State of Connecticut

"AN ACT CONCERNING HOSPITAL ACQUIRED INFECTIONS"

Status Report on the Healthcare Associated Infections Initiative

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Connecticut Healthcare Associated Infections Advisory Committee

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I. Summary

Connecticut is one of 28 states that have legislatively mandated reporting of certain healthcare associated infections (HAI). Passed in 2006, the Connecticut law (CGS 19a-490 n-o), established a mandatory reporting initiative, and set up an advisory mechanism (the HAI Committee) to recommend which HAIs should be made reportable and how. The legislature also appropriated funding to staff the Connecticut HAI program in the Connecticut Department of Public Health (DPH). The law also called on the HAI Committee to recommend methods to increase public awareness about HAI prevention, and specified an annual report to the legislature. This report is an update of the program activities and reported data in Connecticut since the first annual report (published in October 2008). This document and additional information about healthcare associated infections and the Connecticut HAI program are available on the DPH website: http://www.ct.gov/dph/hai

During 2007, the Committee met and advised the Department to first mandate the reporting of central line associated blood stream infections (CLABSIs) in one intensive care unit (ICU) of each of the 30 acute care hospitals in Connecticut. They also recommended that Connecticut, like many other states, use the Centers for Disease Control and Prevention's (CDC's) National Healthcare Safety Network (NHSN) reporting system to gather and report the data. In December 2007, the 30 acute-care hospitals (29 general hospitals and one children's hospital) enrolled in the NHSN, and have been submitting CLABSI data since January 1, 2008.

Meanwhile, in 2007 and early 2008, the Department established the HAI program with the legislative appropriation, and hired three staff.

This year the Connecticut HAI Committee advised DPH HAI program as it undertook three major new initiatives: the validation of the CLABSI data reported to DPH, the drafting of an interim state HAI surveillance and prevention plan in accordance with federal requirements and guidance, and the preparation of applications for American Recovery and Reinvestment (ARRA, also known as "federal stimulus') funding for HAI surveillance and prevention projects, helping Connecticut procure $1.2 million in additional resources to fight HAIs in the state.

The validation study, a national best practice, was performed by completing chart audits on all patients with positive blood cultures in the ICUs reporting CLABSIs to DPH. This study showed that 23 of the 48 CLABSIs were reported to DPH, and 25 were not (48% of the CLABSIs were reported). Most of the unreported cases were due to issues with classifying the CLABSIs in accordance with the NHSN case definition, and these findings were used to develop trainings for the hospital infection preventionists that report the cases to DPH.

The CLABSI rates (number of CLABSI per 1000 central line days) reported to DPH are reported in aggregate (all hospitals together, as opposed to individual hospital). The data is classified and reported according to type of intensive care unit and size of hospital. For the period July 2008 through June 2009, the statewide CLABSI rate was 2.3 CLABSIs per 1000 central line days for medical ICUs, 2.0 for medical-surgical ICUs, and 3.2 for pediatric ICUs. The rate was 2.3 for hospitals with 200 beds or fewer, 2.2 for hospitals with 201 to 500 beds, and 1.9 for hospitals over 500 beds. The HAI program is beginning to track the data over time as more data accumulates. With only two periods at the startup of the project, and with the first period consisting of only six months of data, it would be difficult to draw conclusions about central line infection trends until more data accumulates and validation continues. The tracking of data will continue to determine trends, which is important to track progress in eliminating those CLABSIs that are preventable.

With the continued progress of HAI prevention activities and an emphasis across the nation on expanding programs to track more types of infections and to link surveillance (case counting) more closely with prevention initiatives, DPH and the Connecticut HAI Committee are planning to engage in a strategic planning process after a federally required State plan is submitted by DPH to the federal Department of Health and Human Services (DHHS) in December. The federally required plan will be a good interim plan to serve during the time a comprehensive, results-based strategic plan will take to complete (approximately 12 to 18 months). This strategic planning process should be inclusive of the full range of stakeholders, including representatives of healthcare facility types other than hospitals (e.g., ambulatory surgical centers, hemodialysis centers, and long term care facilities).

II. Major activities since October 2008

Connecticut Healthcare Associated Infections Committee

The Connecticut HAI Committee continues to be very active. It held quarterly in-person meetings at the Connecticut Hospital Association in Wallingford. It also held five extra public meetings during the year (most participants attending by conference call).

