New York State

HOSPITAL-ACQUIRED INFECTION REPORTING SYSTEM

Pilot Year - 2007

New York State Department of Health
Report to Hospitals – June 30, 2008

HOSPITAL-ACQUIRED INFECTION REPORTING SYSTEM
NEW YORK STATE - PILOT YEAR 2007

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EXECUTIVE SUMMARY

According to the federal Centers for Disease Control and Prevention (CDC), there were an estimated 1.7 million healthcare-associated infections and 99,000 deaths from those infections in 2002. [1] Other investigators have estimated the annual costs associated with these infections to be $4.5 billion to $5.7 billion.[2,3] None of these parameters measure the effect of these infections on the patients, their family members, friends and colleagues. Their emotional, physical and personal costs are not quantifiable.

The Legislature passed and the Governor signed legislation in July 2005 requiring hospitals to report select hospital-acquired infections (HAIs) to the New York State Department of Health (NYSDOH, DOH or "the Department"). The legislation provided a "pilot phase" to develop the reporting system; train hospitals on its use; standardize definitions, methods of surveillance and reporting; audit and validate the hospitals' infection data and modify the system to ensure that the hospital-specific infection rates, when released, would be fair, accurate and reliable. The legislation provided for an initial report to hospitals assessing the overall accuracy of the data submitted in the pilot phase and providing guidance for improving the accuracy of hospital-acquired infection reporting.

New York's reporting system utilizes the Centers for Disease Control and Prevention's National Healthcare Safety Network (NHSN) for HAI reporting, and is the first state to do so. Now, 17 states are committed to using the NHSN and it has become the standard for state reporting.

Public Health Law Section 2819 sets forth the responsibilities of the Department and New York State hospitals. The following report summarizes the development and implementation of the HAI reporting system, an assessment of the overall accuracy of the data submitted in the pilot phase, guidance for improving the accuracy of hospital acquired infection reporting, lessons learned and next steps. Italicized wording is the explicit language of the law.

Technical Advisory Workgroup (TAW)

The commissioner shall consult with technical advisors who have regionally or nationally acknowledged expertise in the prevention and control of hospital acquired infection and infectious disease in order to develop the adjustment for potential differences in risk factors to be used for public reporting.[PHL 2819 5.(b)]

The TAW has met five times including the first meeting on May 5, 2006. The list of technical advisors is provided in Appendix C. At the first meeting, the TAW endorsed the following NYSDOH goals for the HAI reporting program which are consistent with the legislation:

- Develop and implement a reliable, valid, useful HAI reporting system for the public, the hospitals, and the NYSDOH;
- Prevent the selected HAIs;

- Use the HAI reporting system to evaluate risk factors and potential interventions; and
- Use the data to evaluate the impact of initiatives to improve quality of care.

The legislation called for the reporting of HAIs, with the initial starter set of central line-associated bloodstream infections (CLABSIs) and infections associated with surgical procedures in intensive care units (ICUs). The workgroup selected surgical site infections associated with coronary artery bypass procedures and colon surgical procedures due to the frequency of these infections, severity of infection-related complications, potential for risk adjustment and potential for quality improvement.

The Department continues to meet with the TAW semi-annually. Their input has been invaluable.

Establishment and Training Hospitals on Use of the National Health Care Safety Network (NHSN)

The department shall establish guidelines, definitions, criteria, standards and coding for hospital identification, tracking and reporting of hospital acquired infections which shall be consistent with the recommendations of recognized centers of expertise in the identification and prevention of hospital acquired infections including, but not limited to the National Health Care Safety Network of the Centers for Disease Control. [PHL 2819 2.(c)]

After selecting the CDC's NHSN as the reporting mechanism, all hospital CEOs were informed by letter of the reporting requirements and training opportunities. Nine regional training sessions were held throughout the state in late 2006 on the NHSN enrollment procedures, guidelines for surveillance, standard definitions, use of the NHSN and reporting indicators. The Greater New York Hospital Association (GNYHA) videotaped the presentations and has made them accessible as training materials.

A NYSDOH web site and an email distribution system of reporting hospitals was developed, a direct email link to the HAI program was established (hai@health.state.ny.us) and program staff have answered more than 2,000 inquiries. Ongoing education has been maintained via telephone, regional training sessions to discuss modifications to the reporting system and selection of indicators for 2008, onsite hospital visits, additions to the HAI web site and circulating an electronic newsletter.

Timeliness and Completeness of Reporting

The first year of data submission under this section shall be considered the "pilot phase" of the statewide hospital acquired infection reporting system. The purpose of the pilot phase is to ensure, by various means, including any audit process referred to in subdivision seven of this section, the completeness and accuracy of hospital acquired infection reporting by hospitals. [PHL 2819 5.(c)(ii)]

The pilot year for hospital reporting of HAIs was January 1-December 31, 2007. The initial legislation stated that the Department could not require reporting more often than every six months, 60 days after the end of the reporting period. The first six months of data were due by the end of August 2007. As of October 2007, 96 percent of facilities had

complied with the 2007 reporting requirements for the initial six-month reporting period. The eight facilities that did not comply were cited by DOH and provided a plan of correction. Although all eight facilities are now reporting, one of these eight facilities had not fulfilled the reporting requirements in time for this report.

Timeliness and completeness of reporting surgical site infections (SSIs) were delayed due to the long incubation for some infections and the fact that SSIs were often detected after the initial hospitalization. As per the NHSN definition, SSIs were considered hospital-associated if they occur within 30 days or up to a year after the procedure if there was an implant (including sternal wires).

Only 63 percent of colon SSIs were detected during the initial hospital admission, 24 percent were detected upon readmission and 13 percent were detected post-discharge. Only 32 percent of chest SSIs and 28 percent of donor vessel SSIs were detected during the initial hospitalization. 63 percent of chest SSIs and 66 percent of donor vessel SSIs were detected upon readmission to the same hospital. Nineteen (5 percent) chest site infections and nine (6 percent) donor site infections were detected post-discharge, including two organ space infections. The NHSN system did not distinguish between post-discharge infections involving readmission to another hospital and infections treated in the private practice or outpatient setting. Therefore, NYSDOH created a custom data entry field to capture this information.

HAI reporting program personnel are continuing to conduct audits to determine the accuracy and completeness of reporting of CLABSIs and SSIs. For SSIs, the primary focus is on superficial SSIs occurring during the initial hospitalization and deep and organ space infections involving re-operation and/or readmission to a hospital (the initial hospital where the surgery is performed or another hospital).

HAI Infection Rates 2007

For data reported during the pilot phase, hospital identifiers shall be encrypted by the department in any and all public databases and reports. The department shall provide each hospital with an encryption key for that hospital only to permit access to its own performance data for internal quality improvement purposes. [PHL 2819 5.(c)(ii)]

By law, this pilot year report does not provide hospital identified infection rates. Future reports will include comparative hospital specific infection rates.

Hospitals that perform very few procedures or have ICUs with very few patients with central lines will usually have infection rates that fluctuate greatly over time. The NHSN uses minimum thresholds to report infections and infection rates. The Department will use the same thresholds:

- For surgical site infections, there must be a minimum of 20 patients undergoing a surgical procedure in the specific risk category before infection and rate data will be released.
- For CLABSIs and rates in adult and pediatric ICUs, there must be a minimum of 50 central-line days.

- For CLABSIs and umbilical catheter-associated blood stream infections (BSIs) in neonatal ICUs, there must be a minimum of 50 central line or umbilical catheter days within a birth weight category.

Colon Surgical Site Infection Rates

The SSI rate for patients undergoing colon procedures in New York hospitals in 2007 ranged from 4.5 infections per 100 procedures in the lowest-risk patients to 9.4 per 100 procedures in the highest-risk group (Table 1). National colon SSI rates ranged from 4.0 to 11.3, for the lowest- and highest-risk patients, respectively (Table 2).

De-identified hospital rates by risk category are provided in Table 3. HAI program staff members have been evaluating facilities with the highest and lowest infection rates, determining if there are surveillance and reporting differences, assessing trends, risk factors and interventions to reduce infections.

Tables 4a, 4b, and 8 describe patient and procedure related risk factors associated with colon surgical site infections. Patient-related factors included obesity and male gender. Emergency procedures, especially those involving trauma patients, were the most likely to result in surgical site infections. The department will work with the surgical community to identify possible strategies to reduce infections in this extremely vulnerable group. In addition, the DOH will evaluate the need for further risk adjustment and incorporate these risk factors prior to releasing the report of 2008 infection rates.

Coronary Artery Bypass Graft (CABG) Surgical Site Infection Rates

CABG surgery most often involves two surgical sites: a chest incision and a separate site to harvest donor vessels. Because infections can occur at either incision, the infection rates are presented separately. New York State (NYS) donor vessel site infection rate was significantly lower than national rates across the majority of risk categories. Chest site infection rates were similar to national rates with the exception of a higher rate of deep incisional chest site infections (Tables 11 and 13). This difference may be due in part to difficulties in appropriately classifying the depth of chest SSIs. When the rates of deep and organ/space infections were combined, the difference was no longer statistically significant. The State is considering combining these rates when reporting 2008 hospital-specific rates due to the difficulty in accurately and reliably distinguishing between deep and organ/space infections.

Individual hospital infection rates are provided in Tables 17 and 18 for donor vessel site infections and chest incision site infections, respectively. Individual hospitals reported performing as few as 65 CBGB procedures and as many as 1,065**.** Half the hospitals reported less than one chest or donor site infection per month. The donor vessel site infection rates ranged from zero to 4.0 percent, and from zero to 5.3 percent for chest incision sites. HAI program staff members have been evaluating facilities with the highest and lowest infection rates, determining if there are surveillance and reporting differences, and assessing trends, risk factors and interventions to reduce infections. Additional information will be collected during the 2008 audit process to systematically evaluate possible prevention practices.

Risk factors associated with chest SSIs included female gender, chronic lung disease, diabetes, immunodeficiency, obesity, post-operative renal failure, GI bleeding, bleeding re-operations and emergency procedures (Table 24). The department will work with infection preventionists, surgeons and the cardiac advisory committee to identify possible strategies to reduce infections in these patients. In addition, the DOH will evaluate the need for further risk adjustment due to these factors prior to releasing hospital-specific infection rates with identifiers.

Central Line Associated Blood Stream Infections (CLABSIs) in Adult/Pediatric ICUs

Table 28 provides the New York CLABSI rates by type of adult or pediatric ICU. The ICU-specific rates vary from a low of 2.0 infections per 1,000 central line (CL) days in cardiothoracic ICU patients to 4.0 infections per 1,000 CL days in pediatric ICU patients. NYS CLABSI rates in coronary and pediatric ICUs were significantly lower than national data but higher in surgical ICUs (Table 29).

Within the State, New York City (NYC) facilities had lower CLABSI rates in medical and surgical intensive care units than the rest of the State (Tables 30 and 31). This difference may be attributable to a major regional collaborative to reduce CLABSI rates that began in 2006 in the NYC area, sponsored by GNYHA and United Hospital Fund. This possible explanation is currently being evaluated during 2008 audits.

Tables 32-39 provide the individual hospital CLABSI rates by type of ICU. Hospitals with the highest CLABSI rates have been notified by the department, possible explanations are being evaluated and if the problem is continuing, recommendations have been made and enhanced monitoring is being conducted. Many of the hospitals with the highest rates had already recognized the higher rates, implemented interventions and reduced their rates.

Central Line Associated Bloodstream Infections (CLABSIs) in Neonatal ICUs

As reported in the literature, neonates in the lowest birth weight categories had the highest CLABSI rates. Neonates born under 750 grams had 7.5 infections per 1,000 CL days whereas neonates weighing more than 2,500 grams had 4.0 infections per 1,000 CL days. State rates are summarized in Table 46 were higher than the national rates (Table 47) but this difference was only statistically significant in one birth weight category (751-1000 grams).

Similar trends were seen for neonates with umbilical catheters. Infants weighing less than 750 grams had the highest umbilical catheter-associated BSI rates (12.2 infections per 1,000 umbilical catheter days). The lowest rates were detected in infants born between 1501-2,500 grams (1.7) and more than 2,500 grams (2.2/1,000 umbilical catheter days). State rates are summarized in Table 50. Table 51 provides the most recent national comparison data from CDC. State rates were higher than national rates in the highest and lowest birth weight categories.

Hospitals with the highest CLABSI rates have been notified, possible explanations are being evaluated and if the problem is continuing, recommendations have been made and enhanced monitoring is being conducted. In addition, the department is working with neonatologists across the State on a collaborative to reduce CLABSI rates in neonatal intensive care units.

Accuracy of Reporting

To assure the accuracy of the self-reported hospital acquired infection data and to assure that public reporting fairly reflects what actually is occurring in each hospital, the department shall develop and implement an audit process. [PHL 2819 7.]

The NYSDOH HAI reporting program generates bi-weekly reports by region and by hospital to detect data entry errors. These reports are reviewed by the regional HAI program staff members, and hospitals are given the opportunity to verify and/or correct the data.

Audits of a sample of medical records were conducted by the department to assess compliance with reporting requirements. Onsite visits were conducted by HAI program staff in 95 percent (183) of the hospitals between July 2007 and January 2008. Data submitted to NHSN for the first quarter of 2007 were used to select medical records for review.

The purposes of the audit were to:

- Determine the reliability and consistency in applying the surveillance definitions;
- Evaluate the adequacy of surveillance methods to detect infections;
- Evaluate current risk adjustment methods and determine whether additional factors need to be considered for public reporting purposes; and
- Evaluate intervention strategies designed to reduce or eliminate specific infections.

If data inconsistencies were identified, hospitals were contacted, the discrepancies were discussed and if the records needed to be modified, the hospitals edited the data. Ongoing monitoring, education and training have been and continue to be provided to ensure the integrity of the data.

Strengths and Weaknesses – Use of NHSN for Mandatory Reporting

A major objective of the pilot phase was to evaluate the strengths and weaknesses of using the NHSN for mandatory reporting purposes, determining whether the State should continue to use the NHSN reporting system and recommend changes or modifications for 2008.

The major strengths of using the NHSN were:

- Standard definitions had been developed and could be applied consistently;
- These definitions are used throughout the United States and in other countries;
- CDC served as a valued partner, was available to assist and support the Department, clarified the interpretation of data elements and definitions, and provided information technology support;
- Hospitals could immediately use the information they reported, calculate trends over time and compare their infection rates with national rates; and
- Hospitals began to use the system for collaborative intervention initiatives to reduce HAIs.

The major weaknesses of using the NHSN were:

- Due to confidentiality agreements, hospitals had to take additional steps to confer rights to grant the State permission to view and analyze their data. These steps could have been averted or minimized if the department had been able to make this modification internally.
- To make system changes or collect additional information, the department had to request that all hospitals create the same customized data entry fields in the same way.
- NYSDOH could not modify definitions unilaterally; CDC had to make these changes. This may not necessarily be a weakness, because any New York-specific modification or change affects the ability of hospitals to compare themselves with other hospitals across the nation.

To deal with these weaknesses, CDC and NYSDOH worked together to make changes to the NHSN or the department developed custom data entry fields to collect additional information.

Legislative Changes (Chapter Amendments)

In July 2007, the Governor signed chapter amendments to Public Health Law Section 2819 to ensure appropriate (*1.*), complete (*2.*) and timely (*3.*) reporting of HAIs by hospitals in New York. These revisions include:

1. An HAI was redefined as an infection that 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." [PHL 2819 1(b)]*
2. "*For hospital acquired infections for which the department requires tracking and reporting as permitted in this section, hospitals shall be required to report a suspected or confirmed hospital-acquired infection associated with another hospital to the originating hospital. Documentation of reporting should be maintained for a minimum of six years." [PHL 2819 2(e)]*
3. *Each hospital shall regularly report to the department the hospital infection data it has collected. The department shall establish data collection and analytical methodologies that meet accepted standards for validity and reliability. The frequency of reporting shall be monthly, and reports shall be submitted not more than sixty days after the close of the reporting period. [PHL 2819 3]*

Lessons Learned

During the pilot year, the Department and hospitals learned the following important lessons regarding HAI reporting:

1. Strict adherence to the surveillance definitions is critical to provide consistency and comparability of data across hospitals. Clinical findings are appropriate for treatment decisions but are not appropriate for mandatory reporting purposes since there is significant variability between providers and different institutions.
2. Additional risk factors were identified and need to be further assessed to determine if they affect the hospital-specific infection rates.

3. Post-discharge surveillance methods are highly variable, dependent upon allocated resources and integration of information systems. In addition, the majority of severe infections were detected during the initial hospitalization or upon readmission. Therefore, NYSDOH is not mandating a uniform post-discharge methodology but will continue to monitor the impact of these efforts.
4. The original legislative language prohibited the department from receiving timely, actionable data from the hospitals. The laws were amended in 2007 to require HAI reporting within 60 days of the end of the surveillance month.
5. Timely and complete data submission was often affected by infection control staffing turnover, prolonged vacancies and the need for education and training to comply with the legislative mandate. Hospitals need to provide back-up personnel to ensure compliance with reporting requirements and patient safety.
6. Very few facilities made use of electronic data transfer and therefore relied on cumbersome manual data collection and entry. Hospitals need to integrate information systems to support infection prevention and reporting efforts.

Next Steps

The Department will work to improve HAI reporting and infection prevention efforts including taking the following actions:

1. Continue to monitor the accuracy and timeliness of data being submitted, discuss findings and ensure corrective action is taken.
2. Conduct onsite audits to evaluate surveillance methods, interpretation of surveillance definitions, and completeness of reporting.
3. Continue to evaluate the effectiveness of various post-discharge methods.
4. In conjunction with the TAW, evaluate the need for further risk adjustment and if deemed necessary, integrate into the public reports.
5. Develop methods and format for public reporting of identified hospital infection rates in collaboration with the TAW.
6. Conduct surveys or additional audits to evaluate the effectiveness of prevention strategies to reduce HAIs.
7. Identify and evaluate hospitals with the lowest and highest infection rates to determine if reported data are reliable and if the data are reliable, attempt to identify reasons for the differences.
8. Monitor infection control resources to evaluate the impact of public reporting on other infection prevention and control responsibilities.
9. Collaborate with other department staff to investigate outbreaks, evaluate emerging trends and/or provide regulatory action for non-compliance with the legislative mandates.
10. Consult with infection preventionists, hospital epidemiologists, surgeons and the Cardiac Advisory Committee to identify possible strategies to reduce HAIs.
11. Monitor HAI prevention projects for compliance with program objectives, fiscal responsibility and potential applicability to other hospitals or healthcare settings.
12. Continue to provide education, training and ongoing support to hospital infection reporting staff.

Report to Hospitals, Governor and Legislature

No later than one hundred eighty days after the conclusion of the pilot phase, the department shall issue a report to hospitals assessing the overall accuracy of the data submitted in the pilot phase and provide guidance for improving the accuracy of hospital acquired infection reporting. The department shall issue a report to the governor and the legislature assessing the overall completeness and accuracy of the data submitted by hospitals during the pilot phase and make recommendations for the improvement or modification of hospital acquired infection data reporting based on the pilot phase as well as share lessons learned in prevention of hospital acquired infections. No hospital identifiable data shall be included in the pilot phase report, but aggregate or otherwise de-identified data may be included. [PHL 2819 5.(c)(iii)]

This report is being submitted to meet the department's reporting requirements to hospitals as required by statute. The Department will soon issue the report to the Governor and the Legislature, which is also required by statute.

The HAI reporting program staff dedicate this report to the Technical Advisory Workgroup members and the dedicated infection prevention and control professionals who have worked collaboratively with the Department to make New York's HAI Reporting System a model for the country.

Respectfully Submitted,
HAI Reporting Program
New York State Department of Health

HOSPITAL-ACQUIRED INFECTION REPORTING SYSTEM
NEW YORK STATE - PILOT YEAR 2007

BACKGROUND

According to the federal Centers for Disease Control and Prevention (CDC), there were an estimated 1.7 million healthcare-associated infections and 99,000 deaths associated with these infections in 2002. [1] Systematic, infection surveillance in acute care hospitals in the United States began in the late 1960's and early 1970's. The purpose of surveillance at the time was to identify outbreaks, wards or services with high rates of infection. In the 1990's, hospitals began targeting surveillance activities and focusing on high-volume, high-risk procedures and specific patient populations. By focusing efforts, hospitals could devote attention to the identification of risk factors, implement prevention strategies, measure effectiveness, and provide feedback to clinicians.

Because the information was used only for internal purposes, there was no need for inter-facility standardization of surveillance definitions, activities or approach. Each hospital designed its own surveillance system, decided which infection indicators to monitor, developed its own definitions of infection and monitored trends.

To assess and compare the incidence of hospital-acquired infections (HAIs) in New York State hospitals, on July 19, 2005, the Governor signed into law a requirement for the reporting of HAIs by general hospitals. Chapter 284 of the Laws of 2005 amended Public Health Law to include Section 2819 on HAI reporting. The law, including subsequent amendments, can be found in Appendix A. The main points of the legislation include:

- DOH is responsible for establishing guidelines, definitions, criteria, standards and coding for hospital identification, tracking and reporting of HAIs.
- Hospitals are initially required to identify, track and report critical care units, central line-related bloodstream infections and select surgical site infections.
- The first year of data collection is a pilot phase for the statewide HAI reporting system.
- Working with technical advisors, DOH will develop statistical methods to adjust for patients' risk differences to make the information fair, reliable and comparable across all hospitals.
- For pilot phase data, hospital identifiers will be encrypted by the Department in all public reports.
- No later than 180 days after the conclusion of the pilot phase, DOH will issue a report to hospitals assessing the overall accuracy of the data submitted and provide guidance for improving the accuracy of HAI reporting.
- While hospital-identifiable data will not be in the pilot phase report, aggregate or otherwise de-identified data may be included.
- After the pilot phase report, future reports will include hospital identifiers.
- To ensure the accuracy of the hospital data, DOH will develop and implement an audit process.
- Individual patient-identifying information reported to DOH is protected by Public Health Law and cannot be released.

Before passage of this legislation, the New York State Codes, Rules and Regulations [Section 405.11(b.)] required hospitals to collect and analyze HAI surveillance data and

report outbreaks, but did not specify which infections to monitor, how to perform surveillance, or how to analyze the data and report findings. Facilities would decide which definitions to use, which infections to monitor and the duration of surveillance. Data were used for internal quality improvement purposes and not shared or compared with other hospitals unless hospitals were voluntarily participating in a collaborative endeavor. Hospitals did not conduct routine surveillance of all HAIs, but instead selected HAI indicators based upon a Joint Commission-required risk assessment.

Hospitals that serve the highest-risk patients (e.g., major teaching or referral hospitals) are more likely to have higher infection rates. Surgeons that perform higher-risk procedures or perform surgery on higher-risk patients are more likely to have higher infection rates. The law specifies that DOH, in conjunction with technical advisors, develop statistical methods to adjust for these differences to make comparisons between hospitals fair and reliable.

Although some hospital-acquired infections are easy to define and detect, others are much more complicated because of patients' underlying illnesses, nonspecific signs and symptoms associated with many infections, prolonged time between infection and onset of symptoms, and frequent use of antibiotics for both prevention and treatment. Determining whether a patient acquired an infection in the hospital or came into the facility already infected or incubating the infection is complicated by the fact that patients can develop infections from organisms carried by other patients, health care workers or visitors; organisms found in the air, water, equipment or surfaces; or organisms patients carry with them upon arrival (endogenous flora normally present on the skin, nose, gastrointestinal tract, etc.). Chapter 284 of the Laws of 2005 calls for reporting of infections acquired in the hospital, not infections that were present or incubating when the patient was admitted.

Counting and reporting infections will not in and of itself protect patients. Indeed, if hospitals dedicate all their infection control resources to surveillance and reporting, prevention efforts will suffer. With its technical advisors, DOH established the following goals for the HAI reporting program:

- Develop and implement a reliable, valid, useful HAI reporting system for the public, the hospitals, and the State Department of Health;
- Prevention the HAIs selected;
- Use the HAI reporting system to evaluate risk factors and potential interventions; and
- Use the data to evaluate the impact of initiatives to improve quality of care.

HAI DATA SYSTEM SELECTION AND TRAINING

Selection of the HAI Reporting System

New York was the first state in the nation to utilize the National Healthcare Safety Network (NHSN) for HAI reporting. Now, 17 states are committed to using the NHSN and it has become the standard for state reporting.

DOH and its technical advisors chose to use the CDC's National Healthcare Safety Network (NHSN) for reporting because it met the following criteria:

- The system was already in place, and approximately 10 percent of New York hospitals already were participating.
- Standard definitions, surveillance and risk adjustment methods had been established.
- National benchmarks and comparison data had been integrated into the system.
- Regardless of their location, health care facilities in networks can use the system to share data, collaborate on quality improvement, prevention and patient safety initiatives and evaluate effectiveness.
- Immediately upon data entry, information can be used for internal or external monitoring and action.
- Patient and facility confidentiality are maintained.
- NHSN can be used for all infection surveillance activities and is not limited to those mandated by DOH.
- DOH negotiated a Memorandum of Understanding (MOU) to use NHSN, which meets all the requirements of the law.

Developing a Memorandum of Understanding between DOH and CDC

On January 19, 2007, an MOU (Appendix B) was established between the DOH and CDC. The MOU included the following agreements:

- CDC will provide DOH with a mechanism for immediate and ongoing access to the hospital-submitted data contained in NHSN.
- CDC will ensure that NHSN is secure and meets prevailing business standards for security features and disaster recovery.
- CDC will provide technical assistance to support hospital enrollment into NHSN and for data entry.
- CDC and DOH will work collaboratively to ensure that hospitals in New York State are adequately trained to use NHSN.
- CDC will provide each participating facility in New York with the following Assurance of Confidentiality: "The information obtained in this surveillance system that would permit identification of any individual or institution is collected with a guarantee that it will be held in strict confidence, will be used only for the purposes stated, and will not be disclosed or released without the consent of the individual, or the institution in accordance with Section 304, 306, and 308(d) of the Public Health Service Act (42 USC 242b, 242k, and 242m(d))."

