CONNECTICUT DEPARTMENT OF
PUBLIC HEALTH

Keeping Connecticut Healthy

THE DEPARTMENT OF PUBLIC HEALTH

To

The Connecticut General Assembly

AN ACT CONCERNING HOSPITAL ACQUIRED INFECTIONS

…

October 1, 2007

State of Connecticut
Department of Public Health
410 Capitol Avenue
P.O. Box 340308
Hartford, CT 06134-0308

Healthcare-associated infections ("HAIs") are a major public health problem throughout the United States. In Public Act 06-142, *An Act Concerning Hospital Acquired Infections*, the Connecticut legislature established the Committee on Healthcare Associated Infections ("Committee") and charged it with advising the Department of Public Health (DPH) with respect to the development, implementation, operation, and monitoring of a mandatory reporting system for HAIs in Connecticut.

In carrying out its charge, the Committee was instructed to consider appropriate standardized outcome and process measures that are: (1) capable of being validated; (2) based upon nationally recognized and recommended standards, to the extent such standards exist; (3) based upon competent and reliable scientific evidence; (4) protective of practitioner information and information concerning individual patients; and (5) capable of being used and easily understood by consumers. The Committee also was instructed to recommend to DPH appropriate methods for increasing public awareness about effective measures to reduce the spread of infections in communities, hospitals, and other healthcare settings.

The Committee began meeting regularly on August 31, 2006, and engaged in a deliberative and productive work process that included the Committee's: (1) review of national data concerning the magnitude of the HAI problem; (2) hearing directly from persons who have been deeply affected by HAIs; (3) review of recommendations of national authorities and experts on HAI reporting and infection prevention; (4) consideration of activities already taking place in Connecticut related to HAI reporting and prevention; (5) examination of established national and state HAI reporting systems, with presentations from and discussions with individuals who have been extensively involved in developing those initiatives and systems; and (6) consideration of various educational initiatives to increase public awareness of HAIs and ways to reduce the incidence of them.

The following is a status report on the Committee's recommendations, discussed in detail in the April 2007 report, and the Department's efforts to implement the same.

Recommendation 1. Connecticut should utilize the reporting system established by the National Healthcare Safety Network (NHSN) of the Centers for Disease Control and Prevention (CDC).

DPH has initiated discussions with CDC and will be issuing a letter to Connecticut's hospitals about their need to register to be part of the NHSN system. (System requirements for connecting to NHSN are attached.)

Recommendation 2. Connecticut should initially begin collecting data on the NHSN module that tracks data relative to central line-associated blood stream infections ("CLABSIs") in patients in intensive care units. After hospitals are collecting and

reporting data on CLABSIs in a standardized manner, other modules will be added to the system, as appropriate.

The Committee has requested that the Connecticut Hospital Association provide information regarding the number and types of intensive care units found in Connecticut hospitals. At the November 2007 meeting, the Committee is expected to develop a final recommendation on what type and quantity of data should be collected. DPH and CHA are working together to provide training to each of the Connecticut hospitals. The training session for Facility Administrators has been scheduled for October 19, 2007. The training session for users will be held in November 2007. The goal is to have all hospitals enrolled in the CDC NHSN program and reporting data on the first identified module by January 1.

Recommendation 3. The Connecticut program should be designed to go beyond the collection and reporting of data. It is essential that the data collected be used to implement evidence-based prevention methods.

While the Committee is currently focused on the statewide implementation of the data collection system, it remains committed to ensuring that the data collected will be used to implement evidence-based prevention methods.

Recommendation 4. HAI-related education is a critical element to the success of a statewide HAI reporting and prevention system, and education initiatives should commence well in advance of public reporting of HAI information derived from the HAI reporting system recommended by this Committee.

The Department of Public Health issued a request for proposals (see attached) to begin the process of public education on the issue of HAI and good hygiene practices. Minutes from the last Education Subcommittee meeting are attached.

Recommendation 5. The implementation and success of the recommended HAI reporting system and education initiatives require an immediate and ongoing state funding commitment.

During the 2007 legislative session, the Connecticut General Assembly provided funding to DPH in the amount of $305,000, of which $55,000 is to be used to implement the Education Subcommittee recommendations, with the remainder of the funding to be used to hire dedicated staff at DPH for the new reporting system.

Recommendation 6. The Committee should continue to serve in an advisory capacity to assist in the development and implementation of the recommended reporting system and education initiatives.

The Committee continues to meet and serve in an advisory capacity, especially in the areas of education and the implementation of additional modules and new reporting requirements.

Recommendation 7. Resources in the amount of $250,000 are necessary for the Department of Public Health to implement the enclosed recommendations. An additional $55,000 is necessary to implement the recommendations of the Education Subcommittee.

During the 2007 legislative session, the Connecticut General Assembly provided the above funding amounts to the Department to implement the recommendations of the committee. This initiative will require continued funding in subsequent years in order to fully achieve the ultimate goal of making Connecticut hospitals safer by preventing a broad variety of healthcare associated infections

Recommendation 8. Additional resources are necessary for Connecticut's hospitals to implement the collection, reporting and prevention efforts detailed in this report.

The Connecticut General Assembly did not provide additional funding to Connecticut hospitals specifically for this new initiative. The Committee will continue to examine and report on the type and magnitude of resources that are necessary to implement a successful data collection and reporting system that has the ultimate goal of infection prevention.

HAI Education Subcommittee Update

Date: 9/20/07

Subcommittee Chairs:

Name	**Department**	**Organization**
Jennifer Martin	Infection Control	Connecticut Children's Medical Center
Susan MacArthur	Infection Control and Quality Management	Hartford Hospital

Purpose: Develop a Statewide hand hygiene education plan that encourages a partnership between patients and the providers who care for them.

Goals:

1. Increase healthcare compliance with hand hygiene best practices throughout the State of Connecticut.
2. Increase the awareness of what consumers can do to prevent healthcare associated infections.

Subcommittee Members:

Name	*Department/Organization*
Bonnie Capasso	Parent /consumer/volunteer
Wendy Furniss	Department of Public Health – Regulatory
William Gerrish	Department of Public Health – Office of Communications
Susan MacArthur	Infection Control and Quality Management
Jennifer Martin	Infection Control
Julie Petrellis	Connecticut Hospital Association
Jean Rexford	Connecticut Center for Patient Safety
Tanya Court	Business Fairfield

Subcommittee Activities:

1. Established goals and purpose of subcommittee. It was determined that the educational campaign will focus on hand hygiene.

