



National Healthcare Safety Network (NHSN) Report, Data Summary for 2009, Device-associated Module

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Background

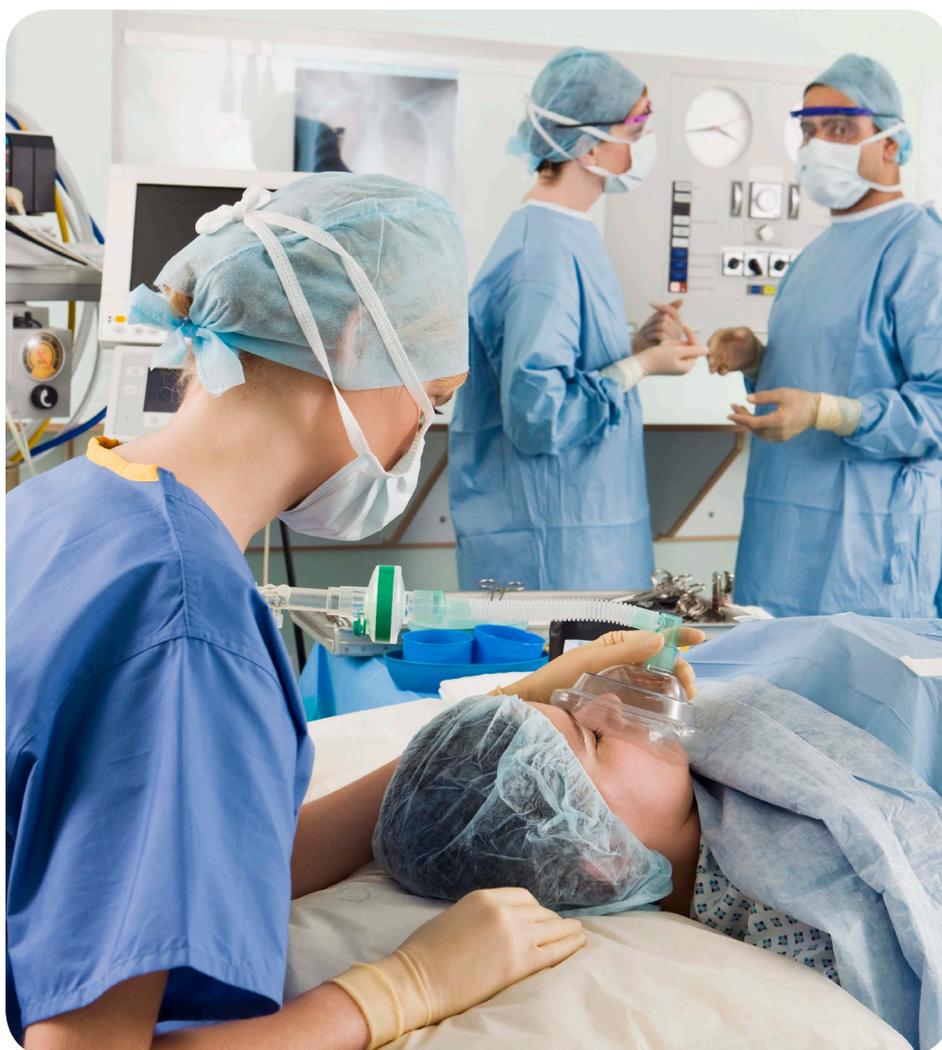
This report is a summary of Device-associated Module data collected by hospitals participating in the National Healthcare Safety Network (NHSN) for events occurring from January through December 2009 and reported to the Centers for Disease Control and Prevention (CDC) by October 18, 2010. This report updates previously published Device-associated Module data from NHSN and provides contemporary comparative rates.¹ Procedure-associated module data will be reported separately: surgical site infection (SSI) data will be reported as standardized infection ratios utilizing new logistic regression models; post-procedure pneumonia rates for 2009 are available on the NHSN public website. This report complements other NHSN reports, including national and state-specific standardized infection ratios (SIRs) for select healthcare-associated infections (HAIs).^{2,3,4}

NHSN was established in 2005 to integrate and supersede three legacy surveillance systems at CDC: the National Nosocomial Infections Surveillance system, the Dialysis Surveillance Network (DSN), and the National Surveillance System for Healthcare Workers (NaSH). NHSN data collection, reporting, and analysis are organized into three components: Patient Safety, Healthcare Personnel Safety, and Biovigilance, and use standardized methods and definitions in accordance with specific module protocols.^{5,6,7} The modules may be used singly or simultaneously, but once selected, they must be used for a minimum of one calendar month. All infections are categorized using standard CDC definitions that include laboratory and clinical criteria.⁷ The Device-associated (DA) Module may be used by facilities other than hospitals, including long-term care facilities and outpatient

dialysis centers. A report of data from this module for outpatient dialysis centers was published separately.⁸ For this report, only data from the Patient Safety component will be presented. NHSN facilities report their healthcare-associated infection (HAI) surveillance data voluntarily or in response to state mandatory reporting requirements. CDC aggregates these data into a single national database for the stated purposes in place in 2009, which were to:

- Collect data from a sample of healthcare facilities in the United States to permit valid estimation of the magnitude of adverse events among patients and healthcare personnel.
- Collect data from a sample of healthcare facilities in the United States to permit valid estimation of the adherence to practices known to be associated with prevention of these adverse events.
- Analyze and report collected data to permit recognition of trends.
- Provide facilities with risk-adjusted metrics that can be used for inter-facility comparisons and local quality improvement activities.
- Assist facilities in developing surveillance and analysis methods that permit timely recognition of patient and healthcare worker safety problems and prompt intervention with appropriate measures.
- Conduct collaborative research studies with NHSN member facilities (e.g., describe the epidemiology of emerging healthcare-associated infection [HAI] and pathogens, assess the importance of potential risk factors, further characterize HAI pathogens and their mechanisms of resistance, and evaluate alternative surveillance and prevention strategies).

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



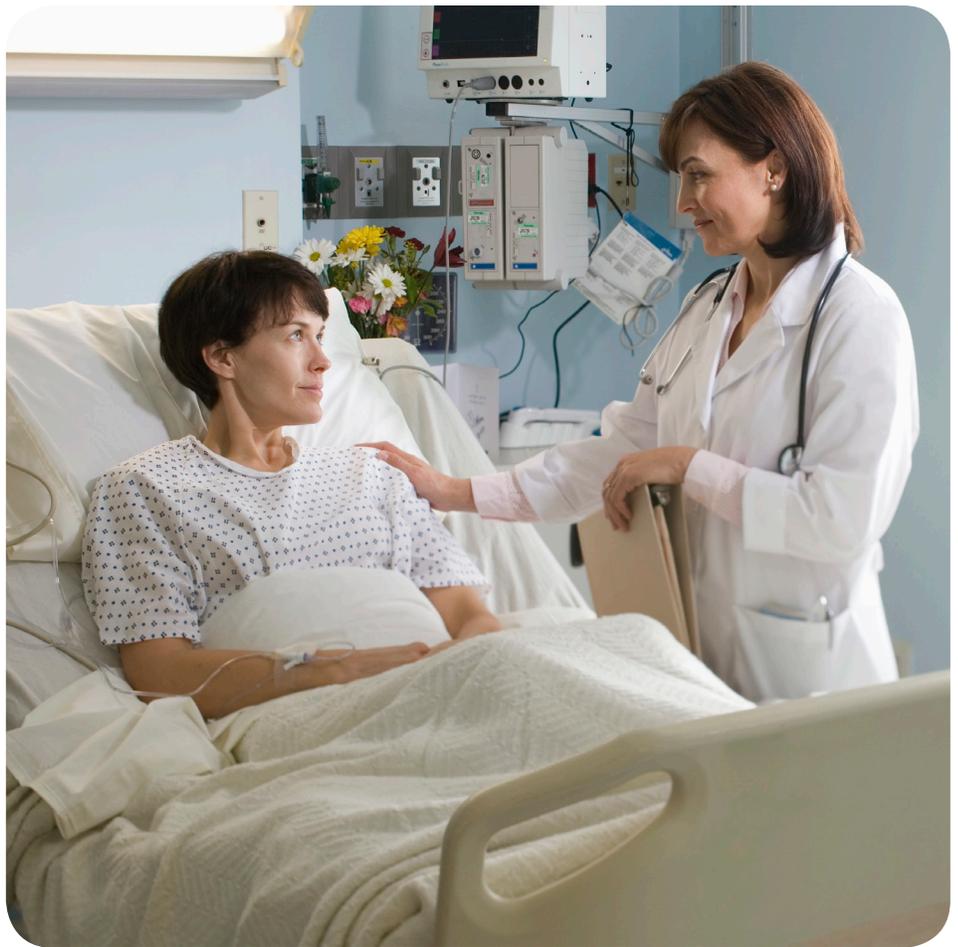
Methods

Data Collection Methods

Healthcare facility personnel responsible for infection prevention and patient safety may choose, with consideration of state mandates and prevention initiatives, to collect data on central line-associated primary bloodstream infections (BSIs), ventilator-associated pneumonias, or urinary catheter-associated urinary tract infections (UTIs) that occur in patients staying in a patient care location such as a critical care or intensive care unit (ICU), specialty care area (SCA), or ward. In NHSN, these locations are further characterized according to patient population: adults, children, or infants (in tables, pediatric and nursery locations are so noted). In neonatal intensive care unit (NICU) locations (level III or level II/III), IPs collect data on central line-associated and umbilical catheter-associated primary bloodstream infections or ventilator-associated pneumonia for each of five birth-weight categories (≤ 750 g, 751–1000 g, 1001–1500 g, 1501–2500 g, and > 2500 g); data on catheter-associated urinary tract infections are not collected in any neonatal location. Corresponding location-specific denominator data consisting of patient-days and specific device-days are also collected by IPs or other trained personnel.