The Committee has 11 "voting" members appointed by legislative leaders representing a variety of stakeholders including consumers, but it also has 30 active non-voting "participants" that regularly attend the meetings and participate in discussions. The participants have now expanded to include representatives of hemodialysis centers. Unfortunately the Committee has recently lost two voting members. Dr. Brian Cooper, the Connecticut State Medicine Society representative, resigned when he took a new position out-of-state, and most regrettably, Dr. Richard Garibaldi, a member representing hospital epidemiologists, who passed away. They will be sorely missed, and efforts are underway to find successors who can continue their exemplary service.

The Committee established a strategic planning group in January 2009 to work intensively in partnership with DPH on the state HAI plan. The initial focus of this planning has been on which data elements should be added to the one measure and location that are currently reported in Connecticut; however, the activities of the group have expanded to assist DPH and the Committee in the development of a comprehensive state plan consistent with the federal (DHHS) plan that will require all states to measure and report on seven national "target" HAI surveillance and prevention indicators within five years. The DPH HAI Coordinator facilitates this group. The Committee has already begun to prioritize and determine which National Target metrics (ie, benchmarks, see table below) to track first. The leading candidate is a metric that measures central line associated insertion practices metric which is the process measure that relates to the currently tracked metric in Connecticut (CLABSIs), and the subject of one of the two statewide HAI prevention collaborations: the Johns Hopkins CUSP: Stop BSI project. Another metric under consideration is *Methicillin-resistant Staphylococcus Aureus* (MRSA), which, as noted earlier, is the subject of a prevention collaborative in the state under the Centers for Medicaid and Medicare Services (CMS) 9th Scope of Work, or *clostridium difficile*. Connecticut already has data for the CLABSIs target and with the NHSN can readily expand upon this by adding reported "events" to develop baseline data for additional prevention targets. The approach Connecticut will take is to build on current activities. This includes surveillance (bolstered by the Emerging Infection Program (EIP) HAI ARRA funds the state is are receiving), and our prevention collaboratives, which will link our NHSN-based HAI surveillance and reporting systems to prevention activities, whose success can be evaluated by ongoing surveillance. EIP is a network of partnerships between health departments and academic institutions (usually schools of public health) that collaborate with CDC to perform important "enhanced"

surveillance projects that answer important questions that are vital to advance public health and the prevention of disease.

Metric	National 5-Year Prevention Targets
1. CLABSI 1	Reduce the CLABSI rate by at least 50% from baseline or to zero in ICU and other locations
2. CLIP 1	100% adherence with central line bundle (group of central line insertion best practices that have been demonstrated to reduce infections)
3a. C diff 1	At least 30% reduction in hospitalizations with *C. difficile* per 1000 patient discharges
3b. C diff 2	Reduce the facility-wide healthcare facility-onset *C. difficile* by at least 30% from baseline or to zero
4. CAUTI 2	Reduce the catheter-associated urinary tract infections (CAUTI) by at least 25% from baseline or to zero in ICU and other locations
5a. MRSA 1	At least a 50% reduction in incidence of healthcare-associated invasive methicillin-resistant *Staphylococcus Aureus* (MRSA) infections
5b. MRSA 2	Reduce the facility-wide healthcare facility-onset MRSA bacteremia by at least 25% from baseline or to zero
6. SSI 1	Reduce the admission and readmission by at least 25% from baseline or to zero
7. SCIP 1	At least 95% adherence to process measures to prevent surgical site infections (e.g., correct site preparation, use of antibiotics just before and during the surgery

The federal government recently awarded Connecticut $1.2 million for a two-year period in response to DPH's request for ARRA funding for HAI surveillance and prevention. This will permit Connecticut to establish an EIP project for special and enhanced surveillance to improve our tracking of HAIs and an ARRA-funded Epidemiology and Laboratory Capacity (ELC) project that will build our capacity to engage in a full 12 to 18 month-long strategic planning process, involving all stakeholders to expand the state's HAI program in terms of HAIs tracked and data validated. It will also help to develop strong partnerships between data tracking and prevention collaboratives, which will improve our understanding and targeting of successful prevention efforts to reduce HAIs in Connecticut. Finally, the program will serve as a training ground for new workers in infection control that will improve the state's capacity to fight HAIs in the future.

