CONNECTICUT DEPARTMENT OF PUBLIC HEALTH

Keeping Connecticut Healthy

State of Connecticut

"AN ACT CONCERNING HOSPITAL ACQUIRED INFECTIONS"

Status Report on the Healthcare Associated Infections Initiative

October 1, 2008

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

Title:	Report to the Legislature Concerning the Status of the Healthcare Associated Infections Initiative
Authors:	Lauren Backman, RN, MHS, Epidemiologist III, Healthcare Associated Infections Program, Infectious Disease Section Richard Rodriguez, Epidemiologist II, Healthcare Associated Infections Program, Infectious Disease Section Richard Melchreit, MD, Coordinator, Healthcare Associated Infections Program, Infectious Disease Section Connecticut Healthcare Associated Infections Advisory Committee
Subject:	Report on the Implementation of Connecticut's Healthcare Associated Infections Initiative
Statute:	CT Public Act 06-142 (Substitute Senate Bill No. 160): An Act Concerning Hospital Acquired Infections
Date:	October 1, 2008
Number of Pages:	83 pages
For additional Information:	Richard Melchreit, MD, Program Coordinator Healthcare Associated Infections Program Infectious Disease Section Connecticut Department of Public Health 410 Capitol Avenue, MS# 11 FDS P.O. Box 340308 Hartford, CT 06134 (860) 509-7995 Richard.melchreit@ct.gov

Table of Contents

I. Executive Summary

Legislative Charge

In 2006, the Connecticut General Assembly passed Public Act 06-142, "An Act Concerning Hospital Acquired Infections." It created an 11-member "Committee on Healthcare Associated Infections" to advise the Department of Public Health (DPH) on the development, operation, and monitoring of a mandatory Healthcare Associated Infections (HAI) reporting system.

The Public Act requires DPH to submit a first annual report to the General Assembly by October 1, 2008 on the information collected by the HAI reporting system, make the report available to the public, and post it on the DPH website.

Committee on Healthcare Associated Infections

The Committee includes representation from consumers, the public, hospital prevention practitioners and infectious disease physicians, the state medical society and hospital association, and DPH. Meetings are open to the public and the participation of others is encouraged to ensure that a wide array of expertise participates and variety of viewpoints is considered.

The Committee recommended that Connecticut:

1. Use the CDC's National Healthcare Safety Network (NHSN) reporting system.
2. Begin in a clearly defined manner and expand incrementally to ensure accurate data, start with one NHSN Patient Safety Module and implement additional modules once hospitals are able to conduct surveillance and report in a standardized manner. The first module should be Central Line Associated Blood Stream Infections (CLABSIs) in Intensive Care Unit (ICU) patients.
3. Use the data to implement evidence-based prevention methods.
4. Deliver HAI-related education, because it is critical element of the HAI reporting system.
5. Continue the Committee after October 2008.
6. Make a state funding commitment - hire DPH staff for the initiative and give more needed funding to Connecticut hospitals to report on and reduce HAIs.

Establishment and Training on the National Healthcare Safety Network (NHSN)

Following the recommendation of the Committee, DPH required hospitals to begin submitting data January 1, 2008, using the NHSN reporting system, on patients in one medical or medical/surgical ICU.

Hospital infection prevention personnel were trained on methods and protocols for reporting and collecting HAI surveillance data. The Connecticut Hospital Association sponsored the first trainings in October to December 2007. In May and June 2008, immediately after the DPH HAI program staff was hired, they visited all 30 Connecticut hospitals participating in the required reporting of HAIs. At those visits many of the hospital staff asked for more training; regional HAI Program trainings were held in July and August 2008.

Reporting of Central Line-associated Bloodstream Infections in Intensive Care Units

The preliminary central line infection rates in medical and medical-surgical ICUs in Connecticut hospitals collected between January and June 2008 were lower than the US rates in the most recently available (2006) report. There were 1.34 infections per 1000 central line days in medical ICUs in Connecticut compared to 2.9 nationally; there were 1.56 central line infections per 1000 central line days in medical-surgical ICUs in Connecticut compared to the national rates of 2.4 in "major teaching "hospitals and 2.2 in all other NHSN reporting hospitals.

Conclusions and Next Steps

Connecticut took an incremental approach and engaged in a collaborative process that followed national recommendations for the gathering and reporting of public HAI data. At this early stage, this approach has been successful.

The adoption of NHSN by Connecticut has efficiently and effectively established public health surveillance methods and is already providing the data structure to make useful cross-facility and state comparisons.

A good foundation has been built for the continued operations of the HAI reporting initiative and decisions on how to incrementally advance the system with quality data. The Committee will continue to serve and advise DPH as it analyzes future data and validates the data collected in the autumn of 2008 and beyond. The Committee will also consider and advise DPH on the incremental expansion of the types of HAI outcomes and prevention processes to study and report.

To view the full text of this report, please visit: http://www.ct.gov/dph

II. Connecticut Public Act 06-142: "An Act Concerning Hospital Acquired Infections"

In 2006, the Connecticut General Assembly passed Public Act 06-142, "An Act Concerning Hospital Acquired Infections" (Appendix A). The act created an 11-member "Committee on Healthcare Associated Infections," responsible for developing, operating, and monitoring a mandatory reporting system for healthcare associated infections ("HAI"). The act defines an HAI as any localized or systemic conditions resulting from an adverse reaction to the presence of an infectious agent or its toxin that (1) occurs in a patient in a healthcare setting; (2) was not found present or incubating at the time of admission unless the infection was related to a previous admission to the same setting; and (3) if the setting is a hospital, meets the criteria for a specific infection site, as defined by the national Centers for Disease Control and Prevention (CDC).

The act required the Department of Public Health (DPH) to implement the committee's recommendations concerning a mandatory reporting system for infections and standardized data reporting measures. It required the committee, by April 1, 2007, to (1) advise DPH on the development, implementation, operation, and monitoring of a mandatory system for reporting HAIs; (2) identify, evaluate, and recommend to DPH appropriate standardized measures; and (3) identify, evaluate, and recommend to DPH appropriate ways of increasing public awareness about effective measures to reduce the spread of infections. The Committee on Healthcare Associated Infections issued a report on April 1, 2007 with eight recommendations: http://www.ct.gov/dph/lib/dph/hisr/hcqsar/healthcare/pdf/healthcare_acquired_infections_2007.pdf .

The act requires DPH, by October 1, 2007 and within available appropriations, to implement the committee's recommendations. It also required DPH, by October 1, 2007 to submit a report to the General Assembly regarding the plan to implement the mandatory reporting system for healthcare associated infections recommended by the Committee on Healthcare Associated Infections and the status of such implementation. The report was submitted and is available at: http://www.ct.gov/dph

The act also requires DPH, by October 1, 2008 and annually thereafter, to submit a report to the General Assembly on the information collected relating to the mandatory reporting system for healthcare associated infections. The act requires the report to be posted on the DPH website and made available to the public.

III. Healthcare Associated Infections

A. Overview

Nosocomial, (a term derived from *nosos* the Greek word for 'disease') or hospital-acquired infections (more appropriately called health care-associated infections or HAIs because they are also found in types of health care facilities other than hospitals), are infections that occur while patients are receiving medical treatment for other conditions. Please refer to Section VII. for a detailed list of Key Terms and Definitions. HAIs continue to be a major public health problem in the United States. The Healthcare Infection Control Practices Advisory Committee (HICPAC), a federal advisory committee that was established in 1991 to provide advice and guidance to the Department of Health and Human Services and CDC regarding surveillance, prevention, and control of HAIs and related events in healthcare settings, published "The Guidance on Public Reporting of Healthcare-Associated Infections…" in 2005. This document reported that in hospitals alone, healthcare associated infections affect an estimated 1.7 million Americans, including 500,000 intensive care unit (ICU) patients, resulting in an estimated 99,000 deaths and $4.5 billion to $5.7 billion in annual health care costs (1,2). HAIs not only put the patient at risk, but also increase the days of hospitalization required for patients and add considerable healthcare costs. A survey based on the data from 20% of U.S. hospitals revealed that patients who acquire an infection as a result of medical care in hospitals spend an average of almost ten additional days in the hospital and incur over $38,000 in added health care costs (3).

In a state of health our body's defenses constantly repel the microbes that may do us harm. In sickness, disease processes may lower our defenses to infection. Hospitalized patients, especially those in ICUs, are at increased risk of infection because of their underlying illness. Many, but not all, are already debilitated or ill. Their vulnerability for infection is further increased by surgical procedures, invasive therapies and immuno-compromising medications that are used to treat their acute medical condition (4) (Appendix B. Examples of Factors that May Increase the Risk of Developing a Healthcare Associated Infection).

Approximately 5 to 10 percent of patients admitted to acute care hospitals acquire one or more infections while in the hospital (3,5). Four types of infections account for more than 80% of all infections acquired in the healthcare setting: urinary tract infections (usually catheter associated), surgical site infections, bloodstream infections (usually associated with the use of an intravascular device), and pneumonia (usually ventilator-associated) (6,7). One fourth of HAIs involve patients in intensive care units, and nearly 70 percent are due to a wide variety of microorganisms that are resistant to one or more antibiotics (8).

The frequency of healthcare associated infection varies by body site. The most common of these infections are catheter-associated urinary tract infections (CA-UTIs) that account for approximately 32% of all HAIs but carry the lowest mortality and lowest cost. Surgical site infections (SSIs) account for 22% of all HAIs, although the exact frequency of these infections is difficult to gauge because between 50% and 80% of SSIs become apparent only after discharge from the hospital. Surgical site infections are second in frequency and third in cost. Bloodstream infections and pneumonia are less common infections (about 15 percent each) but are associated with much higher mortality and costs (1).

HAIs are caused by a wide variety of pathogenic bacteria and fungi. The microbiologic cause of these infections includes an array of microorganisms that are resistant to commonly prescribed antibiotics, also called multidrug-resistant organisms (MDRO). These include such pathogens as methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant enterococci (VRE), multidrug-resistant gram-negative bacilli (MDRGNB), and fungi. In addition, more virulent strains of *Clostridium difficile* may be transmitted within the hospital environment, which in turn can contribute to the morbidity and mortality of seriously ill patients who are more vulnerable to HAIs (7).

The types of microorganisms that most commonly cause healthcare associated BSIs have changed over time (Appendix C). During the 1980s, coagulase-negative staphylococci, followed by *Staphyloccus aureus*, were the most frequently reported causes of BSIs, accounting for 27% and 16% of BSIs respectively. Pooled data from 1992 through 1999 indicated that coagulase-negative staphylococci, followed by enterococci, were the most frequently isolated causes of healthcare associated BSIs. Coagulase-negative staphylococci accounted for 37% of isolates, gram-negative bacilli accounted for 14%, enterococci accounted for 13.5%, and 12.6% were *S. aureus.* In 1999, 25.9% of the enterococcal ICU isolates were resistant to vancomycin and >50% of all *S. aureus* isolates from ICUs were resistant to oxacillin (9).

Major advances in the treatment of heart disease, cancer, pulmonary disorders, and a broad range of once-fatal diseases have prolonged life, but accompanied by this increased life expectancy is the increasing challenge of controlling health care-associated infectious diseases. However, most HAIs are not an inevitable consequence of medical progress or hospitalization, even for today's severely ill patients. Evidence-based patient care practices, sophisticated medical equipment, and multifaceted infection prevention programs are now available that can decrease the incidence of these infections in our hospitals. To decrease the incidence of HAIs, close attention must be paid to adherence to proper infection prevention practices, including hand hygiene, avoidance of unnecessary invasive procedures, and the judicious use of antibiotics.

B. Public Reporting of Healthcare Associated Infections

1. Background

Increasing public awareness of the serious problem of healthcare-associated infections and the uses of data collection have led to a call for public disclosure of healthcare infection rates in the United States through mandatory reporting of information related to healthcare associated infections. In recent years, federal agencies, various state legislatures and agencies, hospitals and other healthcare providers, public health organizations, and consumer and patient representatives have explored the development of reporting systems for monitoring the incidence of HAIs. The goal is to help consumers make informed choices about their healthcare and improve the quality of healthcare by reducing the incidence of HAIs. Most hospitals and other healthcare facilities, however, do not publicly report HAI data and there are no national standards for public reporting. Presently there is insufficient evidence that demonstrates the effectiveness of public reporting systems in reducing HAIs. Therefore, the national infection advisory committee, The Healthcare Infection Control Practices Advisory Committee (HICPAC), has not recommended for or against mandatory public reporting of HAI rates (2)

In order to better guide the states considering legislation for mandatory reporting of healthcare-associated infection information, the Centers for Disease Control (CDC) partnered with HICPAC, the Council for State and Territorial Epidemiologists (CSTE), the Association for Professionals in Infection Control and Epidemiology (APIC), and the Society for Healthcare Epidemiology of America (SHEA) and developed guidance for public reporting of healthcare associated infections (2). These recommendations include the following:

1) to use established public health surveillance methods when designing and implementing mandatory healthcare-associated infection reporting systems;
2) to create multidisciplinary advisory panels, including persons with expertise in the prevention and control of healthcare associated infections, to monitor the planning and oversight of public reporting systems for healthcare-associated infections;
3) to choose appropriate process and outcome measures based on facility type, and phase-in measures to allow time for facilities to adapt and to permit ongoing evaluation of data validity; and
4) to provide regular and confidential feedback of performance data to healthcare providers.

Specifically, HICPAC recommends that states establishing public reporting systems for HAIs select one or more of the following process or outcome

measures as appropriate for hospitals or long-term care facilities in their jurisdictions:

1) central-line insertion practices;
2) surgical antimicrobial prophylaxis;
3) influenza vaccination coverage among patients and healthcare personnel;
4) central line-associated bloodstream infections; and
5) surgical site infections following selected operations.

Public reporting of healthcare performance information typically describes the outcomes of medical care in terms of mortality, selected complications, or medical errors. Increasingly, process measures (ie, measurement of adherence to recommended health care practices, such as hand hygiene) are being used as indicators of how well an organization adheres to established standards of practice with the assumption that good processes lead to good health care outcomes. National health care quality improvement initiatives, notably those of the Joint Commission on the Accreditation of Healthcare Organizations (JCAHO), the Centers for Medicare & Medicaid Services (CMS), and the Hospital Quality Alliance, use process measures in their public reporting initiatives (1).

Monitoring both process and outcome measures and assessing their correlation is a comprehensive approach to improving patient safety and quality improvement. Process measures are desirable in a public reporting system because the target adherence rate of 100% is explicit and process measures do not require adjustment for the patient's underlying risk of infection. Process measures that are selected for inclusion in a public reporting system should be those that measure common practices, are valid for a variety of healthcare settings, and can be clearly specified (have specific exclusion/inclusion criteria). Examples of process measures meeting these criteria include: adherence rates of central line insertion practices, adherence rates of surgical antimicrobial prophylaxis, and coverage rates of influenza vaccination for health care personnel and patients (10,11,12). Outcome measures should be chosen for reporting based on the frequency, severity, and preventability of the outcomes and the likelihood that they can be detected and reported accurately (13). Examples of outcome measures meeting these criteria include central-line associated, laboratory-confirmed primary bloodstream infections (CLABSI) in intensive care units, and surgical site infections (SSI) following selected operations (10,14). CDC's experience indicates that monitoring HAIs through both process measures and outcomes measures is desirable. Therefore, HICPAC suggests that highest priority be given to monitoring CLABSI or SSIs and providers' adherence to the related processes of care (i.e., Central-line insertion practices for CLABSI and surgical antimicrobial prophylaxis for SSIs (2).

The impact of public reporting of HAIs on the delivery of healthcare services is unknown. It has been recognized that in addition to the possible benefits of

public reporting, there is also the potential for unintended consequences. Mandatory public reporting that does not incorporate sound surveillance principles and reasonable goals may divert resources to reporting infections and collecting data for risk adjustment and away from patient care and prevention. Such reporting also could result in unintended disincentives to treat patients at higher risk for HAI. Lastly, publicly reported healthcare associated infection rates can mislead those who are affected by the data or interested in the data if inaccurate information is disseminated. Therefore, in a mandatory public report of HAI information, the limitations of the current methods should be clearly communicated with the publicly released report (2).

It is clear from CDC's experience that a reporting system will produce quality data when the infrastructure includes trained Infection Preventionists (IP), formerly known as Infection Control Professionals or ICPs, maintenance of manual and automated data collection systems and databases, analysis and interpretation of findings, creation of evidence based recommendations, and feedback to healthcare professionals so changes in infection prevention practices can occur.

2. Review of Reporting Mandates from other States

In recent years, demand has been growing for public reporting of HAI data. As of July 2008, twenty-four states have passed state laws requiring public reporting of hospital-acquired infection rates: one state passed a law requiring public reporting on infection information, but not specific infection rates; two states passed laws requiring confidential reporting of infection rates to state agencies; and one state passed a law that permits voluntary public reporting on infection information (Appendix D: Summary of State Activity on HAIs).

Hospital infections have moved into the national limelight, and the focus of the health care industry is increasingly on infection prevention. In the past year, federal legislation has been introduced concerning hospital infection reporting and antibiotic resistant infection detection and prevention (16,17). State and federal legislation are simply the latest development in the movement to improve the quality of medical care.

C. CDC Reporting Systems: National Healthcare Safety Network (NHSN)

For more than 30 years, healthcare associated infection surveillance has been the foundation on which performance improvement and infection prevention have been built. Through voluntary reporting from a national network of sentinel hospitals, CDC has monitored healthcare associated infections using the surveillance methods of the National Nosocomial Infections Surveillance (NNIS) system. To enhance the potential for public reporting, enable even more healthcare facilities to participate in a national surveillance system, and use

recent advances in information technology, CDC launched the National Healthcare Safety Network (NHSN) in 2005. NHSN is a secure, Internet-based system that builds on the working relationships and surveillance standards established in NNIS. Through NHSN, participating hospitals can report to CDC and can join a group (e.g., a state reporting agency or healthcare system) allowing the agency or healthcare system to see their data. Using standard definitions for surveillance and standard approaches to data collection and analysis have allowed hospitals to gauge how well they are preventing infections. Because hospitals have different kinds of patients, rates of healthcare associated infections can be calculated to account for these differences in severity of illness or complexity of procedures performed. The use of these "risk-adjusted rates" allows facilities to more accurately compare their own progress in infection prevention and control to other facilities as well as to their own past performance rates. Wide adoption and adherence to nationally standardized infection criteria, data collection protocols, and statistical methods enables NHSN to be used more effectively for public reporting across states.

Participation in NHSN has increased greatly in the past few years and the system is expected to continue to expand in order to accommodate local, state, and federal reporting initiatives for healthcare associated infections. CDC is currently providing support to more than 1300 hospitals in 16 states that are using NHSN to fulfill state reporting requirements (18).

As a result of CDC's discussions with states about NHSN, technical enhancements are planned to better support public reporting. CDC is expanding its training and user support for NHSN and is adding information technology capacity to handle the anticipated continued increase in system use.

D. National Payment Policy Incentives

The debates about public reporting and pay-for-performance programs have focused national attention on HAIs. Although not all HAIs are preventable, public and private organizations have established standards and other activities aimed at controlling and preventing them. Last year, the federal Centers for Medicare & Medicaid Services (CMS) adopted new rules that will end payments to hospitals for the extra care required to treat patients harmed by certain preventable hospital acquired infections (19). CMS has collaborated closely with CDC on the selection of these conditions, with particular attention to identifying evidence-based guidelines that are consistent with CDC's recommended practices. Thus, this Medicare payment provision is closely tied to CDC's prioritized HAI prevention practices. As a prerequisite for implementing this Medicare payment provision, CMS also requires hospitals to begin reporting present on admission (POA) indicator data to identify whether the selected conditions are acquired during a hospitalization. Beginning October 1, 2007, hospitals were required to begin submitting information on claims specifying whether diagnoses were present on admission. POA data will be needed to determine whether payments

should be made for the selected healthcare-associated infections. CMS's collection of POA data will generate increased information about hospital-acquired conditions, including infections, which can be used by CDC and others to develop and disseminate reliable national estimates of these conditions.