2. **Proposal for Education Campaign** -RFP was drafted and currently awaiting proposals from potential PR firms. Expectation is to have a clear and consistent message for consumers that will emphasize the importance of heath care provider's washing their hands.

3. **Education Campaign Kick-off** – invite CEO's of Hospitals, Patient Advocacy groups, Medical and Nursing Associations, Media and others to a large "kick-off" at the Capitol hosted by the Governor and the Commissioner. Key message will be Connecticut values hand washing. Date pending availability of Governor and Commissioner.

NHSN System Requirements

The following recommended system requirements were developed to ensure the best use of the key features of the NHSN which demand high processor performance, such as Java graphical interface, Internet audio / video streaming, professional 3D graphics, multimedia, data analysis, graphical data visualization and palm device synchronization. The **minimum system requirements** are a 1Ghz equivalent or higher processor, e-mail account, high-speed internet access (greater than 200Kbs), and 500 MB available disk space.

It is the responsibility of the healthcare facility to choose the specific microcomputer brand and model to purchase.

Recommended System Requirements

Computer

- 3 GHz processor - Intel Pentium IV, or AMD K6/Athlon/Duron family, or compatible processor recommended
- 512MB of RAM
- Sound card
- Speakers or headphones
- CD-ROM or DVD drive
- Hard disk 40 GB

Internet Browser

- Microsoft Internet Explorer 6 or higher

Monitor

- 17" Super VGA (800 X 600) or higher resolution video adapter and monitor

Operating System (OS)

- Windows XP/ Windows 2000

Printer

- Laser Printer

Internet Access

- High-speed Internet access >200Kbs
  (e.g., T1, Cable, DSL, ADSL)

Email Access

- E-mail account

AJIC major articles

National Healthcare Safety Network (NHSN) Report, data summary for 2006, issued June 2007

Jonathan R. Edwards, MS, Kelly D. Peterson, BBA, Mary L. Andrus, BA, RN, CIC, James S. Tolson, BS, Joy S. Goulding, Margaret A. Dudeck, MPH, Randy B. Mincey, BA, Daniel A. Pollock, MD, Teresa C. Horan, MPH, and the NHSN Facilities
Atlanta, Georgia

This report is a summary of device-associated infections data collected and reported by hospitals participating in the National Healthcare Safety Network (NHSN) from January through December 2006. This report updates previously published data from the National Nosocomial Infections Surveillance (NNIS) system.[1-3]

The NHSN was established in 2005 to integrate and supersede 3 legacy surveillance systems at the Centers for Disease Control and Prevention (CDC): the NNIS system, the Dialysis Surveillance Network (DSN), and the National Surveillance of Healthcare Workers (NaSH). Similar to the NNIS system, NHSN facilities voluntarily report their healthcare-associated infection (HAI) surveillance data for aggregation into a single national database for the following purposes:

- Estimation of the magnitude of HAI;
- discovery of HAI trends;
- facilitation of inter- and intrahospital comparisons with risk-adjusted data that can be used for local quality improvement activities; and
- assistance for facilities in developing surveillance and analysis methods that permit timely recognition of patient safety problems and prompt intervention with appropriate measures.

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Identity of all NHSN facilities is held confidential in accordance with Sections 304, 306, and 308(d) of the Public Health Service Act (42 USC 242b, 242K, and 242m(d)).

METHODS

The NHSN has both a Patient Safety and a Healthcare Personnel Safety surveillance component. Within the Patient Safety component, the data are collected using standardized methods and definitions and are grouped into specific module protocols[4,5] as follows:

- Device-associated module: See section below.
- Procedure-associated module: Facilities choose to monitor in- or outpatients undergoing selected operative procedures for the presence of surgical site infection or postprocedure pneumonia.
- Medication-associated module: For certain locations, facilities choose to report susceptibility data for selected organisms and/or antimicrobial-use data for selected agents.

The modules may be used singly or simultaneously, but, once selected, they must be used for a minimum of 1 calendar month. All infections are categorized using standard CDC definitions that include laboratory and clinical criteria.[5] Although the Device-associated module may also be used by facilities other than hospitals, including outpatient dialysis centers, this first report focuses only on Device-associated module data reported by hospitals. A report of data from this module for outpatient dialysis centers will be published separately. Data from the Procedure-associated module will be included in a subsequent NHSN Report when sufficient data are available. Data from the Medication-associated module will be published in a separate report.

Device-associated (DA) module: Infection control professionals (ICPs) may choose to collect data on central line-associated primary bloodstream infections,

Table 1. NHSN hospitals contributing data used in this report

Hospital type	N (%)
Children's	10 (5)
General, including acute, trauma, and teaching	181 (86)
Military	3 (1)
Veterans Affairs	15 (7)
Women's	2 (1)
Total	211 (100)

	Bed size category				
Hospital type	**≤200**	**201-500**	**501-1000**	**>1000**	**Total**
	N (%)	N (%)	N (%)	N (%)	
Major teaching	12 (6)	43 (21)	40 (19)	2 (1)	96 (45)
Graduate teaching	6 (3)	17 (8)	12 (6)	0 (0)	35 (17)
Limited teaching	8 (4)	10 (5)	7 (3)	0 (0)	25 (12)
Nonteaching	16 (7)	31 (14)	7 (3)	0 (0)	55 (26)
Total	42 (20)	101 (48)	66 (31)	2 (1)	211 (100)

Major: Hospital is an important part of the teaching program of the medical school, and the majority of medical students rotates through multiple clinical services.
Graduate: Hospital is used by the medical school for graduate training programs only, ie, residency and/or fellowships.
Limited: Hospital is used in the medical school's teaching program only to a limited extent.

ventilator-associated pneumonias, or urinary catheter-associated urinary tract infections (UTIs) that occur in patients staying in a patient care location such as an intensive care unit (ICU), specialty care area, or ward. In the NHSN, these locations are further characterized according to patient population: adults or children (in Tables, pediatric locations are so noted). In neonatal intensive care unit (NICU) locations (level III or level II/III), ICPs collect data on central line-associated and umbilical catheter-associated primary bloodstream infections or ventilator-associated pneumonia for each of 5 birth-weight categories (≤750 g, 751-1000 g, 1001-1500 g, 1501-2500 g, and >2500 g). Corresponding location-specific denominator data consisting of patient-days and specific device-days are also collected by ICPs or other trained personnel.