Validation of Central line-associated Blood Stream Infection (CLABSI) Data

Purpose of the validation study

Section 19a-490 n-o of the Connecticut General Statutes requires that each recommended measure for the reporting of Healthcare Associated Infections (HAI), also known as hospital acquired or nosocomial infections, be "capable of being validated". A method to validate data must be considered in any mandatory reporting system to ensure that HAIs are being accurately and completely reported and that rates are comparable from hospital to hospital or among all hospitals in the reporting system. Achieving accurate data reinforces the need to assess the accuracy of self-reported data from institutions. While data on nosocomial infections are generally accurately reported, sensitivity

(underreporting of infections) was a more serious problem than other measures of accuracy. When the pressure of making data publicly available is added to a process that already has a tendency to miss cases of nosocomial infection, the possibility of serious underreporting of infections becomes cause for concern. Validating data are essential if data from performance measurement systems are to be credible. Public reporting of data that are poorly defined or executed could result in inaccurate comparisons and missed opportunities to intervene to reduce infections.

The objectives and activities of the DPH Healthcare Associated Infections Program in validating the mandatory reporting of healthcare associated central line associated bloodstream infection data, were to:

1. Determine the reliability and consistency of surveillance definitions,
2. Evaluate current surveillance methods used to detect infections,
3. Assess completeness of reporting to NHSN and DPH, and
4. Where gaps exist, provide on-site education on the definitions, surveillance mechanisms, and use of NHSN.

Validation study methods

From January 2009 through April 2009, a blinded retrospective medical record review was conducted in the 30 Connecticut acute care hospitals to identify healthcare associated central line infections in intensive care unit patients.

A list of eligible patients within each qualifying ICU was determined by obtaining microbiology laboratory records of those ICU patients who had a culture positive for a bloodstream infection during the study period, October 1, 2008 – December 31, 2008. Medical records and hospital admission data were reviewed to determine if a CLABSI occurred within the study timeframe, whether the infection was hospital associated and related to an admission in an eligible ICU, and which NHSN criteria was used to meet the case definition. All definitions used for determining the presence of an infection followed the CDC NHSN Surveillance Protocol. Any questionable case that needed clarification regarding NHSN eligibility was reviewed with the CDC NHSN staff for final determination of meeting NHSN CLABSI case criteria. A standardized data collection form was used to record findings and entered into an electronic database at DPH. The data from the validation study was electronically matched to the dataset containing the NHSN CLABSI cases reported for the same time period. The NHSN CLABSI cases reported by the hospital surveillance system were compared to the true CLABSI cases determined by the retrospective analysis. The dataset match yielded cases that fell into four categories. They were:

1. CLABSI cases in both NHSN and DPH Validation datasets
2. CLABSI cases in neither NHSN or DPH Validation dataset
3. CLABSI cases in the NHSN dataset but not the DPH Validation dataset
4. CLABSI cases in the DPH Validation dataset but not the NHSN dataset

Any unreported case(s) were analyzed individually to determine why the case(s) went undetected and what action was necessary to correct the problem. DPH program staff reviewed and followed up with each hospital that were identified as having reported data

inaccuracies or data irregularities. Cases determined to have been reported but not meeting NHSN criteria were also reviewed and discussed with hospital surveillance personnel to correct any misinterpretation of criteria. None of the earlier reported CLABSI data or aggregate rates reported from January 2008 through June 2008 (presented in the October 2008 Report) was modified based on the findings of this data validation project. The review of data with hospital staff also served to provide on-site education on the definitions, surveillance mechanisms and use of NHSN.

Validation study results

A total of 773 positive blood cultures representing 410 patients were reviewed by DPH. Of the total number of positive blood cultures, 476 septic events were identified. The DPH CLABSI chart review identified 48 hospital-ICU-associated CLASBI (Table 1).

Table 1. Results of the Central Line Associated Bloodstream Infection (CLABSI) Validation Audit Reported by Connecticut Hospitals and Connecticut Health Department reviewers

	Hospital NHSN Reports		
CT DPH HAI Reports	**CLABSI**	**No-CLASBI**	**Total**
CLABSI	**23**	**25**	**48**
No-CLABSI	**4***	**424**	**428**
TOTAL	**27**	**449**	**476**

* 1 Positive Blood culture was never submitted to DPH and therefore the medical record was never reviewed.