The rules expand two key initiatives that begin to link payments for health care services to quality of care – the Hospital-Acquired Conditions (HAC) and the Hospital Quality Measures Reporting Initiatives.

As of October 1, 2008, three of the eight conditions selected for the HAC provision are healthcare associated infections, specifically, catheter-associated urinary tract infections, vascular catheter-associated infections, and a surgical site infection - mediastinitis (infection in the chest) after coronary artery bypass graft surgery. Medicare will no longer pay hospitals at a higher rate for the increased costs of care for these infections unless they were present on admission (19).

In addition, CMS announced a proposal to expand the list of conditions in 2009 beyond those chosen in 2008. Under the proposed regulations for 2009, Medicare would expand the nonpayment policy for three additional conditions including one healthcare associated infections: Surgical site infections following certain orthopedic procedures that are often elective and that involve the repair, replacement, or fusion of various joints including the shoulder, elbow, and spine (20).

The second initiative CMS is proposing is the expansion of the hospital quality-reporting program, which will reduce the amount a hospital is paid if it does not participate in the voluntary reporting of standardized quality measures. Hospitals are currently required to report 30 quality measures on their claims for Medicare inpatient services to qualify for a full update to their FY 2009 payment rates. CMS is adding 13 quality measures, as well as retiring one of the existing measures (pneumonia oxygenation assessment measure), bringing the total number of measures in FY 2009 to 42. The proposed additions include measures in the following categories: Surgical Care Improvement Project (SCIP), Cardiac surgery, hospital readmissions, nursing care, patient safety indicators and inpatient quality indicators (21).

IV. Implementation of the Healthcare Associated Infections Initiative

A. Committee on Healthcare Associated Infections

1. Healthcare Associated Infections Advisory Committee Activities

The Connecticut legislation required the Commissioner of the Department of Public Health (DPH) to appoint an 11 member Healthcare Associated Infections Advisory Committee. The committee is composed of members who are volunteers and their length of service is for as long as each volunteer is willing to serve. The composition of the CT Healthcare Associated Infections Advisory Committee is detailed in the table below.

Healthcare Associated Infections Advisory Committee Composition	# of Appointees
Commissioner or Commissioner's designee	1
Representatives from the Connecticut Hospital Association	2
Representatives from a health care consumer organization	2
Representatives from Hospital-based Infectious Disease Specialist or Epidemiologist	2
Representative from Connecticut State Medical Society	1
Representative from Labor organization who represents hospital-based nurses	1
Members from the public	2
Total Membership	**11**

Table 1: CT Healthcare Associated Infections Advisory Committee Composition

The legislation mandated that the advisory committee advise DPH with respect to: (1) the development, implementation, operation and monitoring of a mandatory reporting system for healthcare associated infections; (2) identify, evaluate and recommend to DPH appropriate standardized measures and processes designed to prevent healthcare associated infections in hospital settings and any other healthcare setting deemed appropriate by the committee and; (3) identify, evaluate, and recommend to DPH appropriate methods for increasing public awareness about effective measures to reduce the spread of infections in communities and in hospital settings. The legislation required that all appointments to the committee be made by August 1, 2006, the first meeting be held by September 1, 2006, and a report on the HAI Plan be submitted to the CT General Assembly by October 1, 2007.

The selected members were notified in August 2006. A complete list of the current committee members can be found in Appendix E. The committee first met on August 31, 2006. Subsequent to that first meeting, the committee met six times from September 2006 to October 2007. By consensus, the HAI committee agreed on eight recommendations and submitted detailed reports on April 1, 2007 and October 1, 2007. These reports and meeting minutes document the committee's rationale for its recommendations and provide insight into their perspective on implementing a healthcare-associated

infections reporting system. For more detailed information on the minutes and reports, please link to: http://ct.gov/dph

Since the October 2007 report, the advisory Committee and DPH activities have focused on implementing the eight recommendations as discussed below. These activities have included the staffing of the HAI program at DPH, CDC NHSN training and implementation for CT hospitals, status of CLABSI reporting to NHSN, the Education subcommittee Hand Hygiene initiative, and the discussion of MRSA legislation.

2. Healthcare Associated Infections Advisory Committee: Recommendations -- April 2007 and October 2007

The Advisory Committee's recommendations are briefly summarized as follows:

1. Connecticut should utilize the CDC NHSN reporting system.

2. Connecticut should initially collect data on central line-associated blood stream infections ("CLABSIs") on patients in intensive care units.

3. It is essential that the data collected be used to implement evidence-based prevention methods.

4. HAI-related education is a critical element of a statewide HAI reporting and prevention system.

5. The implementation and success of a state HAI reporting system requires a state funding commitment.

6. The Committee should continue to serve in an advisory capacity.

7. Resources in the amount of $305,000 are necessary to implement the recommendations.

8. Additional resources are necessary for Connecticut's hospitals.

For more detailed information, please link to http://www.ct.gov/dph

3. Healthcare Associated Infections Advisory Committee: Education Subcommittee Activities

Recognizing that education initiatives are a critical element to the success of a Healthcare Associated Infections program, the Healthcare Associated Infections Advisory Committee recommended the establishment of an Education Sub-committee. With the goals of: (1) increasing healthcare

compliance with hand hygiene best practices throughout the state, and (2) increasing awareness of what consumers can do to prevent healthcare associated infections, the Education subcommittee developed five specific recommendations. They are as follows:

i. Efforts to educate various constituencies should begin well in advance of public reporting. Important constituencies to educate are consumers, hospital staff, the media and legislators.

ii. Education should include the following subject matter: evidence-based best practices, the definition of an HAI, the rationale for choosing CLABSIs as the first focus area, the types and definitions of data that will be reported, and the plan to implement other collection and reporting measures. It was also recommended that relevant portions of the current work of the Best Practices Subcommittee of DPH's Quality in Healthcare Advisory Committee be incorporated in the HAI education plan.

iii. A variety of mechanisms for education should be used including public service announcements, hospital- hospital-wide campaigns for staff and patients using buttons or stickers that say "Wash Your Hands," websites and links, radio shows, and other media outlets.

iv. Funding for these educational efforts will be necessary to implement a state–wide educational campaign.

v. The Committee should continue to meet to provide guidance and help Implement educational efforts relating to the reporting of CLABSIs and any additional infection measures that the Committee determines are appropriate for public reporting in the future.

The first meeting of the Education subcommittee was held on February 23, 2007. In the meetings that followed, the Education subcommittee developed a Statewide Hand Hygiene education plan to encourage a partnership between patients and the providers who cared for them. Hand hygiene is one of the least expensive and most effective ways to reduce healthcare acquired infections. Infection Preventionists have been instructing doctors and nurses for years on the benefits of this one important task. For more information on the meeting minutes, please link to: http://www.ct.gov/dph

On June 13, 2008, at a ceremony in the State Capitol, DPH launched a public education campaign designed to increase Connecticut residents knowledge about health-care associated infections and the importance of infection control practices, especially hand washing. To view the video of the ceremony, please link to http://ct.gov/dph. Developed through a partnership between hospitals, nursing homes, patient advocates and the DPH, representatives of hospitals, nursing homes, and other members of the

healthcare community joined DPH in pledging their support of a statewide campaign titled: “Making Connecticut Safer: Two Hands at a Time”. The campaign materials developed by Policy Studies, Inc., Cambridge, MA, were distributed to hospitals and nursing homes across the state to help organizations increase hand washing among patients, family members, and visitors, and set expectations concerning hand washing among health care workers. For more information on the Hand Hygiene campaign, click on the link: http://www.ct.gov/dph/cwp/view.asp?a=3522&q=417034
Publicity surrounding the campaign included: newspaper articles, a DPH website announcement, and CT State public access TV (CTN). In conjunction with the state campaign, DPH sponsored a Hand Hygiene Awareness campaign for state employees with hand hygiene displays and posters in the lobbies of the state office building housing DPH, the Department of Mental Health and Addiction Services, the Department of Developmental Services, and the Office of Health Care Access (410 Capitol Avenue, Hartford, CT). A more permanent display is under consideration.

B. National Healthcare Safety Network Patient Safety Module Implementation

1. Centers for Disease Control and Prevention (CDC) National Healthcare Safety Network (NHSN)

The Healthcare Associated Infections Advisory Committee recommended that Connecticut use the Centers for Disease Control and Prevention (CDC), National Healthcare Safety Network (NHSN) surveillance system to track, report, and prevent healthcare associated infections.

The Committee recognized several important benefits to using the system: the system is being used by many states allowing CT data to be compared with other participating NHSN States; using NHSN eliminated the need to fund and design a data collection system; CDC is the host for NHSN and therefore responsible for updates and upgrades; hospitals report data to NHSN via a web-based interface; DPH is able to access hospital-specific NHSN data for CT hospitals, the CDC NHSN system is modular with different infection monitoring modules; and several CT hospitals have significant experience as NHSN participants.

In following this recommendation, DPH required all 30 acute care hospitals in CT to formally enroll in the NHSN system by December 1, 2007 and all hospitals complied with this requirement (Appendix F: CT Hospitals Reporting HAIs).

2. NHSN Central Line Associated Blood Stream Infection (CLABSI) Module

The Committee recognized that the best approach to implementing a reporting system and ensure accurate data was to begin in a critical and clearly defined manner. Therefore, the Committee recommended that CT should start with one NHSN Patient Safety module and implement additional modules once hospitals were able to conduct surveillance and report in a standardized manner.

Central line-associated blood stream infections (CLABSI) are one of the most serious and costly hospital associated infections. These infections account for approximately 15% of HAIs. They occur primarily in intensive care units and result in significant increases in lengths of stay and costs of hospitalization. There is also strong evidence through peer-reviewed scientific studies that many of these infections can be prevented with the implementation and consistent use of evidence-based processes of care, also known as “Central Line Care Bundles” that includes: staff education, hand hygiene, use of maximal sterile barrier precautions, chlorhexidine gluconate skin antisepsis, avoidance of femoral lines, empowerment of staff to stop the

procedure if sterile technique is broken, and daily assessment of the continued need for a central line (22,23,24).

In following the Advisory Committees' recommendation, DPH required hospitals to begin submitting data on the NHSN Patient Safety Module: Central line-associated Blood Stream Infections in patients in a medical or medical/surgical intensive care units to the NHSN by January 1, 2008. (Appendix G: NHSN Definitions of Central-line Associated Bloodstream Infection). As of January 1, 2008, within one month of enrolling in the NHSN surveillance system, all CT hospitals began submitting the required monthly reporting plans and CLABSI data to NHSN.

3. NHSN: Conferring Rights to the Connecticut DPH

The Healthcare Associated Infections Advisory Committee recommended the use of the CDC NHSN surveillance system because of the advantage that DPH would be able to access hospital-specific NHSN data for CT hospitals via a web-based interface. This process of CT DPH having access to each CT Hospital's CLABSI data involved each individual CT hospital "Conferring Rights to Connecticut DPH" through the NHSN system (Appendix H: Conferring Rights to CT DPH). The NHSN system requires a state health department (CT DPH) to enroll as a "Group" in NHSN. Each hospital or NHSN Facility then joins the "Group". Through the process of "Conferring Rights", the NHSN Facility gives access rights to certain data to the "Group".

In early July 2008, CT hospitals were required to join the Connecticut Health Department group and confer selected data rights to the CT DPH group. The CT Department of Public Health (DPH), Hospital Associated Infections Program, administers the group and is the only mechanism that DPH has to review data submitted to NHSN by each hospital. In addition, no other hospital group member has rights to review other group member data. The Advisory Committee recommended that hospitals confer rights from January 1, 2008 and beyond, for the following data elements: Patients (with identifiers), Data analysis, CLABSI events, Summary data for CLABSI events, and Denominator data for CLABSI events. The confidentiality of patient data is protected under CT General Statutes, Sections 19a –25. As of July 31, 2008, all 30 CT acute care hospitals have conferred rights for DPH to have access to the required NHSN CLABSI data elements.

During August 2008, DPH HAI program staff began to monitor the accuracy and timeliness of data being submitted, discussed the findings with the hospitals, and ensured that corrective action was taken. Data discrepancies and data transmission questions, which are to be expected in a new electronic surveillance reporting system, have included: data entry – keyboard errors, technical problems in the NHSN transfer of data to DPH, missing monthly event data, missing monthly denominator data (patients days and

device days), and incorrect choice of ICU type medical ICU, medical/surgical ICU). The DPH HAI program has been working with the hospitals and is making good progress on resolving the “not unexpected” issues.

C. Characteristics of Hospitals and Hospital Infection Control Programs in Connecticut

1. Infection Control Programs: Background

The United States healthcare system and patient population have changed substantially over the past several decades. In 1958, responding to a nationwide epidemic of nosocomial *Staphylococcus aureus* infections and recognizing the need for hospitals to identify problems in a timely fashion, the 'American Hospital Association's Advisory Committee on Infections Within Hospitals' recommended that nosocomial infection surveillance become a regular hospital routine (25). In 1970, the CDC recommended that hospitals establish positions for an infection control nurse and a hospital epidemiologist (26). In 1976 when the Joint Commission on Accreditation of Health Care Organizations (JCAHO) published standards for organization, surveillance, reporting, evaluation, record maintenance, and other requirements for infection prevention and control activities as a condition for hospital accreditation (27). The practice of infection control also has evolved since the landmark Study on the Efficacy of Nosocomial Infection Control (SENIC) project (28). Performed in the United States over a 10 year period (1975 – 1985), the SENIC project demonstrated that, overall, 32% of nosocomial infections involving the four major sites (bloodstream, surgical wound, urinary tract, and respiratory tract) could be prevented with high-intensity infection surveillance and control programs. Subsequent analyses have demonstrated nosocomial infection prevention and control programs to be not only clinically effective but also cost-effective (29,30).

The success or failure of an infection control program is defined by its effectiveness in achieving its goals:

1) to protect the patient,
2) to protect the healthcare worker, visitors, and others in the healthcare environment; and
3) to accomplish these two goals in a cost-effective manner.

The key responsibilities of infection control are: problem identification, data collection and analysis, intervention through changes in policies and procedures, and ongoing data collection to monitor success (Appendix I: Definitions and Components of Infection Control and Prevention Programs). Additional functions include participation in a monitoring program for antibiotic usage, consultation to the microbiology laboratory, advice on product evaluation, input into facility design, coordination with safety and other quality-assurance programs, and research activities (27). Specialized knowledge in healthcare epidemiology, microbiology and transmission of infectious diseases, and biostatistics, are integral to the practice of infection prevention and control.

Apart from general guidance provided by JCAHO, there are surprisingly few recommendations on infrastructure and essential activities for infection control programs (27,31). While there is a consensus in the literature on the general components of an infection control program, controversies exist over priorities and how to conduct these programs. In essence, there is no single best practice 'Infection Control and Surveillance' program for hospitals. Best practices for individual hospitals will vary at any one time because of differences in types of patients, bed numbers, services offered, staff expertise, patient care practices, and available resources. Best practices will also vary as new infections, new antibiotic resistance, and new patient risk factors emerge (32). The key to prevention of HAI and control of outbreaks is still a well-organized management system with influence on the behaviors of doctors, nurses and other hospital staff. Questions then arise as to what material and administrative elements are needed to ensure a successful infection control program, what resources are needed if the traditional discipline of infection-based hospital epidemiology is to be applied successfully to quality-assurance and risk-management programs, and what critical functions the hospital and healthcare epidemiology programs must undertake (31). Therefore, each hospital must tailor the specific functions of their infection control program to meet the unique needs for their healthcare institution.

2. Connecticut Hospitals

All 30 CT hospitals required to participate in the reporting of healthcare associated infections (Appendix F), were visited by DPH HAI program staff in May/June 2008. To better understand the composition and representativeness of the CT hospitals, the primary Infection Preventionist was informally surveyed during the HAI program visit. During the discussions, information was collected on the hospital characteristics and Infection Control surveillance activities to help determine the scope of current activities among the HIA programs in the acute care hospitals in CT. The results described below are a result of the informal data collection process and are to be considered preliminary. The purpose of these data are to serve as a foundation for further discussion with the HAI Advisory Committee related to CT hospitals teaching and bed size category, types and numbers of ICUs, and the number of Infection Preventionists in CT Hospitals.

Characteristics of the 30 hospitals in CT participating in the reporting of healthcare associated infections to DPH are shown in Table 2. The majority of CT hospitals (57%) have teaching affiliations for medical students, interns and residents. Fourteen of the 17 (82%) hospitals with teaching programs had greater than 200 beds. Ten of the 13 (77%) non-teaching hospitals were smaller, community hospitals with less than 200 beds. Bed size category ranges for this report are based on the number of occupied beds or average daily census. The number of CT hospitals in the bed size categories: less

than 200 beds, or 201-500 beds, were almost equal (43%, 47%). Three of the 30 hospitals (10%) had 501 – 1000 beds. None of the hospitals in CT are larger than 1000 beds.

Table 2. CT Hospitals by Bed Size Category° and Hospital Teaching Type

Hospital Bed Size* Category				
Hospital Type	**<200**	**201-500**	**501-1000**	**Total**
Teaching*	3	11	3	17 (57%)
Non Teaching	10	3	0	13 (43%)
Total	**13 (43%)**	**14 (47%)**	**3 (10%)**	**30 (100%)**

° Bed Size = Average Daily Census
* Teaching Hospitals = Hospital is associated with a training program for medical students, interns, and residents.

Based on the Average Daily Census (Table 3), the smaller CT hospitals in the less than 200 bed category had an average daily census of 75 beds (range of 33-126). Those hospitals in the mid-range of 201-500 beds, had an average daily census of 226 (range of 123-420), and the larger hospitals in the 501-1000, had an average census of 590 (range of 457 – 750). Statewide, the daily census average was 197 (median 160, range of 33-750).

Table 3. CT Hospitals by Bed Size Category and Average Daily Census

Hospital Bed Size Category				
Aver. Daily Census	**<200**	**201-500**	**501-1000**	**Statewide**
Mean°	75	226	590	197
Median°	70	206	564	160
Range°	33 - 126	123 - 420	457 - 750	33 - 750

° "Mean" is the mathematical average of a set of numbers. "Median" is one type of average, found by arranging the values in order and then selecting the one in the middle. "Range" is the distance between the largest and the smallest numbers in the data.

3. Intensive Care Units

All of the hospitals in CT (100%) have an Intensive Care Unit (ICU) (Table 4). Most hospitals reported having 1 to 3 ICUs. The most common types of ICUs were a combined Medical-Surgical unit (n=24), followed by a Neonatal ICU (n=13). None of the hospitals reported having a specific Respiratory or Trauma ICU. The total number of ICU beds in CT hospitals was 914 (median 22.5, range of 6-154). The mean number of ICU beds in <200 bed size hospitals was 11.8. In the midsize hospitals (201-500 beds), the mean number of ICU beds was 14.2, and in the 501-1000 hospital bed size category, the mean number of ICU beds was 18.8. The mean number of ICU beds for all CT hospitals was 14.7.