RESULTS

Characteristics of the 211 NHSN hospitals from 40 states and the District of Columbia that contributed data for this report are shown in Table 1. For the Device-associated module in which data volume was sufficient for this first report, we tabulated device-associated infection rates and device utilization (DU) ratios for January through December 2006 (Tables 2-10).

Tables 2 to 4 update and augment previously published device-associated rates and DU ratios by type of non-NICU locations.[1,2] For inclusion in these Tables, the pooled mean infection rates and DU ratios required data from at least 10 different locations of a given type. For the percentile distributions, data from at least 20 different locations are required. Each of the analyses of Device-associated module data excluded rates or DU ratios for locations that did not report at least 50 device-days or patient-days. Because of this, the number of locations contributing data varies in the Tables.

Three new locations—pediatric medical/surgical ICU, medical ward, and medical/surgical ward—had sufficient data to be included in this report. The number of locations that were neurosurgical ICU or medical ward was not adequate to provide distributions of any infection rates and DU ratios. For burn ICU, there were insufficient data for ventilator-associated pneumonia and catheter-associated UTI rate and corresponding DU ratio distributions. For trauma ICU, insufficient data were available for ventilator-associated pneumonia rate distributions and for catheter-associated UTI rate and urinary catheter utilization ratio distributions.

The data for adult combined medical/surgical ICUs were split into 2 groups by type of hospital: "major teaching" and "all others." Major teaching status was defined as a hospital that is an important part of the teaching program of a medical school and the majority of medical students rotates through multiple clinical services (see also footnote to Table 1).

For the Device-associated module, in non-NICU locations, the device-days consisted of the total number of central line-days, urinary catheter-days, and ventilator-days. The DU of a location is one measure of invasive practices in that location and constitutes an extrinsic risk factor for HAI.[2] DU may also serve as a marker for severity of illness of patients, that is, patients' intrinsic susceptibility to infection.

Tables 5 to 10 update and augment the previously published, device-associated rates and DU ratios from

Table 2. Pooled means and key percentiles of the distribution of central line-associated BSI rates and central line utilization ratios, by type of location, DA module, 2006

					Percentile				
Central line-associated BSI rate*	**No. of locations**	**No. of CLAB**	**Central line-days**	**Pooled mean**	**10%**	**25%**	**50% (median)**	**75%**	**90%**
Type of location									
Burn ICU	14	127	18,612	6.8					
Coronary ICU	53	181	63,941	2.8	0.0	0.0	2.0	4.2	6.5
Surgical cardiothoracic 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
Medical/surgical ICU									
Major teaching	63	304	128,502	2.4	0.0	0.6	1.9	3.1	5.5
All others	102	431	198,551	2.2	0.0	0.0	1.0	2.3	4.5
Pediatric medical/surgical ICU	36	255	48,144	5.3	0.0	1.1	3.5	6.5	9.4
Neurosurgical ICU	19	75	21,412	3.5					
Surgical ICU	72	378	137,484	2.7	0.0	0.9	2.0	4.4	7.4
Trauma ICU	21	182	39,635	4.6	0.0	0.4	3.3	6.5	8.5
Inpatient medical ward	18	51	24,218	2.1					
Inpatient medical/surgical ward	26	58	38,340	1.5	0.0	0.0	0.0	1.8	3.6
					Percentile				
Central line utilization ratio†	**No. of locations**		**Central line-days**	**Patient-days**	**Pooled mean**	**10%**	**25%**	**50% (median)**	**75%**	**90%**
Type of location									
Burn ICU	15		18,612	29,007	0.64					
Coronary ICU	53		63,941	146,703	0.44	0.19	0.28	0.42	0.53	0.60
Surgical cardiothoracic ICU	51		92,484	127,333	0.73	0.52	0.64	0.76	0.89	0.92
Medical ICU	75		170,719	288,862	0.59	0.30	0.46	0.57	0.70	0.77
Medical/surgical ICU										
Major teaching	63		128,502	223,001	0.58	0.36	0.47	0.58	0.69	0.74
All others	104		198,551	408,305	0.49	0.28	0.40	0.53	0.63	0.74
Pediatric medical/surgical ICU	39		48,144	97,498	0.49	0.20	0.33	0.44	0.57	0.64
Neurosurgical ICU	19		21,412	44,364	0.48					
Surgical ICU	72		137,484	222,459	0.62	0.38	0.46	0.63	0.71	0.77
Trauma ICU	21		39,635	61,176	0.65	0.49	0.56	0.61	0.72	0.78
Inpatient medical ward	18		24,218	100,174	0.24					
Inpatient medical/surgical ward	27		38,340	163,510	0.23	0.07	0.15	0.20	0.25	0.32

BSI, bloodstream infection; *CLAB*, central line-associated BSI.

*$\frac{\text{Number of CLAB}}{\text{Number of central line-days}} \times 1000$.

†$\frac{\text{Number of central line-days}}{\text{Number of patient-days}}$.

the High Risk Nursery Component of the NNIS system.[1,3] New for the NHSN Report are the 2 lowest birth-weight categories and separate Tables for central line-associated bloodstream infections (BSI), umbilical catheter-associated BSI, and ventilator-associated pneumonia in level III and level II/III NICUs. For NICUs in the Device-associated module, device-days consist of the total number of central line-days, umbilical catheter-days, and ventilator-days. Each of the analyses of NICU data excluded rates or DU ratios for units that did not report at least 50 device-days or patient-days. Because of this, the number of units contributing data varies in the Tables. Although the percentile distribution of the rates is provided, for most birth-weight categories the number of ventilator-associated pneumonias and ventilator-days is still small and the data should be considered provisional.

Tables 11 to 17 are new for this report and provide data on select attributes of the device-associated infections for each location. For example, Tables 11, 14, and 15 show the frequency and percentage distribution of the specific sites of BSI and the criterion used for identifying these infections. Note that for adult and pediatric ICUs and wards, only laboratory-confirmed BSI are allowed and shown, whereas clinical sepsis is included as a valid BSI specific site for neonates in NICU. For some of the patient care locations in these Tables, the number of central line-associated BSI does not exactly match those shown in the rates Tables because of an omission in the business logic in an early version of the NHSN Web interface. A total of 33 device-associated laboratory-confirmed BSIs for adult and pediatric ICU/wards did not have a criterion reported; the same was true for 5 BSIs in level III NICUs and 1 BSI in level II/III NICUs.