Of these 23 (48%) had been reported to NHSN by Connecticut hospitals as a CLASBSI and were identified as a CLABSI by the DPH validation reviewers. Twenty-five of the 48 infections (52%) were discordant cases, identified by the DPH validation reviewers, and had not been reported to NHSN.

The majority of the information recorded by hospitals as a non-HAI was consistent with the DPH validation reviewers. Of the 428 No-CLABSI events identified by DPH, there was agreement on 424 (99%) of the events identified by the hospital NHSN reports and DPH reviewers. There was disagreement on four No-CLABSI cases, of which three had been reported as CLABSI to NHSN and one positive blood culture was never received by DPH and therefore the medical record was never reviewed. The 48 HAI CLABSIs identified by the Connecticut DPH Program yielded an infection rate of 3.51 per 1000 Central Line (CL) days. During the study timeframe, 27 CLABSIs had been reported by the Connecticut hospitals to NHSN, for an infection rate of 1.97 per 1000 CL days.

There was little difference in the classification of surveillance definitions for the CLABSI reported between the DPH reviewer and the NHSN hospital reports (Table 2). None of the infections fell into the Clinical Sepsis category. Both the DPH and NHSN reports

identified 65% of the CLABSI as Laboratory Confirmed Bloodstream Infections - Criterion 1 (LCBI 1); also known as "recognized pathogen." "Pathogens" are microorganisms that cause illness. Almost 35% of the CLABSIs were identified as the LCBI - Criterion 2 (LCBI 2), infection with a bacterium generally thought of as a "common skin contaminant." Criterion 2 requires repeated blood cultures indicating the organism rather than just one positive culture, the criterion for Criterion 1. This suggests that there was no systematic missing of BSIs based on general classification of infecting organism: either true pathogens or "common skin contaminants."

Table 2. Results of the Central Line Associated Bloodstream Infection (CLABSI) Validation Audit Reported by the Connecticut Hospitals and Connecticut Health Department reviewers and NHSN surveillance criteria for CLABSI

	CLABSI Reported by Hospital N=23	CLABSI Not Reported by Hospital N=25	Total CLABSI CT HAI N=48
LCBI Criterion 1	**15 (65%)**	**17 (68%)**	**32 (67%)**
LCBI Criterion 2	**8 (35%)**	**8 (32%)**	**16 (33%)**
CSEP	**0**	**0**	**0**
TOTAL	**23 (100%)**	**25 (100%)**	**48 (100%)**

Table 3 identifies the pathogens associated with DPH and NHSN reports. Of the pathogens associated with the CLABSI, one-third of the microorganisms were *Enterococcus sp*., 1/3 were coagulase-negative *Staphylococci*, and 15% were *Staphylococcus aureus* with Methicillin-resistant *Staphylococcus aureus* (MRSA) representing a small percentage of the infections (<5%).

Table 3. Results of the Central Line Associated Bloodstream Infection (CLABSI) Validation Audit Reported by the Connecticut Hospitals and Connecticut Department of Public Health reviewers and the Microorganisms Associated with the CLABSIs

Name of Microorganism	CLABSI Reported by Hospital N=23	CLABSI Not Reported by Hospital N=25	Total CLABSI CT HAI N=48*
NHSN Recognized Pathogen – Criteria 1			
Staphylococcus aureus	4 (15%)	5 (16%)	9 (15%)
[Methicillin resistant *Staphylococcus aureus]***	[1 (4%)]	[1 (3%)]	[2 (3.5%)]
Enterococcus	8 (31%)	10 (32%)	18 (31.5%)
[Vancomycin resistant Enterococcus (VRE)]	[5 (19%)]	[3 (10%)]	[8 (14%)]
Candida spp.	2 (8%)	3 (10%)	5 (9%)
Escherichia coli	0	1 (3%)	1 (2%)
Enterobacter spp.	0	2 (6%)	2 (3.5%)
Pseudomonas spp.	0	1 (3%)	1 (2%)
Serratia marcescens	1 (4%)	0	1 (2%)
Lactobacillus spp.	0	1 (3%)	1 (2%)
NHSN Common Skin Contaminants – Criteria 2			
Coagulase negative Staphylococci	11 (42%)	8 (27%)	19 (33%)
TOTAL Pathogens	**26 (100%)**	**31 (100%)**	**57 (100%)**