Table 4. CT Hospitals by Bed Size Category° and ICU Type

Hospital Bed Size Category								
ICU Type	**<200 N¹=13**		**201-500 N¹=14**		**501-1000 N¹=3**		**Total N¹=30**	
	n	**#**	**n**	**#**	**n**	**#**	**n**	**#**
Burn	0	0	1	10	0	0	1	10
Cardiothoracic	0	0	2	24	2	30	4	54
Coronary	0	0	2	20	3	46	5	66
Medical	0	0	3	34	2	36	5	70
Medical-Surgical	12	116	11	202	1	22	24	340
Neonatal	2	43	9	120	2	71	13	234
Neurosurgical	0	0	0	0	2	32	2	32
Pediatric	1	18	1	4	1	19	3	41
Respiratory	0	0	0	0	0	0	0	0
Surgical	0	0	3	41	2	26	5	67
Trauma	0	0	0	0	0	0	0	0
Total ICU	**15**	**177**	**32**	**455**	**15**	**282**	**62**	**914**

° = Average Daily Census, N¹=Number of CT Hospitals
n = Number of hospitals with ICU type; # = total number of ICU beds for each ICU type

4. Infection Preventionists

Based on the informal survey with the Infection Preventionists (IP), the average number of IP at CT hospitals was 1.62 (Table 5). The hospitals in the bed size category, 501 -1000 beds, had a mean of 3.17 IP per hospital. The smaller community hospitals (less than 200 beds) averaged 1.07 IP per hospital.

Table 5. CT Hospitals: Infection Preventionists by Bed Size Category

Bed Size Category				
Infection Preventionists (IP)	**<200**	**201-500**	**501-1000**	**Statewide**
IP (number)	**13.95**	**25.15**	**9.50**	**48.60**
IP per Hospital (number)	**1.07**	**1.80**	**3.17**	**1.62**

Recommendations for staffing must not only consider the number of occupied beds (average daily census) but also include the scope of the program, the complexity of the health care facility or system, the characteristics of the patient population, and the unique or urgent needs of the facilities and community.

D. Data Collection: Central Line Associated Blood Stream Infections in Intensive Care Units

1. Central Line-Associated Blood Stream Infections: Background

CLABSIs fall within a general category of primary bloodstream infections that are associated with the presence of a central line, or an umbilical catheter in neonates, at the time of or before the onset of the infection. The term primary bloodstream infection refers to those in which there is no obvious source. A central line is an intravascular catheter that terminates at or close to the heart or in one of the great vessels. An example of a great vessel is the aorta or superior vena cava. Patients may have a central line placed if they need fluids, medications, nutrition or monitoring. Central lines can be either temporary or permanent.

Each year, an estimated 250,000 cases of central line-associated bloodstream infections (CLABSIs) occur in hospitals in the United States, with an estimated attributable mortality of 12%-25% for each infection (10). There is universal agreement that central line BSIs are associated with an increased hospital length of stay, from 10 to 20 days, and the attributable cost per infection is estimated from $34,508 to $56,000 (33,34), and the annual cost of caring for patients with CLABSIs ranges from $296 million to $2.3 billion (35). CLABSIs are the second leading cause of HAI-related mortality in U.S. hospitals (after ventilator-associated pneumonia) and have been recommended as a reportable measure by expert authorities, including HICPAC (2).

The majority of serious catheter-related infections are associated with central venous catheters, especially those placed in patients in ICUs. Hospitalized ICU patients are at increased risk for infection because of underlying illness, compromised immune systems, and the use of invasive devices; therefore, the elimination of all healthcare associated infections is challenging (Appendix C: Examples of Factors that May Increase the Risk of Developing a Healthcare Associated Infection). Central line-associated blood stream infections are the third most common healthcare associated infections (after ventilator-associated pneumonia and catheter-associated urinary tract infections) reported by the medical/surgical ICUs participating in the NNIS (now known as NHSN) system (36).

With the guidance provided by HICPAC on the components necessary for a meaningful reporting system which included: the frequency, severity, and preventability of the outcome (infection), the likelihood that the infection can be detected and reported accurately, the ability to risk adjust, and the availability of well-established prevention strategies, the CT Healthcare

Associated Infections Advisory Committee recommended inclusion of this infection rate in the initial reporting requirements for general hospitals in CT.

Each hospital is required to report all Central Line associated bloodstream infections and the causative pathogen from an intensive care unit, the number of central line days, and the number of patient days, as defined by the NHSN Definitions *(*Appendix G*).*

2. Healthcare-Associated Central Line-Associated Blood Stream Infections: Identifying and Applying NHSN Definitions

Before an infection is reported to NHSN, the person performing surveillance must decide that the clinical, laboratory, and other diagnostic information gathered on the patient satisfy the criteria for an NHSN infection. There is no single source of information that allows an infection preventionist to accurately identify healthcare associated infections. To assist surveillance personnel in making these decisions consistently, the NHSN manual includes criteria for determining the presence of an infection through the use of site-specific definitions. These definitions do not define clinical illness; rather, they are used for credible, consistent application across institutions. The NHSN definitions are the only criteria that should be used. CDC definitions include clinical and laboratory information that requires training, discussion, and updating. It is important that HAI participants consistently use them for reporting infections, so rates can be appropriately compared (Appendix G NHSN Definitions).

Any infection reported to NHSN must meet the definition of a healthcare associated infection. A HAI is: 1) a localized or systemic condition resulting from an adverse reaction to the presence of an infectious agent(s) or its toxin(s) and, 2) there must be no evidence that the infection was present or incubating at the time of hospital admission.

The Central Line associated Blood Stream Infection module requires active, patient-based, prospective surveillance of device-associated infections and their corresponding denominator data by a trained IP. This means that the IP shall seek out infections during a patient's stay by screening a variety of data sources, such as laboratory, pharmacy, admission/discharge/transfer, radiology/imaging, and pathology databases, and patient charts, including history and physical exam notes, nurse/physicians notes, temperature charts, etc. Others may be trained to screen data sources for these infections, but the IP must make the final determination.

Experts acknowledge and various studies have demonstrated the challenge of diagnosing laboratory-confirmed bloodstream infections in a standardized manner. This is largely due to the subjectivity in classifying cultures that are positive for bacteria commonly considered part of the skin flora. In order to

guarantee standardization of rates for inter-hospital comparison, the CT Healthcare Associated Infections Advisory Committee recommended that the reporting to NHSN/DPH should be restricted to CLABSIs that meet the NHSN criteria for Laboratory Confirmed Primary Bloodstream Infection (Appendix J: CT HAI Program Reporting Requirements).

3. Healthcare-Associated Central Line-Associated Blood Stream Infections: Evidence Based Prevention Practices

In the United States, 48% of intensive care unit patients have central venous catheters, accounting for about 15 million central-venous-catheter-days per year in ICUs (35). Most Central Line-Associated Blood Stream Infections can be prevented through proper insertion and care of the central line. These techniques are addressed in the CDC's Healthcare Infection Control Practices Advisory Committee (CDC/HICPAC*) Guidelines for the Prevention of Intravascular Catheter-Related Infections* (2).

In 2001, CDC was asked by the Pittsburgh Regional Healthcare Initiative (PRHI) to provide technical assistance for a hospital-based intervention to prevent central-line associated BSIs among intensive care unit (ICU) patients (32 hospitals and 66 ICUs) in southwestern Pennsylvania (23). During a 4-year period, BSI rates among ICU patients declined 68%, from 4.31 to 1.36 per 1,000 central line days. The interventions were multifaceted, consisting of five components:

1) promotion of targeted, evidence-based catheter insertion practices (i.e., use of maximum sterile barrier precautions during insertion, use of chlorhexidine for skin disinfection before catheter insertion, avoidance of the femoral insertion site, use of recommended insertion-site dressing care practices, and removal of catheters when no longer indicated);
2) promotion of an educational module about central line--associated BSIs and strategies for their prevention;
3) promotion of standardized tools for recording adherence to recommended catheter insertion practices;
4) promotion of a standardized list of contents for catheter insertion kits that includes all supplies required to adhere to recommended insertion practices; and
5) measurement of central line--associated BSI rates and distribution of data to participating hospitals in confidential quarterly reports, allowing comparison of individual unit-specific rates with pooled mean rates from other participating ICUs in the region and pooled mean rates from all other U.S. hospitals participating in the National Nosocomial Infection Surveillance (NNIS) system (now NHSN), stratified by type of ICU.

The work in Pennsylvania was soon followed by similar intervention and tracking efforts in 67 hospitals and 103 ICUs in Michigan. Using CDC guidelines and evidence-based interventions, hospital ICUs across Michigan saw up to a 66% reduction in catheter associated BSIs over 18 months (37). Recent data from the CDC NHSN system (1997-2007), demonstrated declines in CLABSI rates in most, but not all, major types of ICUs in facilities reporting to CDC (Figure 1) (38).

The prevention practices are not new. Since 1996, most have been included in the Healthcare Infection Control Practices Advisory Committee recommendations for the prevention of central line-associated BSIs (10,39). The CDC guidelines have served as the basis for national healthcare quality initiatives, such as the Institute for Healthcare Improvement's 100,000 Lives Campaign, which bundles together these guidelines to create best practices to reduce healthcare associated infections (40). In addition, several of these evidence-based recommendations have been incorporated into the Joint Commission standards for accreditation of U.S. Hospitals and have been endorsed by the National Quality Forum (41).

Quality Improvement collaborations among ICUs have reported substantial increases in rates of adherence to infection control practices. The Central Line Bundle, developed by the Institute of Healthcare Improvement (IHI), is a group of evidence-based interventions for patients with intravascular central catheters that, when implemented together, result in better outcomes than when implemented individually (41). The science supporting each bundle component has been adequately studied to be considered the standard of care (35,42).
The central line bundle has five key components:

1. Hand hygiene
2. Maximal barrier precautions
3. Chlorhexidine skin antisepsis
4. Optimal catheter site selection, with subclavian vein as the preferred site for non-tunneled catheters
5. Daily review of line necessity, with prompt removal of unnecessary lines.

The experience of the hospitals that have used the central line bundle thus far has been that the greater the level of compliance with *all* of the items in the bundle, the better the reduction in the Central line-BSI rate. Of course, compliance is only as good as the element that is least adhered to in the bundle. The Johns Hopkins Hospital's experience with compliance with some elements of central line care analogous to the central line bundle is depicted below:

Table 6. John Hopkins Hospital experience with Central Line Bundle elements (43)

Intervention	Compliance
Hand Hygiene	62%
Chlorhexidine antiseptic at the procedure site	100%
Draped the entire patient in a sterile fashion	85%
Used a hat, mask and sterile gown	92%
Used sterile gloves	100%
Sterile dressing applied	100%

Although the results described in these reports suggest that adhering to these evidence-based preventive practices can prevent most BSIs, subsequent reports suggest that adherence to these practices remains low (43,44).

During the DPH HAI program hospital visits in May/June 2008, Infection Prevention and Control staff was asked about their facility's central line infection prevention practices. While many of the hospitals had implemented a central line prevention program, several are in the planning phase or early stages of practice implementation.

4. The Role of Infection Preventionists in the Identification of Healthcare-Associated Infections

The CDC's Healthcare Infection Control Practices Advisory Committee (HICPAC) guidelines on the public reporting of HAI recommend that states use established public health surveillance methods (including standardized case-finding methods and data validity checks) when designing and implementing pubic reporting of HAIs. HAI surveillance requires trained, professional personnel to collect, validate, analyze, and interpret the data.

One of the most important activities of any infection prevention and control program is the surveillance of healthcare associated infections. The collection, analysis, and dissemination of surveillance data has been shown to be the single most important factor in the prevention of healthcare associated infections (28). Accordingly, the best source of data for any mandatory reporting system of Healthcare Associated Infections is the Infection Preventionists (IP). And yet, there are substantive concerns in the data collection process and quality improvement efforts when these tasks are delegated to personnel with little or no training in infection surveillance and prevention. Studies have demonstrated that there is a significant discordance in the quality of data retrieved by those with training in infection prevention and control when compared to those with little or no training (45). Therefore, it is imperative with public reporting systems that persons supplying healthcare data should have adequate training and be able to consult with appropriate infection prevention and epidemiology personnel to assist them in data submission and interpretation data as needed. Multiple, well trained and

well- supported IPs are a crucial factor in the reduction of infections in CT hospitals.

Each state and hospital must assess the scope of its infection prevention program to ensure that adequate resources are available for any additional surveillance activities needed to meet the legislative mandates of public reporting. In today's healthcare environment, in addition to their traditional roles, infection Preventionists (IP) have expanded obligations in various aspects of healthcare delivery that include, but are not limited to, construction and renovation activities, employee and occupational health, bioterrorism and pandemic influenza preparation, disaster planning, and outpatient services. Recommendations for staffing must not only consider the number of occupied beds (average daily census) but also include the scope of the program, the complexity of the health care facility or system, the characteristics of the patient population, and the unique or urgent needs of the facilities and community. The SENIC study found that IP, many of them nurses, were essential components of an effective program. The SENIC study suggested that having one IP per 250 occupied beds was associated with an effective program (28). However, in recent years, the amount and complexity of the IP's work has burgeoned due to increases in the prevention and control of new infections, the intensity and complexity of patient care delivered, increased severity of illness of the patient population at risk, integration with quality activities and antibiotic /device utilization reviews, and increased activity in healthcare delivery beyond the hospital. A report of the analysis of infection control practices conducted between 1982 and 2001 reflected a 145% increase in infection control activities over a 20-year period (46). Consequently, the old ratio of one IP per 250 beds is no longer adequate. In most acute-care hospitals today, the scope of work of IP is much greater than that provided by the old ratio. In the recent Delphi project report, a ratio of 0.8 to 1 Infection Preventionists for every 100 beds was suggested, whereas the average number of beds per IP in NHSN hospitals was 149 (47). In Connecticut, the actual average staffing ratio is yet to be determined. However, informal IP staffing ratio data was obtained during the DPH HAI program visit in May/June 2008. This data is considered preliminary because it includes responsibilities other than infection prevention/control performed by the IP such as employee health, quality assurance, quality improvement, off site and out patient clinics surveillance. This preliminary data indicated a state-wide average of 1.62 IPs per hospital (see Table 5).

Given the crucial role of the Infection prevention and Control Program in public reporting, the Healthcare Associated Infections Advisory Committee reports of April 2007 and October 2007 recommended that additional resources were necessary for Connecticut hospitals to implement the collection, reporting, and prevention efforts of the Healthcare Associated Infections Initiative. No specific funding was appropriated in state fiscal year 2007/2008 for this recommendation.

The advisory committee will continue to assess the costs of implementing the reporting of healthcare associated infections and hospital infection prevention and control activities and advocate for inclusion of specific funding for hospitals and infection prevention and control programs. Only larger resources and higher funding for infection prevention and control programs will permit hospitals to provide their programs with personnel and the dollars to implement comprehensive infection control programs. Additional personnel and resources must offset any further burden placed on IP by public reporting.

E. Training and Technical Assistance

1. Education and Training

Education and training for Connecticut Infection Preventionists is an essential and necessary component of the statewide Healthcare Associated Infections Initiative. To ensure that healthcare associated infections are being accurately and completely reported and that rates are comparable from hospital to hospital or among all hospitals in the reporting system, the use of standard case definitions, data collection methods and data entry is fundamental. In addition, the educational programs must meet the need of Infection Preventionists with varying educational backgrounds and work responsibilities.

To provide ongoing education and reinforcement of methods and protocols for reporting and collecting HAI surveillance data, formal and informal training sessions have been provided to the Connecticut Hospital Infection Prevention and Control programs.

The first training session, sponsored by the Connecticut Hospital Association, was conducted in October 2007 to December 2007 with acute care hospital Infection prevention staff. The training sessions involved viewing the NHSN recorded web-cast trainings and slide sets. The topics included: NHSN enrollment, NHSN Data collection and reporting requirements, and the NHSN Central Line- Line Associated Blood Stream Infection Module: Protocols and Definitions. NHSN has offered extensive web-based training around appropriate use of the system. Archived trainings can be accessed from the CDC website, http://www.cdc.gov/ncidod/dhqp/nhsn_members.html

Upon the hiring of personnel for the new DPH HAI program in April/May 2008, all 30 CT hospital Infection Prevention and Control Programs were visited in May and June of 2008. Prepared DPH HAI program packets of educational materials were distributed during the visits for discussion with the infection control and associated hospital personnel (Appendix K: HAI Program Information for Hospital Visits - 2008). Content of the packets included: a HAI Program Introductory letter from the State Epidemiologist and HAI Program Coordinator, a short narrative and contact information for the new DPH HAI program staff, May 2008 status report of the Implementation of Public Act 06-142 and the Advisory Committee's recommendations, CDC NHSN Manual handout on CLABSI and data collection forms, and the draft document for "Conferring rights of data" to DPH. During the discussions, information was collected on the hospital characteristics and Infection Prevention and Control surveillance activities to help determine the scope of current activities among the HAI programs in the acute care hospitals in CT.

As a result of the feedback obtained from the May 2008 hospital IP visits indicating the need for more trainings, regional HAI Program trainings were held in July/August 2008. The training program content included: Overview of CT HAI reporting and NHSN Surveillance system, NHSN CLABSI Module – Protocols and Definitions, NHSN data entry, Case presentations and discussion of applying NHSN criteria for central line infections, and discussion of the use of NHSN with CT NHSN hospitals who participated in NHSN before passage of the law (Appendix L: HAI Program Regional Trainings).

2. Technical Assistance

In addition to the CDC NHSN technical support team, the DPH HAI program is an important resource to hospital Infection Prevention and Control programs by providing consultation and guidance with program start-up assistance, initial and ongoing training and program quality assurance support services. Through staff training, sharing resources, on-site consulting services, telephone consultation, internal communication and other training/technical assistance, the DPH HAI program can help Infection Prevention and Control programs overcome barriers to achieving successful and sustainable HAI program outcomes.

F. Reporting: Central Line Associated Blood Stream Infections in Intensive Care Units

1. Evaluation of the HAI CLABSI Initiative

Initiatives involving new reporting systems require time to allow facilities to become familiar with the requirements and to ensure the system is used correctly. Eighty-seven percent or 26 of the CT acute care hospitals are new to the NHSN system. Also, in a new reporting system, data should be examined and validated before release, and sufficient sample size should be accumulated so that rates are stable at the time of public release. Facilities in CT vary in the types of patients they treat, and a facility that treats a high volume of severely ill patients may have higher infection rates. The frequency of the event (CLABSI) must be considered because the final sample size must be large enough or adequately "statistically powered" so that there is confidence in the accuracy of the outcome being measured. In CT, there are a few (n=3) large hospitals (over 700 beds) with a high number of days of central line device use per month (also known as device days), and several small hospitals with small numbers of ICU patients and therefore, small numbers of device days (Table 2). The data needs to be statistically analyzed and risk-adjusted for differences in the severity of illnesses so that the populations being observed are similar to avoid "apples and oranges" comparisons. Nationally, much research is being devoted to developing and evaluating risk adjustment methods to permit inter-hospital comparisons (48). The DPH HAI program gained access to the CT Hospitals NHSN CLABSI data beginning in July 2008. During the remainder of 2008, the DPH HAI program staff will continue to receive the data, assess the data for quality, standardize the approach to risk-adjusting the benchmarks, and then interpret and disseminate the data to the Advisory Committee.

Note: The CLABSI data reported to DPH to date shows small event numbers and have not been validated. Therefore, the CLABSI data in this report should be considered preliminary and labeled as such.

2. Validation of Data

Public Act 06-142 requires that each recommended measure for the reporting of Healthcare Associated 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 within a hospital unit over time, from hospital to hospital or among all hospitals in the reporting system. The importance of validation was emphasized by a CDC study of the accuracy of reporting to the National Nosocomial Infections Surveillance (NNIS) system, the precursor to

the current NHSN system, which found that although hospitals identified and reported most of the HAIs that occurred, the accuracy varied by infection site (14). 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 added pressure of publicly reporting data 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 (49).