Technical Advisory Workgroup

A Technical Advisory Workgroup (TAW) was established to provide guidance and expertise to DOH during the establishment, implementation, and evaluation of hospital-acquired infection reporting in New York. The workgroup consists of physicians and nurses with expertise in infection prevention and control, hospital epidemiology and research as well as representatives from the Healthcare Association of New York State (HANYS), Greater New York Hospital Association (GNYHA), Center for Medical Consumers, New York State Association for Professionals in Infection Control and Epidemiology (APIC) Coordinating Council (NYSACC) and Society for Healthcare Epidemiology of America (SHEA). The workgroup meets in the spring and fall and has provided guidance on system development, education, training, selection of HAI reporting indicators, risk factors and risk adjustment, and development of the reporting format. Appendix C lists the workgroups members.

Selection of Infections to Report - Pilot Year 2007

The legislation called for the initial monitoring of central line-associated bloodstream infections (CLABSIs) and infections associated with surgical procedures in intensive care units. On May 5, 2006, DOH first met with the TAW to determine appropriate surgical procedures for surveillance during the pilot year. This workgroup selected coronary artery bypass procedures and colon surgical procedures (facilities performing more than 150 procedures had the option of limiting surveillance to the first 150 procedures) due to the frequency of infections, severity of infection-related complications, potential for risk adjustment and potential for quality improvement.

On August 25, 2006, the State Health Commissioner issued a letter to all hospital chief executive officers (CEOs) notifying them that the Department designated NHSN as the required electronic reporting system for the pilot year (Appendix D). The CEOs were informed that their hospitals must establish a NHSN account, follow NHSN protocols and definitions and that key employees should attend one of the training programs. Surveillance would begin on January 1, 2007 for the selected hospital-acquired infection indicators.

Hospital Training Programs for 2007 HAI Reporting

CDC's NHSN coordinator, Teresa Horan, provided training to a sample of hospitals in the Capital Region in August 2006. This training was undertaken to develop and evaluate training materials, monitor participating facilities' ability to enroll in NHSN, and identify gaps, difficulties in implementation, or understanding before rolling out the effort statewide. The training served as a train-the-trainer session for DOH staff who conducted training throughout the State. Ms. Horan also attended the first DOH-led training session to ensure consistency and answer questions.

Nine training sessions were held in October and November 2006 to prepare facilities for mandatory reporting in 2007. GNYHA provided a webcast of the training sessions as a backup for facilities or persons unable to attend or to serve as a refresher. All but five hospitals attended the training programs.

HAI Reporting Program Web Site and Newsletter

A web site was established on DOH's secure Health Provider Network to support hospital participants. The web site (https://commerce.health.state.ny.us/hpn/cch/hosp_infection/) contains training materials, protocols, links to the CDC and other infection prevention and control sites, information on accessing training webcasts, presentations, TAW contacts, presentations to workgroup advisors, and a direct email link to program staff.

Ongoing education has been maintained by telephone, regional training sessions, onsite hospital visits, posting a Frequently Asked Questions section on the web site and circulating an electronic newsletter. The following topics were addressed during 2007:

- Monthly reporting of ICU patient and central line days (May).
- Correct surgical classification of colon procedures (May).
- Reporting of surgical-site infections (SSIs) identified by post-discharge surveillance and upon readmission to the hospital (May).
- Determining when a primary operative procedure includes multiple surgical procedures (June).
- Documentation of central line and patient days in critical care units (July).
- Annual renewal procedures for NHSN membership (September).
- Using the NHSN surgical operative procedure table to determine SSI assignments (December).

Definitions for HAI Reporting using the NHSN

Any infection reported to NHSN must meet the basic definition of an NHSN HAI:

- A localized or systemic condition resulting from adverse reaction to the presence of an infectious agent(s) or its toxin(s) and
- No evidence that the infection was present or incubating at the time of hospital admission.

Other important considerations include the following:

- Clinical evidence may be derived from direct observation of the infection site or review of information in the patient chart or other clinical records.
- For certain infection sites, a physician's or surgeon's diagnosis of infection derived from direct observation during a surgical operation, endoscopic examination, or other diagnostic studies or from clinical judgment may be an acceptable criterion for an NHSN infection, unless there is compelling evidence to the contrary.

Reference:
http://www.cdc.gov/ncidod/dhqp/pdf/nhsn/NHSN_Manual_PatientSafetyProtocol_CURRENT.pdf

The explicit criteria for the mandated infection indicators are provided below:

CLABSI - Laboratory-Confirmed Bloodstream Infections (LCBIs) - 2007

The NHSN adjusts for risk of CLABSIs by limiting comparisons to similar types of intensive care units.

A laboratory-confirmed central-line associated bloodstream infection must meet one of the following criteria:

1. The patient has a recognized pathogen (organism that causes disease) cultured from one or more blood cultures and the organism cultured from the blood is not related to an infection at another site.

2. The patient has at least one of the following symptoms: fever, chills or hypotension; and the signs, symptoms and positive blood culture are not related to infection at another site; and at least one of the following:
    - common skin contaminant is cultured from two or more blood cultures drawn on separate occasions.
    - common skin contaminant is cultured from at least one blood culture and the physician institutes appropriate therapy.*

3. A patient 1 year of age or younger who has at least one of the following signs or symptoms: fever greater than 38 degrees Centigrade, taken rectally; hypothermia (a rectal temperature of less than 37 degrees Centigrade), apnea or bradycardia; and signs, symptoms and positive laboratory results unrelated to an infection at another site; and at least one of the following:
    - common skin contaminant is cultured from two or more blood cultures drawn on separate occasions.
    - common skin contaminant is cultured from at least one blood culture and the physician institutes appropriate therapy.*

[*After deliberations with the NYSDOH and others, CDC eliminated these criteria effective January 1, 2008.]

Clinical sepsis (CSEP) is an NHSN-reportable condition for neonates and infants only. The following criteria are used:

1. A patient 1 year of age or younger who has at least one of the following clinical signs or symptoms with no other recognized cause: fever greater than 38 degrees Centigrade, taken rectally; hypothermia (a rectal temperature of less than 37 degrees Centigrade), apnea, or bradycardia; and blood culture not done or no organisms detected in blood and no apparent infection at another site, and physician institutes treatment for sepsis.

Surgical Site Infection (SSI) Criteria

Surgical site infection criteria are applied to those patients undergoing an inpatient operation during a single trip to an 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. SSIs occurring during the initial hospital admission or readmission and meeting NHSN criteria are included in HAI reporting. SSIs presenting within 30 days of the operative procedure are reported as hospital-acquired. SSIs extending deeper than the superficial surgical incision and where a nonhuman-derived implantable foreign body (e.g., prosthetic heart valve, nonhuman vascular graft, mechanical heart, or hip prosthesis) was permanently placed in a patient are included up to one year after the initial operation.

Superficial SSI: an infection involving the superficial incision must meet at least one of the following criteria:

- Purulent drainage from the superficial incision,

- Organisms (bacteria) isolated from an aseptically obtained culture of fluid or tissue from the superficial incision, or
- At least one of the following signs or symptoms: pain or tenderness, localized swelling, redness, or heat, and superficial incision is deliberately opened by surgeon, and is culture-positive or not cultured. A culture-negative finding does not meet criteria for diagnosis of an SSI.

Deep Incisional SSI: an infection with deeper involvement of the surgical incision must meet at least one of the following criteria:

- Purulent drainage from a deep location within but not below the incision,
- Incision spontaneously opens up or is deliberately opened by a surgeon and is culture-positive or not cultured, when the patient has at least one of the following signs or symptoms: fever (higher than 38 degrees Centigrade), or localized pain or tenderness (culture-negative finding does not meet criteria for an SSI),
- An abscess or other evidence of infection involving the deep incision is found on direct examination, during re-operation, or by radiologic examination, or
- Diagnosis of a deep incisional SSI by a surgeon or attending physician.

Organ Space SSI: an infection with involvement below the surgical incision extending into a body cavity must meet at least one of the following criteria:

- Purulent drainage from a drain that is placed through a stab wound into a body cavity (the organ/space),
- Organisms (bacteria) grown from an aseptically obtained culture of body fluid or tissue,
- An abscess or other evidence of infection involving a body cavity that is found on direct examination, during re-operation, or radiologic examination, or
- Diagnosis of a body cavity SSI by a surgeon or attending physician.

NHSN Post-Discharge Surveillance Requirements and Definitions

NHSN requires post-discharge surveillance to detect surgical site infections that occur after initial hospitalization. Some patients develop infections and are admitted to the same hospital, some may be admitted to another hospital, and others may be treated as outpatients. NHSN does not recommend a specific or standard method to identify infected patients after discharge. Detection of these events is dependent upon access to outpatient medical records, as well as communication within and between facilities. Now that NHSN is being used for public reporting and facility comparisons, these methods of detection and results had to be assessed. Therefore, a post-discharge surveillance survey was conducted during the pilot phase.

Assuring HAI Data System Security and Integrity

The security of the data system was established using DOH information technology standards for integrity, security, and confidentiality of data. The HAI secure data system is on the Division of Epidemiology local area network (LAN) where HAI system users could easily access the data, while assuring a high level of security for confidential data. All users are required to attend confidentiality training and to sign an attestation of DOH's security and data confidentiality regulations.

Only essential personnel have been granted access to data on the LAN. Sub-folders were established for each region. Regional program personnel have been granted access to data and reports pertaining only to the specific hospitals in their region.

MONITORING HOSPITAL IMPLEMENTATION

Monitoring Hospital Progress with Enrollment in the National Healthcare Safety Network

To participate in NHSN, hospitals had to take the following steps:

1. Enroll in NHSN.
    a. Sign an agreement with the CDC.
    b. Designate a system administrator.
2. Obtain a digital certificate for each person with access to NHSN.
3. Confer rights to the State Department of Health to access the hospital's data.
4. Define the hospital locations using CDC criteria so similar units can be compared between facilities and nationally.
5. Complete a facility survey regarding resources, beds, services provided, etc.
6. Submit a monthly surveillance plan identifying required reporting indicators.
7. Begin to submit data.

Monitoring Data Submission

NHSN protocols were to be followed for data entry, information coding and surveillance. These can be found at:
http://www.cdc.gov/ncidod/dhqp/pdf/nhsn/NHSN_Manual_PatientSafetyProtocol_CURRENT.pdf
The NHSN data entry system has limited internal data validity checks. Therefore, the NYSDOH HAI reporting program developed and generated bi-weekly reports by region and by hospital to detect data entry errors. These reports were reviewed by the regional HAI program staff members, hospitals were contacted, and the data were verified or corrected. Examples of data entry errors included:

Colon Surgery

- Miscoding a colon procedure as a clean procedure.
- Outpatient colon procedures.
- Colon procedures without general anesthesia.
- Colon surgery duration less than 30 minutes or more than 15 hours.
- Date of birth equal to the procedure date.

CABG Surgery

- Outpatient CABG surgery.
- CABG procedures without the use of general anesthesia.
- American Society of Anesthesiologists' (ASA) Classification of Physical Status score of 1 or 2.
- CABG surgery duration less than 30 minutes or more than 15 hours.
- CABG surgery designated as trauma case.
- Date of birth equal to the procedure date.

CLABSI in Adult and Pediatric Intensive Care Units

- Reports where central line days equaled patient days, because patients are unlikely to have a central line every day of their stay.
- Recognized pathogens designated as a skin contaminant.

CLABSI in Neonatal Intensive Care Units (NICUs)

- Reports where central line/umbilical line days equaled patient days, because patients are unlikely to have a central line/umbilical line every day of their stay.
- Recognized pathogens designated as a skin contaminant.

Hospital On-site Audit Process

Hospital audits of select medical records were conducted to assess compliance with reporting requirements. On-site visits were conducted by HAI program staff in 95 percent (183) of the hospitals between July 2007 and January 2008. Data submitted to NHSN for the first quarter of 2007 were used to select medical records for review. Information extracted from chart reviews were recorded in standardized electronic data collection tools.

Before a visit, DOH sent a letter to the hospital CEO to advise of the scheduled audit visit, its purpose, and the evaluation components (Appendix E). The audits were to:

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

Central Line-Associated Bloodstream Infection Surveillance Audits

An ICU surveillance and prevention measure survey was completed for each ICU in every reporting hospital. Using a standardized questionnaire, HAI staff interviewed the Infection Control Professional (ICP) and/or the ICU staff member with reporting responsibilities.

In each ICU, the medical records of five to 10 patients with positive blood cultures were reviewed to determine whether a central line-associated bloodstream infection occurred and if infected, which NHSN criteria were used to meet the case definition. A standardized data collection form was used to record findings. Information was also obtained on risk factors and documented prevention efforts. HAI staff were blind to case status (reported or not) until after the chart reviews were completed.

Discrepancies were discussed with hospital staff and information corrected in the NHSN database.

Coronary Artery Bypass Graft and Colon Surgical Site Infection Surveillance Audits

Central office HAI program staff selected the medical records to be reviewed by the regional office HAI program staff on-site. All case records of patients reported by the

hospital to have developed a surgical site infection from January 1-March 31, 2007 were selected for review to ensure consistency in applying the NHSN definition and determining the extent of infection, risk factors for developing an SSI and documentation of implementation of prevention measures. For every infected patient, two additional medical records were reviewed involving patients who were not reported to have developed a SSI (control patients). These control patients were matched as follows:

- CABG: Gender, age within 10 years, procedure [Coronary Bypass Graft with Chest and Separate Donor Site (CBGB) or Coronary Bypass Graft with Chest Incision Only (CBGC)], multiple procedure status
- Colon: Duration of surgery (above or below 3 hour cut point), trauma, emergency, ASA score, age within 1 year.

Two control patient charts were reviewed; one from the case-reporting hospital and a second from another hospital to evaluate potential underreporting within or between hospitals, to identify risk factors and potential prevention strategies.

While reviewing the medical record and documenting the findings, the HAI regional program staff member was not aware (blind) of the patients' SSI status (i.e., whether the patient had been reported to be infected or not infected). After reviewing all records and documenting the findings, the HAI regional staff opened a sealed envelope with case status, discrepancies were discussed with the hospital infection reporting staff, and changes were made in the NHSN database.

DATA SUBMISSION AND ANALYSIS

Only the hospitals can enter and edit their data in NHSN.

Surgical Site Infection Data

NHSN requires patient and procedure-specific data on all patients undergoing that procedure during the surveillance period. This "denominator" data is entered manually or electronically from operating room logs and includes the patient identifier, date of birth, gender, date of admission, date of procedure, procedure type, duration of surgery, anesthesia type, ASA score, whether the patient's surgery was a result of blunt force penetrating trauma or an emergency (not elective and unscheduled), wound class, endoscope use, and whether multiple procedures were performed at the same time.

When an infection is detected, additional information regarding the date of onset, depth and severity of infection, microorganisms detected and their antimicrobial susceptibility patterns, time of detection (during initial admission, upon readmission to the same hospital or detected post-discharge, including readmissions to another hospital) and discharge status are collected and reported into the NHSN.

NHSN uses three factors to establish risk categories: ASA score, length of surgery time, and surgical wound classification. The criterion for each category is listed below:

- If a patient is given an ASA score of greater than or equal to a 3 = 1 point.
- If the length of surgery time is greater than the 75^{th} percentile = 1 point.
- If the surgical wound classification is contaminated or dirty = 1 point.

The points are added to identify the appropriate risk category for each patient, ranging from zero to 3 points. For colon operations, the influence of endoscope use was captured by subtracting 1 from the number of risk factors. Risk category "M" indicates a modified risk category where no risk factors were present and the procedure was performed by laparoscope.

To adjust for risk differences between and within hospitals over time, NHSN stratifies the data by dividing the patients by certain characteristics and only provides the surgical site infection rates by risk category. An overall infection rate by surgical procedures is not generated or compared over time.

The SSI rates are only reported for patients within a risk category if 20 or more procedures were performed during the calendar year of surveillance. These CDC criteria were established to provide a reliable infection rate and meaningful data.

Central Line Associated Bloodstream Infection (CLABSI) Data

Denominator data for patients with central lines are collected and reported in aggregate for the month by type of ICU. A determination is made daily within each ICU on the number of patients with a central line. The number of patients with a central line each day is added up for the month and submitted as "central line days" per month per ICU. For neonates, umbilical line days or central line days are submitted by birth weight category (750 grams or less, 751-1,000 grams, 1,001-1,500 grams, 1,501-2,500 grams and more than 2,500 grams).

The following information is entered on all CLABSI cases: Patient identifier; gender; birth weight for neonates; date of birth; date of admission; date of CLABSI; microorganisms, susceptibility patterns or other method of diagnosis; whether patient died and whether CLABSI contributed to death.

CLABSI rates are only reported in intensive care units or within birth weight categories for neonates in which there are at least 50 central line days. These CDC criteria were established to provide a reliable infection rate and meaningful data.

Data Storage

Every two weeks, the entire dataset submitted by hospitals was saved on a secure data server at the State Department of Health, serving as an emergency back-up system. This information will be used to assess the timeliness of reporting, changes over time, and for historical purposes.

Statistical Methods

After the data sets were generated, the data was imported and analyzed using SAS® statistical software package.

SSI rates were calculated within each risk category and presented as the number of infections per 100 procedures. In order to have a reliable rate, neither NHSN nor DOH provided SSI data or rates if fewer than 20 procedures were performed in a given risk category or population group.

CLABSI rates were calculated for each type of ICU, with the ICU type as the sole risk adjustment in adult and pediatric ICU patients with a central line. Neonates undergo further risk stratification within NICU types (level of care provided in the specific ICU) by birth weight category. CLABSI rates are presented as the number of infections per 1,000 central line days, because patients are only at risk while they have a central line. To have a reliable CLABSI rate, information is only presented if there were 50 or more central line days within a given risk category or population group.

The infection rate data in this report are based on the 2007 data reported by hospitals into NHSN as of April 1, 2008. Hospital-specific rates are coded by a unique NHSN identifier known only by each individual hospital. Public Health Law prohibits identifying the hospitals by name in this report in the pilot phase of the program.

Hospital-specific infection rates were compared to the statewide total. If the data were broken down by risk category, the hospital-specific rate within a specific risk category was compared to the total rate for that category. In the total column for an individual hospital, the rate has not been adjusted for risk differences and is therefore considered an unadjusted or crude infection rate. Statistically significant differences are indicated as follows:

- If the hospital-specific infection rate is significantly lower (95 percent confidence interval) than the total, the rate is highlighted in yellow, bolded and designated "L."
- If the hospital-specific rate was significantly higher than the total, the rate is in red, bolded and designated "H."

RESULTS

Colon Surgical Site Infections

Colon Surgical Site Infection Rates - Tables 1-3

The SSI rate for patients undergoing colon procedures in 2007 ranged from 4.5 infections per 100 procedures in the lowest-risk patients to 9.4 per 100 procedures in the highest-risk group (Table 1). National colon SSI rates ranged from 4.0 to 11.3, for the lowest- and highest-risk patients, respectively (Table 2).

De-identified hospital-specific rates by risk category are provided in Table 3. No data are presented for hospitals with fewer than 20 procedures in a risk category because a meaningful comparison could not be made. Individual hospitals reported as few as one colon procedure and as many as 508. Rates of infection for facilities performing a minimum of 20 procedures, ranged from 0-27 percent. Although the facility with a rate of 27 percent performed only 37 procedures, the rates were consistently high within each risk category. There was no correlation between number of procedures performed (fewer than 100, 100-149, more than 150) and the percent rate of infection (6.4, 5.3, and 6.3 respectively).

HAI program staff members have been evaluating facilities with the highest and lowest infection rates, determining if there are surveillance and reporting differences, assessing trends, risk factors and interventions to reduce infections.

Assessment of NHSN Risk Factors for Colon Surgical Site Infections – Tables 4a.-4b.

Tables 4a and 4b describe patient and procedure related risk factors associated with colon surgical site infections and currently collected in the NHSN. Female patients were less likely to develop a colon SSI. Patients undergoing laparoscopic procedures tended to have a lower rate of SSI, although the difference was not significant. The SSI rate increased as the ASA score increased (the sicker the patient, the higher the rate), as the level of fecal contamination in the abdomen at the time of surgery increased, and if multiple procedures (including non-colon procedures) were performed at the same time (Table 4a.).

Based on the NHSN definition, facilities determined whether each colon procedure performed was a result of trauma and whether the procedure was carried out as an emergency. Trauma is defined by NHSN as an operative procedure that is performed as a result of blunt or penetrating traumatic injury to the patient. Emergency is defined as an operative procedure that is non-elective and unscheduled. Table 4b presents SSI rates by risk category and by emergency or trauma status. Emergency surgery alone or with trauma was associated with an increased risk of infection. Trauma alone did not result in a statistically significant increased risk of infection. This may have been due to the small numbers of procedures in this category.

The Department will work with the surgical community to identify possible strategies to reduce infections in these extremely vulnerable patients. In addition, the DOH will be evaluating the need for further risk adjustment prior to releasing hospital-specific infection rates with identifiers.

Microorganisms Associated with Colon Surgical Site Infections – Table 5

Of the 1,082 colon wound infections, 263 (24 percent) involved *Enterococcus* species, 239 (22 percent) involved *Escherichia species*, and 145 (13 percent) involved *Staphylococcus aureus.* There were 110 (10 percent) methicillin-resistant *Staphylococcus aureus* (MRSA) infections and 35 (3 percent) methicillin-sensitive *Staphylococcus aureus* infections. Thus, MRSA was the third most-common organism, after *Enterococcus* and *Escherichia* species.

Post-Discharge Surveillance for Colon Surgical Site Infections – Table 6

The majority (87 percent) of colon SSIs were detected during the initial admission (63 percent) or upon readmission (24 percent) to the same hospital. The other 13 percent were identified post-discharge and may or may not have involved admission to another hospital. Changes in the HAI reporting legislation in July 2007 will require facilities to notify one another of infections related to surgery at a different hospital, and the original hospital where surgery was performed will be required to report the infection. A customized data field in the reporting form was created for the 2008 reporting year to capture this information. Table 6 describes the extent of colon SSIs and provides additional information regarding the depth of infection and when the SSIs were detected (e.g., during initial admission, readmission to the same facility or after discharge).

HAI Reporting Program Audit of Colon Patients' Medical Records – Tables 7a.-7b.

Table 7a provides the number and percentage of inconsistencies by variable between data abstracted by the DOH HAI program reviewer and the information reported by the hospital

into NHSN. Procedure duration and wound class had the highest level of discordance. Table 7b describes the impact. The hospitals tended to report a longer duration of surgery than the HAI reporting program. If not corrected, this would have led to an overestimate of the patient's risk of infection. Misclassification and potential data entry errors were discussed with hospital staff during audit visits and information was corrected in the NHSN database.

HAI Reporting Program Audit of Additional Risk Factors for Colon Surgical Site Infections – Table 8

During the HAI program staff review of medical records, additional risk factors were assessed but not found to be associated with colon SSIs: history of Crohn's disease; cancer of the abdomen; history of radiation therapy to the abdomen; diabetes timing and discontinuation of perioperative antibiotics; receipt of perioperative blood transfusions; highest blood glucose level at 24, 48, or 72 hours; or post-operative hypothermia.

The only additional risk factor found to be associated with an increased risk of colon SSI was increased body mass index (obesity). Patients undergoing chemotherapy within the previous six months appeared to be at significantly lower risk of infection.

The DOH will be evaluating the need for further risk adjustment due to obesity and the previously described NHSN risk factors (emergency/trauma procedures) prior to releasing hospital-specific infection rates with identifiers.

Audit of Prevention Strategies for Colon Surgical Site Infections – Table 9

During the site visits, HAI program staff requested information on hospitals' strategies to prevent colon SSIs. Before the operative incision, all hospitals use a surgical skin preparation. Nearly half the hospitals routinely use an iodophor (44 percent), 21 percent reported using chlorhexidine, and the rest leave the choice of antiseptic agent to the surgeon. Most hospitals do not use antimicrobial impregnated sutures (73 percent) or antimicrobial impregnated mesh (60 percent). The relative effectiveness of these measures in preventing colon SSIs has not been established in independent studies.

Since most of these measures were used at the discretion of the surgeon, the overall effect on the hospital SSI rate could not be determined. During the 2008 audits, the HAI program will attempt to obtain patient-specific procedure data to determine the effect of these interventions in preventing colon SSIs.

Audit of Surveillance Strategies for Colon Surgical Site Infections - Table 10

Table 10 summarizes hospital surveillance practices for colon procedures. Only 10 percent of facilities use an automated (electronic) method to enter information on all colon surgery patients. The other 90 percent enter data manually, which can be labor intensive, burdensome and increase the likelihood of data entry errors.

HAI staff will be urging hospitals to make this information available electronically. As the number of procedures under surveillance increases, this burden will increase substantially and can be averted by electronic data transfer.

Coronary Artery Bypass Graft (CABG) Surgical Site Infections

Coronary Artery Bypass Graft Surgical Site Infections Rates – Tables 11-19

CABG surgery most often involves two surgical sites: a chest incision and a separate site to harvest donor vessels. Because infections can occur at either incision, the infection rates are presented separately.

NYS donor vessel site infection rates were significantly lower than national rates across the majority of risk categories. NYS chest site infection rates were similar to national rates with the exception of a higher rate of deep incisional chest site infections (Tables 11 and 13). This difference may be due in part to difficulties in appropriately classifying the depth of chest SSIs. When the rates of deep and organ/space infections were combined, the difference was no longer statistically significant. The State is considering combining these rates when reporting 2008 hospital-specific rates due to the difficulty in accurately and reliably distinguishing between deep and organ/space infections.