* The CLABSI # and pathogen # are not equal due to multiple pathogens for several CLABSIs.
** Pathogen listed in brackets is a subset of the pathogen listed in the row above (i.e., MRSA is a subset of the staph aureus row, VRE is a subset of the Enterococcus row)

Discussion of the findings of this validation study

The purpose of the data validation project was to monitor the accuracy of data submitted by hospitals to NHSN, and assess the hospital's surveillance system and use of NHSN definitions. A final validation project report was presented to the HAI Advisory Committee at their June 17, 2009 meeting. The results were also discussed at HAI program trainings held on August 20, 2009 and September 23, 2009.

The findings of this study suggest that many of the hospital associated central line associated infections identified by the validation reviewers had not been reported to the national surveillance system. This variation in reporting accuracy was similar to the findings of a recent New York State health department HAI validation study (1). Their findings indicated that the hospitals reported inconsistent infection data because they interpreted the HAI case definitions differently. While fear of the consequences for healthcare facilities of detecting high infection rates has been proposed as one reason reporting data may be incomplete, the results of this study suggest that the main reason for under reporting was participant misunderstanding of the surveillance definitions.

New initiatives involving new reporting systems require time to allow facilities to become familiar with the requirements and ensure that the system is being used correctly. The NHSN system requires trained and knowledgeable infection control professionals with dedicated time to conduct HAI surveillance. Even subtle differences in the interpretations of the case definitions can introduce measurable variation in HAI rates. Studies have demonstrated that there is a significant discordance in the quality of data retrieved by those with training in infection prevention when compared to those with little or no training (2). This study reveals the importance of validating data through retrospective surveillance, and it shows the necessity of continuous training, maintaining contact with surveillance personnel and ongoing validation audits. Validation by visiting the hospitals on an ongoing basis is indispensable for detecting systematic problems with regard to surveillance and drawing conclusions for improving training for participants. The Connecticut HAI program has planned to continue formal validation activities, in addition to continuing more informal forms of validation, such as ongoing education and hospital visits.

REFERENCES:

1. New York State Hospital-Acquired Infection Reporting System: Pilot Year: 2007. Report June 30, 2008.

2. Sherman E, Heydon K, St. John K, Teszner E, Rettig SL. Administrative Data Fail to Accurately Identify Cases of Healthcare Associated Infection. Infect Control Hosp Epidemiol 2006;27:332-337.

Hospital infection preventionist training (August – September 2009)

The CLABSI validation study is one component of an improvement cycle for the reported HAI data project. The cycle began in the summer of 2008 when the hospital infection preventionists received additional training from the Connecticut HAI program staff on NHSN and the CLABSI surveillance definition that supplemented the initial training they received from CDC when they first registered into the NHSN reporting system.

The 2008 validation study period began after the completion of the 2008 training. As described above, the validation study findings point out areas that should be focused on in the training that follows this study. The content of the 2009 training, completed in August-September 2009, emphasizes the issues pointed out by the validation study. CLABSI data will be revalidated after the training is completed - in the 4th quarter of 2009.

The 2009 training also included information on how to use NHSN for additional HAIs (beyond CLABSIs), with the aim to promote expanded use of NHSN and the future

expansion of the HAI reporting project, and to promote the general usability of NHSN as an HAI tracking tool.

III. Hospital-reported CLABSI Data

Hospitals securely submit their data each month to DPH via NHSN, and DPH HAI staff ensure that data is submitted on time, perform checks to determine that the data is being submitted correctly according to protocol, and answer questions from hospital staff.

Comparison of central line infection rates is complicated by the fact that factors other than careful attention to infection control practices vary among hospitals and can affect their rates. The data is collected and presented in ways to help the public and health providers make comparisons and give hospital staff a target for improvement, while at least partially overcoming some of the problems that can cause the data to be misleading.

National and state CLABSI data is reported by location (such as type of ICU) because the patient mix, and therefore the rates, varies by location. It is also broken out by size of hospital, because patient mix in hospitals and ICUs differ in smaller, more rural hospitals compared to the larger urban hospitals that often have tertiary services (more intensive services for more complicated, sicker patients that are more predisposed to developing infections).