Table 3. Pooled means and key percentiles of the distribution of urinary catheter-associated UTI rates and urinary catheter utilization ratios, by type of location, DA module, 2006

Urinary catheter-associated UTI rate*	No. of locations	No. of CAU	Urinary catheter-days	Pooled mean	Percentile				
					10%	25%	50% (median)	75%	90%
Type of location									
Burn ICU	12	96	12,860	7.5					
Coronary ICU	41	301	65,277	4.6	0.9	2.8	4.0	5.5	8.1
Surgical cardiothoracic ICU	41	262	70,221	3.7	0.0	1.8	3.4	4.3	7.2
Medical ICU	55	680	156,261	4.4	0.7	1.8	3.8	5.6	8.3
Medical/surgical ICU									
Major teaching	51	450	132,096	3.4	0.4	1.9	3.0	4.5	6.4
All others	83	697	221,435	3.1	0.0	0.8	2.4	4.2	6.5
Pediatric medical/surgical ICU	27	113	21,686	5.2	0.0	0.0	2.8	6.0	9.3
Neurosurgical ICU	14	171	26,253	6.5					
Surgical ICU	54	509	126,887	4.0	0.0	1.2	3.0	6.1	9.9
Trauma ICU	19	283	51,027	5.5					
Inpatient medical ward	11	110	15,448	7.1					
Inpatient medical/surgical ward	25	87	23,416	3.7	0.0	1.5	2.9	5.0	7.7

Urinary catheter utilization†	No. of locations	Urinary catheter-days	Patient-days	Pooled mean	Percentile				
					10%	25%	50% (median)	75%	90%
Type of location									
Burn ICU	12	12, 860	18,704	0.69					
Coronary ICU	41	65,277	105,643	0.62	0.34	0.47	0.65	0.73	0.79
Surgical cardiothoracic ICU	41	70,221	87,976	0.80	0.54	0.72	0.82	0.89	0.95
Medical ICU	56	156,261	206,440	0.76	0.58	0.67	0.77	0.83	0.89
Medical/surgical ICU									
Major teaching	51	132,096	165,410	0.80	0.62	0.76	0.82	0.88	0.92
All others	83	221,435	330,453	0.67	0.61	0.72	0.80	0.84	0.89
Pediatric medical/surgical ICU	30	21,686	73,574	0.29	0.12	0.21	0.28	0.35	0.39
Neurosurgical ICU	14	26,253	31,530	0.83					
Surgical ICU	54	126,887	155,557	0.82	0.65	0.73	0.83	0.88	0.93
Trauma ICU	19	51,027	56,166	0.91					
Inpatient medical ward	11	15,448	62,568	0.25					
Inpatient medical/surgical ward	26	23,416	102,014	0.23	0.14	0.16	0.21	0.28	0.30

UTI, urinary tract infection; *CAU*, catheter-associated UTI.

*$\frac{\text{Number of CAU}}{\text{Number of urinary catheter-days}} \times 1000$.

†$\frac{\text{Number of urinary catheter-days}}{\text{Number of patient-days}}$.

DISCUSSION

These data are the first reported from the new NHSN. Although NHSN facilities began collecting data on paper in 2005, the Web interface was not available for use until the end of October 2005. Thus, because many facilities were unable to enter data for 2005, we elected to consider that year as a pilot test of the system and, hence, included only data from January 2006 forward.

The hospitals reporting data included in this report are a subset of those that were members of the NNIS system, and the characteristics shown in Table 1 reflect this. However, as more states elect to use the NHSN as their system for meeting mandatory HAI reporting requirements and as enrollment is opened to all facilities, we expect to have a more diverse group of healthcare facilities reporting in the future.

Comparisons of these data with those of like locations from the last NNIS Report may be misleading. As noted in the results, it is not possible to compare the NICU data with the High Risk Nursery data of the NNIS system because of the multiple changes implemented in NHSN and because the volume of data is still limited for several of the birth-weight categories. Another difference in the NHSN is that data from pediatric ICUs are no longer combined with adult ICU data (eg, in the NNIS, pediatric surgical ICUs were combined with adult surgical ICUs). Data from pediatric ICU types are now reported as their own specialty types; for instance, pediatric medical/surgical ICU is separated and had sufficient data for inclusion in this report. Another example is that, in the NNIS Report, the central line-associated BSI rate for medical ICU was 5.0, and, in this report, it is 2.9. Two factors may account for this difference: (1) a change in the numerator in 2006

Table 4. Pooled means and key percentiles of the distribution of ventilator-associated PNEU rates and ventilator utilization ratios, by type of location, DA module, 2006

					Percentile				
Ventilator-associated PNEU rate*	**No. of units**	**No. of VAP**	**Ventilator days**	**Pooled mean**	**10%**	**25%**	**50% (median)**	**75%**	**90%**
Type of location									
Burn ICU	12	124	10,098	12.3					
Coronary ICU	48	100	35,727	2.8	0.0	0.0	1.3	4.5	6.6
Surgical cardiothoracic ICU	48	265	46,710	5.7	0.0	1.4	4.0	8.1	19.4
Medical ICU	64	339	109,277	3.1	0.0	0.9	2.8	4.6	7.2
Medical/surgical ICU									
Major teaching	58	302	84,530	3.6	0.0	1.3	2.5	5.1	7.3
All others	99	372	135,546	2.7	0.0	0.0	1.6	3.8	6.2
Pediatric medical/surgical ICU	32	81	32,936	2.5	0.0	0.0	1.0	2.8	6.1
Neurosurgical ICU	15	97	13,799	7.0					
Surgical ICU	61	384	73,205	5.2	0.0	1.8	4.1	6.4	10.0
Trauma ICU	19	329	32,297	10.2					
					Percentile				
Ventilator utilization ratio†	**No. of units**	**Ventilator days**	**Patient days**	**Pooled mean**	**10%**	**25%**	**50% (median)**	**75%**	**90%**
Type of location									
Burn ICU	13	10,098	24,067	0.42					
Coronary ICU	50	35,727	126,002	0.28	0.08	0.16	0.26	0.33	0.43
Surgical cardiothoracic ICU	49	46,710	115,199	0.41	0.18	0.27	0.35	0.47	0.56
Medical ICU	65	109,277	244,457	0.45	0.21	0.33	0.45	0.56	0.66
Medical/surgical ICU									
Major teaching	58	84,530	195,551	0.43	0.20	0.32	0.46	0.56	0.65
All others	102	135,546	402,777	0.34	0.21	0.29	0.35	0.43	0.54
Pediatric medical/surgical ICU	35	32,936	77,642	0.42	0.20	0.30	0.38	0.47	0.57
Neurosurgical ICU	15	13,799	32,632	0.42					
Surgical ICU	62	73,205	176,695	0.41	0.21	0.28	0.39	0.49	0.60
Trauma ICU	20	32,297	56,251	0.57	0.38	0.46	0.53	0.63	0.69

PNEU, pneumonia infection; *VAP*, ventilator-associated PNEU.