Tables 15 and 16 provide the CBGB SSI rates by wound site and risk group for NYC and Upstate. The SSI rates were similar in New York City and Upstate hospitals. The only statistically significant finding was a higher donor vessel site infection rate in Upstate hospitals (2.0 versus 1.2 infections per 100 procedures).

De-identified hospital-specific infection rates are provided in Tables 17 and 18 for donor vessel site infections and chest incision site infections, respectively. Individual hospitals reported performing as few as 65 CBGB procedures and as many as 1,065**.** Half the hospitals reported less than one chest or donor site infection per month. The donor vessel site infection rates ranged from zero to 4.0 percent, and from zero to 5.3 percent for chest incision sites.

Table 19 provides the SSI rates by hospital for patients undergoing a CBGC procedure. The number of procedures performed ranged from zero to 100. Due to the small number of procedures, most of the rates could not be presented. For hospitals with sufficient data, the CBGC SSI rate ranged from zero to 7.5 percent.

HAI program staff members have been evaluating facilities with the highest and lowest infection rates, determining if there are surveillance and reporting differences, assessing trends, risk factors and interventions to reduce infections.

Microorganisms Associated with CABG Surgical Site Infections – Tables 20-21

Of the 362 chest wound infections, 130 (36 percent) involved *Staphylococcus aureus.* There were 68 (18 percent) methicillin-sensitive *Staphylococcus aureus* (MSSA) and 62 (17 percent) methicillin-resistant *Staphylococcus aureus* (MRSA) infections. MRSA was the third most common organism, after coagulase-negative staphylococci (70 infections, 19 percent) and MSSA.

Of the 141 donor site infections, 31 (22 percent) involved *Staphylococcus aureus.* There were 17 (12 percent) MSSA donor site infections and 14 (10 percent) MRSA donor site infections. MRSA was the fourth most-common organism following MSSA, *Pseudomonas*

(16 infections, 11 percent), *Klebsiella* (16 infections, 11 percent), and *Enterococcus* was also involved in 14 infections.

Post-Discharge Surveillance for CABG Surgical Site Infections - Tables 22-23

During 2007, only 32 percent of chest SSIs and 28 percent of donor vessel SSIs were detected during the initial hospitalization. 63 percent of chest SSIs and 66 percent of donor vessel SSIs were detected upon readmission to the same hospital. Nineteen (5 percent) chest site infections and nine (6 percent) donor site infections were detected post-discharge, including two organ space infections. The 2007 reporting system did not capture whether these events involved a readmission to another facility. A custom field was created for 2008 reporting so that this information can be ascertained.

Assessment of Additional Risk Factors for CABG Surgery Patients – Table 24

In addition to data submitted by hospitals via the NHSN, hospitals also submit patient-level data to the Cardiac Surgery Reporting System (CSRS), which provides the public with hospital- and surgeon-specific death rates and is published on the NYSDOH's web site:
http://www.nyhealth.gov/diseases/cardiovascular/heart_disease/docs/2003-2005_adult_cardiac_surgery.pdf

The 2007 CSRS data was not complete or validated in time for this report, but preliminary data was merged with HAI data to assess additional risk factors or predictors of HAIs. Table 24 presents the SSI rates by patient or surgical risk factor using the CSRS information. The following factors were associated with increased risk of infection:

Patient Risk Factors	Surgical Risk Factors
Female Gender*	Emergency Procedure
Chronic Obstructive Pulmonary Disease*	Bleeding Requiring Re-operation
Diabetes*	
Immunodeficiency*	
Body Mass Index*	
Post-operative Renal Failure*	
Post-operative GI Bleeding	

The significant pre-existing conditions (*) may be important to consider when generating the hospital-specific HAI rates. Given that the HAI report must be issued by May 1 of the year following the reporting period, CSRS data may not be available in time to prepare risk-adjusted rates beyond those already considered in NHSN. When the 2007 CSRS information is complete and validated, the HAI reporting program will determine whether any of these conditions need to be considered for risk adjustment and public reporting.

Within a hospital, the number of operations performed within each risk category can be quite small. The eventual public reporting of hospital-specific rates will need to address this by developing a risk-adjusted infection rate that takes into consideration the risk index of the patients served or limit comparisons to select groups of patients with sufficient numbers to compare rates. Discussions with technical advisors and consumers have suggested that a single risk-adjusted rate may be more meaningful and useful.

HAI Reporting Program Audit of Prevention Strategies for CABG Surgical Site Infections – Table 25

During site visits, HAI regional staff requested information on prevention strategies for CABG SSIs with a particular focus on *Staphylococcus aureus* (MSSA) and methicillin-resistant *Staphylococcus aureus* (MRSA). Table 26 describes the reported hospital practices. Most facilities (71 percent) instituted chlorhexidine bathing, showering or cloths preoperatively, and half the facilities used mupirocin nasal ointment on either all patients (43 percent) or those identified to have MRSA (6 percent).

Additional information will be collected during the 2008 audit process to systematically evaluate possible prevention practices.

HAI Reporting Program Audit of CABG Patients' Medical Records - Table 26-27

Of the 213 CABG patients' medical records reviewed, only three (1.4 percent) discrepancies were identified between HAI program staff and the hospital regarding the surgical site infection status of the patient (Table 26). HAI program staff misclassified one patient (insufficient information in the medical record), and the hospital missed two infected patients that had been readmitted and/or re-operated on due to infection. This information was corrected in the NHSN and recommendations were made to establish a system to detect readmissions and patients undergoing a re-operation for infection.

Table 27 describes other inconsistencies noted during the medical record reviews. Distinguishing between a superficial and deep infection is difficult for CABG procedures because there is minimal fascia or muscle in the chest area. It should be noted that if a patient develops osteomyelitis (bone infection) and mediastinitis, the NHSN hierarchy calls for coding the infection as a mediastinitis. As described for colon surgery, the Department is considering combining deep and organ/space infections for public reporting purposes.

Post-Discharge Surgical Site Infection Surveillance Survey (PDS) – CABG or Colon

NHSN requires that hospitals perform post-discharge surveillance (PDS) to capture surgical site infections, but NHSN does not recommend a specific method to identify infected patients after discharge. Because this voluntary system is now being used for mandatory public reporting, this component of surveillance had to be evaluated.

HAI program staff contacted hospitals by telephone or during an onsite visit and obtained information using a standard questionnaire. As of August 2007, 93 percent of facilities performing colon or CABG surgery were contacted and interviews completed (166 of 178 hospitals).

Of the 166 facilities that performed colon surgery, 91 (55 percent) reported having a PDS system. Of the 38 facilities that performed CABG surgery, 21 (55 percent) perform systematic PDS. Facilities that actively perform surveillance would detect more infections and therefore have higher rates of infection, providing an inherent bias to the data.

Seventy-six (46 percent) of facilities that perform colon surgery and 18 (47 percent) that perform CABG surgery have outpatient or ambulatory clinics to see post-operative

patients. Only 43 percent of colon facilities and 61 percent of CABG facilities with outpatient or ambulatory clinics perform PDS in this setting.

Methods Used to Identify Post-Discharge Events:

- Monthly listing of patients having procedure sent to surgeons
    - 71 percent of colon facilities
    - 38 percent of CABG facilities
- Contact patients directly
    - 10 percent of colon facilities
    - 19 percent of CABG facilities

Identification of Patients Returning to the OR for Infection:

- 147 (89 percent) facilities have mechanism to identify these patients
    - OR notifies Infection Control (31, or 21 percent)
    - Infection Control reviews daily OR schedule (76, or 52 percent)
    - Other (40, or 27 percent)
- Other mechanisms include record review, quality management notifies, or the OR notifies other entities.

Identification of Patients Readmitted to Primary Hospital:

- 145 (87 percent) facilities have a system to identify surgical patient readmission.
    - Infection Control reviews daily admission report (135, or 77 percent)
    - Electronic notification (19, or 13 percent)
    - Medical records notify (11, or 7.6 percent)
    - Admission department notify (5, or 3.4 percent)
- 76 (52 percent) facilities reported additional mechanisms including infection control rounds, quality management laboratory record review, staff notification, and nursing reports.

Communication among facilities:

- 146 (88 percent) facilities notify other facilities of their SSIs
- 119 (72 percent) have been notified by other facilities of their SSIs at least on one occasion

A common concern expressed by interviewees was that a universally acceptable and applicable post-discharge surveillance methodology was not feasible and that their current system did not warrant the time, labor, and information technology support required.

All this information was provided to technical advisors and consumers in September 2007. The advisors recommended the following:

- Do not require or mandate a universal, post-discharge surveillance mechanism.
- Continue to monitor the severity of these events.
- Consider including patients identified post discharge only if they were readmitted to another hospital. The system already includes patients readmitted to the same facility.

DOH agreed and developed a custom field in NHSN to identify SSI events detected following readmission to another hospital.

Adult and Pediatric Central Line Associated Bloodstream Infections

Adult and Pediatric Intensive Care Unit Central Line Associated Blood Stream Infection (CLABSI) Rates – Table 28-39

Table 28 provides the New York CLABSI rates by type of adult or pediatric ICU. The ICU-specific rates vary from a low of 2.0 infections per 1,000 CL days in cardiothoracic ICU patients to 4.0 infections per 1,000 CL days in pediatric ICU patients. NYS CLABSI rates in coronary and pediatric ICUs were significantly lower than national data but higher in surgical ICUs (Table 29).

Within the State, NYC facilities had lower CLABSI rates in medical and surgical intensive care units than the rest of the State (Tables 30 and 31). This difference may be attributable to a major collaborative to reduce CLABSI rates that began in 2006 in the NYC area, sponsored by GNYHA and United Hospital Fund. This possible explanation is currently being further evaluated during 2008 audits.

Tables 32-39 provide the de-identified hospital-specific CLABSI rates by type of ICU. Hospitals with the highest CLABSI rates have been notified, possible explanations are being evaluated and if the problem is continuing, recommendations have been made. Many of the hospitals with the highest rates had already recognized the higher rates, implemented interventions and reduced their rates

Microorganisms Associated with Adult and Pediatric ICU Central Line Associated Bloodstream Infections (CLABSI) – Table 40

Of the 1,348 CLABSIs reported, 446 (33 percent) involved coagulase-negative staphylococci (CNS), and 257 infections (19 percent) involved *Enterococcus species* [136 or 10 percent of total infections involved vancomycin-sensitive enterococci and 121 or 9 percent involved vancomycin-resistant enterococci]. Ten percent, or 134 infections, involved *Staphylococcus aureus* [51 or 4 percent of total infections involved methicillin-sensitive *Staphylococcus aureus* and 83 or 6 percent involved methicillin-resistant *Staphylococcus aureus*]. Table 40 presents the distribution of microorganisms involved in CLABSIs.

Changes in Criteria for Central Line Associated Blood Stream Infections 2007 vs. 2008 – Table 41 - 42

In 2007, laboratory-confirmed CLABSIs were classified using one of three criteria (1, 2a, 2b):

1. CLABSIs in which a known pathogen is identified.
2. CLABSIs in which the only organisms identified are normal skin flora (organisms that are present on the skin of many, if not most, people).
    a. CLABSIs with two or more positive blood cultures involving normal skin flora.
    b. CLABSIs with one positive blood culture involving normal skin flora.

In the State during 2007, 1,040 (77 percent) of CLABSI met Criterion 1, 141 (11 percent) met Criterion 2a, and 167 (12 percent) met Criterion 2b.

CDC will change the inclusion criteria for a CLABSI in 2008. Infections meeting Criterion 2b will no longer be included. This change will increase the specificity of the definition and make it more consistent with the clinical interpretation of laboratory findings. Table 41 summarizes the distribution of CLABSI in the State during 2007, and Table 42 summarizes the distribution of CLABSIs throughout the United States in 2006 (the most recent data available from the CDC).

HAI Reporting Program Audit of Central Line Associated Bloodstream Infection Patients' Medical Records

CLABSI audits were conducted in 147 hospitals. Within these hospitals, evaluations were conducted in 227 adult ICUs and 14 pediatric ICUs. Medical records were reviewed for 1,037 adult and 52 pediatric patients with positive blood cultures to assess risk factors and presence of a CLABSI. For the adult ICUs, 584 patients (56 percent) had a central line in place and, of those, 161 (28 percent) met NHSN criteria for a CLABSI. For pediatric ICUs, 31 patients (60 percent) had a central line in place and, of those, seven (23 percent) met the NHSN criteria for a CLABSI.

Inconsistencies Identified in HAI Program Audit of Medical Records – Tables 43-44

Most of the information recorded by hospitals was consistent with HAI program reviewers. Minor discrepancies were detected (Table 43). Eighty-seven of the 1,089 adult and pediatric records reviewed revealed an inconsistency in documentation of an infection (Table 44). Overall, there was 92 percent (1002/1089) agreement between the reviewer and the hospital reporting a CLABSI. Chart documentation and challenges in applying NHSN criteria, especially those associated with common skin flora, most often resulted in case detection inconsistency. Data discrepancies, though infrequent, were related to data entry errors. These errors have been corrected. Monitoring and audits will continue in 2008.

HAI Reporting Program Audit of Risk Factors for Central Line Associated Bloodstream Infections in Adult and Pediatric Intensive Care Unit Patients-Table 45

During HAI Reporting Program audits, medical records were reviewed to identify risk factors for infection in patients who did and did not develop a CLABSI (Table 45). Patients with multiple central lines and those who had their lines inserted in the ICU were more likely to develop a CLABSI [(OR 2.2, 95 percent CI 1.5-3.3) and (OR 1.8, 95 percent CI 1.3-2.6), respectively].

Removal of non-essential lines is a critical component of central line infection risk reduction efforts. The Department will be evaluating the correlation between device utilization and infection rates for different types of ICUs in 2008.

Neonatal Intensive Care Unit (NICU) Central Line Associated Bloodstream Infections (CLABSIs)

NICU and Central Line Use in Neonates

New York State designates four types of NICUs based on the level/degree of care required by newborns. Regional Perinatal Centers (RPCs) and Level III units provide highly specialized care to newborns with serious illness, including premature birth and low birth

weight, and neonates are under the supervision of a neonatologist. RPCs have additional requirements to provide all aspects of maternal and neonatal care including education, data collection and evaluation within the region. Level II/III units care for neonates requiring level III care as well as infants that are not critically ill but may need extended observation or to gain weight. Central lines are a standard practice in RPCs and Level III facilities. To compare to national NHSN data, RPCs and level III NICU rates are combined.

Umbilical catheters are the first type of central line used following birth if a neonate is unstable. Their use is appropriate only for a limited time. If a central line is still necessary for a neonate following removal of the umbilical catheter, a new central line is placed in a different site.

Regional Perinatal Centers and Level III NICU CLABSI Rates – Tables 46-51

As expected, neonates in the lowest birth weight categories had the highest CLABSI rates. Neonates born under 750 grams had 7.5 infections per 1,000 CL days whereas neonates weighing more than 2,500 grams had 4.0 infections per 1,000 CL days. State rates are summarized in Table 46 and were higher than the national rates (Table 47) but this difference was only statistically significant in one birth weight category (751-1000 grams).

Tables 48 and 49 present the CLABSI rates for RPCs/Level III NICUs in New York City and Upstate. There were no statistically significant differences by birth weight category

Similar trends were seen in neonates with umbilical catheters. Infants weighing less than 750 grams had the highest umbilical catheter-associated BSI rates (12.2 infections per 1,000 umbilical catheter days). The lowest rates were detected in infants born between 1501-2,500 grams (1.7) or over 2,500 grams (2.2/1,000 umbilical catheter days). State rates are summarized in Table 50. Table 51 provides the most recent national comparison data from CDC. State rates were higher than national rates in the highest and lowest birth weight categories.

Hospitals with the highest CLABSI rates have been notified, possible explanations are being evaluated and if the problem is continuing, recommendations have been made. In addition, the Department is working with neonatologists across the State on a collaborative to reduce CLABSI rates in neonatal intensive care units.

Level II/III NICU CLABSI Rates – Table 52 - 55

The CLABS infection rates in Level II/III NICUs in 2007 varied by birth weight category, and no CLABSIs were reported in neonates born weighing more than 2,500 grams. Table 52 summarizes the State rates and they are again higher than national rates summarized in Table 53.

The umbilical catheter-associated bloodstream infection rates in Level II/III NICUs in 2007 varied greatly due to very low device utilization. No BSIs were reported in neonates with birth weights of 1,001-1,500 grams or 1,501-2,500 grams. State rates by birth weight are summarized in Table 54, with national rates in Table 55. Given the small numbers, meaningful data by hospital on umbilical catheter CLABSI rates in Level II/III facilities is not likely to be available in 2008 nor reported in 2009.

The NICU collaborative, if effective, will be expanded to include Level II/III facilities in future years.

De-identified Hospital-Specific CLABSI and Umbilical Catheter Infection Rates – Tables 56-57

The hospital-specific CLABSI rates were compared by level of NICU (RPC, Level III non-RPC, and Level II/III). This breakdown provided a level of risk adjustment but due to small numbers, the rates fluctuate greatly.

Microorganisms Associated with Neonatal Intensive Care Unit Central Line Associated Bloodstream Infections – Table 68

Of the 447 CLABSIs in NICU patients, 289 infections (65 percent) involved coagulase-negative staphylococci (CNS), 43 infections (10 percent) involved *Staphylococcus aureus* with 33 (7 percent) methicillin-sensitive *Staphylococcus aureus* and nine (2 percent) methicillin-resistant *Staphylococcus aureus* infections. Table 58 summarizes the distribution of microorganisms associated with CLABSIs.

Changes in NHSN Criteria for CLABSIs in Neonates in 2007 vs. 2008 – Table 59-62

Laboratory-confirmed CLABSIs are classified by three criteria (NHSN criterion 1, 3 and Clinical Sepsis apply to neonates):

1. CLABSI in which a known pathogen is identified.
3. CLABSI in which the only organisms identified are normal skin flora (organisms that are present on the skin of many, if not most, people).
    a. CLABSIs with two or more positive blood cultures involving normal skin flora.
    b. CLABSIs with only one positive blood culture involving normal skin flora.

CDC will change the inclusion criteria for a CLABSI in 2008. Infections meeting the 3b criterion will no longer be included.

During 2007 in New York, 140 (45 percent) NICU (RPC/Level III) CLABSIs met Criterion 1, 57 (18 percent) met 3a, 102 (33 percent) met 3b and the others involved clinical sepsis. This change will increase the specificity of the definition and make it more consistent with the clinical interpretation of laboratory findings. Table 59 summarizes the distribution of CLABSIs in the State and Table 60 summarizes the distribution of CLABSIs throughout the United States in 2006.

In level II/III NICUs 19 (59 percent) of CLABSIs met criteria 1, four (13 percent) met 3a and nine (28 percent) met 3b. Distribution of specific sites and criteria for State and national data are in Tables 61 and 62.

Clinical sepsis is defined as:
A patient 1 year of age or less with at least one of the following clinical signs or symptoms with no other recognized cause: fever (greater than 38 Centigrade, rectal), hypothermia (less than 37 Centigrade, rectal), apnea, or bradycardia
and

blood culture not done or no organisms detected in blood with no apparent infection at another site
and
physician institutes treatment for sepsis.

Only 6.7 percent of reported infections met these criteria. Detecting and documenting these non-specific findings are labor intensive and cannot be adequately assessed for accuracy. Therefore, DOH is considering excluding "clinical sepsis" subset of CLABSIs.

HAI Reporting Program Audit for CLABSIs in NICU Patients with Positive Blood Cultures - Table 63-64

CLABSI audits of NICUs were conducted in 34 hospitals. Medical records were reviewed for 110 patients with positive blood cultures to assess risk factors for and the presence of a CLABSI. In the NICUs, 60 of the selected patients (55 percent) had a central line in place at the time of the positive blood culture and, of those, 39 (65 percent) met the NHSN criteria for a CLABSI. For the subset of patients that had been reported before the HAI audit, minor inconsistencies were identified (Table 63).

When the results of the HAI reporting program review were compared with the hospitals' infection reporting (Table 64), 12 (11 percent) revealed an inconsistency in case detection. Chart documentation and challenges in consistently applying the NHSN criteria, especially for those cultures with common skin flora, resulted in case detection inconsistency. Data discrepancies, though infrequent, appeared to be due to data entry errors.

The detection, classification and reporting of CLABSIs will be closely monitored in 2008. Direct comparisons of CLABSI rates between 2007 and 2008 cannot be made without adjusting for the changes in the case definition. This will be done when trend analyses are performed in the future.

Assessment of Risk Factors for CLABSIs in NICU Patients – Table 65

Patient-specific risk factors were assessed during the medical record reviews of NICU patients. Table 65 compares the risk factors of neonates with and without CLABSIs. Neonates who received mechanical respiratory ventilation and administration of intravenous nutrition were more likely to develop a CLABSI [(OR 10.0, 95 percent CI 1.2-82.9) and (OR 5.1, 95 percent CI 1.6-16.0), respectively].

Unless or until hospitals adopt universal electronic medical records, adjustment for these factors may not be feasible. As facilities develop electronic medical records, mechanical ventilation and intravenous nutrition should be routinely captured and used to evaluate and adjust for risk of infection.

HAI Reporting Program Audit of Central Line Insertion Prevention Strategies in Adult, Pediatric and Neonatal Intensive Care Units – Table 66

No single intervention has been shown to be effective in preventing CLABSIs, but a group of evidence-based interventions have been found to be highly effective. This group of interventions is referred to as a "bundle" and includes hand washing; gowns, gloves and

masks to be worn by the inserter; skin cleansing of the insertion site with an antiseptic soap and protective barriers surrounding the insertion site.

In 2005, a number of hospitals in the greater NYC area voluntarily began participating in a collaborative initiative to reduce CLABSI in adult ICUs by implementing an infection prevention central line insertion bundle (GNYHA-UHF Collaborative). Though the focus of CL insertion bundles is aimed at the Adult ICU patient population, some hospitals also implemented components of the bundle in Pediatric and Neonatal ICUs.

During the audits of 2007, 88 percent (307/350) of the ICUs claim to have implemented this standardized bundle and 71 percent (218/350) claim to monitor for compliance. Table 66 summarizes prevention strategies reported by adult, pediatric and neonatal ICUs.

Infection rates will be compared for participating and non-participating facilities as of 2007 and during 2008. Additional information will attempt to be gathered during the HAI program audits of 2008 to evaluate various aspects of bundle implementation and monitoring.

HAI Reporting Program Audit of Surveillance Practices for CLABSIs – Table 67

As part of the audit process, HAI staff interviewed hospital infection control and ICU staff in 145 hospitals and 350 ICUs to evaluate hospitals' methods to identify cases to ensure compliance with reporting requirements.

A variety of surveillance methods are necessary to ensure the complete and accurate reporting of CLABSIs. Although multiple methods are used, the most frequently reported case detection method was follow-up of positive blood cultures (96 percent (337/350) of surveyed ICUs).

Electronic surveillance systems are used only in 11 percent (39/350) of hospital ICUs. Several software manufacturers are currently adapting their systems to support NHSN reporting. These efforts will hopefully result in better detection and reduction in staff time for infection surveillance, monitoring and reporting. Thus, allowing more time and effort to be dedicated to infection prevention efforts.

INFECTION CONTROL RESOURCES IN NEW YORK STATE HOSPITALS

To measure the impact of mandatory HAI reporting on infection control resources, a baseline survey was conducted in March 2007. An electronic survey of infection control resources and responsibilities was conducted by the State Department of Health on its secure data network. Questions included the number and percentage of time for infection control professionals (ICPs) and hospital epidemiologist (HE) staff, ICP/HE educational background and certification, infection control program support services, activities and responsibilities of infection prevention and control program staff, and an estimate of time dedicated to such activities, including surveillance.

Practitioners in 222 (99 percent) of 224 acute care hospitals responded. The average number of ICPs per facility was dependent upon average daily census of acute care beds and ranged from a mean 0.64 full-time equivalent (FTE) ICPs in facilities with an average daily census of 100 beds or less to 6.5 FTE ICPs in facilities with an average daily census

of 900 beds or more. When the ICP resources were averaged over the health care settings for which they were responsible, the "average full-time ICP" was responsible for 151 acute care facility beds, 1.3 intensive care units (average 16 ICU beds), 21 long-term care facility beds, 0.6 dialysis centers, 0.5 ambulatory surgery centers, 4.8 ambulatory/outpatient clinics and 1.1 private practice offices. Infection control professionals reported that 45 percent of their time is dedicated to surveillance. Other activities for which ICPs reported at least partial responsibility include: staff education, quality assurance, occupational health, emergency preparedness, construction, central supply/processing, and risk management.

This survey will be repeated and the information used to monitor and assess infection prevention and control resources and activities in hospitals as New York State implements mandatory public reporting of HAI rates. The information will also be used to determine whether infection control resources correlate with the completeness and accuracy of HAI reporting.

HOSPITAL-ACQUIRED INFECTION PREVENTION PROJECTS - FY 2007-2008

During the State fiscal year of 2007-2008, three projects received funding to reduce transmission of hospital-associated infections and enhance the knowledge of new infection prevention specialists. These three groups were uniquely qualified given their experience and readily available expertise.

Healthcare Association of New York State (HANYS), 53 hospitals statewide - $105,023

The Healthcare Educational and Research Fund (HERF), a non-profit subsidiary of HANYS, was funded to provide comprehensive educational programs and monitor the systematic implementation of evidence-based control measures to reduce ventilator-associated pneumonia infections (VAP) in critical care patients. Morbidity and mortality associated with the development of VAP are high, with mortality rates ranging from 20 to 41 percent.

Greater New York Hospital Association (GNYHA), 30 hospitals - $174,860

GNYHA is coordinating the development, implementation, and evaluation of comprehensive evidence-based practices to prevent and control *Clostridium difficile* (C. diff) infections. C. diff is a multi-drug resistant, toxin-producing bacterium that is responsible for most cases of antibiotic-associated diarrhea. This initiative is one of the first in the nation to specifically target these infections.