Recognizing that the potential consequence of the public reporting of data that is poorly defined or executed may result in diminishing the overall quality of the state's health care by misleading or failing to give healthcare consumers accurate comparisons or missed opportunities to intervene to reduce infections, methods need to be put in place to validate Connecticut's HAI data. Using the data validity methods developed by several states with mandatory reporting of HAIs and with CDC's validation protocol guidance, DPH will conduct CLABSI data validity checks and hospital site visit audits in the late Fall of 2008. The purpose of the Hospital audits will be to:

1) Determine the reliability and consistency of surveillance definitions,
2) Evaluate current surveillance methods used to detect infections,
3) Evaluate current risk adjustment methods and determine if additional factors need to be considered for public reporting purpose,
4) Evaluate intervention strategies designed to reduce or eliminate specific infections and,
5) Provide on-site education on the definitions, surveillance mechanisms and use of NHSN.

3. Report Results

The final phase of implementation of the CT HAI initiative is to develop a public report. This document is the initial report representing the implementation plan, current status of the initiative, and data to be considered **"Preliminary"**. Initial data collection began January 1, 2008. Data collected from January 1, 2008 through June 30, 2008 are analyzed.

4. Data Summary

Table 6 provides the Central Line Associated Bloodstream Infection (CLABSI) rates for Connecticut. Results are presented separately for each type of Intensive Care Unit (either Combined Medical/Surgical ICU or Medical ICU). All 30 hospitals submitted CLABSI data during January 2008 through June 2008. A total of twenty-nine ICUs (24 combined medical/surgical ICUs and 5 medical ICUs) from 29 hospitals are included in this report. Data are not included from one hospital that reported Pediatric ICU data due to the small cell numbers. Central line associated infection rates varied by the specific ICU from 1.34 infections per 1,000 Central line (CL) days in Medical ICU patients to 1.56 infections per 1,000 CL days in Medical-Surgical ICU patients. Table 7 presents the national average of CLABSI rates for hospitals across the country reporting data to NHSN in the most recent available report. CT CLABSI rates reported were lower for both the Medical and Medical/Surgical ICUs as compared to national data.

Please keep in mind, that these reports are "Preliminary". They include only 6 months of data, from January 1, 2008 through June 30, 2008. Small numbers of patients and infections may distort reported performance. Beyond checking for errors and inconsistencies of the submitted data, DPH has not been able to verify the numbers that the facilities submit each month, and it is likely that some facilities do a better job of reporting than others.

Table 6. Central-Line Associated Blood Stream Infection (CLABSI) Rates* by type of Adult Intensive Care Unit (ICU), Connecticut, Data Reported January 2008 – June 2008

Type of Location	No. ICU	No. CLABSI	No. of Central Line Days	Rate/1000 CL Days
Medical ICU	**5**	**8**	**5,976**	**1.34**
Medical/Surgical ICU	**24**	**33**	**21,114**	**1.56**

* $\frac{\text{Number of CLABSI}}{\text{Number of Central Line Days}}$ x 1000

Table 7. Central-Line Associated Blood Stream Infection (CLABSI) Rates* by type of Adult Intensive Care Unit (ICU), National NHSN Data, January - December 2006

Type of Location	No. ICU	No. CLABSI	No. of Central Line Days	Pooled Mean[º]
Medical ICU	**73**	**489**	**170,719**	**2.9**
Medical/SurgicalICU				
Major Teaching	**63**	**304**	**128,502**	**2.4**
All Others	**102**	**431**	**198,551**	**2.2**

* $\frac{\text{Number of CLABSI}}{\text{Number of Central Line Days}}$ x 1000

º "Mean" is the mathematical average of a set of numbers. For inclusion in the NHSN Table, the pooled mean infection rates required data from at least 10 different locations of a given type.

Table 8 provides the CLABSI rates by CT hospital bed size. Hospitals with an average daily census of < 200 beds had 0.81 infections per 1,000 CL days. The larger hospitals, 201-1000 beds, had 1.67 infections per 1,000 CL days.

Table 8. Central-Line Associated Blood Stream Infection (CLABSI) Rates* by Size of Hospital, Connecticut, Data Reported January 2008 – June 2008.

Hospital Size	No. ICU	No. CLABSI	No. of Central Line Days	Rate/1000 CL Days
<200 Beds	**12**	**4**	**4,939**	**0.81**
201- 1000 Beds	**17**	**37**	**22,151**	**1.67**

* Number of CLABSI_____ x 1000 days
Number of Central Line Days

The Central line device utilization ratio for January 2008 through June 2008 is shown in Table 9. The CL device days consists of the total number of central line days and patient-days are the total number of days that patients are in the location during the selected time period. The central line utilization ratio 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 CT, almost two-thirds (0.64) of the medical ICU patients had a CL in place during the six month reporting time period. In the Medical/Surgical ICU patients, half (0.51) of the patients had a CL. CT Central line device utilization ratios were higher in Medical ICU patients (0.64) than the national average (0.59), but the same in the Medical/Surgical ICU patient (0.51) as compared to the combined national average (0.52) for major teaching and all other hospitals (Table 10).

Table 9. Central-Line Utilization Ratioº by type of Adult Intensive Care Unit (ICU), Connecticut, Data Reported January 2008 – June 2008

Type of Location	No. ICU	No. of Central Line Days	No. of Patient Days	CL Ratio°
Medical ICU	**5**	**5,976**	**9,283**	**0.64**
Medical/Surgical ICU	**24**	**21,114**	**41,455**	**0.51**

º Number of Central Line Days
Number of Patient Days

Table 10. Central-Line Utilization Ratio º by type of Adult Intensive Care Unit (ICU), National NHSN Data, January - December 2006

Type of Location	No. ICU	No. of Central Line Days	No. of Patient Days	Meanº
Medical ICU	75	170,719	288,862	0.59
Medical/Surgical ICU				
Major Teaching	63	128,502	223,001	0.58[1]
All Others	104	198,551	408,305	0.49[1]

º Number of Central Line Days / Number of Patient Days

º "Mean" is the mathematical average of a set of numbers. For inclusion in the NHSN Table, the pooled mean infection rates required data from at least 10 different locations of a given type.

[1] Combined average = 0.52

As expected, CT hospitals with an average daily census of <200 beds had smaller CL utilization ratios (0.37), than the larger hospitals (201-1000 beds) with a CL utilization ratio of 0.59 (Table 11).

Table 11. Central-Line Utilization Ratioº by Size of Hospital, Connecticut, Data Reported January 2008 – June 2008

Hospital Size	No. ICU	No. of Central Line Days	No. of Patient Days	CL Ratio°
<200 Beds	12	4,939	13,198	0.37
201- 1000 Beds	17	22,151	37,540	0.59

° Number of Central Line Days / Number of Patient Days

Table 12 presents the distribution of the most common microorganisms identified from patients in the ICU with a CLABSI. Forty-three (43) pathogens were isolated from 41 Central line-associated infections. Of the Central line infections, 13 (30.2%) involved Enterococcus species, 11 (25.6%) involved coagulase-negative staphyloccus, and 7 (16.3%) involved Candida spp. Of the Enterococcus microorganisms isolated from the CLABSIs, there were 7 that were vancomycin-resistant enterococci (VRE) and 6 that were vancomycin-sensitive. There were 2 (4.7%) methicillin-resistant *Staphylococcus aureus* (MRSA), and 3 (7.0%) methicillin-sensitive *Staphylococcus aureus* infections.

Table 12. Microorganisms* associated with Central-Line Associated Blood Stream Infections (CLABSI) in the Adult Intensive Care Units (ICU), Connecticut, Data Reported January 2008 – June 2008.

Name of Microorganism	No.	%
NHSN Recognized Pathogen Criteria – Criteria 1	**32 Total**	**74.4%**
Staphylococcus aureus	**5**	**11.6**
(MRSA°)	**(2 of 5)**	
Enterococcus	**13**	**30.2**
(VRE[a])	**(7 of 13)**	
Candida spp.	**7**	**16.3**
Enterobacteriaceae Family		
Klebsiella spp.	**2**	**4.7**
Escherichia coli	**2**	**4.7**
Serratia marcescens	**1**	**2.3**
Enterobacter spp.	**0**	**0**
Pseudomonas spp.	**1**	**2.3**
Achromobacter spp.	**1**	**2.3**
Acinetobacter spp.	**0**	**0**
Skin Microorganisms meeting NHSN CLABSI Clinical Criteria 2	**11 Total**	**25.6%**
Coagulase negative Staphylococci	**11**	**25.6**
TOTAL Microorganisms	**43**	**100%**

* 43 Microorganisms were isolated from 41 CLABSI
° MRSA = methicillin-resistant *Staphylococcus aureus*
[a] VRE = vancomycin-resistant enterococci

5. Website

The Connecticut Department of Public Health (DPH), Healthcare Associated Infections Program website is being developed to provide information to healthcare providers and consumers on the Connecticut DPH reporting requirements for healthcare associated infections. Public Act No. 06-142 requires that the October 1, 2008 report be posted on the DPH website and made available to the public. The statute also requires the Committee on Healthcare Associated Infections to identify ways to increase the public's awareness on effective measures to reduce the spread of infections in communities, hospitals and other healthcare settings.

Figure 2 of this report depicts the main page of the website. This page introduces users to the site and presents a brief overview of HAIs. A number of useful links are displayed:

- 'Healthcare Associated Infections' provides educational information to the public about healthcare-associated infections, including how they are

defined and the different terms used for them (health care-associated infections, nosocomial, etc). This section will also provide information about what patients can do to prevent health care-associated infections, such as prompting health care workers to clean their hands. This information will be presented in a printable format so people can use it when discussing procedures and hospitalizations with their physicians and as a reminder while they are in the health care facility;

- 'CT Healthcare Associated Infection Advisory Committee' provides information on the committee members, meeting schedule, and meeting minutes;

- 'Information for Healthcare Providers' presents technical information on the reporting requirements for CT health care facilities;

- 'Multidrug-Resistant Organisms (MDRO)' provides the user with general information about the different types of bacteria and other microorganisms that have developed resistance to antimicrobial drugs. Common examples of these organisms includes: Methicillin/Oxacillin-resistant *Staphylococcus aureus* (MRSA), Vancomycin-resistant enterococci (VRE), and links to related information;

- 'Publications and Reports' links the user to HAI Program related reports;

- 'Public Education Campaign' connects the user to the 2008 Hand Hygiene campaign and related materials;

- "Definition of Terms' is a list of technical terms and their definitions;

- 'Frequently Asked Questions' presents background information in an easy-to-read format; and

- 'Resources' connects the user to other sites that have information on HAIs.

DPH and the Advisory Committee will be developing an additional link to the site, 'Public Reporting to Consumers' that will ensure the most effective communication of complex statistics and related issues to the public. Issues that will be addressed include: overall layout, the format in which the data are presented, the type of graphics such as bar charts or stars indicating general comparisons and actual rates with explanations on how to interpret them; and incorporate web-appropriate educational techniques that will educate the consumer on proper interpretation of rates and report cards, including the meaning of infection rates, statistical significance, risk adjustment, definition of terms, methodology used to calculate the rate, and links to appropriate related studies.

V. Conclusions

Connecticut took an incremental approach and engaged in a collaborative process that followed national recommendations for the gathering and reporting of public HAI data. At this early stage, this approach has been successful.

The key first step in the process was to create our multidisciplinary advisory panel, gather advice from all interested parties, and learn from the experiences of the CDC and other states. The Connecticut Committee on Healthcare Associated Infections did its work well; this has permitted Connecticut to avoid pitfalls and digressions. DPH followed the advice, and built and staffed its HAI program to put the committee recommendations into action.

An effective collaborative network has been developed in Connecticut for this initiative. As in other states, Connecticut's DPH has worked with partners such as CHA and individual hospital infection prevention programs.

The adoption of NHSN by Connecticut has efficiently and effectively established public health surveillance methods and is already providing the data structure to make useful cross-facility and state comparisons. As demonstrated in this report, it can collect and report on data. While it is a very well designed and supported data system, it is not simple to use, and it takes considerable time and effort to learn and become facile. Addition of any additional HAI modules, such as Central Line Insertion Practices or Surgical Site Infections, will also take considerable time and effort for facilities to become adept.

This is a report of the pilot phase of the HAI reporting initiative. As noted earlier, the CLABSI data reported to DPH and summarized in this report was collected before the completion of training, is over a short time period, and has not been validated. It is very important to know that the data presented here is preliminary, and would likely change significantly with the completion of training and validation. The goal of the pilot phase is to determine whether the data system (NHSN) and the technical assistance network are functioning adequately to accomplish the goals of the program. To assume that the data presented here are reliable and accurate and useful for policy would be premature. This is why the data is presented in aggregate, and were not subjected to detailed analysis and tests for statistical significance. Now that the pilot stage has been completed, the data will become more reliable and accurate and useful to guide CLABSI prevention initiatives to implement evidence-based prevention methods, such as technical assistance, training, and infrastructure building.

While CLABSIs have the benefit of being easier to define that the other nationally recommend HAI measures, they are not always simple to define in the clinical setting, and the collection of denominator data is a continuing challenge.

One of the key CDC recommendations is that the program gives active and regular to feedback to healthcare providers in the facilities. This was successfully established during the pilot phase. Over the past six months, the DPH HAI Program has already developed a strong technical assistance and training network with hospital infection control programs. This is the basis for the future with better data, linking outcomes to processes, and tracking the (hoped for) decreases in HAI. It takes considerable effort through regular and repeated assessment, training, and technical assistance to ensure the surveillance is consistent and data correctly entered. While this is especially true at the beginning, it will need to continue throughout the life of the program.

Hospital prevention programs have motivated staffs willing to work with DPH and the Committee, but they are small staffs, which raise significant concerns about diverting them from their primary duties of hospital infection surveillance, leadership, planning, monitoring, consultation, staff education, and outbreak investigation to fulfill the current reporting requirement, much less any expansion.

The wide variety of types and sizes of hospitals in Connecticut means the patient populations and risks will likely vary, and careful analysis is needed to ensure if there are variations between hospital infection rates, that we clarify what proportion is due to factors that can and cannot be prevented through improved prevention processes, such as the "bundles."

HAI-related education is critical element of the HAI reporting system of providers and the public starting variety of levels technical for providers IPs, other staff, and the public. An important program focus and activity will be to next include education on how to interpret the data for a variety of audiences: IPs, other health providers, policy makers, and consumers.

With the caveat that these are preliminary, unvalidated data, Connecticut CLABSI rates were lower than the national rates for both the Medical and Medical/Surgical ICUs. This data and the information gathered at the hospital visit interviews gives some assurance that the hospitals in Connecticut are addressing the challenge of CLABSI prevention.

The state's investment in HAI prevention has borne fruit in an operating HAI reporting system. However, to reap the benefits of the system and realize its potential, will require both sustained DPH support and funding for Connecticut hospitals to expand staffs to report and reduce HAIs.

A good foundation has been built for the continued operations of the HAI reporting initiative and decisions on how to incrementally advance the system with quality data. The Committee will continue to serve in an advisory capacity and advise DPH as it analyzes future data and validates the data collected in the autumn of 2008 and beyond. The Committee will also consider and advise DPH on the incremental expansion of the types of HAI outcomes and prevention processes reported.

VI. Appendices

Appendix A: CT Public Act No. 06-142

Substitute Senate Bill No. 160

Public Act No. 06-142

AN ACT CONCERNING HOSPITAL ACQUIRED INFECTIONS.

Be it enacted by the Senate and House of Representatives in General Assembly convened:

Section 1. (NEW) (*Effective from passage*) (a) As used in this section, "commissioner" means the Commissioner of Public Health; "department" means the Department of Public Health; "healthcare associated infection" means any localized or systemic condition resulting from an adverse reaction to the presence of an infectious agent or its toxin that (1) occurs in a patient in a healthcare setting, (2) was not found to be present or incubating at the time of admission unless the infection was related to a previous admission to the same health care setting, and (3) if the setting is a hospital, meets the criteria for a specific infection site, as defined by the National Centers for Disease Control; and "hospital" means a hospital licensed under chapter 368v of the general statutes.

(b) There is established a Committee on Healthcare Associated Infections, which shall consist of the commissioner or the commissioner's designee, and the following members appointed by the commissioner: Two members representing the Connecticut Hospital Association; two members from organizations representing health care consumers; two members who are either hospital-based infectious disease specialists or epidemiologists with demonstrated knowledge and competence in infectious disease related issues; one representative of the Connecticut State Medical Society; one representative of a labor organization representing hospital based nurses; and two public members. All appointments to the committee shall be made no later than August 1, 2006, and the committee shall convene its first meeting no later than September 1, 2006.

(c) On or before April 1, 2007, the Committee on Healthcare Associated Infections shall:

(1) Advise the department with respect to the development, implementation, operation and monitoring of a mandatory reporting system for healthcare associated infections;

(2) Identify, evaluate and recommend to the department appropriate standardized measures, including aggregate and facility specific reporting measures for healthcare associated infections and processes designed to prevent healthcare associated infections in hospital settings and any other healthcare settings deemed appropriate by the committee. Each such recommended measure shall, to the extent applicable to the type of measure being considered, be (A) capable of being validated, (B) based upon nationally recognized and recommended standards, to the extent such standards exist, (C) based upon competent and reliable scientific evidence, (D) protective of practitioner information and information concerning individual patients, and (E) capable of being used and easily understood by consumers; and

(3) Identify, evaluate and recommend to the Department of Public Health appropriate methods for increasing public awareness about effective measures to reduce the spread of infections in communities and in hospital settings and any other healthcare settings deemed appropriate by the committee.

Sec. 2. (NEW) (*Effective from passage*) On or before October 1, 2007, the Department of Public Health shall, within available appropriations, implement the recommendations of the Committee on Healthcare Associated Infections established pursuant to section 1 of this act, with respect to the establishment of a mandatory reporting system for healthcare associated infections and appropriate standardized measures for the reporting of data related to healthcare associated infections.

Sec. 3. (NEW) (*Effective from passage*) (a) On or before October 1, 2007, the Department of Public Health shall submit a report to the joint standing committee of the General Assembly having cognizance of matters relating to public health concerning the plan for implementing the mandatory reporting system for healthcare associated infections recommended by the Committee on Healthcare Associated Infections pursuant to section 1 of this act, and the status of such implementation, in accordance with the provisions of section 11-4a of the general statutes.

(b) On or before October 1, 2008, and annually thereafter, the department shall submit a report to the joint standing committee of the General Assembly having cognizance of matters relating to public health on the information collected by the department pursuant to the mandatory reporting system for healthcare associated infections established under section 2 of this act, in accordance with the provisions of section 11-4a of the general statutes. Such report shall be posted on the department's Internet web site and made available to the public. Approved June 6, 2006

Appendix B.

Examples of Factors that May Increase the Risk of Developing a Healthcare Associated Infection (4)

Examples of Factors that May Increase the Risk of Developing a Healthcare Associated Infection
❖ Compromised immune or nutritional status
❖ Use of catheters, such as central venous or urinary
❖ Co-morbidities (i.e. diabetes, renal insufficiency, malignancy)
❖ Immunosuppressive treatment
❖ Length of stay in healthcare setting
❖ Limited mobility
❖ Prolonged antibiotic use (> 10 days)
❖ Prevalence of antibiotic resistant bacteria due to antibiotic overuse
❖ Surgical drains
❖ Inadequate infection control practices among health care workers, especially inappropriate hand hygiene
❖ Emergency treatment
❖ Presence of other infections

Appendix C.