*$\frac{\text{Number of VAP}}{\text{Number of ventilator-days}} \times 1000$.

†$\frac{\text{Number of ventilator-days}}{\text{Number of patient-days}}$.

Table 5. Pooled means and key percentiles of the distribution of central line-associated BSI rates and central line utilization ratios for level III NICUs, DA module, 2006

					Percentile				
Birth-weight category	**No. of units**	**No. of CLAB**	**Central line-days**	**Pooled mean**	**10%**	**25%**	**50% (median)**	**75%**	**90%**
Central line-associated BSI rate*									
≤750 g	42	118	18,458	6.4	0.0	2.5	5.2	11.0	15.6
751-1000 g	44	83	18,781	4.4	0.0	0.0	3.8	8.7	10.2
1001-1500 g	42	87	17,968	4.8	0.0	0.0	3.6	7.5	14.0
1501-2500 g	36	68	16,208	4.2	0.0	0.0	0.0	4.1	8.5
>2500 g	32	50	16,131	3.1	0.0	0.0	0.0	1.9	5.3
					Percentile				
Birth-weight category	**No. of units**	**Central line-days**	**Patient-days**	**Pooled mean**	**10%**	**25%**	**50% (median)**	**75%**	**90%**
Central line utilization ratio†									
≤750 g	45	18,458	57,896	0.32	0.20	0.27	0.32	0.43	0.52
751-1000 g	47	18,781	61,132	0.31	0.17	0.21	0.34	0.44	0.53
1001-1500 g	47	17,968	79,647	0.23	0.08	0.14	0.24	0.33	0.49
1501-2500 g	44	16,208	93,901	0.17	0.04	0.06	0.11	0.24	0.47
>2500 g	43	16,131	75,457	0.21	0.05	0.07	0.13	0.24	0.37

BSI, bloodstream infection; CLAB, central line-associated BSI.

*$\frac{\text{Number of CLAB}}{\text{Number of central line-days}} \times 1000$.

†$\frac{\text{Number of central line-days}}{\text{Number of patient-days}}$.

Table 6. Pooled means and key percentiles of the distribution of umbilical catheter-associated BSI rates and umbilical catheter utilization ratios for level III NICUs, DA module, 2006

Umbilical catheter-associated BSI rate*	No. of units	No. of UCAB	Umbilical catheter-days	Pooled mean	Percentile 10%	25%	50% (median)	75%	90%
Birth-weight category									
≤750 g	36	42	6116	6.9	0.00	0.00	2.90	10.80	19.10
751-1000 g	34	24	5609	4.3	0.00	0.00	0.00	0.00	9.50
1001-1500 g	32	20	6304	3.2	0.00	0.00	0.00	0.00	14.50
1501-2500 g	30	10	5625	1.8	0.00	0.00	0.00	0.00	5.70
>2500 g	35	7	8150	0.9	0.00	0.00	0.00	0.00	1.70

Umbilical catheter utilization ratio†	No. of units	Umbilical catheter-days	Patient-days	Pooled mean	Percentile 10%	25%	50% (median)	75%	90%
Birth-weight category									
≤750 g	44	6116	53,523	0.11	0.05	0.07	0.12	0.24	0.30
751-1000 g	45	5609	54,855	0.10	0.04	0.07	0.11	0.18	0.26
1001-1500 g	45	6304	72,120	0.09	0.03	0.05	0.09	0.15	0.21
1501-2500 g	43	5625	89,228	0.06	0.02	0.03	0.05	0.11	0.17
>2500 g	46	8150	79,983	0.10	0.04	0.07	0.11	0.19	0.27

BSI, bloodstream infection; *UCAB*, umbilical catheter-associated BSI.

*$\frac{\text{Number of UCAB}}{\text{Number of umbilical catheter-days}} \times 1000$.

†$\frac{\text{Number of umbilical catheter-days}}{\text{Number of patient-days}}$.

Table 7. Pooled means and key percentiles of the distribution of central line-associated BSI rates and central line utilization ratios for level II/III NICUs, DA module, 2006

Central line-associated BSI rate*	No. of units	No. of CLAB	Central line-days	Pooled mean	Percentile 10%	25%	50% (median)	75%	90%
Birth-weight category									
≤750 g	25	62	10,556	5.9	0.0	0.0	3.1	8.3	9.5
751-1000 g	22	48	9156	5.2	0.0	0.0	2.6	11.2	17.0
1001-1500 g	30	35	10,337	3.4	0.0	0.0	0.0	4.4	12.9
1501-2500 g	21	17	7219	2.4	0.0	0.0	0.0	0.6	4.2
>2500 g	19	33	7831	4.2					

Central line utilization ratio†	No. of units	Central line-days	Patient-days	Pooled mean	Percentile 10%	25%	50% (median)	75%	90%
Birth-weight category									
≤750 g	27	10,556	27,968	0.38	0.23	0.28	0.41	0.46	0.54
751-1000 g	31	9156	28,556	0.32	0.18	0.21	0.28	0.42	0.51
1001-1500 g	32	10,337	38,243	0.27	0.13	0.20	0.28	0.38	0.46
1501-2500 g	32	7219	37,880	0.19	0.02	0.05	0.14	0.21	0.40
>2500 g	28	7831	28,721	0.27	0.03	0.07	0.17	0.26	0.33

BSI, bloodstream infection; *CLAB*, central line-associated BSI.

*$\frac{\text{Number of CLAB}}{\text{Number of central line-days}} \times 1000$.