New York State Association for Professionals in Infection Control and Epidemiology Coordinating Council (NYSACC) - $64,709

NYSACC was funded to develop, plan and conduct a comprehensive, one-week infection control training course for novice ICPs. The course was held May 12-16, 2008. Participants were given paper and electronic copies of all course materials as well as the references, guidelines and recommendations used to provide the evidence-based interventions recommended for the prevention and control of infections in patients in hospital and long-term care settings.

HAI PREVENTION PROJECTS – FY 2008-2009

On August 22, 2007, DOH issued a Request for Applications (RFA) from non-profit health care organizations to develop, implement and evaluate strategies to reduce or eliminate targeted hospital-acquired infections. To be eligible, each applicant had to obtain the collaboration and commitment of at least five participating hospitals. The HAI reporting program is responsible for the evaluation, selection and oversight of the projects.

One-year contracts were awarded beginning March 1, 2008, with the possibility of renewal for up to four more years. The following contractors were selected:

Beth Israel Medical Center, New York City - $199,941

This project is designed to evaluate the impact of obtaining MRSA cultures on patients admitted to critical care units in five hospitals. Although the ultimate goal is reducing MRSA transmission and infection, other objectives include measuring the costs and effectiveness of this strategy, determining whether there is a concomitant reduction in the length of stay in the critical care unit or reduction in mortality, and measuring the indirect effects on the incidence of other antibiotic-resistant organisms.

New York City Health & Hospitals Corporation (HHC), New York City - $200,000

HHC will implement and evaluate multiple strategies to decrease the incidence of hospital-acquired infections associated with multidrug-resistant organisms in intensive care units in six municipal hospitals. Active surveillance cultures, instituting central line protocols and antimicrobial catheters are among the interventions under evaluation.

North Shore University Hospital, Manhasset - $199,996

This project will evaluate MRSA transmission and infection in ICUs by using rapid MRSA detection technology and strain typing of isolates. These new molecular techniques will be used to provide timely and accurate case management of patients with MRSA, determine whether and to what extent transmission is occurring, and ultimately to measure the impact on the reduction of MRSA infection in participating ICUs.

University of Rochester School of Medicine & Dentistry, Rochester - $192,573

This project is designed to reduce central line-associated bloodstream infections outside the ICU using evidence-based protocols for central line insertion and care. Past initiatives have focused on critical care patients. The institution of facility-wide integration and measurement poses multiple challenges. This project should provide reproducible methods and outcomes similar to those seen in critical care units.

Westchester County Healthcare Corporation – Valhalla - $199,991

This project is designed to reduce the incidence of hospital-associated bloodstream infections in intensive care and respiratory care patients. These infections have been found to extend the length of stay and increase costs by up to $40,000 per survivor. ICU patients are at particularly high risk for health care-associated BSI due to the frequency of central line use and underlying disease state. It is hoped that the use of topical antimicrobial agents will reduce the microbial load on the skin, minimize acquisition of new organisms, and reduce bloodstream infections due to skin flora. Participating hospitals will collect pre-intervention data, educate practitioners to ensure proper use of the antimicrobial agent, assess skin tolerance, and measure the impact on infection rates.

MANDATORY REPORTING OF INFECTIONS IN 2008

The New York State Department of Health met with technical advisors and consumers in September 2007 and presented a status report on implementation, preliminary results of hospital audits and feedback from hospitals.

The only changes between 2007 and 2008 reporting indicators involve the addition of SSIs associated with hip procedures and continuous monthly reporting of CLABSIs in critical care units. Attachment B lists the explicit ICD-9 codes used to define the procedures.

The following reporting indicators were selected for reporting in 2008:

- Surgical site infections associated with coronary artery bypass graft procedures (all procedures listed in Attachment B);
- Surgical site infections associated with colon procedures (all procedures in facilities performing fewer than 150 procedures or a minimum of 150 procedures for facilities that perform more than 150 colon procedures annually);
- Surgical site infections associated with hip replacements and revisions (all procedures listed in Attachment B); and
- Central line-associated bloodstream infections (CLABSIs) associated with the following critical care units: medical, surgical, medical-surgical, pediatric, neonatal, cardiothoracic surgical, coronary and neurosurgical. Surveillance and reporting will be required throughout the year. DOH's hospital-specific infection rates will not include reports of clinical sepsis in neonates and infants, given the detection and reporting issues presented in this document.

CONCLUSIONS

The pilot phase was used to establish and integrate mandatory reporting of HAIs in New York hospitals. All but one hospital participated in the DOH HAI Reporting Program training sessions, enrolled in the National Healthcare Safety Network, and conducted surveillance using the standard definitions and protocols. Ninety-six percent of facilities complied with the 2007 reporting requirements. The eight facilities that did not comply were cited and subsequently provided a plan of correction.

Significant Data Findings

The hospital-specific colon SSI rates in some facilities were consistently higher than other hospitals across all risk categories. HAI regional program staff members have been working with these hospitals to evaluate differences and discuss potential interventions. The need for further risk adjustment will be evaluated since additional risk factors were identified in our audits. The patient-related risk factors associated with colon SSIs were obesity and male gender. The procedure-related risk factors were performing multiple procedures through the same incision and performing emergency or emergency/trauma procedures.

State coronary artery bypass graft surgery donor vessel site infections in 2007 were lower than national rates for 2002-2004, perhaps due to increased use of laparoscopic methods to harvest the donor vessel. Coronary artery bypass graft surgery chest site incision infections were similar to national rates.

- Multiple risk factors were associated with chest site infections including obesity, diabetes, immunodeficiency, post-operative renal failure, respiratory failure and bleeding requiring re-operation. Unfortunately, many of these risk factors cannot be controlled by the hospital.
- A high proportion of facilities recommended pre-operative chlorhexidine bathing and used nasal mupirocin on these patients. The patient-specific use of these agents was not routinely documented in the medical record, so DOH audits were inconclusive.

New York's CLABSI rates in coronary and pediatric intensive care units were lower than national data but CLABSI rates in NYS surgical ICUs were higher. Within the State, New York City facilities had lower CLABSI rates in medical and surgical intensive care units. This difference may be attributable to a major collaborative initiative that began in late 2005 in New York City (GNYHA and United Hospital Fund project).

- The audits revealed an increased incidence of infection for patients with multiple central lines and those whose lines were placed in the intensive care unit rather than before hospital admission (information not currently collected by the NHSN).

CLABSI rates within some birth weight categories in neonatal intensive care units in the State were higher than national rates, although this was not a consistent finding.

- No single hospital had consistently higher CLABSI rates across all birth weight categories.
- CLABSI rates statewide and nationally decrease as the birth weight increases. The lower birth weight babies are more likely to develop virtually all complications since all body systems are underdeveloped.
- Higher CLABSI rates in neonates were associated with mechanical ventilation and intravenous nutrition.

The primary objectives for the pilot year were to evaluate the strengths and weaknesses of the reporting system and make revisions for 2008 reporting.

The major strengths of using NHSN were confirmed:

- Standard definitions could be applied consistently.
- These definitions are used throughout the United States and in other countries.

- CDC served as a valued partner and was available to assist and support DOH, clarify the interpretation of data elements and definitions, and provide information technology support.
- Hospitals could immediately use the information reported, calculate trends over time and compare their infection rates with national rates.
- Hospitals have begun to use the system for collaborative intervention initiatives to reduce HAIs.

The major weaknesses of using NHSN were:

- Due to confidentiality agreements, hospitals had to take additional steps to grant DOH permission to view and analyze their data. These steps could have been averted or minimized if DOH had been able to make this modification internally.
- DOH could not make universal system modifications. To make system changes or collect additional information, DOH had to ask all hospitals to create the same customized data entry fields in the same way.
- DOH could not unilaterally modify definitions; CDC had to. This may not necessarily be a weakness because any state-specific modification or change affects hospitals' ability to compare themselves with other hospitals across the nation.

Hospitals will continue to monitor and report colon SSIs, CABG SSIs and CLABSIs in adult, pediatric and neonatal ICUs during 2008. In addition, hip replacement surgical site infections will be monitored and reported. Thirteen regional training programs were held in the fall of 2007 to update HAI reporting mandates, system changes, definition changes, and the use of customized data fields to enhance data quality.

Before the public reporting of hospital-identified HAI rates in 2009, DOH will need to further evaluate the influence of hospital size, patient population characteristics and other risk factors to determine whether further adjustment is needed. DOH will work closely with its technical advisors and consumers to develop meaningful, credible HAI rates by hospital.

PROGRAM PERSONNEL

Central Office

Program Director – Rachel L. Stricof, MT, MPH., CIC
Program Manager – Carole Van Antwerpen, RN, BSN, CIC – 9/7/06 - present
Program Operations Manager – Cindi (Coluccio) Dubner, BS – 7/13/06 - present
Data Manager – Karolina Schabses, MPH – 8/1/06 - 8/24/07
Data Analyst – Boldtsetseg Tserenpuntsag, DrPh – 11/2/06 - present
Administrative Assistant – Patricia Lewis, AAS - 9/16/06 - present

Regional Staff

Western Region – Peggy Hazamy, RN, BSN, CIC – 2/8/07 - present
Central Region - Diana Doughty, RN, MBA, CIC, CPHQ – 2/8/07 - present
Capital Region – covered by Program Manager, Carole Van Antwerpen, RN, BSN, CIC
New Rochelle Region – Betsy Todd, RN, MPH, CIC – 3/8/07 – 5/16/08
Long Island Region – Marie Tsivitis, MPH, CIC – 3/8/07 - present
New York City Region – Kathleen Gase, MPH, CIC – 10/1/07 - present

Students from the School of Public Health

Kamal Siag, MD - 5/17/07 - 8/24/07
Edgar Manukyan, MD - 8/20/07 to 5/07
Andrea Fischer, MPH - 1/3/08 to Present

Abbreviations

ASA – American Society of Anesthesiologists' Classification of Physical Status
CABG – Coronary Artery Bypass Graft Surgery
CBGB – Coronary Bypass Graft with Chest and Separate Donor Site
CBGC – Coronary Bypass Graft with Chest Incision Only
CDC – Centers for Disease Control and Prevention
CEOs – Chief Executive Officers
CI – Confidence Interval
CL – Central Line
CLABSI – Central Line Associated Bloodstream Infection
CNS – Coagulase Negative Staphylococcus
CPT – Current Procedural Technology codes
CSEP – Clinical Sepsis
CSRS – Cardiac Surgery Reporting System
DIP – Deep Incisional Infection at the Primary Surgical Site (for CABG procedures, this would be the chest site)
DIS – Deep Incisional Infection at the Secondary Surgical Site (for CABG procedures, this would be the donor vessel site)
DOH – New York State Department of Health
FTE – Full-Time Equivalent
GNYHA – Greater New York Hospital Association
HAI – Hospital-Acquired Infection
HANYS – Hospital Association of New York
HE – Hospital Epidemiologist
HERF – Healthcare Education and Research Fund
IC – Infection Control
ICD-9 – International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM)
ICP – Infection Prevention and Control Specialist
ICU – Intensive Care Unit
IT – Information Technology
LAN – Local Area Network
LCBI – Laboratory Confirmed Bloodstream Infection
MDRO – Multi-Drug Resistant Organisms
MOU – Memorandum of Understanding
MRSA – Methicillin-Resistant *Staphylococcus aureus*
MSSA – Methicillin-Sensitive *Staphylococcus aureus*
NICU – Neonatal Intensive Care Unit
NHSN – National Healthcare Safety Network
NNIS – National Nosocomial Infection Surveillance System
NYS – New York State
NYSACC – New York State Association for Professionals in Infection Control and Epidemiology
NYSDOH – New York State Department of Health
OR – Operating Room
OR – Odds Ratio-Statistical
OS – Organ Space Infection Site
PDS – Post-Discharge Surveillance
PHL – Public Health Law

RPC – Regional Perinatal Center (Level IV – highest level of NICU care)
SHEA – Society for Healthcare Epidemiology of America
SIP – Superficial Incisional Infection at the Primary Surgical Site (for CABG procedures, this would be the chest site)
SIS – Superficial Incisional Infection at the Secondary Surgical Site (for CABG procedures, this would be the donor vessel site)
SSI – Surgical Site Infection
TAW – Technical Advisory Group
UB – Umbilical Catheter
UCAB – Umbilical Catheter Associated Infection
VAP – Ventilator-Associated Pneumonia
VRE – Vancomycin-Resistant Enterococci

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Public Health Law 2819

§ 2819. Hospital acquired infection reporting. 1. For the purposes of this section, "hospital acquired infection" shall mean any localized or systemic patient condition that:

(a) resulted from the presence of an infectious agent or agents, or its toxin or toxins as determined by clinical examination or by laboratory testing; and

* (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.

* NB Effective until January 1, 2008

* (b) was not found to be present or incubating at the time of admission unless the infection was related to a previous admission.

* NB Effective January 1, 2008

2. (a) Each general hospital shall maintain a program capable of identifying and tracking hospital acquired infections for the purpose of public reporting under this section and quality improvement.

(b) Such programs shall have the capacity to identify the following elements: the specific infectious agents or toxins and site of each infection; the clinical department or unit within the facility where the patient first became infected; and the patient's diagnoses and any relevant specific surgical, medical or diagnostic procedure performed during the current admission.

(c) The department shall establish guidelines, definitions, criteria, standards and coding for hospital identification, tracking and reporting of hospital acquired infections which shall be consistent with the recommendations of recognized centers of expertise in the identification and prevention of hospital acquired infections including, but not limited to the National Health Care Safety Network of the Centers for Disease Control and Prevention or its successor. The department shall solicit and consider public comment prior to such establishment.

(d) Hospitals shall be initially required to identify, track and report hospital acquired infections that occur in critical care units to include surgical wound infections and central line related bloodstream infections.

* (e) Subsequent to the initial requirements identified in paragraph (d) of this subdivision the department may, from time to time, require the tracking and reporting of other types of hospital acquired infections (for example, ventilator-associated pneumonias) that occur in hospitals in consultation with technical advisors who are regionally or nationally-recognized experts in the prevention, identification and control of hospital acquired infection and the public reporting of performance data.

* NB Effective until January 1, 2008

* (e) For hospital acquired infections for which the department requires tracking and reporting as permitted in this section, hospitals shall be required to report a suspected or confirmed hospital-acquired infection associated with another hospital to the originating hospital. Documentation of reporting should be maintained for a minimum of six years.

* NB Effective January 1, 2008

* (f) Subsequent to the initial requirements identified in paragraph (d) of this subdivision the department may, from time to time, require the tracking and reporting of other types of hospital acquired infections (for example, ventilator-associated pneumonias) that occur in hospitals in consultation with technical advisors who are regionally or nationally-recognized experts in the prevention, identification and control of hospital acquired infection and the public reporting of performance data.

* NB Effective January 1, 2008

* 3. Each hospital shall regularly report to the department the hospital infection data it has collected. The department shall establish data collection and analytical methodologies that meet accepted standards for validity and reliability. In no case shall the frequency of reporting be required to be more frequently than once every six months, and reports shall be submitted not more than sixty days after the close of the reporting period.

* NB Effective until January 1, 2008

* 3. Each hospital shall regularly report to the department the hospital infection data it has collected. The department shall establish data collection and analytical methodologies that meet accepted standards for validity and reliability. The frequency of reporting shall be monthly, and reports shall be submitted not more than sixty days after the close of the reporting period.

* NB Effective January 1, 2008

4. The commissioner shall establish a state-wide database of all reported hospital acquired infection information for the purpose of supporting quality improvement and infection control activities in hospitals. The database shall be organized so that consumers, hospitals, healthcare professionals, purchasers and payers may compare individual hospital experience with that of other individual hospitals as well as regional and state-wide averages and, where available, national data.

5. (a) Subject to paragraph (c) of this subdivision, on or before May first of each year the commissioner shall submit a report to the governor and the legislature, which shall simultaneously be published in its entirety on the department's web site, that includes, but is not limited to, hospital acquired infection rates adjusted for the potential differences in risk factors for each reporting hospital, an analysis of trends in the prevention and control of hospital acquired infection rates in hospitals across the state, regional and, if available, national comparisons for the purpose of comparing individual hospital performance, and a narrative describing lessons for safety and quality improvement that can be learned from leadership hospitals and programs.

(b) The commissioner shall consult with technical advisors who have regionally or nationally acknowledged expertise in the prevention and control of hospital acquired infection and infectious disease in order to develop the adjustment for potential differences in risk factors to be used for public reporting.

(c)(i) No later than July first, two thousand six, the department shall establish a hospital acquired infection reporting system capable of receiving electronically transmitted reports from hospitals. Hospitals shall begin to submit such reports as directed by the commissioner but in no case later than January first, two thousand seven.

(ii) The first year of data submission under this section shall be considered the "pilot phase" of the statewide hospital- acquired infection reporting system. The purpose of the pilot phase is to ensure, by various means, including any audit process referred to in subdivision seven of this section, the completeness and accuracy of hospital acquired infection reporting by hospitals. For data reported during the pilot phase, hospital identifiers shall be encrypted by the department in any and all public databases and reports. The department shall provide each hospital with an encryption key for that hospital only to permit access to its own performance data for internal quality improvement purposes.

(iii) No later than one hundred eighty days after the conclusion of the pilot phase, the department shall issue a report to hospitals assessing the overall accuracy of the data submitted in the pilot phase and provide guidance for improving the accuracy of hospital acquired infection reporting. The department shall issue a report to the governor and the legislature assessing the overall completeness and accuracy of the data submitted by hospitals during the pilot phase and make recommendations for the improvement or

modification of hospital acquired infection data reporting based on the pilot phase as well as share lessons learned in prevention of hospital acquired infections. No hospital identifiable data shall be included in the pilot phase report, but aggregate or otherwise de-identified data may be included.

(iv) After the pilot phase is completed, all data submitted under this section and compiled in the statewide hospital acquired infection database established herein and all public reports derived therefrom shall include hospital identifiers.

6. Subject to subdivision five of this section, a summary table, in a format designed to be easily understood by lay consumers, that includes individual facility hospital acquired infection rates adjusted for potential differences in risk factors and comparisons with regional and/or state averages shall be developed and posted on the department's web site. The commissioner shall consult with consumer and patient advocates and representatives of reporting facilities for the purpose of ensuring that such summary table report format is easily understandable by the public, and clearly and accurately portrays comparative hospital performance in the prevention and control of hospital acquired infections.

7. To assure the accuracy of the self-reported hospital acquired infection data and to assure that public reporting fairly reflects what actually is occurring in each hospital, the department shall develop and implement an audit process.

8. For the purpose of ensuring that hospitals have the resources needed for ongoing staff education and training in hospital acquired infection prevention and control, the department may make such grants to hospitals within amounts appropriated therefor.

9. Individual patient identifying information reported to the department under this section shall be subject to paragraph (j) of subdivision one of section two hundred six of this chapter. Regulations under this section shall include standards to assure the protection of patient privacy in data collected and released under this section and standards for the publication and release of data reported under this section.

Memorandum of Understanding between the New York State Department of Health and the Centers for Disease Control and Prevention Relating to the Reporting of Hospital-Associated Infections

This is a Memorandum of Understanding ("MoU") made as of the 19th day of January, 2007 between the New York State Department of Health ("DOH"), Corning Tower, Empire State Plaza, Albany, New York, and the Centers for Disease Control and Prevention ("CDC"), 1600 Clifton Road, NE, Atlanta, Georgia, relating to the reporting of hospital-associated infections by hospitals located in New York State, pursuant to the mandate in New York State (NYS) Public Health Law (" NYS PHL") § 2819.

WHEREAS the National Healthcare Safety Network (NHSN) of the CDC has developed and operationalized an electronic system with accepted standards for validity and reliability for the identification and reporting of healthcare-associated infections; and

WHEREAS a growing number of New York State hospitals now voluntarily report healthcare-associated infections to the CDC in accordance with the protocols of the NHSN; and

WHEREAS the New York State Legislature passed PHL § 2819 in 2005 which requires hospitals to regularly identify, track and report hospital infection data in a system that is consistent with the recommendations of the NHSN of the CDC and other recognized centers of expertise; and

WHEREAS the DOH seeks to minimize costs involved in system development, reduce errors involved in duplicative data entry and maximize consistency to promote accurate and comprehensive analyses;

NOW, THEREFORE, the DOH and the CDC agree as follows:

1. The DOH agrees to instruct its regulated hospitals to report various hospital-associated infections to New York State via the NHSN in satisfaction of the requirements of NYS PHL § 2819.

2. The CDC agrees to receive such reports as DOH's authorized representative and designated recipient of data and provide DOH with a mechanism for immediate and ongoing access to the hospital submitted data contained in the NHSN.

3. CDC agrees to provide a mechanism to enable the DOH to retrieve and store data on an ongoing, daily basis.

4. CDC agrees to ensure that the NHSN is secure and meets, at a minimum, the prevailing business standard for security features and for disaster recovery.

5. The NHSN agrees to be compliant with the Public Health Information Network ("PHIN") or successor standards.

6. The CDC agrees to provide technical assistance to support hospital enrollment into the NHSN and for data entry using the NHSN.

7. The CDC and the DOH agree to work collaboratively to ensure that hospitals in New York State are adequately trained to use the NHSN.

8. CDC affords each participating NHSN facility in New York the following Assurance of Confidentiality: "The information obtained in this surveillance system that would permit identification of any individual or institution is collected with a guarantee that it will be held in strict confidence, will be used only for the purposes stated, and will not be disclosed or released without the consent of the individual, or the institution in accordance with Section 304, 306, and 308(d) of the Public Health Service Act (42 USC 242b, 242k, and 242m(d))."

9. DOH agrees to only approve disclosure of the information as provided by NYS PHL § 206(1)(j), namely, when " used solely for the purposes of medical or scientific research or the improvement of the quality of medical care through the conduction of medical audits. Such information shall not be admissible as evidence in any action of any kind in any court or before any other tribunal, board, agency, or person." NYS PHL § 206(1)(j)

10. CDC agrees to inform DOH of Federal Freedom of Information Act (FOIA) requests it receives for information it has collected pursuant to this agreement as soon as possible after such a request is received. FOIA requires that CDC disclose this information upon request unless an exemption applies. As required by FOIA, CDC will make a determination as to whether such information will be disclosed or whether it will be withheld because of an applicable exemption. At the time of the execution of this document, CDC represents that the information described in this agreement can be categorized as exempt from FOIA because it is protected from release by Section 308(d) of the Public Health Service Act (see 8., above). CDC agrees to inform DOH of its determination.

11. This MOU shall continue for three years from the date of execution by both parties and may be renewed for three year periods after that with the written consent of both parties.

12. No funds are authorized under this MOU.

13. Any disputes regarding the interpretation or implementation of this MOU will be resolved only by consultation between CDC and DOH.

14. This MOU represents the entire agreement of the parties. Amendments to this MOU may be made with the written consent of both parties. Termination will occur, without cause, when one party provides 60 day advance notice in writing to the other party of the intent to terminate at a specified date.

IN WITNESS WHEREOF, the parties to this agreement have executed the document by their duly authorized representatives as of the date and year herein subscribed.

Centers for Disease Control and Prevention

By: _____

Title: Director, NCPDCID

Date: 1/19/07

New York State Department of Health

By: _____

Title: Director, Center for Community Health

Date: 1/29/07

Name	Facility	Representation	Joined Date	Replaced
Audrey Adams	Montefiore Medical Center	Infection Control	May 2006	
Donna Armellino	North Shore University Hospital	Infection Control	May 2006	
Elizabeth Coughlin	New York Westchester Square	Infection Control	May 2006	
Consuelo Dungca	NYC Health & Hospitals Corporation	Healthcare organization	May 2006	
Sarah Elmendorf	Albany Medical Center	Hospital Epidemiology	May 2006	
Christine Gagnon	VA Medical Center	Infection Control	May 2006	
Lorri Goergen	United Memorial Medical Center	Infection Control	May 2006	
Eileen Graffunder	Albany Medical Center	Researcher	May 2006	
Paul Graman	Strong Memorial Hospital	Hospital Epidemiology	May 2006	
Linda Greene	Via Health Rochester	Infection Control	May 2006	
Janet Haas	New York University	Infection Control	May 2006	
Edward Hannan	School of Public Health	Researcher	May 2006 End Date: May 2008	
Linda Kokoszki	St. Elizabeth Medical Center	Infection Control	May 2006	
Brian Koll	Beth Israel Medical Center	Hospital Epidemiology	May 2006	
Art Levin	Center for Medical Consumers	Consumer	May 2006	
John McNelis	Long Island Jewish Medical Center	Surgeon	May 2006	
Marisa Montecalvo	Westchester Medical Center	Hospital Epidemiology	May 2006	
Nancy Pelham	Kaleida Health	Infection Control	September 2007	Linda Campagna
Lisa Saiman	Morgan Stanley Children's Hospital	Hospital Epidemiology	September 2008	
Kent Sepkowitz	Sloan-Kettering	Hospital Epidemiology	May 2006	
Terri Straub	Greater New York Hospital Association	Healthcare Association	May 2006	
Rhonda Susman	Crouse Hospital	Infection Control	May 2006	
Michael Tapper	Lenonx Hill Hospital	Hospital Epidemiology	May 2006	
Mary Therriault	HANYS	Healthcare Association	September 2007	Kathy Ciccone
Gianna Zuccotti	Sloan-Kettering	Hospital Epidemiology	September 2007	

STATE OF NEW YORK
DEPARTMENT OF HEALTH

Corning Tower The Governor Nelson A. Rockefeller Empire State Plaza Albany, New York 12237

Antonia C. Novello, M.D., M.P.H., Dr.P.H.
Commissioner

Dennis P. Whalen
Executive Deputy Commissioner

August 28, 2006

Dear Chief Executive Officer:

Public Health Law 2819, enacted in 2005, requires surveillance and reporting of Hospital-Acquired Infections (HAI) by general hospitals in New York State no later than January 1, 2007. The New York State Department of Health (NYSDOH) has designated the National Healthcare Safety Network (NHSN) of the Centers for Disease Control and Prevention as the required reporting mechanism for the pilot year, 2007.