Most Common Pathogens Isolated from Hospital Acquired Bloodstream Infections: National Nosocomial Infection Surveillance System (NNIS) Data (9)

PATHOGEN	1986 - 1989 %	1992 - 1999 %
Coagulase-negative staphylococci	27	37
Staphylococcus aureus	16	13
Enterococcus spp.	8	13
Gram negative rods	19	14
Escherichia coli	6	2
Enterobacter spp.	5	5
Pseudomonas aeruginosa	4	4
Klebsiella pneumonia	4	3
Candida spp.	8	8

Appendix D:
Summary of State Activity on Hospital-Acquired Infections as of July 2008

Table 1. 24 States with Laws Requiring Public Reporting of Infection rates

	State	Year Enacted
1.	Colorado	2006
2.	Connecticut	2006
3.	Delaware	2007
4.	Florida	2004
5.	Illinois	2003
6.	Maryland	2006
7.	Massachusetts	2008
8.	Minnesota	2007
9.	Missouri	2004
10.	New Jersey	2007
11.	New York	2005
12.	New Hampshire	2008
13.	Ohio	2006
14.	Oklahoma	2006
15.	Oregon	2007
16.	Pennsylvania	2004
17.	Rhode Island	2008
18.	South Carolina	2006
19.	Tennessee	2006
20.	Texas	2007
21.	Virginia	2005
22.	Vermont	2006
23.	Washington	2007
24.	West Virginia	2008

Table 2: 1 States with Laws Requiring Public Reporting of Infection Information, but not specific Infection Rates

	State	Year Enacted
1.	California	2006

Table 3: 2 States with Laws Requiring Confidential Reporting of Infection Rates to State Agencies

	State	Year Enacted
1.	Nebraska	2005
2.	**Nevada**	2005

Table 4: 1 State with a Law that permits Voluntary Public Reporting of Infections

	State	Year Enacted
1.	Arkansas	2007

Table 5: 4 States with Studies about Hospital-Acquired Infection Reporting

	State	Year Enacted
1.	Alaska	2006
2.	Georgia	2006
3.	**New Mexico**	2007
4.	**North Carolina**	2007

http://www.consumerunion.org

Appendix E:
2008 Committee on Healthcare Associated Infections

Public Act No. 06-142
AN ACT CONCERNING HOSPITAL ACQUIRED INFECTIONS

There is established a Committee on Healthcare Associated Infections, which shall consist of the commissioner or the commissioner's designee, and the following members appointed by the commissioner:

- Two members representing the Connecticut Hospital Association;
- Two members from organizations representing health care consumers;
- Two members who are either hospital-based infectious disease specialists or epidemiologists with demonstrated knowledge and competence in infectious disease related issues;
- One representative of the Connecticut State Medical Society;
- One representative of a labor organization representing hospital based nurses; and
- Two public members.

Healthcare Associated Infections Advisory Committee Composition

Commissioner or Commissioner's designee:

1. Karen Buckley-Bates, Director of Government Relations, CT DPH, Hartford, CT

Two Representatives from the Connecticut Hospital Association

1. Marielle Daniels, CT Hospital Association, Wallingford, CT
2. Brian Fillipo, MD, VP Quality and Patient Safety, CT Hospital Association, Wallingford, CT

Two Representatives from Organizations Representing Health Care Consumers

1. Kevin Lembo, MPA, Office of Healthcare Advocate, State of CT, Hartford, CT
2. Jean Rexford, Exec. Dir., CT Center for Patient Safety, Hartford, CT

Two Representatives that are Hospital-based Infectious Disease Specialists or Epidemiologists

1. Louise Dembry, MD, Hospital Epidemiologist, Yale-New Haven Hospital, New Haven, CT
2. Richard Garibaldi, MD, Hospital Epidemiologist, UCONN Health Center/John Dempsey Hospital, Farmington, CT

One Representative from Connecticut State Medical Society

1. Brian Cooper, MD, Director of ID, Allergy & Immunology, Hartford Hospital, Hartford, CT

One Representative from Labor organization Representing Hospital-based Nurses

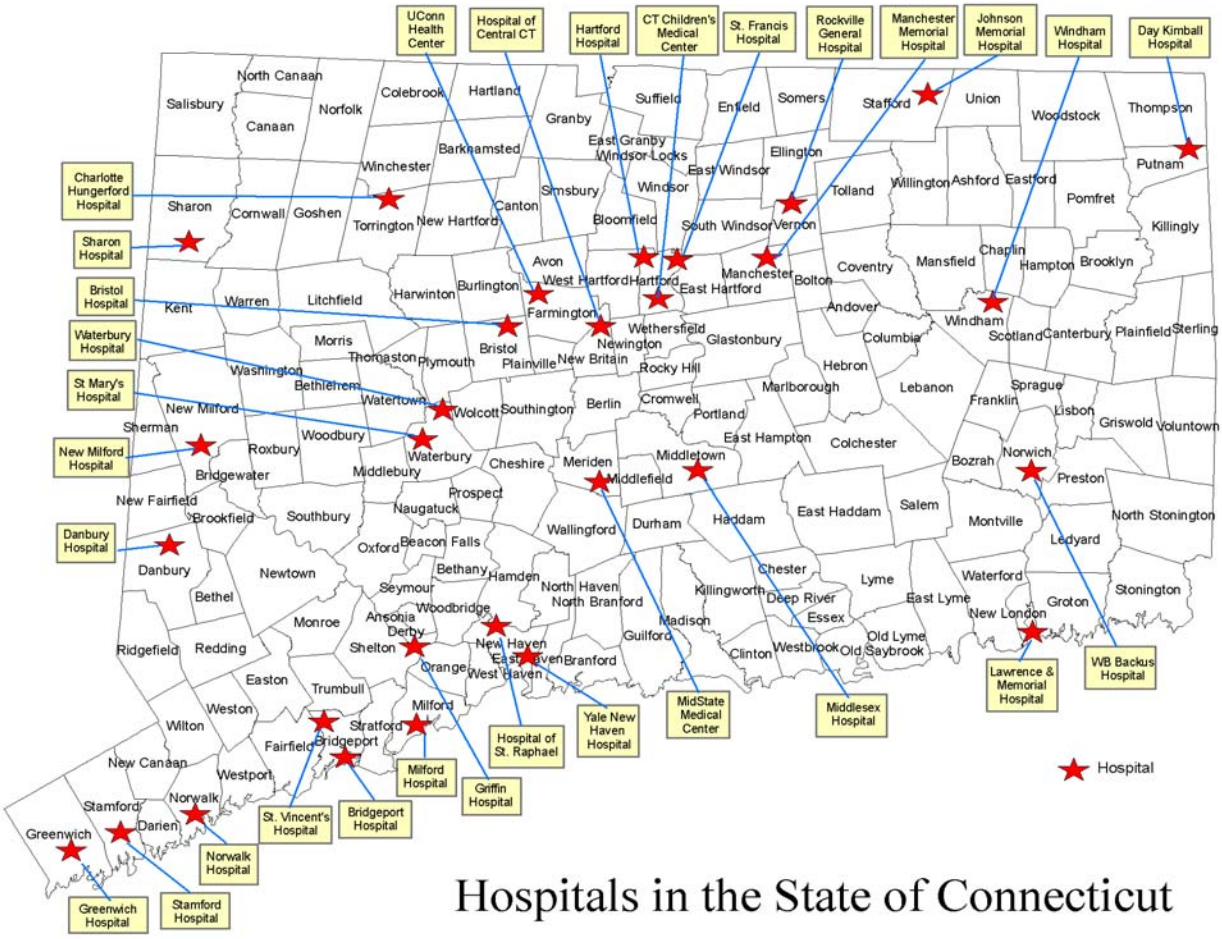
1. Joanne Chaplin, RNC, BBA, VP for Health Care, CT American Federation of Teachers, Rocky Hill, CT

Two Members from the public

1. Harry Mazadoorian, JD, Quinnipiac University, School of Law, Hamden, CT
2. Raymond S. Andrews, Trustee, The Donaghue Medical Research Foundation, West Hartford, CT

Total Membership: 11 members

Appendix F:
Connecticut Hospitals Reporting Healthcare Associated Infections



Hospital Name	Town
Bridgeport Hospital	Bridgeport
Bristol Hospital	Bristol
Charlotte Hungerford Hospital	Torrington
Connecticut Children's Medical Center	Hartford
Danbury Hospital	Danbury
Day Kimball Hospital	Putnam
Greenwich Hospital	Greenwich
Griffin Hospital	Derby
Hartford Hospital	Hartford
Hospital of Central Connecticut	New Britain
Hospital of Saint Raphael	New Haven
Johnson Memorial Hospital	Stafford Springs
Lawrence and Memorial Hospital	New London
Manchester Memorial Hospital	Manchester
Middlesex Hospital	Middletown

Hospital Name	Town
Midstate Medical Center	Meriden
Milford Hospital	Milford
New Milford Hospital	New Milford
Norwalk Hospital	Norwalk
Rockville General Hospital	Rockville
Saint Francis Hospital and Medical Center	Hartford
Saint Mary's Hospital	Waterbury
Saint Vincent's Medical Center	Bridgeport
Sharon Hospital	Sharon
Stamford Hospital	Stamford
UCONN Health Center - John Dempsey Hospital	Farmington
Waterbury Hospital	Waterbury
William W. Backus Hospital	Norwich
Windham Community Memorial Hospital	Willimantic
Yale-New Haven Hospital	New Haven

Appendix G:
National Healthcare Safety Network (NHSN) Definitions of Central Line Associated Bloodstream Infections

The National Healthcare Safety Network (NHSN) Manual
Device-Associated Module

Methodology

This module requires active, patient-based, prospective surveillance of device-associated infections and their corresponding denominator data by a trained infection control professional (ICP). This means that the ICP shall seek out infections during a patient's stay by screening a variety of data sources, such as laboratory, pharmacy, admission/discharge/transfer, radiology/imaging, and pathology databases, and patient charts, including history and physical exam notes, nurses/physicians notes, temperature charts, etc. Others may be trained to screen data sources for these infections, but the ICP must make the final determination. Laboratory-based surveillance should not be used alone, unless all possible criteria for identifying an infection are solely determined by laboratory evidence. Retrospective chart reviews should be used only when patients are discharged before all information can be gathered. Use NHSN forms to collect all required data, using the definitions of each data field. To minimize the ICP's data collection burden, others may be trained to collect the denominator data. These data should be collected at the same time each day. When denominator data are available from electronic databases (e.g., ventilator days from respiratory therapy), these sources may be used as long as the counts are not substantially different (+/- 5%) from manually collected counts.

Central Line-Associated Bloodstream Infection (CLABSI) Event

Introduction: An estimated 200,000 CLABSIs occur in U.S. hospitals each year. Specifically, these are primary bloodstream infections that are associated with the presence of a central line or an umbilical catheter in neonates at the time of or before the onset of the infection. Primary bloodstream infections are usually serious infections that typically caused a prolongation of hospital stay and increased cost and risk of mortality.
CLABSI can be prevented through proper management of the central line. These techniques are addressed in the CDC's Healthcare Infection Control Practices Advisory Committee (CDC/HICPAC) Guidelines for the Prevention of Intravascular Catheter-Related Infections.

Settings:** Surveillance will occur in any of four types of inpatient locations: (1) intensive care units (ICU), (2) specialty care areas (includes hematology/oncology wards, bone marrow transplant units, solid organ transplant units, inpatient dialysis units, long term acute care areas, (3) neonatal intensive care units (NICU), and (4) any other inpatient location in the institution where denominator data can be collected (e.g., surgical or medical wards).
NOTE: It is not required to monitor for CLABSIs after the patient is discharged from the facility, however, if discovered, they should be reported to NHSN. No additional catheter days are reported.

Requirements: Surveillance for CLABSI in at least one inpatient location in the healthcare institution for at least one calendar month as indicated in the *Patient Safety Monthly Reporting Plan* (CDC 57.75A).

** CT requires reporting of CLABSI from a Medical or Medical-Surgical ICU setting.

Central Line-Associated Bloodstream Infection (CLABSI) Event (continued)

Definitions: Central Line-Associated Bloodstream Infection (CLABSI) is a primary bloodstream infection (BSI) in a patient that had a central line *within* the 48-hour period before the development of the BSI.

If the BSI develops in a patient within 48 hours of discharge from a location, indicate the discharging location on the infection report.

Primary bloodstream infections are classified according to the criteria used, either as laboratory-confirmed bloodstream infection (LCBI) or clinical sepsis (CSEP). CSEP may be used to report only a primary BSI in neonates (≤ 30 days old) and infants (≤ 1 year old).

- Report BSIs that are central line-associated (i.e., a central line or umbilical catheter was in place at the time of, or within 48 hours before, onset of the event.
  - ❖ NOTE: There is no minimum period of time that the central line must be in place in order for the BSI to be considered central line-associated.

- Location of attribution: The location where the patient was assigned on the date the BSI was identified.

  - ➢ Example: Patient has a central line inserted in the Emergency Department and then is admitted to the MICU. Within 24 hours of admission to the MICU, patient meets criteria for BSI. This is reported to NHSN as a CLABSI for the MICU, because the Emergency Department is not an inpatient location and no denominator data are collected there.

  - ➢ Example: Patient on the urology ward of Hospital A had the central line removed and is discharged home a few hours later. The ICP from Hospital B calls the next day to report that this patient has been admitted to Hospital B with a BSI. This CLABSI should be reported to NHSN for Hospital A and attributed to the urology ward. No additional catheter days are reported.

  - ➢ EXCEPTION: If a CLABSI develops within 48 hours of transfer from one inpatient location to another in the same facility, the infection is attributed to the transferring location. This is called the **Transfer Rule**.
    - ❖ Example: Patient with a central line in place in the SICU is transferred to the surgical ward. Thirty six (36) hours later, the patient meets the criteria for BSI. This is reported to NHSN as a CLABSI for the SICU.
    - ❖ Example: Patient is transferred to the medical ward from the MSICU after having the central line removed. Within 24 hours, patient meets criteria for a BSI. This is reported to NHSN as a CLABSI for the MSICU.
    - ❖ Example: Patient with a central line in place is transferred from the medical ward to the coronary care ICU (CCU). After 4 days in the CCU, the patient meets the criteria for a BSI. This is reported to NHSN as a CLABSI for the CCU.

Central Line-Associated Bloodstream Infection (CLABSI) Event (continued)

- Central line: An intravascular catheter that terminates at or close to the heart or in one of the great vessels which is used for infusion, withdrawal of blood, or hemodynamic monitoring. The following are considered
  great vessels for the purpose of reporting central-line infections and counting central-line days in the NHSN system:
  - Aorta
  - Pulmonary artery
  - Superior vena cava
  - Inferior vena cava
  - Subclavian veins.
  - Brachiocephalic veins
  - Internal jugular veins
  - External iliac veins
  - Common femoral veins

    - **NOTE**: An introducer is considered an intravascular catheter
    - **NOTE:** In neonates, the umbilical artery/vein is considered a great vessel.
    - **NOTE**: Neither [the location of] the insertion site nor the type of device may be used to determine if a line qualifies as a central line. The device must terminate in one of these vessels or in or near the heart to qualify as a central line.
    - **NOTE:** Pacemaker wires and other nonlumened devices inserted into central blood vessels or the heart are not considered central lines, because fluids are not infused, pushed, nor withdrawn through such devices.

- Infusion: The introduction of a solution through a blood vessel via a catheter lumen. This may include continuous infusions such as nutritional fluids or medications, or it may include intermittent infusions such as flushes or IV antimicrobial administration, or blood, in the case of transfusion or hemodialysis.
- Umbilical Catheter: A central vascular device inserted through the umbilical artery or vein in a neonate
- Temporary Central Line: Non-tunneled catheter
- Permanent Central Line: Includes
  - Tunneled catheters, including certain dialysis catheters
  - Implanted catheters (including ports)
- Location of attribution: The patient care area where the event became evident

Definitions:

Laboratory-confirmed bloodstream infection (LCBI): Any Patient
Criterion 1
Patient has a recognized pathogen cultured from one or more blood culture
and
organism cultured from blood is not related to an infection at another site.

Or

Central Line-Associated Bloodstream Infection (CLABSI) Event (continued)

Laboratory-confirmed bloodstream infection (LCBI): Any Patient
Criterion 2
Patient has at least one of the following signs and symptoms:
Fever (>38°C), chills, or hypotension
and
signs and symptoms and positive laboratory results are not related to an infection at another site
and
at least one of the following:

- Common skin contaminant (i.e., diptheriods (*Cornebacterium spp*.), *Bacillus (not B. anthracis)* spp., *Propionibacterium spp*., coagulase-negative staphylococci (including S. epidermidis), viridans group streptococci, Aerococcus spp., Micrococcus spp.) is cultured from two or more blood cultures drawn on separate occasions

Or

Laboratory-confirmed bloodstream infection (LCBI): Neonates/Infants
Criterion 3
Patient ≤ 1 year of age has at least one of the following signs or symptoms:
fever (>38°C, rectal), hypothermia (<37°C, rectal), apnea, or bradycardia
and
signs and symptoms and positive laboratory results are not related to an infection at another site
and
at least one of the following:

- Common skin contaminant (i.e., diptheriods (*Cornebacterium spp*.), *Bacillus (not B. anthracis)* spp., *Propionibacterium spp*., coagulase-negative staphylococci (including S. epidermidis), viridans group streptococci, Aerococcus spp., Micrococcus spp.) is cultured from two or more blood cultures drawn on separate occasions

---

Note:
1) In Criterion 1, the phrase "one or more blood cultures" means that at least 1 bottle from a blood draw is reported by the laboratory as having grown organisms (i.e., is a positive blood culture).
2) In Criterion 1, the term "recognized pathogen" does not include organisms considered common skin contaminants (see Criterion 2 & 3 for a list of common skin contaminants. A few of the recognized pathogens are *S. aureus*, *Enterococcus* spp., *E. coli*, *Pseudomonas* spp., *Klebsiella* spp., *Candida* spp., etc.,
3) In Criterion 2 & 3, the phrase "two or more blood cultures drawn on separate occasions" means 1). that blood from at least two blood draws were collected within two days of each other (e.g., blood draws on Monday and Tuesday or Monday and Wednesday would be acceptable for blood cultures drawn on separate occasions, but blood draws on Monday and Thursday would be too far apart in time to meet this criterion), and 2). that at least one bottle from each blood draw is reported by the laboratory as having grown the same common skin contaminant organism (i.e., is a positive blood culture). (See Note 4 for determining sameness of organisms)
    a. For example, an adult patient has blood drawn at 8 a.m. and again at 8:15 a.m. of the same day. Blood from each blood draw is inoculated into two bottles and incubated (four bottles total). If one bottle from each blood draw set is positive for coagulase-negative staphylococci, this part of the criterion is met.
    b. For example, a neonate has blood drawn for culture on Tuesday and again on Saturday and both grow the same common skin contaminant. Because the time between these blood cultures exceeds the two-day period for blood draws stipulated in criteria 2 and 3, this part of the criteria is not met.

c. A blood culture may consist of a single bottle for a pediatric blood draw due to volume constraints. Therefore, to meet this part of the criterion, each bottle from two or more draws would have to be culture-positive for the same skin contaminant.

4) There are several issues to consider when determining sameness of organisms.
   a. If the common skin contaminant is identified to the species level from one culture, and a companion culture is identified with only a descriptive name (i.e., to the genus level), then it is assumed that the organisms are the same. The speciated organism should be reported as the infecting pathogen (see examples in Table 1).

Table 1. Example of "sameness" of organism speciation

Culture	Companion culture	Report as…
S. epidermidis	Coagulase-negative staphylococci	*S. epidermidis*
Bacillus spp. (not anthracis)	*B. cereus*	*B. cereus*
S. salivarius	Strep viridans	*S. salivarius*

   b. If common skin contaminant organisms from the cultures are speciated but no antibiograms are done or they are done for only one of the isolates, it is assumed that the organisms are the same.
   c. If the common skin contaminants from the cultures have antibiograms that are different for two or more antimicrobial agents, it is assumed that the organisms are not the same (see Table 2).