†$\frac{\text{Number of central line-days}}{\text{Number of patient-days}}$.

such that only central line-associated laboratory-confirmed BSIs were included, whereas, previously, clinical sepsis infections were also included, and (2) an actual reduction in the number of BSI. This latter factor may be particularly likely because BSI prevention campaigns have been implemented by many hospitals since 2001.[6-8]

Tables 11 to 17 were included to aid the reader in interpreting the rates data. For example, most of the central line-associated and umbilical catheter-associated

Table 8. Pooled means and key percentiles of the distribution of umbilical catheter-associated BSI rates and umbilical catheter utilization ratios for level II/III NICUs, DA module, 2006

Umbilical catheter-associated BSI rate*	No. of units	No. of UCAB	Umbilical catheter-days	Pooled mean	Percentile				
					10%	25%	50% (median)	75%	90%
Birth-weight category									
≤750 g	21	34	4314	7.9	0.0	0.0	7.4	22.6	35.7
751-1000 g	20	18	4092	4.4	0.0	0.0	0.0	2.0	15.2
1001-1500 g	25	10	3879	2.6	0.0	0.0	0.0	0.0	10.3
1501-2500 g	22	4	3737	1.1	0.0	0.0	0.0	0.0	2.5
>2500 g	23	8	5542	1.4	0.0	0.0	0.0	0.0	2.5

Umbilical catheter utilization ratio†	No. of units	Umbilical catheter-days	Patient-days	Pooled mean	Percentile				
					10%	25%	50% (median)	75%	90%
Birth-weight category									
≤750 g	28	4314	24,853	0.17	0.08	0.10	0.20	0.31	0.44
751-1000 g	34	4092	28,862	0.14	0.06	0.10	0.15	0.24	0.33
1001-1500 g	34	3879	39,771	0.10	0.04	0.08	0.11	0.14	0.19
1501-2500 g	35	3737	45,497	0.08	0.03	0.05	0.09	0.12	0.17
>2500 g	35	5542	35,546	0.16	0.04	0.06	0.12	0.21	0.31

BSI, bloodstream infection; *UCAB*, umbilical catheter-associated BSI.

* $\frac{\text{Number of UCAB}}{\text{Number of umbilical catheter-days}} \times 1000$.

† $\frac{\text{Number of umbilical catheter-days}}{\text{Number of patient-days}}$.

Table 9. Pooled means and key percentiles of the distribution of ventilator-associated PNEU rates and ventilator utilization ratios for level III NICUs, DA module, 2006

Ventilator-associated PNEU rate*	No. of units	No. of VAP	Ventilator-days	Pooled mean	Percentile				
					10%	25%	50% (median)	75%	90%
Birth-weight category									
≤750 g	36	56	22,002	2.5	0.0	0.0	1.7	4.1	9.5
751-1000 g	37	33	15,251	2.2	0.0	0.0	0.0	4.9	11.5
1001-1500 g	34	13	9308	1.4	0.0	0.0	0.0	0.0	3.5
1501-2500 g	26	8	7613	1.1	0.0	0.0	0.0	0.0	3.8
>2500 g	24	11	8901	1.2	0.0	0.0	0.0	0.0	0.1

Ventilator utilization ratio†	No. of units	Ventilator-days	Patient-days	Pooled mean	Percentile				
					10%	25%	50% (median)	75%	90%
Birth-weight category									
≤750 g	37	22,002	41,354	0.53	0.32	0.43	0.51	0.68	0.80
751-1000 g	39	15,251	45,089	0.34	0.14	0.19	0.29	0.48	0.62
1001-1500 g	39	9308	60,905	0.15	0.06	0.10	0.14	0.28	0.40
1501-2500 g	39	7613	78,083	0.10	0.02	0.04	0.06	0.17	0.31
>2500 g	38	8901	60,171	0.15	0.03	0.05	0.10	0.25	0.36

PNEU, pneumonia infection; *VAP*, ventilator-associated PNEU.

* $\frac{\text{Number of VAP}}{\text{Number of ventilator-days}} \times 1000$.

† $\frac{\text{Number of ventilator-days}}{\text{Number of patient-days}}$.

BSI were identified using the most objective criterion (1a)[5]; however, for adult and pediatric locations, there was considerable variation. Similarly, the specific site of ventilator-associated pneumonia most frequently reported used the clinical criteria of PNU1 for all locations.[5] However, in adult and pediatric locations, nearly 40% of ventilator-associated pneumonias reported used the more rigorous criteria of PNU2 and PNU3.[5] The specific site of catheter-associated UTI most frequently reported was symptomatic UTI. However, the distinction between this type of UTI and asymptomatic bacteriuria is often only the presence

Table 10. Pooled means and key percentiles of the distribution of ventilator-associated PNEU rates and ventilator utilization ratios for level II/III NICUs, DA module, 2006

Ventilator-associated PNEU rate*	No. of units	No. of VAP	Ventilator-days	Pooled mean	Percentile				
					10%	25%	50% (median)	75%	90%
Birth-weight category									
≤750 g	23	28	7399	3.8	0.0	0.0	0.0	5.4	15.7
751-1000 g	23	24	4916	4.9	0.0	0.0	0.0	7.5	11.0
1001-1500 g	19	4	2762	1.4					
1501-2500 g	12	0	1840	0.0					
>2500 g	17	3	2595	1.2					

Ventilator utilization ratio†	No. of units	Ventilator-days	Patient-days	Pooled mean	Percentile				
					10%	25%	50% (median)	75%	90%
Birth-weight category									
≤750 g	23	7399	15,951	0.46	0.30	0.39	0.54	0.62	0.85
751-1000 g	27	4916	16,863	0.29	0.12	0.20	0.31	0.44	0.67
1001-1500 g	31	2762	23,343	0.12	0.06	0.07	0.09	0.15	0.29
1501-2500 g	31	1840	30,196	0.06	0.01	0.03	0.05	0.09	0.20
>2500 g	30	2595	20,500	0.13	0.06	0.06	0.11	0.18	0.23

PNEU, pneumonia infection; *VAP*, ventilator-associated PNEU.

*$\frac{\text{Number of VAP}}{\text{Number of ventilator-days}} \times 1000$.

†$\frac{\text{Number of ventilator-days}}{\text{Number of patient-days}}$.