On May 5, 2006, the Department met with technical advisors to determine appropriate surgical procedures for surveillance during the pilot year. This workgroup agreed upon coronary artery bypass procedures and colon procedures due to their frequency, severity of infection-related complications, potential for risk adjustment and potential for quality improvement.

Trainings will be held throughout the state during October and November to introduce hospital staff to the NHSN and describe the NYSDOH surveillance and reporting requirements for 2007. These trainings will provide the necessary information for your staff to enroll your facility in the NHSN, perform surveillance and report the selected HAI indicators (see attached). Your facility's infection control practitioner(s) should attend this training. Other personnel involved in infection surveillance, data entry and data analysis should also consider attending. Please have designated staff complete and submit the attached training registration form by **October 4, 2006**.

I hope your staff finds these trainings valuable for implementation of the HAI reporting legislation in New York State. For further information, please visit **https://commerce.health.state.ny.us/hpn/cch/hosp_infection/** or contact Rachel L. Stricof, HAI Reporting Program Director, at 518-474-7000.

Sincerely,

Antonia C. Novello, M.D., M.P.H., Dr.P.H.
Commissioner of Health

cc Infection Control Department

STATE OF NEW YORK
DEPARTMENT OF HEALTH

Corning Tower The Governor Nelson A. Rockefeller Empire State Plaza Albany, New York 12237

Richard F. Daines, M.D.
Commissioner

Wendy E. Saunders
Chief of Staff

Date

Dear CEO (put in actual name):

The New York State Department of Health will be conducting an audit and evaluation of medical records and intensive care unit policies and procedures to evaluate implementation of the hospital-acquired infection reporting legislation. The purposes of this audit are multiple and include:

1. To determine the reliability and consistency of surveillance definitions.
2. To evaluate current surveillance methods used to detect infections.
3. To evaluate current risk adjustment methods and determine if additional factors need to be considered for public reporting purposes.
4. To evaluate intervention strategies designed to reduce or eliminate specific infections.

A site visit has been scheduled for [insert date] with [insert name of facility contact]. To expedite the review process, I am attaching a list of medical records for review. If these records could be made available on [date], it would be greatly appreciated. If your Health Information System has initiated or completed conversion to an electronic medical record, I will need the ability to access these records including any diagnostic/laboratory results related to these patients.

The site visit is likely to occur over several days. During this visit, I will be available to describe the process and evaluation tools. If issues regarding implementation are identified, recommendations may be made during and at the conclusion of the visit.

Should there be any scheduling difficulties, please contact me directly, either by phone [ ] or email [ ].

Sincerely,

HAI Regional Representative

Colon

Surgical

Site

Infection

Tables

Table 1. Colon Surgical Site Infection Rates by Risk Category, New York State, 2007, Data reported as of April 1, 2008

Operative Procedure	Risk Category	No. Hospitals	No. Infections	No. Procedures	Mean Rate	Percentile				
						10%	25%	50% (median)	75%	90%
Colon	M,0	179	264	5815	4.5	0.0	0.0	2.0	7.1	11.8
Colon	1	181	490	7759	**6.3 H**	0.0	0.0	4.8	9.1	15.1
Colon	2	179	284	3729	7.6	0.0	0.0	4.6	12.5	17.6
Colon	3	130	44	469	9.4	0.0	0.0	0.0	20.0	45.0

Red = Significantly higher (**H**) than National rate for risk category.

Table 2. Colon Surgical Site Infection Rates by Risk Category, National Data, 1992 – 2004*

Operative Procedure Category	Risk Category	No. Hospitals	No. Procedures	Mean Rate	Percentile				
					10%	25%	50% (median)	75%	90%
Colon	M,0	99	20,637	3.98	0	1.93	3.22	5.0	6.42
Colon	1	107	33,527	5.66	1.91	3.36	5.10	6.97	8.96
Colon	2	84	13,777	8.54	3.92	5.48	9.09	11.62	17.16
Colon	3	28	1876	11.25	2.11	6.67	13.33	16.22	21.67

Most recent published data CDC NNIS System. National Nosocomial Infections Surveillance (NNIS) system report, Data summary from January 1992 to June 2004, issued October 2004. Am J Infect Control 2004;32:440-85.

Table 3. Colon Surgical Site Infection (SSI) Rates by Risk Category by Hospital, NYS, 2007, Data as of April 1, 2008

	Risk Category M,0			Risk Category 1			Risk Category 2			Risk Category 3		
Hospital	Inf	Proc	Rate/100	Inf	Proc	Rate/100	Inf	Proc	Rate/100	Inf	Proc	Rate/100
10019	0	45	0.0	5	79	6.3	**10**	**41**	**24.4 H**		*	
10058		*			*			*			*	
10087	1	25	4.0	6	103	5.8	5	109	4.6		*	
10168	11	138	8.0	**16**	**106**	**15.1 H**	7	67	10.4		*	
10218		*		5	61	8.2	2	35	5.7		*	
10241	5	118	4.2	4	100	4.0	1	35	2.9		*	
10242		*		1	29	3.4		*			*	
10243		*		0	37	0.0		*			*	
10257	2	32	6.3	3	56	5.4	1	33	3.0		*	
10260	5	58	8.6	7	75	9.3	7	60	11.7		*	
10273		*		0	38	0.0	0	32	0.0		*	
10297		*			*			*			*	
10330	9	208	4.3	5	110	4.5	5	32	15.6		*	
10357		*		1	21	4.8		*			*	
10385	4	54	7.4	1	51	2.0	3	26	11.5		*	
10387		*			*			*			*	
10396	3	30	10.0	0	27	0.0		*			*	
10465		*		3	35	8.6	4	27	14.8		*	
10480	2	47	4.3	3	61	4.9	4	21	19.0		*	
10492	**5**	**40**	**12.5 H**	**9**	**44**	**20.5 H**	1	22	4.5		*	
10556	1	31	3.2	4	39	10.3	4	22	18.2		*	
10628		*		3	23	13.0		*			*	
10632		*			*		5	27	18.5		*	
10670	2	72	2.8	2	49	4.1		*			*	
10673	0	30	0.0	2	25	8.0	2	24	8.3		*	
10678		*		1	24	4.2		*			*	
10679	0	44	0.0	**7**	**49**	**14.3 H**		*			*	
10680	**5**	**22**	**22.7 H**	2	46	4.3	2	28	7.1		*	
10682	2	54	3.7	4	92	4.3	4	24	16.7		*	
10684		*			*			*			*	
10687	3	45	6.7	0	57	0.0	0	31	0.0		*	
10688	3	32	9.4	3	39	7.7		*			*	
10694		*			*			*			*	
10712		*		2	20	10.0		*			*	
10714	4	45	8.9	1	51	2.0		*			*	
10719		*			*			*			*	
10728	2	40	5.0	4	36	11.1		*			*	

Hospital	Risk Category M,0			Risk Category 1			Risk Category 2			Risk Category 3		
	Inf	Proc	Rate/100	Inf	Proc	Rate/100	Inf	Proc	Rate/100	Inf	Proc	Rate/100
10729	1	41	2.4	11	91	12.1 H	3	36	8.3		*	
10730	0	27	0.0	0	51	0.0		*			*	
10731	1	29	3.4	4	101	4.0	5	67	7.5		*	
10739	0	35	0.0	0	39	0.0		*			*	
10748		*			*			*			*	
10749		*		5	24	20.8 H	1	22	4.5		*	
10751		*		7	63	11.1		*			*	
10753	0	52	0.0	0	68	0.0	0	25	0.0		*	
10755		*		0	49	0.0		*			*	
10756	4	82	4.9	8	188	4.3	6	88	6.8		*	
10757	2	43	4.7	3	49	6.1	2	41	4.9		*	
10759	2	52	3.8	1	35	2.9		*			*	
10761	3	28	10.7	1	34	2.9		*			*	
10765	3	86	3.5	2	51	3.9	1	20	5.0		*	
10769		*		3	54	5.6		*			*	
10770	3	76	3.9	1	67	1.5	1	39	2.6		*	
10771		*			*			*			*	
10772	8	144	5.6	14	248	5.6	13	115	11.3		*	
10773	0	30	0.0	1	32	3.1	0	25	0.0		*	
10777		*			*			*			*	
10779		*			*			*			*	
10781		*			*			*			*	
10785	2	32	6.3	3	73	4.1	0	27	0.0		*	
10789		*			*			*			*	
10790	4	41	9.8	6	94	6.4	0	38	0.0		*	
10791	10	116	8.6 H	6	56	10.7		*			*	
10797		*		3	22	13.6		*			*	
10798		*			*			*			*	
10800		*		0	21	0.0		*			*	
10803		*		0	22	0.0		*			*	
10804		*			*			*			*	
10807		*			*			*			*	
10810	3	86	3.5	1	39	2.6	5	23	21.7 H		*	
10811	2	56	3.6	8	64	12.5		*			*	
10812	0	26	0.0	4	53	7.5	2	44	4.5		*	
10816	7	163	4.3	1	130	0.8 L	2	26	7.7		*	

Hospital	Risk Category M,0			Risk Category 1			Risk Category 2			Risk Category 3		
	Inf	Proc	Rate/100	Inf	Proc	Rate/100	Inf	Proc	Rate/100	Inf	Proc	Rate/100
10817		*			*			*			*	
10822	10	130	7.7	12	113	10.6	3	63	4.8	2	27	7.4
10824		*			*		0	28	0.0		*	
10825	2	39	5.1	1	57	1.8	1	27	3.7		*	
10826		*			*		0	21	0.0		*	
10828		*			*			*			*	
10831	0	39	0.0	1	51	2.0		*			*	
10834	2	27	7.4		*			*			*	
10836		*			*			*			*	
10838	2	55	3.6	1	21	4.8		*			*	
10840		*			*			*			*	
10842		*			*			*			*	
10844		*									*	
10845	1	66	1.5	5	107	4.7	4	62	6.5		*	
10847	5	70	7.1	3	61	4.9		*			*	
10848		*			*		1	23	4.3		*	
10853	0	42	0.0	5	73	6.8	1	25	4.0		*	
10854		*		0	33	0.0		*			*	
10860		*		2	24	8.3		*			*	
10861		*			*			*			*	
10862	0	33	0.0	1	71	1.4	1	31	3.2		*	
10863		*		3	23	13.0		*			*	
10866	0	21	0.0		*			*			*	
10867		*			*			*			*	
10868	2	30	6.7	5	75	6.7	5	36	13.9		*	
10869		*			*			*			*	
10871		*			*			*			*	
10872		*			*			*			*	
10874	1	45	2.2	4	56	7.1	1	33	3.0		*	
10876		*			*			*			*	
10878	2	75	2.7	18	182	9.9	7	73	9.6		*	
10879		*			*			*			*	
10880		*		0	28	0.0		*			*	
10881	2	108	1.9	14	287	4.9	9	110	8.2		*	
10882		*			*			*			*	
10888		*			*			*			*	
10890		*		0	25	0.0		*			*	
10891		*			*			*			*	
10893	2	76	2.6	7	155	4.5	3	79	3.8	0	23	0.0

Hospital	Risk Category M,0			Risk Category 1			Risk Category 2			Risk Category 3		
	Inf	Proc	Rate/100	Inf	Proc	Rate/100	Inf	Proc	Rate/100	Inf	Proc	Rate/100
10894		*		2	24	8.3		*			*	
10898		*		4	29	13.8	3	22	13.6		*	
10899	3	34	8.8	7	69	10.1	6	45	13.3		*	
10900	5	109	4.6	8	98	8.2	0	28	0.0		*	
10901	4	97	4.1	5	33	15.2		*			*	
10902	0	53	0.0	0	29	0.0		*			*	
10903		*			*			*			*	
10905		*			*			*			*	
10906		*		1	25	4.0		*			*	
10908		*		2	33	6.1		*			*	
10909		*		7	40	17.5 H	2	34	5.9		*	
10911		*		5	36	13.9		*			*	
10913	6	41	14.6 H	5	26	19.2 H		*			*	
10914	1	39	2.6	11	86	12.8 H	6	29	20.7 H		*	
10915		*			*			*			*	
10916		*		2	29	6.9		*			*	
10917	1	51	2.0	0	51	0.0	2	24	8.3		*	
10918		*			*			*			*	
10920		*			*			*			*	
10924	2	38	5.3	0	33	0.0		*			*	
10928		*		1	49	2.0	0	31	0.0		*	
10936	2	27	7.4	11	43	25.6 H	1	21	4.8		*	
10938	6	51	11.8 H	6	83	7.2	2	36	5.6		*	
10942		*			*			*			*	
10943	0	36	0.0	6	87	6.9	6	41	14.6		*	
10947		*		1	22	4.5		*			*	
10948	0	30	0.0	2	62	3.2	0	26	0.0		*	
10950		*		1	40	2.5		*			*	
10951	5	177	2.8	6	146	4.1	3	31	9.7		*	
10952	3	93	3.2	15	76	19.7 H	4	23	17.4		*	
10956		*			*			*			*	
10959		*		2	28	7.1		*			*	
10962	2	28	7.1		*			*			*	
10963	1	138	0.7 L	9	105	8.6	3	44	6.8		*	
10964		*			*			*			*	
10965	6	70	8.6	2	28	7.1		*			*	
10966		*			*			*			*	
10967		*		1	21	4.8		*			*	
10975		*			*			*			*	
10977	1	37	2.7	4	62	6.5	6	38	15.8		*	

Hospital	Risk Category M,0			Risk Category 1			Risk Category 2			Risk Category 3		
	Inf	Proc	Rate/100	Inf	Proc	Rate/100	Inf	Proc	Rate/100	Inf	Proc	Rate/100
10978		*			*			*			*	
10980		*		3	38	7.9	6	53	11.3		*	
10987	2	22	9.1	2	22	9.1	0	23	0.0		*	
10991		*		0	24	0.0		*			*	
11002		*		1	26	3.8		*			*	
11005	0	51	0.0	0	28	0.0		*			*	
11008		*			*			*			*	
11011		*		0	31	0.0		*			*	
11013	2	23	8.7	1	35	2.9		*			*	
11015		*		2	32	6.3	5	39	12.8		*	
11016		*		1	45	2.2	0	24	0.0		*	
11023	0	40	0.0	1	29	3.4		*			*	
11027		*		1	22	4.5		*			*	
11030	0	46	0.0	0	44	0.0	0	30	0.0		*	
11032	6	84	7.1	0	45	0.0		*			*	
11033		*			*			*			*	
11038		*			*			*			*	
11039	1	23	4.3	2	41	4.9		*			*	
11042	0	33	0.0	2	42	4.8	1	28	3.6		*	
11046	3	27	11.1	1	45	2.2	0	26	0.0		*	
11050		*			*			*			*	
11052		*			*			*			*	
11056	1	20	5.0	2	32	6.3		*			*	
11071	3	28	10.7	**9**	**47**	**19.1 H**		*			*	
11074	5	57	8.8	8	70	11.4	2	30	6.7		*	
11086	0	47	0.0	2	27	7.4		*			*	
11127		*			*		1	27	3.7		*	
11141		*		**4**	**21**	**19.0 H**		*			*	
11212	0	22	0.0	0	23	0.0		*			*	
11407	1	48	2.1	3	69	4.3	3	29	10.3		*	
Total	**264**	**5815**	**4.5**	**490**	**7759**	**6.3**	**284**	**3729**	**7.6**	**44**	**469**	**9.4**

Risk category-specific rates used as reference population for statistical analysis.
* = Insufficient number (less than 20) of procedures
Red = Significantly higher (**H**) than NYS average
Yellow highlighted = Significantly lower (**L**) than NYS average

Table 4a. Risk Factors for Colon Surgical Site Infections, New York State, 2007, Data as of April 1, 2008

Characteristics	No. SSI	No. Procedures	Odds Ratio 95% Confidence Interval
Gender			
Male	547	8398	Ref
Female	535	9375	**0.88 (0.71, 0.99) L**
Laparoscopic Procedure	149	932	0.84 (0.71, 1.01)
Multiple Procedures	426	655	**1.21 (1.07, 1.38) H**
ASA			
1	32	803	Ref
2	394	7368	**1.34 (0.93, 1.94) H**
3	539	7671	**1.76 (1.22, 2.54) H**
4	111	1750	**1.59 (1.06, 2.37) H**
5	6	180	0.84 (0.34, 2.04)
Wound Class			
Clean-contaminated	871	14564	Ref
Contaminated	141	2067	1.14 (0.95, 1.37)
Dirty	70	1128	1.04 (0.81, 1.33)
Duration*			1.00 (0.99, 1.01)
Age*			0.99 (0.98, 1.01)

*Continuous variable, effect assessed using conditional logistic regression.
Red = Significantly higher (**H**)
Yellow highlighted = Significantly lower (**L**)

Table 4b. Risk Factors for Colon Surgical Site Infections, New York State, 2007, Data as of April 1, 2008

	No. SSI	No. Procedures	Rate*	Odds Ratio (95%CI) †
Emergency	242	3508	6.9	**1.11 (1.01, 1.36) H**
Trauma	14	143	9.8	1.66 (0.96, 2.89)
Emergency and/or Trauma	267	3930	6.8	**1.15 (1.01, 1.33) H**
Neither Emergency nor Trauma	815	13841	5.9	Reference

* Per 100 patients
† 95% Confidence Interval,
Red = Significantly higher (**H**)

Table 5. Microorganisms Associated with Colon Surgical Site Infections, New York State, 2007, Data as of April 1, 2008

Microorganism	No. SSI	% (N=1082)
Enterococci	263	24.3
(VRE)	(71)	(6.6)
Escherichia	239	22.0
Staphylococcus aureus	145	13.4
(MRSA)	(110)	(10.2)
Coagulase negative staphylococci	85	7.9
Pseudomonas	82	7.6
Klebsiella	81	7.5
Bacteroides	57	5.3

Table 6. Colon Surgical Site Infections (SSI) by Extent and Detection Time, NYS Hospitals, 2007
Data reported as of April 1, 2008

	Extent of SSI			
When Detected	Superficial Incisional	Deep Incisional	Organ Space	Total
Admission	329	169	184	682
Readmission	94	64	104	262
Post-Discharge Surveillance	105	16	17	138
Total	**528**	**249**	**305**	**1082**

Table 7a. Colon Surgery Patients' Medical Record Review – Inconsistencies between HAI Program Staff and Hospital Data Submitted to the NHSN , NYS Hospitals (n=163), 2007

	N	%		N	%
Procedure Date (n=669)	51	7.6	Primary Closure – Not Done (n=665)	29	4.4
Date of Birth (n=658)	46	7.0	Met criteria for an SSI (n=642)		
NHSN procedure (n=689)	22	3.2	NHSN= Yes, Reviewer = No	51	7.9
Wound Class (n=642)	114	17.8	NHSN=No, Reviewer = Yes	18	2.8
ASA Score (n=639)	55	8.6	Extent of SSI (n=168)		
Procedure Duration (n=623)	372	52.5	Reviewer=DIP, NHSN=SIP	8	4.8
Reviewer less than NHSN by			Reviewer=DIP, NHSN = OS	3	1.8
More than 60 minutes	21	3.4	Reviewer=OS, NHSN=DIP	11	6.6
31-60 minutes	15	2.4	Reviewer=OS, NHSN=SIP	3	1.8
16-30 minutes	14	2.3	Reviewer=SIP, NHSN=DIP	7	4.2
1-15 minutes	68	10.9	Reviewer=SIP, NHSN=OS	1	0.6
Reviewer more than NHSN by			Death of Patient (n=217)	3	1.4
More than 60 minutes	67	10.8	SSI detection(n=170)		
31-60 minutes	65	10.4	Reviewer = A, NHSN = R	3	1.8
16-30 minutes	28	4.5	Reviewer = A, NHSN = P	2	1.2
1-15 minutes	49	7.9	Reviewer = R, NHSN = A	7	4.1
General Anesthesia (n=651)	20	3.1	Reviewer = R, NHSN = P	3	1.8
Trauma (n=657)	9	1.4	Reviewer = P, NHSN = R	1	0.6
Emergency (n=657)	75	11.4			

SIP = superficial incisional infection – chest site
DIP = deep incisional infection – chest site
OS = organ space infection
A = infection identified during original admission
R = infection identified upon readmission
P = infection identified post-discharge

Table 7b. Colon Surgery Patients' Medical Record Review Inconsistencies Sufficient to Affect Risk Classification between HAI Program Reviewer and Hospital's Report, NYS Hospitals (n=163), 2007

Risk Factor	N	%
Procedure Duration (n=623)		
Reviewer ≥ 3 hours	25	4.0
Reviewer < 3 hours	87	14.0
Wound Class (n=642)		
Reviewer = High Risk	53	8.3
Reviewer = Low Risk	42	6.5
ASA Score (n=639)		
Reviewer ≥ 3	26	4.1
Reviewer < 3	29	4.5

Table 8. HAI Program Evaluation of Additional Risk Factors for Colon Surgical Site Infections, New York State, 2007

Characteristics	Infected N (%) N=164	Not Infected N (%) N=272	Odds Ratio 95% Confidence Interval
Prior abdominal surgery	80 (49.7)	125 (46.3)	1.13 (0.76, 1.71)
Crohn's Disease	4 (2.5)	9 (3.3)	0.76 (0.22, 2.72)
Cancer in abdominal cavity	60 (37.7)	103 (38.2)	1.04 (0.68, 1.60)
Other cancer	30 (18.8)	43 (15.9)	1.35 (0.78, 2.32)
Chemotherapy within 6 months	**3 (1.8)**	**16 (5.9)**	**0.23 (0.06, 0.89) L**
History of radiation to abdomen	7 (4.3)	9 (3.4)	1.27 (0.44, 3.69)
Pre-existing abdominal infection	17 (10.4)	36 (13.2)	0.67 (0.34, 1.30)
Diabetic	37 (24.0)	60 (23.2)	1.06 (0.63, 1.77)
Antibiotics within 1 hr of incision	137 (89.0)	229 (88.8)	1.04 (0.52, 2.11)
Re-dosed with antibiotics during surgery	8 (5.2)	20 (7.9)	0.76 (0.32, 1.80)
Antibiotics discontinued within 24 hrs	101 (67.8)	162 (66.1)	1.24 (0.75, 2.06)
Perioperative transfusion			1.04 (0.59, 1.84)
Within 24 hrs prior to surgery	8 (4.9)	14 (5.2)	0.94 (0.39, 2.23)
During surgery	12 (7.3)	31 (11.4)	0.63 (0.31, 1.28)
Within 24 hrs post surgery	10 (6.1)	13 (4.8)	1.20 0.52, 2.76)
Highest blood glucose >= 200			
0-24 hrs post surgery	20 (12.2)	29 (10.7)	1.25 (0.68, 2.28)
25-48 hrs post surgery	13 (7.9)	15 (5.5)	1.44 (0.68, 3.04)
49-72 hrs post surgery	6 (3.7)	9 (3.3)	1.15 (0.41, 3.22)
0-72 hrs post surgery	28 (17.1)	41 (15.1)	1.19 (0.71, 2.00)
Body temperature monitored intra-operatively	120 (79.0)	214 (82.3)	0.87 (0.50, 1.50)
Body Temperature < 36.0 C first taken post surgery	160 (97.6)	265 (97.4)	0.92 (0.22, 3.75)
Body Mass Index (BMI)*			**1.06 (1.03, 1.10) H**

*Continuous variable, effect assessed using conditional logistic regression.

Red = Significantly greater risk (**H**)

Yellow highlighted = Significantly lower risk (**L**)

Table 9. Colon Surgical Site Infection Prevention Practices.
NYS HAI Program Audit of Colon Procedures, NYS Hospitals (n=171), 2007

Infection Prevention Practice	Number of facilities (%)
Antimicrobial impregnated sutures	
All colon procedures	4 (2%)
Selected colon procedures	3 (2%)
Surgeon dependent	16 (9%)
Not used	124 (73%)
Unknown	24 (14%)
Antimicrobial impregnated mesh	
Yes	19 (11%)
Surgeon dependent	17 (90%)
No	102 (60%)
Unknown	50 (29%)
Preoperative antiseptic surgical skin preparation	
Chlorhexidine standard	33 (19%)
Iodophor standard	73 (43%)
Physician specific	53 (32%)
Other	7 (4%)
Unknown	5 (3%)

Table 10. Colon Surgical Site Infection Surveillance Practices, New York State Hospitals (n=171), 2007

Surveillance Practices	Number of Facilities (%)	Surveillance Practices	Number of Facilities (%)
Data Entry		Identification of Cases	
Manually Entered	154 (90%)	Daily rounds	87 (51%)
Entered by ICP	131 (86%)	Discharge coding from medical records	57 (33%)
Entered by clerical staff	7 (4%)	Infection liaison on unit	12 (7%)
Other	15 (10%)	Laboratory data	165 (97%)
Unknown	1 (1%)	Patients with an extended length of stay	30 (18%)
Electronically Imported	17 (10%)	Pharmacy antibiotic data	20 (12%)
Denominator Data		Physician, PA, NP self reported	77 (45%)
OR log	55 (32%)	Post discharge surveillance	78 (46%)
OR schedule	88 (51%)	Readmissions	144 (84%)
Discharge medical record coding	56 (33%)	Return to surgery	126 (74%)
Automatic flagged or filtered report	32 (19%)	Review of temperature records	34 (20%)
CPT or ICD-9 codes prior to discharge	5 (3%)	Unit staff (not designated infection liaison)	66 (39%)
ICD-9 codes on discharge	104 (61%)		
Identification of cases where surgical incision was not primarily closed			
Chart review	51 (30%)		
No systematic process	19 (11%)		
Operative report review	75 (44%)		
Unknown	64 (37%)		

Coronary

Artery

Bypass

Graft

Surgical

Site

Infection

Tables

Table 11. Coronary Artery Bypass Graft with Chest and Donor Site Incisions (CBGB), Surgical Site Infection Rates* by Risk Category and Wound Site, New York State, 2007, Data reported as of April 1, 2008

Risk Category (Denominator)	0 (N=21)		1 (N=8,674)		2 (N=4,403)		3 (N=19)	
Infection Site	**SSI**	**Rate**	**SSI**	**Rate**	**SSI**	**Rate**	**SSI**	**Rate**
Leg (Donor site)	**0**	**0**	**69**	**0.8 L**	**72**	**1.6 L**	**0**	**0.0**
Superficial incisional	0	0	**55**	**0.6 L**	**54**	**1.2 L**	0	0.0
Deep incisional	0	0	**14**	**0.2 L**	18	0.4	0	0.0
Chest	**0**	**0**	**192**	**2.2**	**142**	**3.2**	**1**	**5.3**
Superficial Incisional	0	0	76	0.9	50	1.1	0	0.0
Deep incisional	0	0	60	0.7	**61**	**1.4 H**	1	5.3
Organ/space	0	0	56	0.6	31	0.7	0	0.0
Total	**0**	**0**	**261**	**3.0**	**214**	**4.9**	**1**	**5.2**

*per 100 operations **Red** = Significantly higher (**H**) than National data. **Yellow highlighted** = Significantly lower (**L**) than National data.