Central line infections are reported as a rate: the number of infections per 1000 central lines days during the reporting period. The number of patients that have at least one central line in the reporting location (in Connecticut, an ICU in each acute care hospital) each day during the reporting period determines the number of central line days at that location. The count is done at the same time each day (e.g., noon or beginning of the morning shift). This number is divided into the number of reported CLABSIs at that location during the reporting period to determine the CLABSI rate. If the number of reported CLABSIs alone were reported, rather than the rate, patients in larger ICUs could appear to have a falsely higher risk of CLABSIs than smaller ICUs, or those ICUs with fewer patients with central lines could falsely appear to have a lower risk for CLABSIs.

Comparison is also fostered by the NHSN, which collects and publishes data from across the nation, permitting each state and hospital to compare itself to these national "benchmarks." There are, however, two limitations to the national benchmarks: the national rates are not "validated" and they are a couple of years old. Validation, as described earlier, is vital to ensure the data is collected correctly and fully. Otherwise, a state or hospital that is doing a better job at counting all CLABSI cases may (falsely) appear to have a higher rate, not because their patients are at higher risk of an infection, but because the national benchmark includes too many hospital that are not counting all of their infections. This is why the CDC, state health departments, and hospitals are working hard to develop methods to ensure the national benchmarks are accurate, and serve as a good basis for comparison of real infection rates. CDC publishes updated national benchmarks every two to three years, and this minimizes, but does not eliminate, the problem of comparing new (2008-9) data to older national benchmarks.

Rates of CLABSIs

The following table shows the CLABSI rates for each type of ICU in Connecticut acute care hospitals during the reporting period. The national rate is from published NHSN data (*Am J Infect Control* 2008;36:609-26*)*

Table 4. Central-Line Associated Blood Stream Infection (CLABSI) Rates* by type of Intensive Care Unit (ICU), Connecticut, July 2008 – June 2009

Type of Location	No. ICU	No. CLABSI	No. of Central Line Days	Rate/1000 CL Days	National Rate (2006-2007)
Medical ICU	7	30	12,807	**2.3**	**2.4**
Medical/Surgical ICU	22	78	39,054	**2.0**	**1.5**
Pediatric ICU	3	11	3,392	**3.2**	**2.9**

* Number of CLABSI / Number of Central Line Days x 1000

The data below compares the CLABSI rates in the types of ICUs in Connecticut hospitals reporting data from the period reported in the prior Connecticut HAI Annual Report (six months: January through June 2008) and the period covered by this Annual Report (twelve months: July 2008 through June 2009). Comparing the data from the two periods, there are slight increases in the MICU and MSICU rates that are probably a surveillance artifact of having more data in the second period. It would not be surprising to see this upward trend continue for another year as surveillance methods improve due to lessons learned from the validation study and a repeated cycle of training and technical assistance, before they drop due to continued efforts to prevent CLABSIs (e.g., the CUSP:Stop BSI prevention collaborative project that promotes use of the "checklist" of best central line insertion best practices to reduce infections, or other initiatives). The decrease in the PICU rate may partially be attributed to the addition a third, small, PICU. This PICU location was added after the initial report, and since has been contributing to the denominator (Central Line days) but has made no contribution to the numerator (infections), thereby decreasing the rate.

The HAI program is will begin to track the data over time as more data accumulates. With only two periods at the startup of the project, and with the first period only consisting of six months of data, it would be difficult to draw conclusions about central line infection trends until more data accumulates and validation continues. The tracking of data will continue to determine trends, which is important to track progress in eliminating those CLABSIs that are preventable.

Table 5. Central-Line Associated Blood Stream Infection (CLABSI) Rates* by type of Intensive Care Unit (ICU), Connecticut, January 2008 – June 2008; July 2008 – June 2009

Type of Location	Reporting Period		
	January 1, -June 30, 2008	July 1, 2008 – June 30, 2009	Entire Period (January 1, 2008 – June 30, 2009)
Medical ICU	1.4	2.3	2.0
Medical/Surgical ICU	1.6	2.0	1.9
Pediatric ICU	5.7	3.2	4.3

* Number of CLABSI / Number of Central Line Days x 1000

The following table shows that the reported CLABSI rates do not vary remarkably by size of hospital.