Table 11. Distribution of criteria for central line-associated laboratory confirmed BSI by location, 2006

Type of location	Criterion 1		Criterion 2a		Criterion 2b		Total
	N	%	N	%	N	%	
Burn ICU	104	81.9	11	8.7	12	9.4	**127**
Coronary ICU	120	67.0	36	20.1	23	12.8	**179**
Surgical cardiothoracic ICU	96	66.7	29	20.1	19	13.2	**144**
Medical ICU	332	69.0	76	15.8	73	15.2	**481**
Medical/surgical ICU							
Major teaching	167	56.0	63	21.1	68	22.8	**298**
All others	214	49.9	115	26.8	100	23.3	**429**
Pedatric medical/surgical 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**
Trauma ICU	154	86.0	13	7.3	12	6.7	**179**
Inpatient medical ward	41	80.4	7	13.7	3	5.9	**51**
Inpatient medical/surgical	35	60.3	18	31.0	5	8.6	**58**
Total	**1701**	**64.2**	**463**	**17.5**	**484**	**18.3**	**2648**

See Centers for Disease Control and Prevention[5] for criteria.
BSI, bloodstream infection.

of fever,[5] which can be difficult to attribute completely to infection versus other processes in critically ill patients.

If you would like to compare your hospital's rates and ratios with those in this report, you must first collect information from your hospital in accordance with the methods described for the NHSN System.[4,5] You should also refer to Appendices A and B for further instructions. Appendix A discusses the calculation of infection rates and DU ratios for the Device-associated module. Appendix B gives a step-by-step method for interpretation of percentiles of infection rates or DU ratios. A high rate or ratio (>90th percentile) does not necessarily define a problem; it only suggests an area for further investigation. Similarly, a low rate or ratio (<10th percentile) may be the result of inadequate infection detection. Hospitals should use these data to guide local prevention strategies and other quality improvement efforts aimed at reducing infection rates as much as possible.

Table 12. Distribution of specific sites of ventilator-associated pneumonia by location, 2006

	PNU1		PNU2		PNU3		
Type of location	**N**	**%**	**N**	**%**	**N**	**%**	**Total**
Burn ICU	90	72.6	33	26.6	1	0.8	**124**
Coronary ICU	55	55.0	43	43.0	2	2.0	**100**
Surgical cardiothoracic ICU	144	54.3	119	44.9	2	0.8	**265**
Medical ICU	274	80.8	61	18.0	4	1.2	**339**
Medical/surgical ICU							
Major teaching	191	63.3	111	36.8	0	0.0	**302**
All others	180	48.4	191	51.3	1	0.3	**372**
Pediatric medical/surgical ICU	67	82.7	13	16.1	1	1.2	**81**
Neurosurgical ICU	45	46.4	52	53.6	0	0.0	**97**
Surgical ICU	261	68.0	111	28.9	12	3.1	**384**
Trauma ICU	142	43.2	186	56.5	1	0.3	**329**
Total	**1449**	**60.7**	**920**	**38.3**	**24**	**1.0**	**2393**

See Centers for Disease Control and Prevention[5] for specific sites.

Table 13. Distribution of specific sites of urinary catheter-associated UTI by location, 2006

	ASB		SUTI		
Type of location	**N**	**%**	**N**	**%**	**Total**
Burn ICU	24	25.0	72	75.0	**96**
Coronary ICU	141	46.8	160	53.2	**301**
Surgical cardiothoracic ICU	118	45.0	144	55.0	**262**
Medical ICU	254	37.4	426	62.7	**680**
Medical/surgical ICU					
Major teaching	151	33.6	299	66.4	**450**
All others	317	45.5	380	54.5	**697**
Pediatric medical/surgical ICU	24	21.2	89	78.8	**113**
Neurosurgical ICU	59	34.5	112	65.5	**171**
Surgical ICU	228	44.8	281	55.2	**509**
Trauma ICU	61	21.6	222	78.5	**283**
Inpatient medical ward	52	47.3	58	52.7	**110**
Inpatient medical/surgical	50	57.5	37	42.5	**87**
Total	**1479**	**38.8**	**2280**	**61.2**	**3759**

See Centers for Disease Control and Prevention[5] for specific sites.
ASB, asymptomatic bacteriuria; *SUTI*, symptomatic urinary tract infection; *UTI*, urinary tract infection.

Table 14. Distribution of specific sites and criteria for device-associated BSI among level III NICUs by birth weight, 2006

	LCBI								
	Criterion 1		Criterion 2a		Criterion 2b		CSEP		
Birth-weight category	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**Total**
Central line-associated BSI									
≤750 g	47	40.9	18	15.7	40	34.8	10	8.7	**115**
751-1000 g	45	54.2	8	9.6	27	32.5	3	3.6	**83**
1001-1500 g	43	49.4	8	9.2	30	34.5	6	6.9	**87**
1501-2500 g	33	48.5	13	19.1	19	27.9	3	4.4	**68**
>2500 g	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 BSI									
≤750 g	17	41.5	3	7.3	14	34.1	7	17.1	**41**
751-1000 g	10	41.7	2	8.3	10	41.7	2	8.3	**24**
1001-1500 g	7	35.0	2	10.0	9	45.0	2	10.0	**20**
1501-2500 g	4	40.0	0	0.0	4	40.0	2	20.0	**10**
>2500 g	2	28.6	1	14.3	3	42.9	1	14.3	**7**
Total	**40**	**39.2**	**8**	**7.8**	**40**	**39.2**	**14**	**13.7**	**102**

See Centers for Disease Control and Prevention[5] for specific sites.
BSI, bloodstream infection; *CSEP*, clinical sepsis.

Table 15. Distribution of specific sites and criteria for device-associated BSI among level II/III NICUs by birth weight, 2006

	LCBI								
	Criterion 1		Criterion 2a		Criterion 2b		CSEP		
Birth-weight category	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**Total**
Central line-associated BSI									
≤750 g	25	40.3	10	16.1	23	37.1	4	6.5	**62**
751-1000 g	19	39.6	12	25.0	17	35.4	0	0.0	**48**
1001-1500 g	15	44.1	4	11.8	13	38.2	2	5.9	**34**
1501-2500 g	6	35.3	3	17.7	8	47.1	0	0.0	**17**
>2500 g	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 BSI									
≤750 g	16	47.1	10	29.4	6	17.7	2	5.9	**34**
751-1000 g	6	33.3	1	5.6	11	61.1	0	0.0	**18**
1001-1500 g	3	30.0	0	0.0	7	70.0	0	0.0	**10**
1501-2500 g	2	50.0	0	0.0	2	50.0	0	0.0	**4**
>2500 g	1	12.5	4	50.0	2	25.0	1	12.5	**8**
Total	**28**	**48.3**	**15**	**16.9**	**28**	**31.5**	**3**	**100.0**	**74**

See Centers for Disease Control and Prevention[5] for specific sites and criteria.
BSI, bloodstream infection; *CSEP*, clinical sepsis.