Table 12. Coronary Artery Bypass Graft with Chest only (CBGC), Surgical Site Infection Rates* by Risk Category (Chest Incision Site only), New York State, 2007, Data reported as of April 1, 2008

Risk Category (Denominator)	0 (N=5)		1 (N=545)		2,3 (N=523)	
Infection Site	**SSI**	**Rate**	**SSI**	**Rate**	**SSI**	**Rate**
Chest						
Superficial Incisional	1	20.0	3	0.6	3	0.6
Deep incisional	0	0.0	1	0.2	12	2.3
Organ/space	0	0.0	1	0.2	6	1.1
Total	**1**	**20.0**	**5**	**0.9 L**	**21**	**4.0**

*per 100 operations **Yellow highlighted** = Significantly lower (**L**) than National data.

Table13. Coronary Artery Bypass Graft SSI Rates* (CBGB) by Risk Category and Wound Site, National Data, January 1992 through June 2004

Risk Category	0 (N=2,718)		1 (N=380,340)		2 (N=82,535)		3 (N=246)	
Infection Site	No. SSIs	Rate (%)	No. SSIs	Rate (%)	No. SSIs	Rate (%)	No. SSIs	Rate (%)
Leg (Donor site)	20	0.7	5,436	1.4	2,024	2.4	5	2.0
Superficial incisional	15	0.6	4,203	1.1	1,577	1.9	5	2.0
Deep incisional	5	0.2	1233	0.3	447	0.5	0	0.0
Chest	14	0.5	7,440	2.0	2,459	3.0	19	7.7
Superficial incisional	7	0.3	2,796	0.7	933	1.1	5	2.0
Deep incisional	4	0.2	2,091	0.6	627	0.8	9	3.7
Organ/space	3	0.1	2,553	0.7	899	1.1	5	2.0
Total	**34**	**1.2**	**12,876**	**3.4**	**4,483**	**5.4**	**24**	**9.8**

*per 100 operations

Table 14. Coronary Artery Bypass Graft with Chest only (CBGC), Surgical Site Infection Rates* by Risk Category (Chest Incision Site only), National Data, January 1992 through June 2004

Risk Category (Denominator)	**0 (N=160)**		**1 (N=15,248)**		**2,3 (N=6,499)**	
Infection Site	**SSI**	**Rate**	**SSI**	**Rate**	**SSI**	**Rate**
Chest	**N/A**	**0.0**	**N/A**	**2.2**	**N/A**	**3.7**

*per 100 operations N/A = Not available

Table 15. Coronary Artery Bypass Graft with Chest and Donor Site Incisions (CBGB), Surgical Site Infection Rates* by Risk Category and Wound Site, New York City, 2007, Data reported as of April 1, 2008

Risk Category (Denominator)	0 (N=13)		1 (N=2,410)		2 (N=2,311)		3 (N=7)	
Infection Site	**SSI**	**Rate**	**SSI**	**Rate**	**SSI**	**Rate**	**SSI**	**Rate**
Leg (Donor site)	**0**	**0.0**	**11**	**0.4**	**29**	**1.2**	**0**	**0.0**
Superficial incisional	0	0.0	10	0.4	23	1.0	0	0.0
Deep incisional	0	0.0	1	0.04	6	0.2	0	0.0
Chest	**0**	**0.0**	**59**	**2.5**	**77**	**3.3**	**1**	**14.3**
Superficial incisional	0	0.0	19	0.8	25	1.1	0	0.0
Deep incisional	0	0.0	19	0.8	35	1.5	1	14.3
Organ/space	0	0.0	21	0.9	17	0.7	0	0.0
Total	**0**	**0.0**	**70**	**2.9**	**106**	**4.6**	**1**	**14.3**

*per 100 operations

Table 16. Coronary Artery Bypass Graft with Chest and Donor Site Incisions (CBGB), Surgical Site Infection Rates* by Risk Category and Wound Site, Upstate, 2007, Data reported as of April 1, 2008

Risk Category (Denominator)	0 (N=8)		1 (N=6,264)		2 (N=2,092)		3 (N=12)	
Infection Site	**SSI**	**Rate**	**SSI**	**Rate**	**SSI**	**Rate**	**SSI**	**Rate**
Leg (Donor site)	**0**	**0.0**	**58**	**0.4**	**43**	**2.0 H**	**0**	**0.0**
Superficial incisional	0	0.0	45	0.7	31	1.5	0	0.0
Deep incisional	0	0.0	13	0.2	12	0.6	0	0.0
Chest	**0**	**0.0**	**133**	**2.1**	**65**	**3.1**	**0**	**0.0**
Superficial Incisional	0	0.0	57	0.9	25	1.2	0	0.0
Deep incisional	0	0.0	41	0.6	26	1.2	0	0.0
Organ/space	0	0.0	35	0.6	14	0.4	0	0.0
Total	**0**	**0.0**	**191**	**3.0**	**108**	**5.2**	0	0.0

*per 100 operations **Red** = Significantly higher (**H**) than New York City.

Table 17. Coronary Artery Bypass Graft (CBGB) SSI Rates (Donor Vessel Site Infections only) by Risk Category, NYS, 2007, Data as of April 1, 2008

Hospital	Risk Category 0			Risk Category 1			Risk Category 2			Risk Category 3		
	Inf	Proc	Rate/100	Inf	Proc	Rate/100	Inf	Proc	Rate/100	Inf	Proc	Rate/100
10019		*		0	75	0	2	255	0.8		*	
10087		*		0	85	0	3	290	1.0		*	
10168		*		0	188	0	1	192	0.5		*	
10218		*		1	56	1.8	1	98	1.0		*	
10243		*		0	74	0	1	24	4.2		*	
10257		*		0	83	0	0	77	0		*	
10260		*		0	186	0	2	116	1.7		*	
10330		*		3	533	0.6		*			*	
10385		*		0	191	0		*			*	
10465		*		2	134	1.5	1	52	1.9		*	
10492		*			*		2	109	1.8		*	
10556		*		0	53	0	1	57	1.8		*	
10679		*		1	270	0.4		*			*	
10680		*		1	50	2.0	0	23	0		*	
10682		*		3	243	1.2	1	36	2.8		*	
10730		*		0	127	0		*			*	
10731		*		2	214	0.9	3	231	1.3		*	
10756		*		4	329	1.2	0	62	0		*	
10761		*		0	36	0	1	87	1.1		*	
10765		*		2	129	1.6	3	238	1.3		*	
10770		*		1	45	2.2	5	109	4.6		*	
10790		*		0	183	0	2	204	1.0		*	
10812		*		1	343	0.3	5	186	2.7		*	
10822		*		4	525	0.8	0	110	0		*	
10845		*		4	560	0.7	2	239	0.8		*	
10862		*		0	104	0	1	98	1.0		*	
10878		*		1	235	0.4	1	242	0.4		*	
10881		*		1	393	0.3	2	105	1.9		*	
10893		*		0	273	0	0	151	0		*	
10899		*		0	268	0	1	88	1.1		*	
10900		*		**6**	**271**	**2.2 H**	**3**	**47**	**6.4 H**		*	
10914		*		6	287	2.1	**8**	**112**	**7.1 H**		*	
10916		*		4	261	1.5	3	71	4.2		*	
10938		*		11	914	1.2	2	151	1.3		*	
10943		*		0	63	0	3	170	1.8		*	
10951		*		3	440	0.7	2	62	3.2		*	
10963		*		**6**	**241**	**2.5 H**	**8**	**110**	**7.3 H**		*	
11011		*		1	79	1.3	1	22	4.5		*	
11016		*		1	46	2.2		*			*	
11407		*		0	69	0	1	113	0.9		*	
Total	**0**	**21**	**0**	**69**	**8674**	**0.78**	**72**	**4403**	**1.6**	**0**	**19**	**0**

Table 18. Coronary Artery Bypass Graft (CBGB) SSI Rates (Chest Site Infections only) by Risk Category, NYS, 2007, Data as of April 1, 2008

	Risk Category 0			Risk Category 1			Risk Category 2			Risk Category 3		
Hospital	Inf	Proc	Rate/100	Inf	Proc	Rate/100	Inf	Proc	Rate/100	Inf	Proc	Rate/100
10019		*		1	75	1.3	7	255	2.7		*	
10087		*		0	85	0	14	290	4.8		*	
10168		*		7	188	3.7	5	192	2.6		*	
10218		*		0	56	0	6	98	6.1		*	
10243		*		3	74	4.1	1	24	4.2		*	
10257		*		0	83	0	1	77	1.3		*	
10260		*		**9**	**186**	**4.8 H**	7	116	6.0		*	
10330		*		9	533	1.7		*			*	
10385		*		1	191	0.5		*			*	
10465		*		**7**	**134**	**5.2 H**	2	52	3.8		*	
10492		*			*		2	109	1.8		*	
10556		*		3	53	5.7	1	57	1.8		*	
10679		*		2	270	0.7		*			*	
10680		*		0	50	0	0	23	0		*	
10682		*		4	243	1.6	3	36	8.3		*	
10730		*		0	127	0		*			*	
10731		*		5	214	2.3	6	231	2.6		*	
10756		*		**16**	**329**	**4.9 H**	4	62	6.5		*	
10761		*		1	36	2.8	2	87	2.3		*	
10765		*		5	129	3.9	8	238	3.4		*	
10770		*		**4**	**45**	**8.9 H**	2	109	1.8		*	
10790		*		1	183	0.5	2	204	1.0		*	
10812		*		**15**	**343**	**4.4 H**	5	186	2.7		*	
10822		*		13	525	2.5	3	110	2.7		*	
10845		*		9	560	1.6	8	239	3.3		*	
10862		*		1	104	1.0	2	98	2.0		*	
10878		*		9	235	3.8	8	242	3.3		*	
10881		*		4	393	1.0	1	105	1.0		*	
10893		*		3	273	1.1	5	151	3.3		*	
10899		*		5	268	1.9	4	88	4.5		*	
10900		*		4	271	1.5	1	47	2.1		*	
10914		*		10	287	3.5	7	112	6.3		*	
10916		*		6	261	2.3	1	71	1.4		*	
10938		*		21	914	2.3	9	151	6.0		*	
10943		*		0	63	0	1	170	0.6		*	
10951		*		5	440	1.1	2	62	3.2		*	
10963		*		3	241	1.2	4	110	3.6		*	
11011		*		4	79	5.1	0	22	0		*	
11016		*		0	46	0		*			*	
11407		*		1	69	1.4	7	113	6.2		*	
Total	**0**	**21**	**0**	**192**	**8674**	**2.2**	**142**	**4403**	**3.2**	**1**	**19**	**5.6**

Red =Significantly higher (**H**) than NYS average. **Yellow highlighted**=Significantly lower (**L**) than NYS average. * = Insufficient number of procedures (<20)

Table 19. Coronary Artery Bypass Graft (CBGC) Surgical Site Infection (Chest Sites only) Rates by Risk Category, NYS, 2007, Data as of April 1, 2008

	Risk Category 0			Risk Category 1			Risk Category 2,3		
Hospital	Inf	Proc	Rate/100	Inf	Proc	Rate/100	Inf	Proc	Rate/100
10019		*			*		1	24	4.2
10087		*			*			*	
10168		*			*			*	
10218		*			*			*	
10257		*		0	22	0	0	32	0.0
10260		*			*			*	
10330		*			*			*	
10385		*		1	27	3.7		*	
10465		*			*			*	
10492		*			*			*	
10556		*			*			*	
10679		*			*			*	
10680		*			*			*	
10682		*		**3**	**35**	**8.6 H**		*	
10730		*			*			*	
10731		*			*		0	69	0.0
10756		*		0	21	0		*	
10761		*			*			*	
10770		*			*			*	
10790		*			*			*	
10812		*		0	29	0		*	
10822		*		0	38	0	0	39	0.0
10845		*			*			*	
10862		*			*			*	
10878		*		0	43	0	4	56	7.1
10881		*			*			*	
10893		*			*			*	
10899		*		0	26	0		*	
10900		*			*			*	
10914		*			*			*	
10916		*		0	40	0		*	
10938		*		0	35	0	0	20	0.0
10943		*			*			*	
10951		*		0	21	0		*	
10963		*			*			*	
11011		*			*			*	
11016		*		0	26	0	**7**	**66**	**10.6 H**
11407		*			*			*	
Total	**1**	**5**	**20.0**	**5**	**545**	**0.9**	**21**	**523**	**4.0**

* = Insufficient number (less than 20) of procedures. **Red** =Significantly higher (**H**) than NYS average.

Table 20. Microorganisms Associated with CABG Chest Site Infections, New York State, 2007, Data as of April 1, 2008

Microorganism	N	% of SSIs (N=362)
Staphylococcus aureus	130	35.9
(MRSA)	(62)	(17.1)
Coagulase negative staphylococci	70	19.3
Pseudomonas	29	8.0
Klebsiella	23	6.3
Escherichia	21	5.8
Enterococci	18	4.9
(VRE)	(4)	(1.1)
Serratia	16	4.4

Table 21. Microorganisms Associated with CABG Donor Vessel Site Infections, New York State, 2007, Data as of April 1, 2008

Microorganism	Number	% of SSIs (N=141)
Staphylococcus aureus	31	21.9
(MRSA)	(14)	(9.9)
Pseudomonas	16	11.3
Klebsiella	16	11.3
Enterococci	14	9.9
(VRE)	(2)	(1.4)
Escherichia	12	8.5
Coagulase negative staphylococci	11	7.8

Table 22. Coronary Artery Bypass Graft (CABG) Chest Site Infections by Extent and Detection Time, NYS Hospitals (n=40), 2007, Data reported as of April 1, 2008

	Extent of SSI – Chest Site			
When Detected	Superficial Incisional	Deep Infection	Organ Space	Total
Admission	39	42	33	114
Readmission	82	88	59	229
Post-Discharge Surveillance	12	5	2	19
Total Chest Site Infections	**133**	**135**	**94**	**362**

Table 23. Cardiac Artery Bypass Surgery (CABG) Donor Site Infections by Extent and Detection Time, NYS Hospitals (n=40), 2007, Data reported as of April 1, 2008

	Extent of SSI – Donor Vessel Site		
When Detected	Superficial Infection	Deep Infection	Total
Admission	27	12	39
Readmission	73	20	93
Post-Discharge Surveillance	9	0	9
Total Donor Site Infections	**109**	**32**	**141**

Table 24. Coronary Artery Bypass Graft (CBGB and CBGC) Surgical Site Infection (Chest Incision Site Infections only) Rates by Risk Factors, NYS HAI Reporting Program (NHSN) and Cardiac Surgery Reporting System, Data as of March 4, 2007

Risk Factor	Numerator	Denominator	Rate*	Odds Ratio (95% CI) †
Gender				
Male	204	8876	2.3	Ref
Female	**137**	**3540**	**3.9**	**1.68 (1.35, 2.10) H**
Residency				
Upstate	204	7881	2.6	Ref
NYC	137	4535	3	1.16 (0.94, 1.45)
Medicaid				
Medicaid	43	1536	2.8	Ref
Not Medicaid	298	10880	2.7	0.98 (0.71, 1.35)
Minimally Invasive				
Yes	8	340	2.4	Ref
No	327	11947	2.7	1.16 (0.57, 2.37)
Glucose Control Protocol				
Yes	331	12036	2.8	Ref
No	6	225	2.7	0.96 (0.43, 2.20)
Bleeding Requiring Reoperation				
No	321	12043	2.7	Ref
Yes	**20**	**373**	**5.4**	**2.01 (1.27, 3.20) H**
Unplanned Reoperation (Postop)				
No	327	12281	2.7	Ref
Yes	**14**	**135**	**10.4**	**3.89 (2.22, 6.83) H**
Diabetes				
No	170	8204	2.1	Ref
Yes	**171**	**4212**	**4.1**	**1.95 (1.58, 2.43) H**
Renal Failure/Dialysis				
No	330	12128	2.7	Ref
Yes	11	288	3.8	1.40 (0.76, 2.59)
Immunodeficiency				
No	323	12016	2.7	Ref
Yes	**18**	**400**	**4.5**	**1.67 (1.03, 2.72) H**
Renal Failure (Postop)				
No	328	12242	2.7	Ref
Yes	**13**	**174**	**7.5**	**2.79 (1.57, 4.95) H**
Any Previous Organ Transplant				
No	339	12364	2.7	Ref
Yes	2	52	3.8	1.40 (0.34, 5.78)
Respiratory Failure (Postop)				
No	278	11719	2.4	Ref
Yes	**63**	**967**	**9**	**3.81 (2.87, 5.06) H**
Chronic Obstructive Pulmonary Disease				
No	231	9643	2.4	Ref
Yes	**110**	**2773**	**4**	**1.66 (1.31, 2.09) H**

GI Bleeding (Postop)				
No	329	12322	2.7	Ref
Yes	**12**	**94**	**12.8**	**4.78 (2.60, 8.81) H**
Surgical Priority				
Elective	95	4122	2.3	Ref
Urgent	219	7736	2.8	1.23 (0.96, 1.57)
Emergency	**27**	**554**	**4.9**	**2.11 (1.37, 3.27) H**
Body Mass Index‼				**1.06 (1.05, 1.08) H**

Total Conduits Revascularization				
1	39	1587	2.5	Ref
2	88	3505	2.5	1.02 (0.70, 1.50)
3	163	5220	3.1	1.27 (0.89, 1.81)
4	48	1850	2.6	1.06 (0.69, 1.62)
5	2	203	1	0.40 (0.10, 1.67)
≥6	0	18		
Age‼				0.99 (0.98, 1.01)

* Per 100 patients
† 95% Confidence Interval
Statistically significant results, **Red** = Significantly higher (**H**)
‼ Continuous variable, effect assessed from linear regression

Table 25. Coronary Artery Bypass Graft (CBGB and CBGC) Surgery Infection Prevention Practices. NYS HAI Program Audit of CABG Procedures - 35 hospitals, 2007

Infection Prevention Practice	Number of facilities (%)
Pre-operative chlorhexidine bath/shower/cloths routinely used for	
All CABG patients	25 (71.4)
Selected CABG patients	7 (20.0)
Not used	3 (8.6)
Pre-operative MRSA* screening cultures routinely performed on	
All CABG patients	4 (11.4)
Selected CABG patients	2 (5.7)
Not routinely used	29 (82.9)
Mupirocin routinely used on all CABG patients	
Yes	15 (42.9)
No	20 (57.1)
Mupirocin routinely used only on MRSA* positive patients pre-operatively	
Yes	2 (5.7)
No	33 (94.3)

* MRSA = Methicillin resistant *Staphylococcus aureus*

Table 26. Infection Status Revealed during Audit Compared with NHSN Reported Status. NYS HAI Program Audit of CABG procedures (n=35 hospitals), 2007

Revealed during audit	Reported to NHSN		
	Infected	Not infected	Total
Infected	74	2	76
Not infected	1	136	137
Total	75	138	213

Table 27. Inconsistencies Revealed during Medical Chart Reviews.
NYS HAI Program Audit of CABG procedures (n=35 hospitals), 2007

	N	%		N	%
ASA Score (n=213)	23	10.8	SSI extent (Chest Site Only)* (n=76)	12	15.8
Date of admission (n=213)	4	1.9	Reviewer SIP, NHSN DIP	2	2.6
Date of procedure (n=213)	0	0	Reviewer OS, NHSN DIP	3	3.9
Wound class (n=213)	2	0.9	Reviewer OS, NHSN SIP	1	1.3
General Anesthesia (n=213)	0	0	Reviewer DIP, NHSN SIP	4	5.3
Trauma (n=213)	1	0.5	Reviewer DIP, NHSN OS	1	1.3
Date of birth (n=213)	4	1.9	Reviewer missing, NHSN DIP	1	1.3
Emergency(n=213)	15	7	Procedure duration (n=213)	20	9.4
Endoscope (n=213)	74	34.7	Less than NHSN by		
Gender (n=213)	6	2.8	16-30 minutes	4	1.9
Multiple Procedure (n=213)	28	13.1	1-15 munutes	5	2.3
SSI detection (n=76)	3	3.9	More than NHSN by		
Reviewer R, NHSN A	1	1.3	16-30 minutes	3	1.4
Reviewer R, NHSN P	2	2.6	1-15 munutes	8	3.8
NHSN procedure code (CBGB vs. GBGC) (n=213)	10	4.7			

SIP = superficial incisional infection – chest site
DIP = deep incisional infection – chest site
OS = organ space infection
A = infection identified during original admission
R = infection identified upon readmission
P = infection identified post-discharge
The criteria for "endoscope use" is different for CABG procedures than for all other procedures. For CABG procedures, "endoscope use" only applies to harvesting of the vessel. The CDC NHSN program is aware of the confusion and may modify the criteria or clarify on the forms when the system is revised.

Central Line Associated Bloodstream Infection Tables

Adult and Pediatric Intensive Care Units

Table 28. Central Line-Associated Blood Stream Infection (CLABSI) Rates* by Type of Adult or Pediatric Intensive Care Unit (ICU), New York State, 2007, Data reported as of April 1, 2008

Location	No. ICU	No. CLABSI	Central Line Days	Mean	Percentile 10%	25%	50% (median)	75%	90%
Coronary ICU	44	**85**	**38,560**	**2.2 L**	0.0	0.0	1.4	2.8	5.3
CT Surgical ICU	29	120	60,159	2.0	0.0	0.0	1.0	2.2	4.5
Medical ICU	42	227	70,157	3.2	0.0	0.8	2.2	4.4	7.8
MS - Major Teaching	29	151	62,483	2.4	0.0	0.6	1.9	3.0	7.2
MS - All others	111	339	147,816	2.3	0.0	0.0	1.6	3.3	4.8
Pediatric ICU	30	**113**	**28,271**	**4.0 L**	0.0	0.0	3.1	5.8	12.9
Neurosurgical ICU	14	46	14,831	3.1	0.0	1.5	1.9	4.7	7.0
Surgical ICU	38	**267**	**71,504**	**3.7 H**	0.0	1.2	2.8	4.7	9.6

* $\frac{Number-of-CLABSI}{Number-of-central-line-days} x1000$

Red = Significantly higher (**H**) than National data. **Yellow highlighted** = Significantly lower (**L**) than National data.

Table 29. Central Line-Associated BSI (CLABSI) Rates* by Type of Intensive Care Unit (ICU), National Data, 2006

Location	No. ICU	No. CLABSI	Central Line Days	Mean	Percentile 10%	25%	50% (median)	75%	90%
Coronary ICU	53	181	63,941	2.8	0.0	0.0	2.0	4.2	6.5
CT-Surgical ICU	51	150	92,484	1.6	0.0	0.0	1.2	2.8	4.1
Medical ICU	73	489	170,719	2.9	0.0	0.8	2.2	4.2	6.2
MS-Major Teaching	63	304	128,502	2.4	0.0	0.6	1.9	3.1	5.5
MS-All others	102	431	198,551	2.2	0.0	0.0	1.0	2.3	4.5
Pediatric ICU	36	255	48,144	5.3	0.0	1.1	3.5	6.5	9.4
Neurosurgical ICU	19	75	21,144	3.5	0.0				
Surgical ICU	72	378	137,484	2.7	0.0	0.9	2.0	4.4	7.4

CT = Cardiothoracic
MS = Medical Surgical

* $\frac{Number-of-CLABSI}{Number-of-central-line-days} x1000$

Table 30. Central Line-Associated Blood Stream Infection (CLABSI) Rates* by Type of Adult or Pediatric Intensive Care Unit (ICU), New York City, 2007, Data reported as of April 1, 2008

Location	No. ICU	No. CLABSI	Central Line Days	Mean	Percentile 10%	25%	50% (median)	75%	90%
Coronary ICU	29	52	23716	2.2	0.0	0.0	1.0	5.9	12.0
CT Surgical ICU	14	51	30093	2.3	0.0	0.0	1.7	2.6	4.3
Medical ICU	19	99	35149	2.8	0.3	0.8	2.1	4.4	8.2
MS - Major Teaching	20	121	48848	2.5	0.0	0.8	1.8	3.4	6.4
MS – All others	17	72	27585	2.6	0.0	2.0	2.6	4.4	5.1
Pediatric ICU	20	74	18519	4.0	0.0	0.0	3.3	5.5	12.9
Neurosurgical ICU	9	32	10941	2.9	0.0	1.6	1.9	3.5	7.0
Surgical ICU	24	99	36894	2.7	0.0	0.7	2.3	3.5	6.4

Table 31. Central Line-Associated Blood Stream Infection (CLABSI) Rates* by Type of Adult or Pediatric Intensive Care Unit (ICU), Upstate, 2007, Data reported as of April 1, 2008

Location	No. ICU	No. CLABSI	Central Line Days	Mean	Percentile 10%	25%	50% (median)	75%	90%
Coronary ICU	15	33	14844	2.2	0.0	0.0	130	2.6	4.8
CT Surgical ICU	15	69	30066	2.3	0.0	0.0	0.5	2.2	4.5
Medical ICU	23	128	35008	**3.6 H**	0.0	0.2	2.3	5.1	6.9
MS - Major Teaching	9	30	13635	2.2	0.0	0.4	2.0	2.9	7.2
MS – All others	94	267	120231	2.2	0.0	0.0	1.1	3.3	4.6
Pediatric ICU	10	39	9752	4.0	0.0	0.0	2.5	6.7	11.2
Neurosurgical ICU	5	14	3890	3.6	0.0	0.0	1.9	6.9	8.8
Surgical ICU	14	168	34610	**4.8 H**	0.0	1.8	4.1	6.8	10.2

Red = Significant difference (**H**) between New York City hospitals vs. Upstate hospitals.