Table 2. Example of "sameness" of organism antibiogram

Organism Name	Isolate A	Isolate B	Interpret as…
S. epidermidis	All drugs S	All drugs S	Same
S. epidermidis	OX R CEFAZ R	OX S CEFAZ S	Different
Corynebacterium spp.	PENG R CIPRO S	PENG S CIPRO R	Different
Strep viridans	All drugs S	All drugs S except ERYTH (R)	Same

   d. For the purpose of NHSN antibiogram reporting, the category interpretation of intermediate (I) should not be used to distinguish whether two organisms are different.

5. For patients ≤ 1 year of age, the following temperature equivalents for fever and hypothermia may be used:
   Fever: 38°C rectal/tympanic/temporal artery = 37°C oral = 36°C axillary
   Hypothermia: 37°C rectal/tympanic/temporal artery = 36°C oral = 35°C axillary.

Specimen Collection Considerations

Ideally, blood specimens for culture should be obtained from two to four blood draws from separate venipuncture sites (e.g., right and left antecubital veins), not through a vascular catheter. These blood draws should be performed simultaneously or over a short period of time (i.e., within a few hours).[1,2] If your facility does not currently obtain specimens using this technique, you may still report BSIs using the criteria and notes above, but you should work with appropriate personnel to facilitate better specimen collection practices for blood cultures.

Reporting Instructions

- Purulent phlebitis confirmed with a positive semiquantitative culture of a catheter tip, but with either negative or no blood culture is considered a CVS-VASC, not a BSI.
- Report organisms cultured from blood as BSI – LCBI when no other site of infection is evident.

[1] Clinical and Laboratory Standards Institute (CLSI). *Principles and Procedures for Blood Cultures; Approved Guideline*. CLSI document M47-A (ISBN 1-56238-641-7). Clinical and Laboratory Standards Institute, 940 West Valley Road, Suite 1400, Wayne, Pennsylvania 19087-1898 USA, 2007.

[2] Baron EJ, Weinstein MP, Dunne WM Jr., Yagupsky P, Welch DF, Wilson DM. Blood Cultures IV. Washington, DC: ASM Press; 2005.

Last Updated June 2008

Appendix H:
Conferring Rights to NHSN Data Variables to CT DPH

Instructions to Facilities for Conferring Rights to Certain National Healthcare Safety Network (NHSN) Data Variables to the Connecticut Department of Public Health (Ct-DPH) Healthcare Associated Infections Group

Purpose

The purpose of these "Conferring Rights to DPH" instructions to allow the Connecticut Department of Public Health (DPH) access the data that each facility has been required to report pursuant to Public Act 06-142, and the recommendations in the April 1, 2007 report of the Advisory Committee on Healthcare Associated Infections that as established by the legislation. The Advisory Committee recommended that Connecticut should use the reporting system established by the CDC's National Healthcare Safety Network (NHSN), and that Connecticut should begin by reporting Central Line-associated blood stream infections (CLABSIs) in patients in intensive care units.

Introduction

DPH has established an NHSN "Group" for Healthcare Associated Infection (HAI) reporting. To submit data to DPH, you will need to join DPH's group and specify the data that will be shared with the group.

NB: The data your facility confers to the group is only accessible to you and the Connecticut-DPH HAI program staff. No other group members have access to the data. You are at liberty to join other groups, but DPH can only receive your data if you join DPH's group and confer rights to that data.

To Enroll your Facility into the Connecticut Group

Step 1: Log on to NHSN and access the NHSN Landing Page.

Select your facility from the appropriately named "Select facility/group from dropdown list" box.

Select the "Patient Safety" component.

Click "Submit"

Step 2: Join the Group

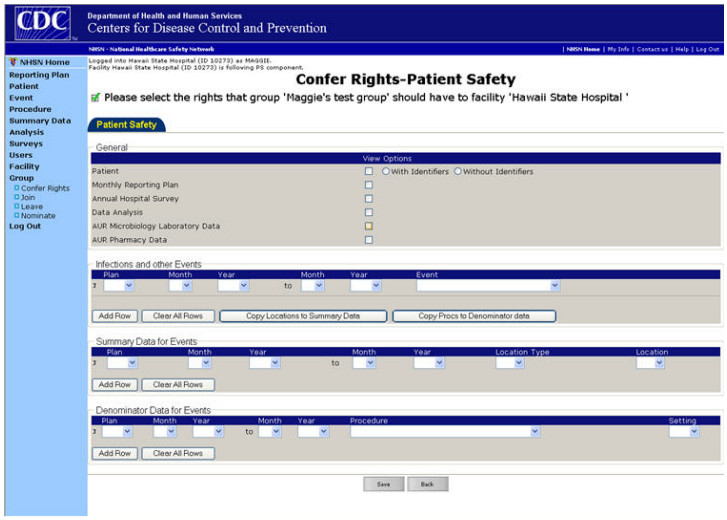
The next page that appears is the NHSN Homepage. You will see a light blue navigation bar to the left side of this screen. Click on "Group" on the navigation bar, and select "Join". The Memberships screen will appear.

In the "Enter ID and Password for this facility to join a new group" box, you will be prompted to enter the Group ID, which is "Ct-DPH" and give the "Group Joining Password" to access the group. The Group Joining Password is: **Nutmeggers!**
NB: The exclamation point is part of the password.

Click the "Join Group" button, and the group will now appear in the "Groups that have access to this facility's data" box.

Step 3: Confer Rights to the Group

In the "Groups that have access to this facility's data" box, select the "Ct-DPH" group that will now appear there, and then click the gray "Confer Rights" button on the right side of the screen. A dialog box filled with sage advice will appear. Click "Okay." The Confer Rights-Patient Safety screen will then appear.



You will need to assign rights in the following sub-sections of this screen:

1. General Rights, click on the following boxes:

- "Patient" and the radio button "with identifiers"
- "Data analysis"

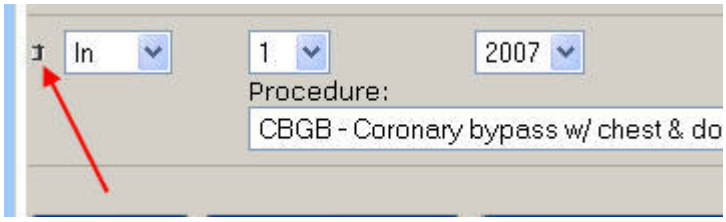
Leave the other boxes in this section blank.

2. Infections and other Events

Data in this section is entered in rows. Each row includes the following variables: plan category, time period, and event. Events include the kind of event and location.

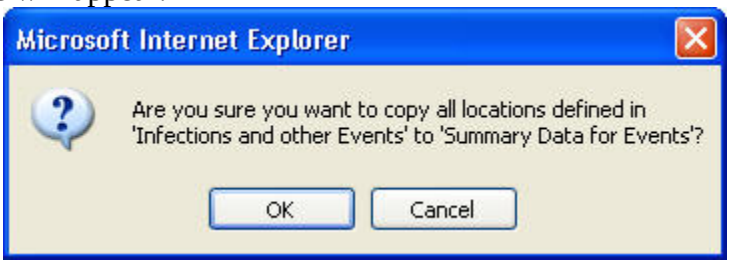
- Plan: click on the dropdown and choose "In" plan
- Time period:
  - Beginning of period:
    - Month: enter 1 from the dropdown
    - Year: enter 2008
  - End of period:
    - Month: leave blank
    - Year: leave blank (if you leave the end time blank, you will confer rights to data right up to the present)
- Event:
  - BSI – Click on "Bloodstream Infection (CLA)" from the dropdown list, this will make the "Location type" and "Location" boxes appear
- Location
  - Location Type: chose "CC" from the dropdown list
  - Location: click on the specific ICU location name that you will be reporting on from the dropdown list (during facility NHSN registration and data entry you will have already added this specific location name using the convention: code based on the name you give the unit – Centers for Disease Control code for that kind of unit)
  - In general, you will be conferring rights to only one location; however, if you are rotating surveillance among more than one ICU, you will need to confer rights to the additional locations: click "Add Row" and repeat the Infections and Other Events "Plan category"/"Time period"/"Event" steps

If for any reason you would like to remove a row, click on the trashcan at the beginning of the row:



3. Summary Data for Events

To transfer this information from "Infections and other Events" to the "Summary Data" section of the Confer Rights screen, click "Copy Locations to Summary data" button at the bottom of the "Infections and other Events" section, the following message will appear:



Click "OK". The plan, date and location rights will be copied in the "Summary Data" section of the "Confer Rights" screen

4. Denominator Data for Events

This section is left blank because you are only conferring rights to BSIs, and denominator data will be submitted automatically by following the instructions above. For other event types, SSIs for instance, you would fill out this section.

5. Finish

Click the "Save" button to confer rights. You have successfully conferred rights to the Ct-DPH Group.

Log out

You are now done and can click "log out" on the menu bar at the top of the screen to close the web page.

Appendix I:

Definition of an Infection Preventionist (IP)

A person whose primary training is in either nursing, medical technology/clinical laboratory scientist, microbiology, public health, or, epidemiology and who has acquired specialized training in infection control. Responsibilities may include collection, analysis, and feedback of infection data and trends to health care providers; consultation on infection risk assessment, prevention and control strategies; performance of education and training activities; implementation of evidence-based infection control practices or those mandated by regulatory and licensing agencies; application of epidemiologic principles to improve patient outcomes; participation in planning renovation and construction projects (e.g., to ensure appropriate containment of construction dust); evaluation of new products or procedures on patient outcomes; oversight of employee health services related to infection prevention; implementation of preparedness plans; communication within the health care setting, with local and state health departments, and with the community at large concerning infection control issues; and participation in research. Certification in infection control (CIC) is recommended, and is available through the Certification Board of Infection Control and Epidemiology (51).

Components of Infection Prevention and Control Program

Outbreak: Prevention and Management
- Case finding and early warning system
- Action Plan with Check List

Policy and Procedure Development

Surveillance
- Incidence of HAIs in Target areas
- Device Utilization
- Antibiotic Utilization
- Resistance Patterns
- Feedback to Staff

Staff Education, Training, and Information

Occupational Health and Safety
- Standard and additional precautions
- Staff Immunizations
- Staff screening and counseling

Monitor Cleaning, Disinfection and Sterilization

Monitor Housekeeping, Waste Disposal and Laundry

Advice on Hospital Construction and Purchases

Quality Management and Improvement

Appendix J:
Connecticut Healthcare Associated Infections (HAI)
Program Reporting Requirements - 2008

Central Line-Associated Primary Bloodstream Infections (CLA-BSI) in an Intensive Care Unit

1. **Types of hospitals to report:**
   Connecticut acute-care general medical and surgical hospitals, and pediatric hospitals.

2. **Reporting Requirements**
   a. **National Healthcare Safety Network**
      The Connecticut Advisory Committee on Healthcare Associated infections selected this reporting system to meet the requirements of the CT Act 06-142, "Act Concerning Hospital Acquired Infections". This is the Centers for Disease Control and Prevention (CDC) system for quality monitoring of hospital acquired infections.

      Hospitals must use the NHSN reporting procedures and follow the Patient Safety Protocols for identifying and reporting infections to CT Department of Health (DPH). Description of procedures, protocols, and definitions can be found in the NHSN Manual: Patient Safety Protocols
      http://www.cdc.gov/ncidod/dhqp/pdf/nhsn/NHSN_Manual_PatientSafetyProtocol_CURRENT.pdf

   b. **CT HAI Program Reporting Requirements:**
      1. CLABS infection surveillance will be performed monthly in one intensive care unit for each hospital as defined by the CDC NHSN system for the following "Locations":
         - Adult Medical Intensive Care
         - Adult Medical/Surgical Intensive Care
         - Pediatric Medical Intensive Care
         - Pediatric Medical/Surgical Intensive Care

         Not every hospital will have different types of intensive care units. Hospitals decide which type of ICU they have by measuring the type of patients that are cared for in that area and applying what is called the *80% Rule*. For instance, the medical ICU serves non-surgical patients, so if a facility finds that 80 percent of their critical care patients are non-surgical, that facility would have a medical ICU according to NHSN definitions.

2. Reporting to CT Department of Public Health (DPH)
   - The total number of central line days and the total number of CLABS infections for each hospitals ICU will be electronically submitted monthly to DPH using NHSN.
   - Reports must be submitted to DPH, via NHSN, within 30 days of the end of the reporting month per NHSN protocol.

3. Optional Tools to Collect Data
   The following forms were developed by NHSN to capture CLABSI related information and may be used to collect the required data:
   - Patient Data Form (CDC 57.75C)
   - Primary Bloodstream Infection (BSI) Form (CDC 57.75D)
   - Denominators for Intensive Care Unit (ICU)/Other Locations (not NICU or SCA) Form (CDC 57.75L)

   These forms can be found at:
   http://www.cdc.gov/ncidod/dhqp/nhsn_PSforms.html

3. Surveillance Methodology

This element requires active, patient-based, prospective surveillance of device-associated infections and their corresponding denominator data by a trained infection control professional (ICP). This means that the ICP shall seek out infections during a patient's stay by screening a variety of data sources, such as laboratory, pharmacy, admission/discharge/transfer, radiology/imaging, and pathology databases, and patient charts, including history and physical exam notes, nurses/physicians notes, temperature charts, etc. Others may be trained to screen data sources for these infections, but the ICP must make the final determination. Laboratory-based surveillance should not be used alone, unless all possible criteria for identifying an infection are solely determined by laboratory evidence. Retrospective chart reviews should be used only when patients are discharged before all information can be gathered. To minimize the ICP's data collection burden, others may be trained to collect the denominator data. These data should be collected at the same time each day (see definition for Central Line-Days).
NOTE: It is not required to monitor for CLAB infections after the patient is discharged from the facility, however, if discovered, they should be reported to NHSN.

4. Central Line Bloodstream Infections (CLABSI)

a. Central Line Associated Bloodstream Infection: Definition

A CLABSI is a primary bloodstream infection (BSI) in a patient that had a central line or umbilical catheter in place at the time of the onset of the event, or was in place within 48 hours before the onset of the event.
NOTE: There is no minimum period of time that the central line must be in place for the BSI to be considered central line-associated.

The Location of the Attribution of the CLABSI is the location where the patient was assigned on the date where the BSI was identified. For example:

- Example: Patient has a central line inserted in the Emergency Department and then is admitted to the MICU. Within 24 hours of admission to the MICU, patient meets criteria for BSI. This is reported to NHSN as a CLABSI for the MICU, because the Emergency Department is not an inpatient location and no denominator data are collected there.

- Example: Patient on the urology ward of Hospital A had the central line removed and is discharged home a few hours later. The ICP from Hospital B calls the next day to report that this patient has been admitted to Hospital B with a BSI. This CLABSI should be reported to NHSN for Hospital A and attributed to the urology ward. No additional catheter days are reported.

- EXCEPTION: If a CLABSI develops within 48 hours of transfer from one inpatient location to another in the same facility, the infection is attributed to the transferring location. This is called the **Transfer Rule**.

- Example: Patient with a central line in place in the SICU is transferred to the surgical ward. Thirty six (36) hours later, the patient meets the criteria for BSI. This is reported to NHSN as a CLABSI for the SICU.

- Example: Patient is transferred to the medical ward from the MSICU after having the central line removed. Within 24 hours, patient meets criteria for a BSI. This is reported to NHSN as a CLABSI for the MSICU.

- Example: Patient with a central line in place is transferred from the medical ward to the coronary care ICU (CCU). After 4 days in the CCU, the patient meets the criteria for a BSI. This is reported to NHSN as a CLABSI for the CCU.

b. Laboratory Confirmed Bloodstream Infection (LCBI) Reporting Criteria

LCBI criteria 1 and 2 may be used for patients of any age, including patients ≤ 1 year of age.
LCBI must meet one of the following three criteria:

Criterion 1*:* Patient has a recognized pathogen cultured from one or more blood cultures
and
organism cultured from blood is not related to an infection at another site (See Notes 1 and 2 below).

Criterion 2: Patient has at least one of the following signs or symptoms: fever (>38°C), chills, or hypotension
and
signs and symptoms and positive laboratory results are not related to infection at another site
and
common skin contaminant (e.g., diphtheroids [Corynebacterium spp.], *Bacillus* [not *B. anthracis]* spp., *Propionibacterium* spp., coagulase-negative staphylococci [including *S.epidermidis],* viridans group streptococci, *Aerococcus spp., Micrococcus spp*.) is cultured from two or more blood cultures drawn on separate occasions. (See Notes 3 and 4 below.)

Criterion 3: Patient < 1 year of age has at least one of the following signs or symptoms: fever (>38°C, rectal), hypothermia (<37°C, rectal), apnea, or bradycardia
and
signs and symptoms and positive laboratory results are not related to an infection at another site
and
common skin contaminant (e.g., diphtheroids [*Corynebacterium spp*.], *Bacillus* [not *B. anthracis]* spp., *Propionibacterium* spp., coagulase-negative staphylococci [including *S. epidermidis]*, veridans group streptococci, *Aerococcus spp., Micrococcus spp.)* is cultured from two or more blood cultures drawn on separate occasions. (See Notes 3, 4, and 5 below.)

Notes:

1. In criterion 1, the phrase ‘‘1 or more blood cultures’’ means that at least 1 bottle from a blood draw is reported by the laboratory as having grown organisms (ie, is a positive blood culture).

2. In criterion 1, the term ‘‘recognized pathogen’’ does not include organisms considered common skin contaminants (see criteria 2 and 3 for a list of common skin contaminants). A few of the recognized pathogens are S aureus, Enterococcus spp, E coli, Pseudomonas spp, Klebsiella spp, Candida spp, and others.

3. In criteria 2 and 3, the phrase ‘‘2 or more blood cultures drawn on separate occasions’’ means:
(1) that blood from at least 2 blood draws were collected within 2 days of each other (eg, blood draws on Monday and Tuesday or Monday and Wednesday would be acceptable for blood cultures drawn on separate occasions, but blood draws on Monday and Thursday would be too far apart in time to meet this criterion) and (2) that at least 1 bottle from each blood draw is reported by the laboratory as having grown the same common skin contaminant organism (i.e., is a positive blood culture). (See Note 4 for determining sameness of organisms.)

a. For example, an adult patient has blood drawn at 8 AM and again at 8:15 AM of the same day. Blood from each blood draw is inoculated into 2 bottles and incubated (4 bottles total). If 1 bottle from each blood draw set is positive for coagulase-negative staphylococci, this part of the criterion is met.
b. For example, a neonate has blood drawn for culture on Tuesday and again on Saturday, and both grow the same common skin contaminant. Because the time between these blood cultures exceeds the 2-day period for blood draws stipulated in criteria 2 and 3, this part of the criteria is not met.
c. A blood culture may consist of a single bottle for a pediatric blood draw because of volume constraints. Therefore, to meet this part of the criterion, each bottle from 2 or more draws would have to be culture positive for the same skin contaminant.

4. There are several issues to consider when determining sameness of organisms.

a. If the common skin contaminant is identified to the species level from 1 culture, and a companion culture is identified with only a descriptive name (i.e., to the genus level), then it is assumed that the organisms are the same. The speciated organism should be reported as the infecting pathogen (see examples in Table 2).
b. If common skin contaminant organisms from the cultures are speciated but no antibiograms are done or they are done for only 1 of the isolates, it is assumed that the organisms are the same.
c. If the common skin contaminants from the cultures have antibiograms that are different for 2 or more antimicrobial agents, it is assumed that the organisms are *not* the same (see examples in Table 3).
d. For the purpose of NHSN antibiogram reporting, the category interpretation of intermediate (I) should not be used to distinguish whether 2 organisms are the same.