Table 6. Central-Line Associated Blood Stream Infection (CLABSI) Rates* by Hospital Size, Connecticut, January 2008 – June 2008; July 2008 – June 2009

Hospital Size (no. of licensed beds)	Reporting Period		
	January 1, - June 30, 2008	July 1, 2009 – June 30, 2009	Entire Period (January 1, 2008 – June 30, 2009)
<200	2.2	2.3	2.3
201-500	1.8	2.2	2.1
501-1000	1.9	1.9	1.9

* Number of CLABSI / Number of Central Line Days x 1000

The central line device utilization (DU) ratio is a number calculated by dividing the number of patients with at least one central line, divided by all patients in an ICU during a specified reporting period. DU is a measure of invasive care interventions in a patient location and can serve as a marker for severity of illness of patients, that is, a patients' intrinsic susceptibility to infection in that particular ICU. It is not a surprise to see a somewhat higher CLABSI rate in an ICU with sicker patients, as indicated by a higher DU ratio, or a change in CLABSIs that would parallel any major change in DU ratio (i.e., an increase in CLABSI rate if the DU increases or vice versa). Note that Connecticut Medical-Surgical ICUs have a higher DU than the national DU, indicating sicker patients, which may at least in part explain the somewhat higher CLBASI rate in Connecticut MS ICUs compared to the national rate. This explanation does not apply to Pediatric ICUs, which have a lower DU than nationally.

Table 7. Central-Line Device Utilization (DU) Ratios* by type of Intensive Care Unit (ICU), Connecticut, July 2008 – June 2009

Type of Location	No. ICU	No. of Central Line Days	No. of Patient Days	DU Ratio	National Ratio (2006-2007)
Medical ICU	7	12,807	23,382	**0.55**	**0.58**
Medical/Surgical ICU	22	39,054	74,872	**0.52**	**0.46**
Pediatric ICU	3	3,392	8,808	**0.39**	**0.46**

* $\frac{\text{Number of CL days}}{\text{Number of Patient Days}}$

The data below indicates that the DU in ICUs did not change appreciably except for Pediatric ICUs. The latter likely decreased because a third, smaller, ICU with a smaller proportion of patients with central lines was added to the reporting system during the second reporting period.

Table 8. Central-Line Device Utilization (DU) Ratios* by type of Intensive Care Unit (ICU), Connecticut, January 2008 – June 2008; July 2008 – June 2009

Type of Location	Reporting Period		
	January 1, -June 30, 2008	**July 1, 2008 – June 30, 2009**	**Entire Period (January 1, 2008 – June 30, 2009)**
Medical ICU	**0.57**	**0.55**	**0.55**
Medical/Surgical ICU	**0.53**	**0.52**	**0.52**
Pediatric ICU	**0.51**	**0.39**	**0.43**

* $\frac{\text{Number of CL days}}{\text{Number of Patient Days}}$

The data below indicates that the larger hospitals have higher DUs, which would be consistent with the perception that they generally care for a higher proportion of the sicker patients. Despite the higher DUs, the larger hospital CLABSI rates are similar (actually slightly lower than) to the smaller hospital rates.

Table 9. Central-Line Device Utilization (DU) Ratios*
by Hospital Size, Connecticut,
January 2008 – June 2008; July 2008 – June 2009

Hospital Size (no. of licensed beds)	Reporting Period		
	January 1, - June 30, 2008	July 1, 2009 – June 30, 2009	Entire Period (January 1, 2008 – June 30, 2009)
<200	0.41	0.39	0.40
201-500	0.55	0.54	0.54
501-1000	0.69	0.64	0.66

* $\frac{\text{Number of CL days}}{\text{Number of Patient Days}}$

The types of microorganisms that cause the CLABSIs

Table 10. Microorganisms associated with Central-Line Associated Blood Stream Infections (CLABSI) in the Intensive Care Units (ICU), Connecticut, January 2008 – June 2009