Table 32. CLABSI Rates by Hospital for Coronary ICUs, NYS, 2007

Hospital	CLABSI	CL-Days	Rate/1000 CL Days
10058	1	215	4.7
10087	0	2608	0.0
10168	4	2051	2.0
10218	2	1120	1.8
10242	2	525	3.8
10243	1	304	3.3
10257	0	74	0.0
10260	0	422	0.0
10385	2	2308	0.9
10396	2	1054	1.9
10556	**2**	**373**	**5.4 H**
10632	**12**	**998**	**12.0 H**
10730	0	157	0.0
10731	3	1180	2.5
10753	3	1320	2.3
10765	**9**	**1407**	**6.4 H**
10779		*	
10785	5	1056	4.7
10790	0	89	0.0
10797	0	161	0.0
10800	4	1287	3.1
10807	0	955	0.0
10812	**6**	**691**	**8.7 H**
10845	2	1168	1.7
10859	0	910	0.0
10878	4	3467	1.2
10881	6	2230	2.7
10893	0	851	0.0
10900	5	2207	2.3
10914	2	684	2.9
10928	0	271	0.0
10943	0	390	0.0
10956	1	72	13.9
10965	0	125	0.0
10967	0	80	0.0
10977	1	1204	0.8
11011	1	1157	0.9
11015	0	548	0.0
11016	0	534	0.0
11038	1	483	2.1
11039	1	541	1.8
11046	0	321	0.0
11056	0	344	0.0
11074		*	
11212	1	586	1.7
Total	**85**	**38560**	**2.1**

Red = Significantly higher (**H**)

Table 33. CLABSI Rates for Cardiothoracic ICUs, NYS, 2007, Data as of April 1, 2008

Hospital	CLABSI	CL-Days	Rate/1000 CL Days
10019	1	4111	0.2 L
10087	1	2176	0.5
10168	3	2858	1.0
10243	1	1159	0.9
10257	0	383	0.0
10260	6	1388	4.3
10330	6	2789	2.2
10385	5	2406	2.1
10556	3	1371	2.2
10679	1	2249	0.4
10730	1	296	3.4
10731	4	2341	1.7
10756	32	4773	6.7 H
10765	9	3453	2.6
10770	0	263	0.0
10790	5	891	5.6 H
10812	1	1883	0.5
10862	0	799	0.0
10878	13	6179	2.1
10881	6	3681	1.6
10899	8	1765	4.5 H
10900	0	1235	0.0
10916	0	478	0.0
10938	7	5762	1.2
10943	0	224	0.0
10951	6	2101	2.9
11011	0	710	0.0
11016	0	361	0.0
11407	1	2074	0.5
Total	**120**	**60159**	**2.0**

Red = Significantly higher (**H**) than Total NYS.
Yellow highlighted = Significantly lower (**L**) than Total NYS.

Table 34. CLABSI Rates by Hospital for Medical ICUs, NYS, 2007
Data as of April 1, 2008

Hospital	CLABSI	CL-Days	Rate/1000 CL Days
10019	5	2989	1.3
10058	1	287	3.5
10168	18	4300	4.2
10218	8	2405	3.3
10257	2	380	5.3
10260	**1**	**3203**	**0.3 L**
10297	**13**	**1404**	**9.3 H**
10330	8	3832	2.1
10396	**10**	**1288**	**7.8 H**
10465	6	2848	2.1
10632	**17**	**2079**	**8.2 H**
10756	**26**	**3775**	**6.9 H**
10765	13	2942	4.4
10769	1	453	2.2
10773	0	147	0.0
10785	3	1099	2.7
10790	1	1253	0.8
10797	7	1291	5.4
10812	1	542	1.8
10822	10	1946	5.1
10825	**2**	**3050**	**0.7 L**
10844		*	
10845	**1**	**4690**	**0.2 L**
10867	0	1179	0.0
10891	0	353	0.0
10893	3	985	3.0
10894	2	1809	1.1
10899	**22**	**1881**	**11.2 H**
10914	9	3281	2.7
10916	1	433	2.3
10928	5	1456	3.4
10942	0	295	0.0
10948	3	1439	2.1
10963	7	1889	3.7
10964	1	592	1.7
10967	1	350	2.9
10980	6	918	6.5
11005	**9**	**842**	**10.7 H**
11011	0	2178	0.0
11015	1	1616	0.6
11016	2	1883	1.1
11046	1	564	1.8
Total	**227**	**70157**	**3.2**

Table 35. CLABSI Rates for Major –Teaching Medical Surgical ICUs, NYS, 2007, Data as of April 1, 2008

Hospital	CLABSI	CL-Days	Rate/1000 CL Days
10019	0	1833	0.0
10087	**1**	**4039**	**0.2 L**
10243	**21**	**2697**	**7.8 H**
10257	0	123	0.0
10357	2	1826	1.1
10385	0	650	0.0
10465	1	1678	0.6
10480	3	2000	1.5
10556	3	994	3.0
10680	1	2240	0.4
10731	**15**	**2922**	**5.1 H**
10770	23	8040	2.9
10826	9	3390	2.7
10878	9	5468	1.6
10879	0	1189	0.0
10881	6	3089	1.9
10893	5	1314	3.8
10900	5	2478	2.0
10902	1	1745	0.6
10905	2	689	2.9
10911	3	1810	1.7
10952	9	3507	2.6
10956	**7**	**445**	**15.7 H**
10976	0	67	0.0
11013	**5**	**689**	**7.3 H**
11032	7	1514	4.6
11038	7	1392	5.0
11039	3	1353	2.2
11407	3	3302	0.9
Total	**151**	**62483**	**2.4**

Red = Significantly higher (**H**) than Total NYS.
Yellow highlighted = Significantly lower (**L**) than Total NYS.

Table 36. CLABSI Rates for Non-Major – Teaching Medical Surgical ICUs, NYS, 2007 Data as of April 1, 2008

Hospital	CLABSI	CL-Days	Rate/1000 CL Days
10241	16	3113	5.1 H
10242	7	2423	2.9
10273	0	1734	0.0
10387	2	654	3.1
10492	3	2145	1.4
10628	3	1468	2.0
10670	5	1354	3.7
10673	0	296	0.0
10678	4	434	9.2 H
10679	5	3384	1.5
10682	15	4566	3.3
10684	1	325	3.1
10687	0	1279	0.0
10688	4	1503	2.7
10694	0	92	0.0
10712	1	295	3.4
10714	3	672	4.5
10719	0	444	0.0
10728	4	707	5.6 H
10729	20	3466	5.8 H
10739	1	823	1.2
10748	0	160	0.0
10749	6	1451	4.1
10751	4	1286	3.1
10753	2	2297	0.9
10755	0	1321	0.0
10757	3	933	3.2
10759	2	457	4.4
10761	0	3755	0.0
10771	0	306	0.0
10772	10	3910	2.6
10773	4	1567	2.6
10777	0	468	0.0
10781		*	
10789	0	745	0.0
10791	11	2507	4.4 H
10798	0	142	0.0
10800	4	1815	2.2
10803	0	236	0.0
10804	3	911	3.3
10807	7	1378	5.1 H
10810	1	2603	0.4
10811	1	3810	0.3 L
10816	3	4000	0.8
10817	0	534	0.0
10824	5	1888	2.6
10828	0	501	0.0
10831	9	2967	3.0
10834	0	530	0.0
10836	0	550	0.0
10838	2	845	2.4
10840		*	
10842	1	1027	1.0
10847	0	961	0.0
10848	2	2578	0.8
10853	10	2172	4.6 H
10854	4	1029	3.9
10859	1	1132	0.9
10860	9	4018	2.2
10861	0	153	0.0
10862	1	2289	0.4
10863	1	612	1.6
10866	0	145	0.0
10868	3	2970	1.0
10869	2	1560	1.3
10871	1	154	6.5
10872	0	253	0.0
10874	4	2232	1.8
10876	1	517	1.9
10882	2	698	2.9
10888	0	527	0.0
10890	3	833	3.6
10898	6	1317	4.6
10901	2	1227	1.6
10903	1	471	2.1
10906	1	335	3.0
10908	0	932	0.0
10909	5	1495	3.3
10913	0	1516	0.0
10915	1	516	1.9
10917	1	3354	0.3 L
10920	0	196	0.0
10924	0	1650	0.0
10936	2	1041	1.9
10938	33	8320	4.0 H
10943	0	473	0.0
10947	0	268	0.0
10950	5	1695	2.9
10951	6	3060	2.0
10959	0	299	0.0
10962	1	261	3.8
10965	3	539	5.6
10975	4	402	10.0 H
10977	0	1382	0.0
10978	0	80	0.0
10987	0	1504	0.0
10991	13	1393	9.3 H
11002	3	679	4.4
11008	0	80	0.0
11023	2	639	3.1
11027	2	568	3.5
11030	1	2939	0.3 L
11033	0	113	0.0
11042	10	2870	3.5
11050	0	134	0.0
11052	0	149	0.0
11071	6	1103	5.4 H
11074	9	1863	4.8 H
11086	0	201	0.0
11127	2	997	2.0
11141	4	815	4.9
Total	**339**	**147816**	**2.3**

Table 37. CLABSI Rates for Surgical ICUs, NYS, 2007,
Data as of April 1, 2008

	CLABSI	CL-Days	Rate/1000 CL Days
10019	6	2273	2.6
10058	5	583	8.6 H
10168	14	4668	3.0
10218	17	2657	6.4 H
10257	1	442	2.3
10260	2	1749	1.1
10297	4	417	9.6
10330	13	2791	4.7
10396	4	973	4.1
10465	4	1493	2.7
10556	3	1039	2.9
10632	21	1941	10.8 H
10730	4	1001	4.0
10756	50	3662	13.7 H
10765	5	3788	1.3 L
10785	8	1548	5.2
10790	2	628	3.2
10797	2	855	2.3
10812	10	1463	6.8 H
10822	14	1369	10.2 H
10825	8	2076	3.9
10845	14	7801	1.8 L
10878	6	3986	1.5 L
10881	2	3154	0.6 L
10893	1	2246	0.4 L
10894	2	1633	1.2
10899	14	2368	5.9
10914	13	3907	3.3
10916	0	234	0.0
10928	0	553	0.0
10948	3	1276	2.4
10963	9	2933	3.1
10967	0	73	0.0
10980	3	841	3.6
11011	1	1359	0.7 L
11015	2	770	2.6
11046	0	330	0.0
11212	0	624	0.0
Total	**267**	**71504**	**3.7**

Table 38. CLABSI Rates for Neuro-Surgical ICUs, NYS, 2007, Data as of April 1, 2008

Hospital	CLABSI	CL-Days	Rate/1000 CL Days
10218	5	713	7.0
10257	0	276	0.0
10396	2	1026	1.9
10480	2	1294	1.5
10556	0	306	0.0
10765	8	1687	4.7
10770	1	642	1.6
10812	5	721	6.9
10845	4	2101	1.9
10878	9	2588	3.5
10881	4	2349	1.7
10916	0	224	0.0
10928	1	336	3.0
10963	**5**	**568**	**8.8 H**
Total	**46**	**14831**	**3.1**

Red = Significantly higher (**H**) than Total NS ICU.

Table 39. CLABSI Rates for Pediatric ICU, New York State, 2007, NYS, 2007, Data as of April 1, 2008

Hospital	CLABSI	CL-Days	Rate/1000 CL Days
10019	7	1657	4.2
10058	0	98	0.0
10168	6	1994	3.0
10218	1	165	6.1
10243	1	337	3.0
10257	0	97	0.0
10260	0	91	0.0
10396	2	363	5.5
10480	0	278	0.0
10632	**4**	**341**	**11.7 H**
10756	**16**	**2373**	**6.7 H**
10765	12	3121	3.8
10770	3	908	3.3
10790	0	73	0.0
10812	5	1569	3.2
10816	0	185	0.0
10845	0	488	0.0
10880	29	5241	5.5
10881	**1**	**3048**	**0.3 L**
10893	12	2553	4.7
10899	6	818	7.3
10918	4	1998	2.0
10928	0	187	0.0
10948		*	
10956		*	
10963	2	132	15.2
10965	1	43	23.3
11015	1	77	13.0
11046		*	
Total	**113**	**28271**	**4.0**

* Insufficient number (less than 50) of central line days
Red =Significantly higher (**H**) than NYS average
Yellow highlighted=Significantly lower (**L**) than NYS average

Table 40. Microorganisms associated with Central Line Associated Blood Stream Infections (CLABSI) in the Adult and Pediatric Intensive Care Units (ICU), New York State, 2007, Data reported as of April 1, 2008

Microorganism	N	% (N=1348)
Coagulase negative staphylococci	446	33.1
Enterococcus	257	19.1
(VRE)	(121)	(8.9)
Candida	201	14.9
Staphylococcus aureus	134	9.9
(MRSA)	(83)	(6.2)
Klebsiella	130	9.6
Acinetobacter	72	5.3
Pseudomonas	60	4.5

Table 41. Distribution of Criteria for Central Line-Associated Laboratory Confirmed Blood Stream Infections by Type in Adult or Pediatric Intensive Care Unit (ICU), New York State, 2007, Data reported as of April 1, 2008

	Criterion 1		Criterion 2a		Criterion 2b		
Location	N	%	N	%	N	%	Total
Coronary ICU	66	77.6	10	11.8	9	10.6	85
CT-Surgical ICU	95	79.2	17	14.2	8	6.7	120
Medical ICU	175	77.1	19	8.4	33	14.5	227
MS-Major Teaching	130	86.1	10	6.6	11	7.3	151
MS-All others	259	76.4	43	12.7	37	10.9	339
Pediatric ICU	83	73.4	8	4.1	22	19.5	113
Neurosurgical ICU	34	73.9	2	4.3	10	21.7	46
Surgical ICU	198	74.2	32	11.9	37	13.9	267
Total	**1040**	**77.1 H**	**141**	**10.5 L**	**167**	**12.4 L**	**1348**

CT = Cardiothoracic
MS = Medical Surgical
Only tested Totals for statistically significant difference from National Data.

Red = Significantly higher (**H**) than National data.
Yellow highlighted = Significantly lower (**L**) than National data.

Table 42. Distribution of Criteria for Central Line-Associated Laboratory Confirmed Blood Stream Infections (CLABSI) by Type of Adult or Pediatric Intensive Care Unit (ICU), National Data, 2006

	Criterion 1		Criterion 2a		Criterion 2b		
Location	N	%	N	%	N	%	Total
Coronary ICU	120	67.0	36	20.1	23	12.8	179
CT-Surgical ICU	96	66.7	29	20.1	19	13.2	144
Medical ICU	332	69.0	76	15.8	73	15.2	481
MS-MajorTeaching	167	56.0	63	21.1	68	22.8	298
MS-All others	214	49.9	115	26.8	100	23.3	429
Pediatric ICU	133	52.2	34	13.3	88	34.5	255
Neurosurgical ICU	39	52.7	13	17.6	22	29.7	74
Surgical ICU	266	71.3	48	12.9	59	15.8	373
Total	**1367**	**61.2**	**414**	**18.5**	**452**	**20.3**	**2233**

CT = Cardiothoracic
MS = Medical Surgical

Table 43. Inconsistencies between NYS HAI Program and Hospital reported data for patients with a Central Line-Associated Blood Stream Infection in Adult/Pediatric Intensive Care Units

	Charts Reviewed	Number of Inconsistencies	%
Date of Birth	119	3	2.5
Date of Admission	119	8	6.7
Gender	119	3	2.5
ICU-Type	119	5	4.2

Table 44. Infection Status Inconsistencies between NYS HAI Program and Hospital reported data for patients with a Central Line-Associated Blood Stream Infection in Adult/Pediatric ICUs

NYS HAI Program	Hospital Report		
	CLABSI	No-CLABSI	Total
CLABSI	125	43	168
No-CLABSI	44	877	921
Total	169	920	1089

Table 45. HAI Program Audit and Comparison of Adult/Pediatric Intensive Care Unit Patients* with and without Central Line Associated Blood Stream Infections (CLABSIs), New York State, 2007, Data reported as of April 1, 2008

Characteristics	CLABSI (N=168) N (%)	Non-CLABSI (N=447) N (%)	OR (95% CI)**
Gender:			
Male	89 (53.6)	244 (54.8)	0.9 (0.7-1.3)
Female	77 (46.4)	201 (45.2)	1.0 (0.7-1.5)
Other Infectious Process during ICU admission	78 (46.4)	187 (41.8)	1.2 (0.8-1.7)
Surgery prior Positive Culture	54 (32.9)	140 (31.5)	1.1 (0.7-1.6)
Multiple Surgeries at current admission	14 (8.3)	42 (9.4)	0.9 (0.5-1.6)
Chemotherapy last 6 months	10 (6.0)	48 (10.7)	0.5 (0.2-1.1)
Diabetes	28 (16.7)	97 (21.7)	0.7 (0.4-1.1)
Parenteral Nutrition	24 (14.3)	44 (9.8)	1.5 (0.9-2.6)
Dialysis	17 (10.1)	51 (11.4)	0.9 (0.5-1.6)
Trauma	5 (3.0)	12 (2.7)	1.1 (0.4-3.2)
Transplant	3 (1.8)	14 (3.1)	0.6 (0.1-2.0)
Multiple Central Line	**55 (32.7)**	**81 (18.2)**	**2.2 (1.5-3.3)**
Type of Central Line:			
Internal Jugular	62 (37.6)	136 (32.2)	1.2 (0.8-1.8)
Subclavian	50 (29.9)	125 (29.6)	1.0 (0.7-1.5)
PICC***	28 (17.3)	79 (19.8)	0.9 (0.5-1.3)
Femoral	24 (14.8)	57 (13.5)	1.0 (0.6-1.7)
Central Line inserted in:			
In the ICU	**99 (66.4)**	**195 (51.4)**	**1.8 (1.3-2.6)**
Operating Room	18 (12.1)	54 (14.4)	0.9 (0.5-1.5)
Intervention Radiology	16 (10.7)	44 (11.7)	0.9 (0.5-1.8)
Emergency Room	10 (6.7)	43 (11.4)	0.6 (0.3-1.2)
Prior to Hospital admission	6 (4.0)	40 (10.6)	0.4 (0.2-1.0)

* All patients had a central line and positive blood culture

**OR (95% CI) = The odds ratio and 95 percent confidence interval.

The odds of having an exposure are considered to be statistically different **(in red)** when the confidence interval does not include the value of 1.0.

*** PICC = Percutaneously inserted central catheter

Central
Line
Associated
Bloodstream
Infection
Tables
Neonatal Intensive Care Units

Table 46. Central Line-Associated Blood Stream Infection (CLABSI) Rates* for RPC/Level III Neonatal Intensive Care Units (NICU), New York State, 2007, Data reported as of April 1, 2008

	No. Hospitals	No. BSIs	Central Line Days	Mean	Percentile 10%	25%	50% (median)	75%	90%
Birth-weight category									
≤750g	33	101	13,548	7.5	0.0	1.0	5.9	9.9	15.9
751-1000g	35	**83**	**13,042**	**6.4 H**	0.0	0.0	6.1	8.8	13.8
1001-1500g	36	66	12,691	5.2	0.0	0.0	0.0	6.1	12.7
1501-2500g	36	33	7,581	4.4	0.0	0.0	0.0	4.4	7.6
>2500	33	27	6,631	4.0	0.0	0.0	0.0	4.7	9.5

BSI = blood stream infection **Red** = Significantly higher (**H**) than National data.

* $\frac{Number-of-CLABSI}{Number-of-central-line-days} x1000$

Table 47. Central Line-Associated Blood Stream Infection (CLABSI) Rates* for RPC/Level III Neonatal Intensive Care Units (NICU), 2006, National Data

	No. Hospitals	No. BSIs	Central Line Days	Mean	Percentile 10%	25%	50% (median)	75%	90%
Birth-weight category									
≤750g	42	118	18,458	6.4	0	2.5	5.2	11.0	15.6
751-1000g	44	83	18,781	4.4	0	0	3.8	8.7	10.2
1001-1500g	42	87	17.968	4.8	0	0	3.6	7.5	14.0
1501-2500g	36	68	16,208	4.2	0	0	0	4.1	8.5
>2500	32	50	16,131	3.1	0	0	0	1.9	5.3

BSI = blood stream infection

* $\frac{Number-of-CLABSI}{Number-of-central-line-days} x1000$

Table 48. Central Line-Associated Blood Stream Infection (CLABSI) Rates* for RPC/Level III Neonatal Intensive Care Units (NICU), New York City, 2007, Data reported as of April 1, 2008

	No. Hospitals	No. BSIs	Central Line Days	Mean	Percentile 10%	25%	50% (median)	75%	90%
Birth-weight category									
≤750g	20	48	7435	6.4	0.0	0.0	4.4	9.4	17.0
751-1000g	20	40	7191	5.6	0.0	0.0	6.1	9.3	13.8
1001-1500g	20	30	6533	4.6	0.0	0.0	0.0	5.7	11.7
1501-2500g	20	12	3558	3.4	0.0	0.0	0.0	0.0	7.6
>2500	19	14	4133	3.4	0.0	0.0	0.0	4.2	34.5

BSI = blood stream infection

* $\frac{Number-of-CLABSI}{Number-of-central-line-days} x1000$

Table 49. Central Line-Associated Blood Stream Infection (CLABSI) Rates* for RPC/Level III Neonatal Intensive Care Units (NICU), Upstate, 2007, Data reported as of April 1, 2008

	No. Hospitals	No. BSIs	Central Line Days	Mean	Percentile 10%	25%	50% (median)	75%	90%
Birth-weight category									
≤750g	13	53	6113	8.7	0.0	5.3	7.1	10.4	15.9
751-1000g	15	43	5851	7.3	0.0	0.0	6.1	8.3	15.2
1001-1500g	16	36	6158	5.8	0.0	0.0	0.8	7.8	13.6
1501-2500g	16	21	4023	5.2	0.0	0.0	0.0	5.5	7.8
>2500	14	13	2498	5.2	0.0	0.0	0.0	5.7	9.5

BSI = blood stream infection

* $\frac{Number-of-CLABSI}{Number-of-central-line-days} x1000$

No significant difference between NYC and Upstate by birth weight category.

Table 50. Umbilical Catheter-Associated Blood Stream Infection Rates* for RPC/Level III Neonatal Intensive Care Units (NICU), New York State, 2007, Data reported as of April 1, 2008

	No. Hospitals	No. BSIs	Umbilical Line Days	Mean	Percentile 10%	25%	50% (median)	75%	90%
Birth-weight category									
≤750g	34	**44**	**3,593**	**12.2 H**	0.0	0.0	8.4	15.2	30.8
751-1000g	36	22	3,827	5.7	0.0	0.0	0.0	9.7	20.2
1001-1500g	36	18	3,842	4.7	0.0	0.0	0.0	7.5	18.9
1501-2500g	34	7	4,062	1.7					
>2500	33	**12**	**5,372**	**2.2 H**	0.0	0.0	0.0	2.9	9.6

BSI = blood stream infection **Red** = Significantly higher (**H**) than National data.

* $\frac{Number - of - UCAB}{Number - of - umbilical - catheter - days} x1000$

Table 51. Umbilical Catheter-Associated Blood Stream Infection Rates* for RPC/Level III Neonatal Intensive Care Units (NICU), 2006, National Data

	No. Hospitals	No. BSIs	Umbilical Line Days	Mean	Percentile 10%	25%	50% (median)	75%	90%
Birth-weight category									
≤750g	36	42	6,116	6.9	0.0	0.0	2.9	10.80	19.1
751-1000g	34	24	5,609	4.3	0.0	0.0	0.0	0.0	9.5
1001-1500g	32	20	6,304	3.2	0.0	0.0	0.0	0.0	14.5
1501-2500g	30	10	5,625	1.8	0.0	0.0	0.0	0.0	5.7
>2500	35	7	8,150	0.9	0.0	0.0	0.0	0.0	1.7

BSI = blood stream infection

* $\frac{Number - of - UCAB}{Number - of - umbilical - catheter - days} x1000$

Table 52 Central Line-Associated Blood Stream Infection (CLABSI) Rates* for Level II/III Neonatal Intensive Care Units (NICU),New York State, 2007, Data reported as of April 1, 2008

	No. Hospitals	No. BSIs	Central Line Days	Mean	Percentile 10%	25%	50% (median)	75%	90%
Birth-weight category									
≤750g	10	**12**	**1,156**	**10.4 H**	0.0	0.0	5.5	27.8	84.2
751-1000g	11	9	1,109	8.1					
1001-1500g	13	**9**	**1,030**	**8.7 H**					
1501-2500g	12	2	487	4.1					
>2500	9	0	369	0.0					

BSI = blood stream infection **Red** = Significantly higher (**H**) than National data.