Table 16. Distribution of specific sites of ventilator-associated pneumonia among level III NICUs by birth weight, 2006

	PNU1		PNU2		PNU3		
Birth-weight category	**N**	**%**	**N**	**%**	**N**	**%**	**Total**
≤750 g	46	82.1	10	17.9	0	0.0	**56**
750-1000 g	30	90.9	3	9.1	0	0.0	**33**
1001-1500 g	13	100.0	0	0.0	0	0.0	**13**
1501-2500 g	7	87.5	1	12.5	0	0.0	**8**
>2500 g	9	81.8	2	18.2	0	0.0	**11**
Total	**105**	**86.4**	**16**	**13.6**	**0**	**0.0**	**121**

See Centers for Disease Control and Prevention[5] for specific sites.

Table 17. Distribution of specific sites of ventilator-associated pneumonia among level II/III NICUs by birth weight, 2006

	PNU1		PNU2		PNU3		
Birth-weight category	**N**	**%**	**N**	**%**	**N**	**%**	**Total**
≤750 g	17	60.7	11	39.3	0	0.0	**28**
750-1000 g	20	83.3	4	16.7	0	0.0	**24**
1001-1500 g	1	25.0	3	75.0	0	0.0	**4**
1501-2500 g	0	0.0	0	0.0	0	0.0	**0**
>2500 g	2	66.7	1	33.3	0	0.0	**3**
Total	**40**	**67.8**	**19**	**32.2**	**0**	**0.0**	**59**

See Centers for Disease Control and Prevention[5] for specific sites.

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Appendix A. How to calculate a device-associated infection rate and device utilization ratio with Device-associated module data

Calculation of device-associated infection rate

Step 1. Decide on the time period for your analysis. It may be a month, a quarter, 6 months, a year, or some other period.

Step 2. Select the patient population for analysis, ie, the type of location or a birth-weight category in a NICU.

Step 3. Select the infections to be used in the numerator. They must be site specific and must have occurred in the selected patient population. Their date of onset must be during the selected time period.

Step 4. Determine the number of device-days, which is used as the denominator of the rate. Device-days are the total number of days of exposure to the device (central line, umbilical catheter, ventilator, or urinary catheter) by all of the patients in the selected population during the selected time period.

Example: Five patients on the first day of the month had 1 or more central lines in place; 5 on day 2; 2 on day 3; 5 on day 4; 3 on day 5; 4 on day 6; and 4 on day 7. Adding the number of patients with central lines on days 1 through 7, we would have 5 + 5 + 2 + 5 + 3 + 4 + 4 = 28 central line-days for the first week. If we continued for the entire month, the number of central line-days for the month is simply the sum of the daily counts.

Step 5. Calculate the device-associated infection rate (per 1000 device-days) using the following formula:

$$\text{Device-associated infection rate} = \frac{\text{Number of device-associated infections for an infection site}}{\text{Number device-days}} \times 1000$$

Example:

$$\text{Central line-associated BSI rate per 1000 central line-days} = \frac{\text{Number of central line-associated BSI}}{\text{Number of central line-days}} \times 1000$$

Calculation of DU ratio

Steps 1, 2, and 4. Same as device-associated infection rates plus determine the number of patient-days, which is used as the denominator of the DU ratio. Patient-days are the total number of days that patients are in the location during the selected time period.

Example: Ten patients were in the unit on the first day of the month; 12 on day 2; 11 on day 3; 13 on day 4; 10 on day 5; 6 on day 6; and 10 on day 7; and so on. If we counted the patients in the unit from days 1 through 7, we would add 10 + 12 + 11 + 13 + 10 + 6 + 10 for a total of 72 patient-days for the first week of the month. If we continued for the entire month, the number of patient-days for the month is simply the sum of the daily counts.

Step 5. Calculate the DU ratio with the following formula:

$$\text{DU ratio} = \frac{\text{Number of device-days}}{\text{Number of patient-days}}$$

With the number of device-days and patient-days from the examples above, DU = 28/72 = 0.39 or 39% of patient-days were also central line-days for the first week of the month.

Step 6. Examine the size of the denominator for your hospital's rate or ratio. Rates or ratios may not be good estimates of the "true" rate or ratio for your hospital if the denominator is small, ie, <50 device-days or patient-days.

Step 7. Compare your hospital's location-specific rates or ratios with those found in the Tables of this report. Refer to Appendix B for interpretation of the percentiles of the rates/ratios.

Appendix B. Interpretation of percentiles of infection rates or device utilization ratios

Step 1. Evaluate the rate (ratio) you have calculated for your hospital and confirm that the variables in the rate (both numerator and denominator) are identical to the rates (ratios) in the Table.

Step 2. Examine the percentiles in each of the Tables and look for the 50th percentile (or median). At the 50th percentile, 50% of the hospitals have lower rates (ratios) than the median and 50% have higher rates (ratios).

Step 3. Determine whether your hospital's rate (ratio) is above or below this median.

Determining whether your hospital's rate or ratio is a HIGH outlier

Step 4. If rate or ratio is above the median, determine whether the rate (ratio) is above the 75th percentile. At the 75th percentile, 75% of the hospitals had lower rates (ratios) and 25% of the hospital had higher rates (ratios).

Step 5. If the rate (ratio) is above the 75th percentile, determine whether it is above the 90th percentile. If

it is, then the rate (ratio) is a high outlier, which may indicate a problem.

Determining whether your hospital's rate or ratio is a LOW outlier

Step 6. If rate or ratio is below the median, determine whether the rate (ratio) is below the 25th percentile. At the 25th percentile, 25% of the hospitals had lower rates (ratios) and 75% of the hospitals had higher rates (ratios).

Step 7. If the rate (ratio) is below the 25th percentile, determine whether it is below the 10th percentile. If the rate is, then it is a low outlier, which may be due to underreporting of infections. If the ratio is below the 10th percentile, it is a low outlier and may be due to infrequent and/or short duration of device use.

Note: Device-associated infection rates and device utilization ratios should be examined together so that preventive measures may be appropriately targeted. For example, you find that the ventilator-associated pneumonia rate for a certain type of ICU is consistently above the 90th percentile and the ventilator utilization ratio is routinely between the 75th and 90th percentile. Because the ventilator is a significant risk factor for pneumonia, you may want to target your efforts on reducing the use of ventilators or limiting the duration with which they are used on patients to lower the ventilator-associated pneumonia rate in the unit.

Healthcare Acquired Infections 2007

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