Table 2. Examples of ''sameness'' by organism speciation

Culture	Companion Culture	Report as.
S epidermidis	Coagulase-negative staphylococci	S epidermidis
Bacillus spp (not anthracis)	B cereus	B cereus
S salivarius	Strep viridans	S salivarius

Table 3. Examples of ''sameness'' by organism antibiogram

Organism Name	Isolate A	Isolate B	Interpret as.
S epidermidis	All drugs **S**	All drugs **S**	**Same**
S epidermidis	OX **R** CEFAZ **R**	OX **S** CEFAZ **S**	**Different**
Corynebacterium spp	PEN G **R** CIPRO **S**	PEN G **S** CIPRO **S**	**Different**
Strep viridans	All drugs **S**	All drugs **S** Except ERYTH **R**	**Same**

c. Specimen collection considerations

Ideally, blood specimens for culture should be obtained from 2 to 4 blood draws from separate venipuncture sites (e.g., right and left antecubital veins), not through a vascular catheter. These blood draws should be performed simultaneously or

over a short period of time (ie, within a few hours). If your facility does not currently obtain specimens using this technique, you may still report BSIs using the criteria and notes above, but you should work with appropriate personnel to facilitate better specimen collection practices for blood cultures.

d. Reporting instructions

- Purulent phlebitis confirmed with a positive semi-quantitative culture of a catheter tip, but with either negative or no blood culture is considered a CVS-VASC, not a BSI.
- Report organisms cultured from blood as BSI–LCBI when no other site of infection is evident.

5. Intensive Care Unit: Definition

CDC NHSN defines an "*Intensive Care Unit"* as a nursing care area that provides intensive observation, diagnosis, and therapeutic procedures for adults and/or children who are critically ill. An ICU excludes nursing areas that provide step-down, intermediate care or telemetry only. Specialty care areas are also excluded. The type of ICU is determined by the kind of patients cared for in that unit. That is, if 80% of patients are of a certain type (e.g., patients with trauma), than that ICU is designated as that type of unit (in this case, trauma ICU). When a unit houses roughly equal populations of medical and surgical patients, it is called a medical/surgical unit.

Surveillance for infections will occur in only one of the four types of NHSN defined inpatient locations, i.e., Intensive care units (ICU). CDC NHSN defines an "Inpatient Location" as the patient care area to which a patient is assigned while receiving care in the healthcare facility.
NOTE: Only locations where patients are housed overnight (i.e., inpatient locations) and where denominator data are collected can be used when monitoring events in the Central Line Associated Bloodstream Infection (CLABSI) or also known as the Device-associated Module. This means that operating rooms (including cardiac cath labs, c-section rooms, and interventional radiology) and outpatient locations are not valid locations when monitoring events in the CLABSI or Device-associated Module Monthly Reporting Plan.

6. Protocol

The requirements for the CLABS infection surveillance component for ICUs are:

- All patients, in a medical, surgical, medical/surgical, or pediatric ICU that meets the definition of an ICU, are monitored for healthcare-associated CLABS infections.
- Numerator (number of infections) data and denominator (number of central line-days) data will be collected on ICUs being monitored.
- A separate monthly report form should be completed for each ICU surveyed during the month.

2. **Numerator Data**
    1. Infection criteria: see definitions for primary bloodstream infection (BSI), laboratory confirmed bloodstream infection (LCBI), and clinical sepsis (CSEP). Note: CSEP may be used only to report a primary BSI in neonates and infants.
    2. Report the number of laboratory-confirmed primary bloodstream infections (BSIs) beginning in intensive care unit patients while a central line (CL) is in place or within 48 hours after the CL was discontinued and within 48 hours after being transferred out of the intensive care unit.
    3. For CLABS infections, only inpatient locations where denominator data can be collected are eligible for monitoring (e.g. ICU, ward). Examples of locations not eligible: operating room, interventional radiology, emergency dept, etc.
    4. All patients are followed for CLAB infections for 48 hours after they are transferred from the ICU to a hospital ward.
    5. If a patient is transferred from the ICU at the end of a month and a CLABS infection related to the ICU stay becomes apparent within 48 hours, but in the next month, then the date of transfer is recorded as the infection date. Thus, the infection would be counted for the month that the patient was in the ICU population being monitored.
    6. The Primary Bloodstream Infection (BSI) Form (CDC 57.75D) is used to collect and report each CLABSI that is identified during the month selected for surveillance. The Primary BSI form includes patient demographic information on whether a central line was present, and, if so, the type of central line the patient had as appropriate to the location; these data will be used to calculate line specific infection rates. Additional data include the specific criteria met for identifying the primary BSI, whether the patient died, the organisms isolated from blood cultures, and the organisms' antimicrobial susceptibilities.

3. **Denominator Data**
    1. Adult and Pediatric ICU:
        a. For each day, at the same time each day, record the number of patients who have one or more central line(s). Some patients may have more than one line, however, for NHSN/DPH purposes, **count each patient with a central line once**, regardless of the number of central lines, and record the information on the Denominators for Intensive Care Unit (ICU)/Other Locations (Not NICU or Specialty Care Area (SCA) (CDC 57.75L).
        b. On the last day of the month, the total number of central line-days should be recorded on the monthly report form specific to the ICU (CDC# 57.75L: "Denominators for Intensive Care Unit (ICU)/Other Locations (Not NICU or Specialty Care Area (SCA".

7. Instructions for Completing The NHSN Forms

a. Adult and Pediatric ICU Denominator Form

The information on this form will provide you with the monthly central-line days needed to complete the monthly "CDC 57.75L Denominator Form".

1. Record the Facility ID#, the month and year for the data being collected.
2. Record the type of ICU being monitored.
3. For each day of the month record the number of patients with one or more central line(s) (count one line per patient).
4. Establish a routine so that you obtain a count of the number of patients with one or more central line(s) every day at the same time of day.
5. At the end of the month, sum the numbers to obtain the total number of central line-days.
6. Enter these totals into the NHSN (CDC# 57.75L: "Denominators for ICU" form)

8. Data Analysis

The CLABSI rate per 1000 central line days is calculated by dividing the number of CLABSI by the number of central-line days and multiplying the result by 1000. The Central Line Utilization Ratio is calculated by dividing the number of central-,line days by the number of patient days. These calculations will be performed separately for different types of ICUs.

Appendix K:

HAI Program Information for Hospital Visits – 2008
http://www.ct.gov/dph

1. **Healthcare Associated Infections Program Hospital Visit Schedule**
2. **Letter of Introduction from DPA HAI Program**
3. **DPH HAI Program Staff Contact Information**
4. **Public Act 06-142: An Act Concerning Hospital Acquired Infections (HAI)**
5. **HAI Program Background and Status Report**
6. **NHSN Manual: CLABSI Event Protocol**
7. **NHSN MANUAL: CLABSI Report Forms and Instructions**
8. **Draft of Instructions for "Conferring Rights" of NHSN CLABSI data to DPH**

Appendix L:

HAI Program Regional Trainings: July - August 2008
http://www.ct.gov/dph

1. **Healthcare Associated Infection (HAI) Reporting Program Training Registration**

2. **Healthcare Associated Infection (HAI) Reporting Program Training Agenda**

3. **Healthcare Associated Infection (HAI) Reporting Program Training Power Point Presentations**

   One. **CT HAI Infection Reporting Overview**
   Two. **CT HAI CLABSI Definitions and Protocols**
   Three. **CLABSI NHSN Data Collection and Data Entry**
   Four. **CLABSI CASE Studies**

VII. Key terms and Definitions

Acute Care Hospitals are all facilities designated as acute care by the Connecticut Department of Public Health.

Ambulatory surgery center (ASC) are typically freestanding health facility that can keep patients for up to 23 hours to perform surgical procedures.

Birthweight refers to the weight of the infant **at the time of birth** and should not be changed as the infant gains weight. For example, if a neonate weighs 1006 grams at birth but remains in the NICU for two months and has a body weight of 1650 grams when it develops a CLAB infection, the recorded birthweight should still be 1006 grams.

Case an instance of a particular disease, injury, or other health conditions that meets selected criteria.

CDC is the Centers for Disease Control and Prevention.

CDC Location (formerly labeled as "NHSN Location" is the CDC-defined designation given to a patient care area housing patients who have similar disease conditions or who are receiving care for similar medical or surgical specialties. Each facility location that is monitored is "mapped" to one CDC Location. The specific CDC Location code is determined by the type of patients cared for in that area according to the **80% Rule**. That is, if 80% of patients are of a certain type (e.g., pediatric patients with orthopedic problems) then that area is designated as that type of location (in this case, an Inpatient Pediatric Orthopedic Ward).

Central line a flexible tube that is inserted near the patient's heart or into one of the large veins or arteries. A central line provides access to a large vein that can be used to give fluids, measure the amount of fluid in the body or to give medication. The NHSN definition of a central line is an intravascular catheter that terminates at or close to the heart or in one of the great vessels which is used for infusion, withdrawal of blood, or hemodynamic monitoring. The following are considered great vessels for the purpose of reporting central line infections and counting central line-days in the NHSN system: aorta, pulmonary artery, superior vena cava, inferior vena cava, brachiocephalic veins, internal jugular veins, subclavian veins, external iliac veins, and common femoral veins.

- **Note**: An introducer is considered an intravascular catheter.
- **Note:** In neonates, the umbilical artery/vein is considered a great vessel.
- **Note:** Neither [the location of] the insertion site nor the type of device may be used to determine if a line qualifies as a central line. The device must terminate in one of these vessels or in or near the heart to qualify as a central line.
- **Note:** Pacemaker wires and other nonlumened devices inserted into central blood vessels or the heart are not considered central lines, because fluids are not infused, pushed, nor withdrawn through such devices.

- Umbilical Catheter: A central vascular device inserted through the umbilical artery or vein in a neonate
- Temporary Central Line: Non-tunneled catheter.
- Permanent Central Line: Includes Tunneled catheters, including certain dialysis catheters Implanted catheters (including ports)

Central line associated bloodstream infections (CLABSI) A CLABSI is a primary bloodstream infection (BSI) in a patient that had a central line or umbilical catheter in place at the time of the onset of the event, or was in place within 48 hours before the onset of the event.
NOTE: There is no minimum period of time that the central line must be in place for the BSI to be considered central line-associated.

Central line associated bloodstream (CLABSI) infection rate is defined as the number of CLABSI infections per 1000 central line-days.

Central Line Associated BSI rate per 1000 central line days =

$$\frac{\text{Number of central line associated infections}}{\textbf{Number of central line-days}} \times 1000$$

Example: If a hospital intensive care unit (ICU) had 5 infections and 100 central line-days, their rate would be calculated as follows:
5/100 = .05 infections per central line-days X 1000 = a rate of 50 central line infections per 1000 central line- days

Central line days is the total number of days a central line is in place for each patient in the intensive care unit (ICU). The count is performed each day, and each patient with a central line is counted as a central line-day. The count should be performed each day and at approximately the same time each day.

Central line utilization ratio is defined as the ratio of the number of central line-days (or the total number of days of exposure to the central line by all the patients in the selected population during the selected time period) divided by the number of patient days (or the total number of days that patients are in the location during the selected time period) during a specific surveillance period.

$$\textbf{Central Line Utilization Ratio} = \frac{\text{Number of central line days during a specified surveillance period}}{\textbf{Number of patient days during the same period}}$$

Community Associated Infection are infections that are acquired by persons who have not been recently hospitalized (within the past year) or had a medical procedure (such as dialysis, surgery, catheters).

CT DPH is the Connecticut Department of Public Health

Date of Infection see Infection Date

Definition is a set of uniformly applied criteria for determining whether a person should be identified as having a particular disease, injury, or other health condition. In

epidemiology, particularly for an outbreak investigation, a case definition specifies clinical criteria and details of time, place, and person.

Device Associated Infection is an infection in a patient with a device (e.g., ventilator or central line) that was used within the 48-hour period before onset of infection. If the interval is longer than 48 hours, there must be compelling evidence that the infection was associated with device use. For catheter-associated UTI, indwelling urinary catheter must have been in place within 7 days before positive laboratory results or signs and symptoms meeting criteria for UTI were evident. NOTE: There is no minimum period of time that the device must be in place in order for the infection to be considered device-associated.

Device Days is a count of the number of patients with a specific device in the patient care location. To calculate device days, for each day of the month, at the same time each day, record the number of patients who have the specific device (e.g., central line, ventilator, or indwelling urinary catheter).

Drug-resistant infections have become resistant to antibiotics commonly used to kill infections caused by resistant strains of bacteria. Usually, other antibiotics can be used to kill drug resistant infections.

Epidemiology is the study of populations to determine the frequency and distribution of disease and measure risks.

Event Contributed to is that the event either directly caused death or exacerbated an existing disease condition which then led to death.

Exposure having come into contact with a cause of, or possessing a characteristic that is a determinant of, a particular health problem.

Extrinsic risk is a risk that is not inherent in the patient. Some forms of treatment are considered extrinsic risk factors, such as the use of invasive devices (such as catheters) or surgical procedures.

HHS the federal Department of Health and Human Services.

Health a state of complete physical, mental, and social well-being and not merely the absence of disease or other infirmity.

Healthcare-Associated Infection (HAI) is a localized or systemic condition resulting from an adverse reaction to the presence of an infectious agent(s) or its toxin(s) that
a) occurs in a patient in a healthcare setting (e.g., a hospital or outpatient clinic),
b) was not found to be present or incubating at the time of admission unless the infection was related to a previous admission to the same setting, and
c) if the setting is a hospital, meets the criteria for a specific infection site as defined by CDC.

Heart bypass or coronary artery bypass graft (CABG, pronounced cabbage) is a surgery used to bypass blocked heart arteries by creating new passages for blood to flow to the heart muscle. Arteries or veins from other parts of the body are used as grafts.

Hip replacement is an elective procedure for people with severe hip damage or pain related to chronic osteoarthritis, rheumatoid arthritis or other degenerative processes involving the hip joint. The surgical procedure for a hip replacement involves removing the damaged cartilage and bone from the hip joint and replacing them with new, man-made parts.

Infant child less than one year old.

Infection invasion of the body tissues of a host by an infectious agent, whether or not it causes disease.

Infection Date (month/day/year): The date when the first clinical evidence of the healthcare associated infection appeared or the date the specimen used to make or confirm the diagnosis was collected, whichever comes first.

Infusion: The introduction of a solution through a blood vessel via a catheter lumen. This may include continuous infusions such as nutritional fluids or medications, or it may include intermittent infusions such as flushes or IV antimicrobial administration, or blood, in the case of transfusion or hemodialysis.

Intensive Care Unit: A nursing care area that provides intensive observation, diagnosis, and therapeutic procedures for adults and/or children who are critically ill. An ICU excludes nursing areas that provide step-down, intermediate care or telemetry only. Specialty care areas are also excluded. The type of ICU is determined by the kind of patients cared for by the unit. That is, if 80% of patients are of a certain type (e.g., patients with trauma), then that ICU is designated as that type of unit (in this case, trauma ICU). When a unit houses roughly equal populations of medical and surgical patients, it is called a medical/surgical unit.

Intravascular device is a device used to administer a solution into a vein, such as the familiar IV drip.

Knee replacement surgery (arthroplasty) is an elective procedure for people with severe knee damage and pain related to osteoarthritis, rheumatoid arthritis, and traumatic arthritis. A total knee replacement involves removing the damaged cartilage and bone from the surface of the knee joint and replacing them with a man-made surface of metal and plastic. A partial knee replacement involves replacing only part of the knee joint.

Location the specific patient care area to which a patient is assigned while receiving care in the healthcare facility.
NOTE: Only locations where patients are housed overnight (i.e., inpatient locations) and where denominator data are collected can be used when monitoring events in the Device-associated Module. This means that operating rooms (including cardiac cath labs, c-section rooms, and interventional radiology) and outpatient locations are not valid locations when monitoring events in the Device-associated Module Monthly Reporting Plan.

MRSA methicillin-resistant Staphylococcus aureus. Methicillin is an antibiotic drug commonly used to treat Staphylococcus (staph) infections. Some strains of staph are not killed by methicillin. If the staph infection is not killed by methicillin then it is called methicillin-resistant Staphylococcus aureus, or MRSA.

Metric a measurement for calculating health outcomes. There are both process metrics that measure adherence to standard health quality processes and outcome metrics that measure the number of patients affected by specific medical treatments.

Mortality means a fatal outcome or death.

Multiple Procedures are more than one NHSN operative procedure performed through the same incision during the same trip to the operating room.

NHSN or the National Healthcare Safety Network is a CDC developed web based health facility acquired infections reporting system.

Neonatal Intensive Care Unit (NICU): A patient care area that provides level III care to infants who are critically ill. Most NICU patients are under the care of a pediatrician who is a neonatologist, and the ratio of infants to nurses is low (e.g., 2:1). If the population of a NICU is a combination of patients requiring level II- and III-care and their distribution and placement is such that they cannot readily be separated for denominator data collection purposes, you may classify the entire unit as an NICU.

Neonate a patient who is an infant less than or up to 30 days of age (NHSN definitions).

NHSN inpatient is a patient whose date of admission to the healthcare facility and the date of discharge are different calendar days.

NHSN outpatient is a patient whose date of admission to the healthcare facility and the date of discharge are the same day.

NHSN patient days is a count of the number of patients in the patient care location. To calculate patient days, for each day of the month, at the same time each day, record the number of patients on the unit. At the end of the month, the sum of all days is recorded.

Nosocomial infection The term 'nosocomial' comes from two Greek words: 'nosus' meaning 'disease' + 'komeion' meaning 'to take care of'. Hence, nosocomial should apply to any disease contracted by a patient while under medical care. However, 'nosocomial' has been whittled down over the years and now just refers to hospitals – it is now synonymous with hospital-acquired and refers to any infection that occurs during or after hospitalization that was not present or incubating at the time of the patient's admission.

Operating room A patient care area that meets the American Institute of Architects AIA) criteria **(OR)** for an operating room. This may include an operating room, C-Section room, interventional radiology room or a cardiac catheterization lab.

Operation is a single trip to the operating room (OR) where a surgeon makes at least one incision through the skin or mucous membrane, including laparoscopic approach, and closes the incision before the patient leaves the OR.

Pathogen is an agent of disease –that is, a disease producer. The term pathogen is used most commonly to refer to infectious organisms. These include microorganisms such as bacteria, viruses and fungi.

Permanent Central Line is a central line that is tunneled, including certain dialysis catheters. Includes implantable catheters.

Point prevalence is the number of events or persons with a given disease or other attribute during a specified point in time.

Population is the total number of inhabitants of a geographic area or the total number of persons in a particular group (e.g., the number of persons engaged in a certain occupation).

Prevalence is the number of events (for example, instances of a given disease or other condition) in a given population at a designated time.

Procedure specific is related to a specific procedure. Procedure-specific infection rates for total hip replacements, for example, are only those infection rates that relate to total hip replacements

Prospective surveillance is the monitoring of patients for infection while they are still in hospital. This surveillance can also include post discharge surveillance, whereby patients are monitored for a set period once they leave hospital. See also retrospective surveillance

Rate an expression of the relative frequency with which an event occurs among a defined population per unit of time, calculated as the number of new cases or deaths during a specified period divided by either person-time or the average (midinterval)

population. In epidemiology, it is often used more casually to refer to proportions that are not truly rates (e.g., attack rate or case-fatality rate).

Retrospective surveillance is using chart reviews after the patient has been discharged from the hospital as the sole means of identifying infections.

Risk the probability that an event will occur (e.g., that a person will be affected by, or die from, an illness, injury, or other health condition within a specified time or age span)

Risk adjustment is a standardized method used to ensure that intrinsic and extrinsic risk factors for a hospital acquired infection are considered in the calculation of hospital acquired infection rates.

Risk factor an aspect of personal behavior or lifestyle, an environmental exposure, or a hereditary characteristic that is associated with an increase in the occurrence of a particular disease, injury, or other health condition.

Risk index is a means of stratifying patients according to their risk of infection. This then allows appropriate comparison of infection rates. See also risk adjustment.