* $\frac{Number-of-CLABSI}{Number-of-central-line-days} x1000$

Table 53. Central Line-Associated Blood Stream Infection (CLABSI) Rates* for Level II/III Neonatal Intensive Care Units (NICU), 2006, National Data

	No. Hospitals	No. BSIs	Central Line Days	Mean	Percentile 10%	25%	50% (median)	75%	90%
Birth-weight category									
≤750g	25	62	10,556	5.9	0.0	0.0	3.1	8.3	9.5
751-1000g	22	48	9,156	5.2	0.0	0.0	2.6	11.2	17.0
1001-1500g	30	35	10,337	3.4	0.0	0.0	0.0	4.4	12.9
1501-2500g	21	17	7,219	2.4	0.0	0.0	0.0	0.6	4.2
>2500	19	33	7,831	4.2					

BSI = blood stream infection

* $\frac{Number-of-CLABSI}{Number-of-central-line-days} x1000$

Table 54. Umbilical Catheter-Associated Blood Stream Infection Rates* for Level II/III Neonatal Intensive Care Units (NICU), New York State, 2007, Data reported as of April 1, 2008

	No. Hospitals	No. BSIs	Umbilical Line Days	Mean	Percentile 10%	25%	50% (median)	75%	90%
Birth-weight category									
≤750g	11	8	535	14.9					
751-1000g	12	**8**	**536**	**14.9 H**					
1001-1500g	14	0	457	0.0					
1501-2500g	11	0	328	0.0					
>2500	14	2	363	5.5					

BSI = blood stream infection **Red** = Significantly higher (**H**) than National data.

* $\frac{Number - of - UCAB}{Number - of - umbilical - catheter - days} x1000$

Table 55. Umbilical Catheter-Associated Blood Stream Infection Rates* for Level II/III Neonatal Intensive Care Units (NICU), 2006, National Data

	No. Hospitals	No. BSIs	Umbilical Line Days	Mean	Percentile 10%	25%	50% (median)	75%	90%
Birth-weight category									
≤750g	21	34	4,314	7.9	0.0	0.0	7.4	22.6	35.7
751-1000g	20	18	4,092	4.4	0.0	0.0	0.0	2.0	15.2
1001-1500g	25	10	3,879	2.6	0.0	0.0	0.0	0.0	10.3
1501-2500g	22	4	3,737	1.1	0.0	0.0	0.0	0.0	2.5
>2500	23	8	5,532	1.4	0.0	0.0	0.0	0.0	2.5

BSI = blood stream infection

* $\frac{Number - of - UCAB}{Number - of - umbilical - catheter - days} x1000$

Table 56. Central Line Associated Blood Stream Infections in Neonatal ICUs by Hospital, New York State, 2007, Data as of April 1, 2008

Birth-Weight		≤750 grams			751-1000 grams			1001-1500 grams			1501-2500 grams			>2500 grams		
Hosp	NICU Level	BSI	CL-Day	Rate	BSI	CL-Day	Rate	BSI	CL-Day	Rate	BSI	CL-Day	Rate	BSI	CL-Day	Rate
10242	III	4	71	56.3 H	1	151	6.6	0	149	0		*			*	
10730	III	0	253	0	0	154	0	0	110	0		*			*	
10761	III		*			*			*		0	52	0		*	
10791	III		*		0	103	0	0	51	0	0	52	0	0	82	0
10816	III	0	181	0	0	90	0	0	93	0		*			*	
10826	III	0	73	0		*			*			*			*	
10847	III		*			*		0	73	0		*			*	
10894	III	0	100	0	0	136	0	0	301	0	0	266	0		*	
10902	III	1	67	14.9	1	163	6.1	2	110	18.2 H		*			*	
10948	III	0	160	0	0	348	0	0	137	0	0	140	0		*	
10951	III	4	402	10.0	3	195	15.4 H	0	197	0	0	56	0		*	
10956	III		*		1	59	16.9		*			*			*	
10967	III		*			*		0	52	0		*			*	
11013	III		*			*			*			*			*	
11015	III	2	301	6.6	0	460	0	1	297	3.4		*			*	
11042	III		*		0	157	0		*			*			*	
11046	III	0	63	0		*			*			*			*	
Total	**III**	**12**	**1716**	**7.0***	**6**	**2112**	**2.8***	**4**	**1704**	**2.3***	**0**	**841**	**0.0**	**2**	**363**	**5.5***
10260	II/III		*		1	86	11.6	1	56	17.9		*			*	
10357	II/III		*		0	82	0	1	103	9.7		*			*	
10385	II/III		*			*			*			*			*	
10396	II/III	6	372	16.1	4	194	20.6	2	92	21.7		*			*	
10480	II/III	0	318	0	0	162	0	0	201	0	0	96	0	0	87	0
10556	II/III		*			*		0	81	0		*			*	
10628	II/III		*			*		0	0			*			*	
10731	II/III	2	57	35.1	2	219	9.1	4	177	22.6 H	1	100	10	0	51	0
10822	II/III		*			*		0	77	0		*			*	
10860	II/III		*		0	79	0		*			*			*	
10911	II/III	0	143	0	1	176	5.7	0	137	0		*		0	57	0
10943	II/III		*			*			*			*			*	
10965	II/III	1	91	11.0		*			*			*			*	
11011	II/III	0	61	0		*			*		0	111	0		*	
Total	**II/III**	**12**	**1156**	**10.4***	**9**	**1109**	**8.1***	**9**	**1030**	**8.7***	**2**	**487**	**4.1***	**0**	**369**	**0**
10087	RPC	1	101	9.9	2	145	13.8	1	190	5.3	0	91	0		*	
10168	RPC	17	1067	15.9 H	9	593	15.2 H	4	659	6.1	6	722	8.3	2	348	5.7
10218	RPC		*		1	113	8.8	0	149	0	1	51	19.6	0	103	0

Birth-Weight		≤750 grams			751-1000 grams			1001-1500 grams			1501-2500 grams			>2500 grams		
Hosp	NICU level	BSI	CL-Day	Rate	BSI	CL-Day	Rate	BSI	CL-Day	Rate	BSI	CL-Day	Rate	BSI	CL-Day	Rate
10241	RPC	1	156	6.4	0	297	0	0	245	0	1	211	4.7	2	126	15.9
10243	RPC	**6**	**352**	**17.0 H**	3	273	11.0	3	279	10.8		*			*	
10632	RPC	10	707	14.1	3	231	13.0	5	393	12.7	0	151	0		*	
10756	RPC	5	699	7.2	5	611	8.2	**10**	**738**	**13.6 H**	5	740	6.8	3	316	9.5
10765	RPC	1	504	2.0	2	375	5.3	0	393	0	1	224	4.5	1	211	4.7
10770	RPC	1	217	4.6	1	135	7.4	0	311	0	0	98	0	1	171	5.8
10790	RPC	1	106	9.4	0	158	0	1	164	6.1		*			*	
10812	RPC	7	909	7.7	3	809	3.7	7	675	10.4	3	481	6.2	0	281	0
10845	RPC	7	674	10.4	6	671	8.9	2	1281	1.6	0	158	0	0	55	0
10880	RPC	10	1821	5.5	9	1475	6.1	5	978	5.1	5	1071	4.7	8	1910	4.2
10881	RPC	3	705	4.3	8	943	8.5	9	1133	7.9	0	336	0	1	367	2.7
10893	RPC	4	937	4.3	8	857	9.3	4	817	4.9	5	659	7.6	0	800	0
10899	RPC	3	429	7.0	5	778	6.4	2	627	3.2	1	545	1.8	2	363	5.5
10918	RPC	4	918	4.4	8	960	8.3	8	841	9.5	5	640	7.8	3	673	4.5
10963	RPC	3	566	5.3	3	400	8.3	1	481	2.1	0	227	0	1	128	7.8
11407	RPC	5	928	5.6	**1**	**1106**	**0.9 L**	0	633	0	0	265	0	0	306	0
Total	**RPC**	**89**	**11832**	**7.5***	**77**	**10930**	**7.0***	**62**	**10987**	**5.6***	**33**	**6740**	**4.9***	**25**	**6268**	**4.0***
NYS-Total	**All**	**113**	**14704**	**7.7**	**92**	**14151**	**6.5**	**75**	**13721**	**5.5**	**35**	**8068**	**4.3**	**27**	**7000**	**3.8**

Birth weight and type of NICU category-specific rates were used as reference group for comparison.

Rate= $\frac{Number-of-CLABSI}{Number-of-central-line-days} x1000$

* = Insufficient number (less than 50) of central line or umbilical line days

Red = Significantly higher (**H**) than NYS average

Yellow highlighted = Significantly lower (**L**) than NYS average

Table 57. Umbilical Catheter (UC)-Associated Blood Stream Infections in Neonatal ICUs by Hospital, NYS, 2007
Data as of April 1, 2008

Birth-Weight		≤750 grams			751-1000 grams			1001-1500 grams			1501-2500 grams			>2500 grams		
Hosp	NICU level	BSI	UC-Day	Rate	BSI	UC-Day	Rate	BSI	UC-Day	Rate	BSI	UC-Day	Rate	BSI	UC-Day	Rate
10730	III		*			*			*			*			*	
10761	III		*		1	113	8.8	1	148	6.8	0	159	0	1	104	9.6
10791	III		*			*			*		0	53	0		*	
10816	III	0	58	0	0	82	0	0	136	0	0	189	0	0	109	0
10826	III		*			*			*			*			*	
10847	III		*			*			*			*			*	
10894	III		*			*			*			*			*	
10902	III		*			*			*			*		1	78	12.8
10928	III		*			*		1	90	11.1		*		0	58	0
10948	III	0	63	0	0	60	0	0	59	0	0	59	0		*	
10951	III	1	104	9.6	0	93	0	0	111	0	0	140	0	0	128	0
10956	III		*			*			*			*			*	
10967	III		*			*			*			*			*	
11013	III		*			*			*			*			*	
11015	III	1	93	10.8	2	99	20.2		*			*			*	
11042	III	0	51	0	0	60	0		*		0	83	0	0	201	0
11046	III	0	57	0		*			*			*		0	0	0
Total	**III**	**6**	**566**	**10.6***	**5**	**698**	**7.2***	**3**	**707**	**4.2***	**0**	**820**	**0**	**2**	**889**	**2.2***
10260	II/III		*			*		0	50	0		*			*	
10297	II/III		*			*			*			*			*	
10357	II/III	1	62	16.1		*			*			*			*	
10385	II/III		*			*			*			*			*	
10396	II/III	3	95	31.6	2	97	20.6		*			*			*	
10480	II/III	1	181	5.5	1	147	6.8	0	150	0	0	146	0	0	163	0
10556	II/III		*			*			*			*			*	
10628	II/III		*			*			*			*			*	
10731	II/III		*			*			*			*			*	
10822	II/III		*			*			*			*		0	67	0
10860	II/III		*		1	80	12.5		*			*			*	
10911	II/III	1	108	9.3	2	85	23.5	0	68	0		*			*	
10943	II/III		*			*			*			*			*	
10965	II/III		*			*			*			*			*	

Total	II/III	8	535	14.9	8	536	14.9	0	457	0	0	328	0	2	363	5.5
Birth-Weight		**≤750 grams**			**751-1000 grams**			**1001-1500 grams**			**1501-2500 grams**			**>2500 grams**		
Hosp	**NICU level**	**BSI**	**UC-Day**	**Rate**	**BSI**	**UC-Day**	**Rate**	**BSI**	**UC-Day**	**Rate**	**BSI**	**UC-Day**	**Rate**	**BSI**	**UC-Day**	**Rate**
10087	RPC	1	104	9.6	2	91	22	0	55	0		*		0	59	0
10168	RPC	4	263	15.2	2	174	11.5	0	367	0	3	575	5.2	2	389	5.1
10218	RPC		*			*		1	56	17.9		*		0	90	0
10241	RPC	6	293	20.5	0	229	0	2	109	18.3	**2**	**120**	**16.7 H**	1	344	2.9
10243	RPC	1	139	7.2	2	104	19.2	2	117	17.1	0	53	0		*	
10632	RPC	4	130	30.8	1	90	11.1	0	79	0		*		1	52	19.2
10756	RPC	6	291	20.6	1	364	2.7	2	624	3.2	0	340	0	0	526	0
10765	RPC	1	146	6.8	0	112	0	0	89	0	0	107	0	0	156	0
10770	RPC	1	73	13.7	0	76	0	1	122	8.2	0	185	0	0	176	0
10790	RPC		*			*			*			*			*	
10812	RPC	0	222	0	0	127	0	0	176	0	0	101	0	1	186	5.4
10845	RPC	0	183	0	0	87	0	0	174	0	0	91	0	0	99	0
10880	RPC	3	197	15.2	2	112	17.9	0	82	0	1	493	2	3	902	3.3
10881	RPC	1	60	16.7	0	97	0	0	77	0	0	85	0	1	170	5.9
10893	RPC	0	130	0	0	174	0	0	181	0	0	152	0	0	376	0
10899	RPC	2	164	12.2	3	286	10.5	1	361	2.8	0	327	0	0	339	0
10918	RPC	2	163	12.3	2	235	8.5	**3**	**131**	**22.9 H**	0	88	0	0	150	0
10963	RPC	3	124	24.2		*		2	106	18.9	0	73	0	0	70	0
11407	RPC	2	322	6.2	2	672	3	0	224	0	0	330	0	0	335	0
Total	**RPC**	**38**	**3027**	**12.6**	**17**	**3129**	**5.4**	**15**	**3135**	**4.8**	**7**	**3242**	**2.2**	**10**	**4483**	**2.2**
NYS Total	**All**	**52**	**4128**	**12.6**	**30**	**4363**	**6.9**	**18**	**4299**	**4.2**	**7**	**4390**	**1.6**	**14**	**5735**	**2.4**

Birth weight and type of NICU category-specific rates were used as reference group for comparison.

Rate= $\frac{Number-of-UCABSI}{Number-of-umbilicalcatheter-days} x1000$

* = Insufficient number (less than 50) of central line or umbilical line days

Red = Significantly higher (**H**) than NYS average

Yellow highlighted = Significantly lower (**L**) than NYS average

Table 58. Microorganisms Associated with Central Line Associated Blood Stream Infections (CLABSI) in Neonatal Intensive Care Units (NICUs), New York State, 2007, Data reported as of April 1, 2008

Microorganism	N	% (N=447)
Coagulase negative staphylococci	289	64.7
Staphylococcus aureus	43	9.6
(MRSA)	(9)	(2.0)
Candida	34	7.6
Enterococcus	32	7.2
(VRE)	(2)	(0.5)
Klebsiella	27	6.0
E.coli	19	4.3

Table 59. Criteria for Device Associated Blood Stream Infections among RPCs/Level III Neonatal Intensive Care Units (NICU) by Birth Weight, New York State, 2007, Data reported as of April 1, 2008

	Laboratory Confirmed Bloodstream Infection								
	Criterion 1		Criterion 3a		Criterion 3b		CSEP		Total
Birth weight	N	%	N	%	N	%	N	%	N
Central Line-associated									
≤750g	44	43.6	14	13.9	37	36.6	6	5.6	101
751-1000g	36	43.4	15	18.1	31	37.4	1	1.2	83
1001-1500g	30	45.4	14	21.2	20	30.3	2	3.0	66
1501-2500g	16	48.5	7	21.2	9	27.3	1	3.0	33
>2500	14	51.8	7	25.9	5	18.5	1	3.7	27
Total	**140**	**45.2**	**57**	**18.4**	**102**	**32.9**	**11**	**3.6 L**	**310**
Umbilical catheter associated									
≤750g	27	61.4	6	13.6	11	25.0	0	0	44
751-1000g	8	36.4	4	18.2	9	40.9	1	4.6	22
1001-1500g	10	55.6	1	5.6	5	27.8	2	11.1	18
1501-2500g	3	42.9	2	28.6	2	28.6	0	0	7
>2500	7	58.3	0	0	3	25.0	2	16.7	12
Total	**55**	**53.4**	**13**	**12.6**	**30**	**29.1**	**5**	**4.8 L**	**103**

See Center for Disease Control and Prevention for criteria
CSEP = Clinical Sepsis
Yellow highlighted = Significantly lower (**L**) than National data.

Table 60. Distribution of Specific Sites and Criteria for Device Associated Blood Stream Infections among RPCs/Level III Neonatal Intensive Care Units (NICU) by birth weight, 2006, National Data

	Laboratory Confirmed Blood Stream Infection								
	Criterion 1		Criterion 3a		Criterion 3b		CSEP		Total
Birth weight	N	%	N	%	N	%	N	%	N
Central Line-associated									
≤750g	47	40.9	18	15.7	40	34.8	10	8.7	115
751-1000g	45	54.2	8	9.6	27	32.5	3	3.6	83
1001-1500g	43	49.4	8	9.2	30	34.5	6	6.9	87
1501-2500g	33	48.5	13	19.1	19	27.9	3	4.4	68
>2500	24	49.0	4	8.2	12	24.5	9	18.4	49
Total	**192**	**47.8**	**51**	**12.7**	**128**	**31.8**	**31**	**7.7**	**402**
Umbilical catheter associated									
≤750g	17	41.5	3	7.3	14	34.1	7	17.1	41
751-1000g	10	41.7	2	8.3	10	41.7	2	17.1	24
1001-1500g	7	35.0	2	10.0	9	45.0	2	8.3	20
1501-2500g	4	40.	0	0.0	4	40.0	2	10.0	10
>2500	2	28.6	1	14.3	3	42.9	1	20.0	7
Total	**40**	**39.2**	**8**	**7.8**	**40**	**39.2**	**14**	**14.3**	**102**

See Center for Disease Control and Prevention for criteria
CSEP = Clinical Sepsis

Table 61. Distribution of Specific Sites and Criteria for Device Associated Blood Stream Infections among Level II/III NICUs by birth weight, New York State, 2007, Data reported as of April 1, 2008

	Laboratory Confirmed Blood Stream Infection								
	Criterion 1		Criterion 3a		Criterion 3b		CSEP		Total
Birth weight	N	%	N	%	N	%	N	%	N
Central Line-associated									
≤750g	10	83.3	0	0	2	16.7	0	0	12
751-1000g	5	55.6	1	11.1	3	33.3	0	0	9
1001-1500g	4	44.4	2	22.2	3	33.3	0	0	9
1501-2500g	0	0	1	50.0	1	50.0	0	0	2
>2500	0	0	0	0	0	0	0	0	0
Total	**19**	**59.4**	**4**	**12.5**	**9**	**28.1**	**0**	**0**	**32**
Umbilical catheter associated									
≤750g	6	75.0	1	12.5	1	12.5	0	0	8
751-1000g	6	75.0	0	0	2	25.0	0	0	8
1001-1500g	0	0	0	0	0	0	0	0	0
1501-2500g	0	0	0	0	0	0	0	0	0
>2500	2	100.0	0	0	0	0	0	0	0
Total	**14**	**77.8**	**1**	**5.6**	**3**	**16.7**	**0**	**0**	**18**

See Center for Disease Control and Prevention for criteria
CSEP = Clinical Sepsis

Table 62. Distribution of specific sites and criteria for device associated Blood Stream Infections among Level II/III NICUs by birth weight, 2006, National Data

	Laboratory Confirmed Blood Stream Infection								
	Criterion 1		Criterion 3a		Criterion 3b		CSEP		Total
Birth weight	N	%	N	%	N	%	N	%	N
Central Line-associated									
≤750g	25	40.3	10	16.1	23	37.1	4	6.5	62
751-1000g	19	39.6	12	25.0	17	35.4	0	0	48
1001-1500g	15	44.1	4	11.8	13	38.2	2	5.9	34
1501-2500g	6	35.3	3	17.7	8	47.1	0	0	17
>2500	9	27.3	2	6.1	20	60.6	2	6.1	33
Total	**74**	**38.1**	**31**	**16.0**	**81**	**41.8**	**8**	**4.1**	**194**
Umbilical catheter associated									
≤750g	16	47.1	10	29.4	6	17.7	2	5.9	34
751-1000g	6	33.3	1	5.6	11	61.1	0	0	18
1001-1500g	3	30.0	0	0.0	7	70.0	0	0	10
1501-2500g	2	50.0	0	0.0	2	50.0	0	0	4
>2500	1	12.5	4	50.0	2	25.0	1	12.5	8
Total	**28**	**48.3**	**15**	**16.9**	**28**	**31.5**	**3**	**4.0**	**74**

See Center for Disease Control and Prevention for criteria
CSEP = Clinical Sepsis

Table 63. Inconsistencies Revealed during Medical Chart Reviews. NYS HAI Program Audit of CLABSI in Neonatal Intensive Care Units (NICU), 2007

Variables	Charts Reviewed	Number of Inconsistencies	%
Date of Birth	26	1	3.8
Date of admission	26	3	11.5
Gender	26	0	0
Birth Weight	26	1	3.8
Umbilical catheter	26	6	23.0
Central Line	26	3	11.5

Table 64. Infection Status Revealed during Audit Compared with NHSN Reported Status. NYSHAI Program Audit of Neonatal CLABSI of 34 Hospitals, 2007

Revealed during Audit	Reported to NHSN		
	Infected	Not infected	Total
Infected	29	10	39
Not Infected	2	69	71
Total	31	79	110

Table 65. HAI Program Audit of Neonatal Intensive Care Units (NICU) Patients with Central Line and Positive Blood Culture, New York State, Data reported as of April 1, 2008

Characteristics	CLABSI (N=39) N (%)	Non-CLABSI (N=21) N (%)	OR (95% CI)
Gender			
Male	24 (63.2)	14 (66.7)	0.8 (0.3-2.6)
Female	14 (36.8)	7 (33.3)	1.2 (0.4-3.6)
Birth Weight:			
<750gr	21 (53.8)	7 (33.3)	2.3 (0.8-7.1)
751-1000gr	10 (25.6)	7 (33.3)	0.7 (0.2-2.2)
1001-1500gr	5 (12.8)	2 (9.5)	1.4 (0.2-7.9)
1501-2500gr	3 (7.7)	4 (19.5)	0.3 (0.1-1.8)
2500gr	0	1 (4.8)	
Mechanical Ventilation	**28 (71.8) H**	**7 (11.7) H**	**5.1 (1.6-16.0) H**
Prior Tracheostomy	21 (53.8)	6 (28.6)	2.9 (0.9-9.1)
CPAP Ventilation	16 (41.0)	9 (42.9)	0.9 (0.3-2.7)
Parenteral Nutrition	**13 (33.3) H**	**1 (4.8) H**	**10.0 (1.2-82.9) H**
NEC	7 (17.9)	2 (9.5)	2.1 (0.4-11.0)
Maternal Infection	5 (12.8)	1 (4.8)	2.9 (0.3-26.9)
Surgery	4 (10.3)	2 (9.5)	1.1 (0.2-6.5)
ECMO	0	0	
Central Line Type:			
Central Line (only)	22 (56.1)	14 (66.6)	0.6 (0.2-1.9)
Umbilical (only)	8 (20.5)	5 (23.8)	0.8 (0.2-2.9)
Both	9 (23.1)	2 (9.5)	2.9 (0.6-14.6)

ECMO = Extracorporeal Membrane Oxygenation
CPAP = Continuous Positive Airway Pressure
NEC = Necrotizing enterocolitis
Red = Significantly higher (**H**)

Table 66. Summary of Hospital Survey on Central Line Associated Blood Stream Infection: (CLABSI) Prevention Practices in Intensive Care Units (ICU) in New York State Hospitals, 2007

	Number of Facilities (%)			
	Adult ICU	Peds ICU	Neonatal ICU	Total
Infection Prevention Control Bundle				
Implemented	252 (89)	19 (86)	36 (82)	307 (88)
Continue to monitor compliance	185 (73)	11 (58)	22 (61)	218 (71)
Chlorhexidine (CHG) Use/Location				
Chlorhexidine (CHG) Use	260 (91)	20 (100)	12 (27)	292 (83)
Incorporated in kit	229 (91)	15 (79)	10 (91)	254 (90)
Available in cart	18 (7)	3 (16)	1 (9)	22 (8)
Central location to assemble CL supplies	4 (2)	1 (5)	0 (0)	5 (2)
Use Iodophor	18 (6)	5 (23)	28 (64)	51 (14)
Use of Impregnated Catheter				
In All Patients	103 (35)	5 (23)	0 (0)	108 (31)
Some patients	52 (20)	7 (32)	2 (4)	61 (17)
Do not use	129 (45)	10 (45)	42 (96)	181 (52)
Biopatch® Use				
All patients	117 (41)	6 (27)	1 (2)	124 (35)
Some patients	35 (12)	5 (23)	2 (5)	42 (12)
Do not use	132 (47)	11 (50)	41 (93)	184 (53)

Table 67. Summary of Hospital Survey on Central Line Associated Blood Stream Infection: (CLABSI) Detection Practices in Intensive Care Units (ICU) in New York State Hospitals, 2007

	Number of Facilities (%)			
	Adult ICU	Pediatric ICU	Neonatal ICU	Total
Infection Detection Method				
Positive Blood Culture	274 (96)	20 (91)	43 (98)	337 (96)
ICU unit notifies ICP	123 (43)	7 (32)	13 (30)	143 (41)
ICU rounds with staff	110 (39)	7 (32)	11 (25)	128 (36)
Electronic clinical reporting	29 (10)	2 (14)	8 (18)	39 (11)
Pharmacy-Initiated antibiotic orders	10 (4)	1 (5)	7 (16)	18 (5)
Patient Follow- up 48 hrs				
Positive blood culture Paper (hard) copy	204 (72)	13 (59)	24(55)	241 (69)
Positive blood culture Electronic copy	149 (52)	11 (50)	23 (52)	183 (52)
Both paper and electronic	82 (29)	6 (27)	10 (23)	98 (28)
Hospital tracking system	39 (14)	2 (95)	6 (14)	47 (13)