inpatient COLO Procedures | January 2012 |
| | SSI: HYST | Inpatient HYST Procedures | January 2012 |
| | MRSA Bacteremia LabID Event | FacWideIN | January 2013 |
| | *C. difficile* LabID Event | FacWideIN | January 2013 |
| | Healthcare Personnel Influenza Vaccination | All Inpatient Healthcare Personnel | January 2013 |
| | Medicare Beneficiary Number | All Medicare Patients Reported into NHSN | July 2014 |
| | CLABSI | Adult & Pediatric Medical, Surgical & Medical/Surgical Wards | January 2015 |
| | CAUTI | Adult & Pediatric Medical, Surgical & Medical/Surgical Wards | January 2015 |
| Hospital Outpatient Quality Reporting (OQR) Program | Healthcare Personnel Influenza Vaccination | All Outpatient Healthcare Personnel | October 2014 |

[5] Although Table 24 states that this component of CMS reporting was mandated to begin in 2012, it did not begin in Connecticut until 2013 after an initial pilot year of data collection had been completed.
[6] As of the writing of this report, there are no IPPS-exempt cancer hospitals in Connecticut.

**Table 24 (continued): Healthcare facility HAI current or proposed reporting requirements to CMS via NHSN**

| CMS Reporting Program | HAI Event | Reporting Specifications | Reporting Start Date |
|---|---|---|---|
| ESRD Quality Incentive Program (QIP) | Dialysis Event (includes positive blood culture, I.V. antimicrobial start, and signs of vascular access infection) | Outpatient Hemodialysis Facilities | January 2012 |
| | Healthcare Personnel Influenza Vaccination | All Healthcare Personnel | October 2015 |
| Long Term Care Hospital* Quality Reporting (LTCHQR) Program | CLABSI | Adult & Pediatric LTAC ICUs & Wards | October 2012 |
| | CAUTI | Adult & Pediatric LTAC ICUs & Wards | October 2012 |
| | Healthcare Personnel Influenza Vaccination | All Inpatient Healthcare Personnel | October 2014 |
| | MRSA Bacteremia LabID Event | FacWideIN | January 2015 |
| | *C. difficile* LabID Event | FacWideIN | January 2015 |
| | VAE | Adult LTAC ICUs & Wards | January 2016 |
| Inpatient Rehabilitation Facility Quality Reporting (IRFQR) Program | CAUTI | Adult & Pediatric Wards | October 2012 |
| | Healthcare Personnel Influenza Vaccination | All Inpatient Healthcare Personnel | October 2014 |
| | MRSA Bacteremia LabID Event | FacWideIN | January 2015 |
| | *C. difficile* LabID Event | FacWideIN | January 2015 |
| Ambulatory Surgery Centers Quality Reporting (ASCQR) Program | Healthcare Personnel Influenza Vaccination | All Healthcare Personnel | October 2014 |
| PPS-Exempt Cancer Hospital Quality Reporting (PCHQR) Program | CLABSI | All Bedded Inpatient Locations | January 2013 |
| | CAUTI | All Bedded Inpatient Locations | January 2013 |
| | SSI: COLO | Inpatient COLO Procedures | January 2014 |
| | SSI: HYST | Inpatient HYST Procedures | January 2014 |
| | MRSA Bacteremia LabID Event | FacWideIN | January 2016 |
| | *C. difficile* LabID Event | FacWideIN | January 2016 |
| | Healthcare Personnel Influenza Vaccination | All Inpatient Healthcare Personnel | October 2016 |
| Inpatient Psychiatric Facility Quality Reporting (IPFQR) Program | Healthcare Personnel Influenza Vaccination | All Inpatient Healthcare Personnel | October 2015 |

*Updated September 2015*
*LTACH are referred to as Long Term Care Hospitals by CMS*
*ESRD: End-stage renal dialysis*
*VAE: Ventilator-associated event*