Secondary Bloodstream infection (BSI) is a culture-confirmed BSI associated with a documented HAI at another site. If the primary infection is cultured, the Secondary BSI must yield culture of same organism and exhibit same antibiogram as the primary HAI site. For example, if blood culture is positive in a patient with a nosocomial UTI and organisms and antibiograms of both blood and urine specimens are identical, infection is reported as UTI with secondary BSI. Secondary BSI is not reported separately. If, on the other hand, an organ/space SSI is identified by CT scan and no culture is used to meet the criteria for SSI-GIT, and a blood culture grows *Bacteroides fragilis,* then the SSI-GIT is recorded as an SSI with a secondary BSI. The pathogen for the SSI is recorded as *Bacteroides fragilis.*

Specialty Care Area (SCA) is a Hospital location which includes one of the types below:
Bone marrow transplant
Solid organ transplant
Inpatient acute dialysis
Hematology/oncology
Long term acute care

Standardization is a set of techniques used to remove, as far as possible, the effects of differences in age or other confounding variables when comparing two or more populations.

Surgical Site Infections (SSI) are infections that are directly related to an operative procedure. Some SSIs are minor and only involve the skin or subcutaneous tissue. Other SSIs may be deeper and more serious.

Surveillance is the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health.

Surveillance Cultures are those cultures reported as part of infection control surveillance such as stool cultures for vancomycin-resistant enterococci (VRE).

Symptom any indication of disease noticed or felt by a patient.

Temporary Central Line is a central line that is not tunneled.

Transfer Rule is if a device-associated infection develops within 48 hours of transfer from one inpatient location (location A) to another in the same facility (location B) the infection is attributed to the transferring location (location A).

Trend movement or change in frequency over time, usually upwards or downwards**.**

Umbilical Catheter: A central vascular device inserted through the umbilical artery or vein in a neonate. The catheter is a long, soft plastic tube that is placed in the umbilical cord either through the umbilical artery or umbilical vein to allow fluids and medications to be given over an extended period of time.

Validity the degree to which a measurement, questionnaire, test, or study or any other data collection tool measures what it is intended to measure.

Ventilator is a device to assist or control respiration continuously through a tracheostomy or by endotracheal intubation.
NOTE: Lung expansion devices such as intermittent positive pressure breathing (IPPB); nasal positive end-expiratory pressure (PEEP); continuous nasal positive airway pressure (CPAP, hypoCPAP) are not considered ventilators unless delivered via tracheostomy or endotracheal intubation (e.g., ET-CPAP).

Ventilator- associated Pneumonia (VAP) is a pneumonia (PNEU) that occurs in a patient who was intubated and ventilated at the time of or within 48 hours before the onset of the pneumonia. If the PNEU develops in a patient within 48 hours of discharge from a location, the VAP is associated with the discharging location, not the current location.
NOTE:
There is no minimum period of time that the ventilator must be in place in order for the PNEU to be considered ventilator-associated.

Wound Class An assessment of the degree of contamination of a surgical wound at the time of the operation. The wound class system used in NHSN is an adaptation of the American College of Surgeons wound classification schema. Wounds are divided into four classes:

- **Clean**: An uninfected operative wound in which no inflammation is encountered and the respiratory, alimentary, genital, or uninfected urinary tracts are not entered. In addition, clean wounds are primarily closed and, if necessary, drained with closed drainage. Operative incisional wounds that follow nonpenetrating (blunt) trauma should be included in this category if they meet the criteria.
- **Clean-Contaminated**: Operative wounds in which the respiratory, alimentary, genital, or urinary tracts are entered under controlled conditions and without unusual contamination. Specifically, operations involving the biliary tract, appendix, vagina, and oropharynx are included in this category, provided no evidence of infection or major break in technique is encountered.
- **Contaminated**: Open, fresh, accidental wounds. In addition, operations with major breaks in sterile technique (e.g., open cardiac massage) or gross spillage from the gastrointestinal tract, and incisions in which acute, nonpurulent inflammation is encountered are included in this category.
- **Dirty or Infected**: Includes old traumatic wounds with retained devitalized tissue and those that involve existing clinical infection or perforated viscera. This definition suggests that the organisms causing postoperative infection were present in the operative field before the operation.

VIII. References

1. Klevens RM, Edwards JR, et al. Estimating health care-associated infections and deaths in U.S. hospitals, 2002. *Public Health Reports* 2007 March-Apr; 122(2): 160-6.

2. McKibben L, Horan TC, Tokars JI, et al. Guidance on public reporting of healthcare-associated infections: recommendations of the Healthcare Infection Control Practices Advisory Committee. *Infect Control Hosp Epidemiol* 2005; 26: 580-7.

3. Weinstein RA. Nosocomial infection update. *Emerging Infectious Disease* 1998; 4: 416-420.

4. Terrie YC. Nosocomial Infections: Impact on Patient Care. *Pharmacy Times* March 2006. www.pharmacytimes.com/issues/articles/2006-03_3202.asp

5. Jarvis WR. Infection control and changing health-care delivery systems. *Emerging Infectious Disease* 2001; 7: 170-3.

6. Haley RW, Culver DH, White J, et al.The nationwide nosocomial infection rate: a new need for vital statistics. *Am J Epidemiol* 1985;121:159-167.

7. National Nosocomial Infections Surveillance (NNIS) report, data summary from October 1986 – April 1996, issued May 1996; a report from the National Nosocomial Infections Surveillance (NNIS) system. *Am J Infect Control* 1996; 24: 380-8.

8. Eggimann P, Pittet D. Infection Control in the ICU. *Chest* 2001; 120: 2059-93.

9. National Nosocomial Infections Surveillance (NNIS) System Report, data summary from January 1990—May 1999. Issued June 1999. *Am J Infect Control* 1999;27:520-532.

10. O'Grady NP. Alexander M, Dellinger EP, et al. Guidelines for the prevention of intravascular catheter-related infections. Centers for Disease Control and Prevention. MMWR 2002; 51 (No. RR-10): 1-29.

11. RaadII, Hihn DC, Gilbreath BJ, Suleiman N, et al. Prevention of central venous catheter-related infections by using maximal sterile barrier precautions during insertion. *Infect Control Hosp Epidemiol* 1994; 15: 231-8.

12. Chaiyakunapruk N, Veenstra DL, Lipsky BA, Saint S. Chlorhexidine compared with povidone-iodine solution for vascular catheter-site care: a meta-analysis. *Ann Intern Med* 2002; 136:792-801.

13. Centers for Disease Control and Prevention. Updated guidelines for evaluating public health surveillance systems. *MMWR* 2001; 50 (No. RR-13): 1-35.

14. Emori TG, Edwards JR, Culver DH, et al. Accuracy of reporting nosocomial infections in intensive-care unit patients to the National Nosocomial Infections Surveillance System: a pilot study [Erratum in *Infection Control Hosp Epidemiol* 1998; 19:497]. *Infect Control Hosp Epidemiol* 1998; 19: 308-16.

15. Werner RM, Asch DA. The unintended consequences of publicly reporting quality information. *JAMA* 2005:293;1239-1244.

16. Help Congress stop MRSA! Consumers Union: StopHospitalInfections.org campaign, http://www.consumersunion.org/campaigns/Congressional%20Legislation%20110th%201-08.pdf

17. Community and Healthcare-Associated Infections Reduction Act of 2007, S2278, 110th Cong (2007) http://www.fda.gov/oc/initiatives/fdaaa/PL110-85.pdf

18. Wright D. The Department of Health and Human Services Role in Reducing Rates of Healthcare-associated infections and Facilitating Quality Improvement Research. Testimony before the House Committee on Oversight and Government Reform. April 16, 2008. http://www.hhs.gov/asl/testify/2008/04/t20080416a.html

19. Medicare program; changes to the hospital inpatient prospective payment systems and fiscal year 2008 rates. Final rule. 42 CFR [section] 411,412,413,489. http://www.regulations.gov

20. Medicare program; changes to the hospital inpatient prospective payment systems and fiscal year 2009 rates. Final rule. http://www.regulations.gov

21. Hospital Quality Initiatives. Centers for Medicare & Medicaid Services. http://cms.hhs.gov/HospitalQualityInits

22. National Quality Forum (NQF), National Voluntary Consensus Standards for the Reporting of Healthcare-Associated Infection Data, Washington, DC: NQF. 2008

23. Muto, C, Herbert C, Harrison E, et al. Reduction in Central Line-Associated Bloodstream Infections Among Patients in Intensive Care Units – Pennsylvania, April 2001 – March 2005. MMWR 2005/ 54(40);1013-1016.

24. Institute for Healthcare Improvement: Prevent Central Line-Associated Bloodstream Infections. 2008. http://www.ihi.org/IHI/Programs/Campaign/CentralLineInfection.htm

25. American Hospital Association: Prevention and control of *Staphylococcus* infections in hospitals, in US Public Health Service – Communicable Disease Center and National Academy of Sciences-National Research Council. *Proceedings of the National Conference on Hospital-Acquired Staphylococcal Disease*. Atlanta, GA. Communicable Disease Center; 1958:XXIII-XXVI.

26. Garner JS, Bennett JV, Scheckler WE, Maki DG, Brachman PS. Surveillance of nosocomial infections, in Centers for Disease Control. *Proceedings of the International Conference on Nosocomial Infections*. Atlanta, GA: Centers for Disease Control; 1970:277-281.

27. Joint Commission on Accreditation of Health Care Organizations. 1997. *Comprehensive Accreditation Manual for Hospitals*. Oakbrook Terrace, IL: Joint Commission on Accreditation of Health Care Organizations; 1997.

28. Haley RW, Culver DH, White J, et al. The efficacy of infection surveillance and control programs in preventing nosocomial infections in US hospitals? *Am J Epidemio*l 1985; 121:182- 205.

29. Haley RW, Morgan WE, Culver DH, et al. Update from the SENIC project. Hospital infection control: recent progress and opportunities under prospective payment. *Am J Infect Control* 1985;13: 97-108.

30. Wenzel RP. The economics of nosocomial infections. *J Hosp Infect* 1995; 31:79-87.

31. Farr BM. Organization of infection control programs. In: Abrutyn E, ed. *Saunders Infection Control Reference Service*. Philadelphia, PA. WM Saunders Co. 1997:13 – 15.

32. Stamm WE. Elements of an active, effective infection control program. *Hospitals.* 1976 Dec 1; 50 (23): 60, 62, 64.

33. Rello J, Ochagavia A, Sabanes E, et al. Evaluation of outcome of intravenous catheter-related infections in critically ill patients. *Am J Respir Crit Care Med* 2000;162:1027--30.

34. Dimick JB, Pelz RK, Consunji R, Swoboda SM, Hendrix CW, Lipsett PA. Increased resource use associated with catheter-related bloodstream infection in the surgical intensive care unit. *Arch Surg* 2001;136:229--34.

35. Mermel LA. Prevention of catheter related infections. *Ann Intern Med* 2000:132:391-401 {Erratum, *Ann Intern Med* 2000;133:395.]

36. Richards MJ, Edwards JR, Culver DH, Gaynes RP. Nosocomial infections in combined medical-surgical intensive care units in the United States. *Infect Control Hosp Epidemiol.* 2000;21:510-515.

37. Pronovost P, Needham D, Berenholtz S, Sinopoli D, et al. An Intervention to Decrease Catheter-Related Bloodstream Infections in the ICU. *N Engl J Med*: 355(26): 2725-2732.

38. Burton D, Edwards J, HoranT, Fridkin S. Trends in Central Line-associated Bloodstream Infections in Intensive Care Units – United States, 1997-2007. Centers for Disease Control and Prevention, Atlanta, GA. www.shea-online.org

39. Pearson ML. Guidleines for prevention of intravascular device-realted infections. Part I. Intravascular device-realted infections: an overview. The Hospital Infection Control Practices Advisory Committee. *Am J Infection Control* 1996;24:262-277.

40. Institute for Healthcare Improvement. Prevent Central Line-Associated Bloodstream Infections. http://www.ihi.org

41. National Quality Forum (NQF), National Voluntary Consensus Standards for the Reporting of Healthcare-Associated Infection Data, Washington, DC:NQF;2008.

42. Maki DG, Kluger DM, Crnuch CJ. The Risk of Bloodstream Infection in Adults With Different Intravascular Devises: A Systematic Review of 200 Published Prospective Studies. *Mayo Clin Proc* 2006; 81:1159-1171.

43. Berenholtz SM, Pronovost PJ, Lipsett PA, et al. Eliminating catheter-related bloodstream infections in the intensive care unit. *Crit Care Med* 2004; 32:2014-2020.

44. Scheretz RJ, Ely EW, Westbrook DM, et al. Education of physicians-in-training can descrease the risk for vascular catheter infection. *Ann Intern Med* 2000;132:641-648.

45. Sherman ER, Heydon KH, StJohn KH, Teszner E, Rettig SI, et al. Administrative data fail to accurately identify cases of healthcare-associated infection. *Infect Control Hosp Epidemiol* 2006; 27:332-337.

46. Goldrick B. The practice of infection control and applied epidemiology: A historical perspective. *Am J Infect Control 2005*, 33: 9, 493 – 500.

47. O'Boyle C, Jackson M, Henley SJ. Staffing requirements for infection control programs in US health care facilities: Delphi project. *Am J Infect Control,* 2003; 30 (6): 321-333.
48. Iezzoni LI, Ash AS, Shwartz M, et al. Judging hospitals by severity-adjusted mortality rates: the influence of the severity-adjustment method. *Am J Public Health* 1196;86:1379-1387.

49. Gaynes R, Richards C, Edwards J, et al. Feeding Back Surveillance Data To Prevent Hospital-Acquired Infections. Emerging Inf Dis 2001, 7:2;295-298.

50. Garner JS, Hierholzer W, McCormick R, et al. Guidelines for isolation precautions in hospitals: Part I. Evolution of isolation practices. *Am J Infect Control, 1996*; 24 (1): 24-31.

IX. List of Figures

Figure 1. Trends in Central Line-Associated Bloodstream Infections (CLABSI) by Intensive Care Unit Type – United States, 1997 – 2007 (39)

Figure. Trends in Central Line-associated Bloodstream Infections (CLABSI) by Intensive Care Unit Type--United States, 1997-2007*

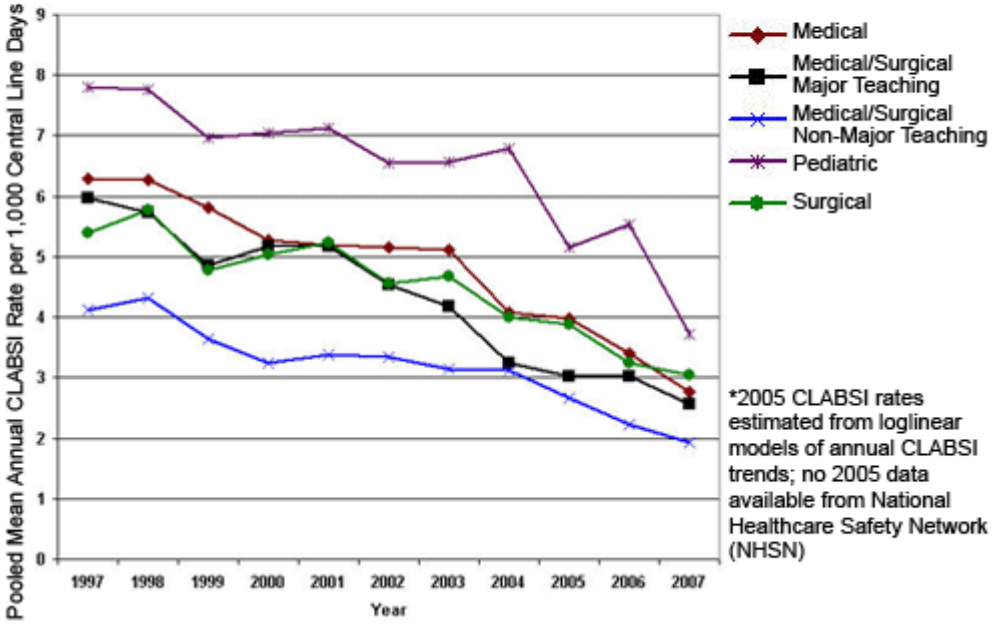
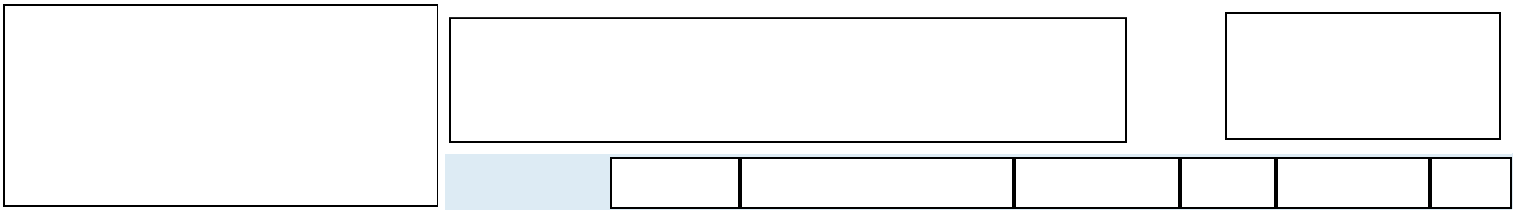


Figure 2. DPH Healthcare Associated Infections Program Website: Homepage



Healthcare Associated Infections (HAI) Program

In 2006, the Connecticut General Assembly passed Public Act 06-142, *An Act Concerning Hospital Acquired Infections.* The legislature established the Committee on Healthcare Associated Infections and charged it with advising the Connecticut Department of Health (DPH) with respect to the development, implementation, operation, and monitoring of a mandatory reporting system for HAIs in Connecticut. The committee was also instructed to recommend to DPH appropriate methods for increasing public awareness about effective measures to reduce the spread of infections in communities, hospitals, and other healthcare settings.

The DPH Healthcare Associated Infections Program administers the HAI reporting initiative. The goals of the HAI Program include:

- To promote patient safety and improve health outcomes by reducing the risk of Healthcare Associated Infections.
- To develop a meaningful and valid Hospital Associated Infection reporting system to healthcare providers and the public.
- To utilize the information collected to encourage and support efforts to reduce morbidity, and mortality associated with healthcare associated infections.
- To sponsor statewide HAI educational campaigns and support local efforts.

For more information click on the links below:

- **Healthcare Associated Infections (HAIs)**
  - General Information about Healthcare Associated Infections
  - Factors that Make People Susceptible to Healthcare Associated Infections
  - Types of Healthcare Associated Infections
  - Tips for Reducing the Likelihood of Developing a Healthcare Associated Infection
  - Hand Washing: Reducing the Risk of Common Infections
- **CT Public Act 06-142: *An Act Concerning Hospital Acquired Infections***
- **CT Healthcare Associated Infection Advisory Committee**
  - 2008 Committee members
  - 2008 Meeting Schedule

Department of Public Health
410 Capitol Avenue
Hartford, CT 06134
Phone:
(860) 509-8000

Directions

E-ALERTS

Receive DPH news updates by e-mail.

Subscribe now or update your e-Alerts

- Committee Meeting Minutes

➢ **Information for Providers**
- Information about Healthcare Associated Infections reportable in CT
- Central Line Bloodstream Infection (CLABSI) Measure

➢ **Multidrug-Resistant Organisms (MDROs): What are they?**

➢ **Publications and Reports**
- Report on Healthcare Associated Infections (April 1, 2007)
- Report on Healthcare Associated Infections (October 1, 2007)
- Report on Healthcare Associated Infections (October 1, 2008)

➢ **Public Education Campaigns**
- 2008 Hand Hygiene Campaign: "Making CT Safer - Two Hands at a Time"

➢ **Frequently Asked Questions**

➢ **Related Links**

➢ **Glossary of Key Terms and Definitions**

➢ **Your Comments on this Site**

➢ **Contact Us**