Name of Microorganism	No.	%
NHSN Recognized Pathogen Criteria		
Achromobacter	1	0.5
Candida spp.	38	19.1
Citrobacter freundii	1	0.5
Enterobacter spp.	7	3.5
Enterococcus	28	14.1
(VRE)	24	12.1
Escherichia coli	4	2.0
Klebsiella spp.	6	3.0
Proteus mirabilis	2	1.0
Pseudomonas spp.	3	1.5
Serratia liquefaciens	1	0.5
Serratia marcescens	3	1.5
Staphylococcus aureus	8	4.0
(MRSA)	10	5.0
Stenotrophomonas maltophilia	1	0.5
Streptococcus group B	2	1.0
Streptococcus pneumoniae	1	0.5
Skin Microorganisms meeting NHSN CLABSI Clinical Criteria		
Bacillus species unspecified	1	0.5
Coagulase negative Staphylococci	55	27.6
Corynebacterium species unspecified	1	0.5
Diptheroids	1	0.5
Streptococcus viridans spec unspecified	1	0.5
TOTAL	199	99.9%*

* variation from 100% due to rounding

The microorganisms that cause CLABSIs are classified as "recognized pathogens" which means that they are well known to cause human disease, or "Skin contaminants" which are species of microorganism (generally bacteria) that are commonly found on the skin and normally do not cause disease. Most commonly blood cultures that have skin contaminant-type microorganisms do not indicate a true infection of the blood, rather, the bacteria got into the blood culture bottles from their normal position on the skin through a breach in techniques when the sample was collected. However, bacteria that are usually skin contaminants may cause disease if they get into the bloodstream through a break in the skin (such as an intravenous line) especially in individuals who have impaired immunity. For this reason NHSN does permit counting of CLABSIs due to "skin contaminants," but sets more stringent criteria (two positive blood cultures taken within a short time of each other) to classify a CLABSI due to a skin contaminant. The data in the table above shows that some of the more common types of microorganisms that cause CLABSIs to include a common fungus (*Candida*) that is often seen in persons with poor immunity, and *Enterococcus,* including drug resistant Enterococcus. It also includes a bacterium that is normally a skin contaminant: *Coagulase negative staphyloccus*, usually *epidermidis*). While MRSA is a concern, it is not one of the most common infections; only 5% of CLABSIs are MRSA.

Public and provider educational activities

The HAI Committee Education Subcommittee recommends educational initiatives for the public to DPH. In addition, the Subcommittee advises the DPH HAI program on educational initiatives for providers on HAIs and their prevention. Unfortunately, due to funding constraints, planned projects to develop an enhanced and more interactive Connecticut HAI program website for the public, and a partnerships between DPH and the 30 acute care hospitals to procure high quality educational materials for hospital patient and staff HAI educational programs, needed to be suspended. Considerable detailed planning was completed, and when resources become available, these initiatives will go forward.

IV. State plan for 2010 and future direction of the HAI program

While the plan described earlier in this report will serve as a one-year temporary or interim state HAI plan, it will address the need for a broader vision and blueprint for the Connecticut HAI program, and will meet federal requirements, it does not include the development of a truly and fully participatory public health planning process involving all stakeholders. It also does not incorporate the social organizing and communication activities that are an integral part of a successful health program strategic planning process. The DPH Planning and Workforce Development Section recently published an excellent guidance for strategic plan development that could be used by the HAI program to organize such a strategic planning process.

There is considerable HAI prevention activity and data collection going on in Connecticut beyond the one HAI condition (CLABSIs) that is currently reported to the Connecticut HAI program. The expansion of the state program that is planned should take this into account, make such data generally accessible and useable, and look for synergies with these data collection and prevention activities. It should also incorporate advances in data management when they come available such as the new MAVEN electronic laboratory reporting system which will enhance surveillance detecting HAIs in both hospital and non-hospital healthcare settings, and will help reduce the burden of paper-based reporting which reduces the time infection prevention staff can engage in training and assurance.

The HAI Committee has agreed that it would be worthwhile to engage in a strategic planning process after the interim plan is submitted to DHHS in December. This planning process should be inclusive of the full range of stakeholders, including representatives of healthcare facility types other than hospitals (e.g., ambulatory surgical centers, hemodialysis centers, and long term care facilities). It should offer a comprehensive assessment and view of the issue of HAIs in the state, and create a vision and clear practical plan for future actions that will logically lead to the result that we desire: to effectively and efficiently prevent HAIs in Connecticut.

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