Four new locations — acute stroke ward, orthopedic trauma ward, pediatric rehabilitation ward, and pulmonary ward — had sufficient data to be included in this report.

Locations were further stratified by bedsize or teaching status if pooled mean rates and percentile distributions significantly differed between two groups. The data for adult combined medical/surgical ICUs were split into two groups by type of hospital: “major teaching” and “all others.” Facilities self-identified teaching status through an annual facility survey. Major teaching status was defined as a hospital that is an important part of the medical school teaching program in which the majority of medical students rotate through multiple clinical services. The “all others” group of adult combined medical/surgical ICUs were further split into two



groups by unit bed size: “ ≤ 15 beds” and “ > 15 beds.” The data for adult medical ICUs were split into two groups by type of hospital as defined above. We assessed the potential impact of teaching status on DA infection rates and distributions for additional critical care and inpatient ward locations and found no consistent significant differences between “major teaching” status and “all other”.

In non-NICU locations, the device-days consisted of the total number of central line-days, urinary catheter-days, or ventilator-days. In NICU locations, the device-days consisted of the total number of central line-days and umbilical catheter-days, or ventilator days for each birth weight category. Device utilization (DU) of a location is one measure of invasive practices in that location and constitutes an extrinsic risk factor for healthcare-associated infection.⁹ DU may also serve as a marker for severity of illness of patients, that is, patients’ intrinsic susceptibility to infection.

Data Reporting Methods

The pooled mean infection rates and DU ratios required data from at least 5 different reporting units of a given location type. For the percentile distributions, data from at least 20 different locations were required, excluding 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 may vary among the tables.

Results

Among the 2449 facilities eligible to report to NHSN at the end of 2009, 1942 had filed monthly reporting plans signaling their intent to follow one or more of the Patient Safety Component modules for at least one month and 1749 hospitals had reported at least denominator data for some patient cohorts under surveillance during 2009. These 1749 hospitals are located in 49 states and the District of Columbia and are predominantly general acute care hospitals (Table 1); approximately

two-thirds were smaller hospitals of 200 beds or less (63.6), and only 16% were categorized as major teaching facilities (Table 2). Additionally, 77% of the hospitals included in this report are located in states with a mandate for reporting DA module data to NHSN. Where data volume was sufficient for this report, we tabulated device-associated infection rates and DU ratios for January through December 2009 (Tables 3–12). Data on select attributes of the device-associated infections are provided in Tables 13–20.

Tables 3–6 update and augment previously published device-associated rates and DU ratios by type of non-NICU locations.¹ The UTI definition was revised in January 2009. This revision included an update to the symptomatic urinary tract infection (SUTI) criterion, the removal of asymptomatic bacteriuria (ASB), and the addition of asymptomatic bacteremic urinary tract infection (ABUTI).^{7,10}

Tables 7–12 update and augment the previously published, device-associated rates and DU ratios by birth-weight category for NICU locations.¹ The clinical sepsis (CSEP) criterion was discontinued in January 2010.^{7,11} Therefore, the central line-associated bloodstream infection (CLABSI) rate tables exclude all BSIs that

were reported using this criterion in 2009. This allows unpublished hospital-specific CLABSI rates collected using the changed BSI definition to be compared directly to the aggregate data included in this report.

Tables 13–20 provide data on select attributes of the device-associated infections for each location. For example, Tables 13, 14, 17 and 18 show the frequency and percent distribution of the specific sites of BSI and the criterion used for identifying these infections. Note that for these tables, criteria 2 and 3 have been combined.

Discussion

The data in this report were restricted to a single year for several reasons. First, there were more facilities contributing data than in previous years and because of this, there were sufficient data reported in 2009 to support the analysis of a single year of data (e.g., considerable data contributing to the pooled means, most location types with >20 locations reporting), thus obviating the need to combine data with previous years. Second, data included in the last published report have recently been used as baseline data (i.e., referent population) for calculating standardized infection ratios (SIR) and measuring

progress toward infection prevention goals in the U. S. Department of Health and Human Services' HAI Action Plan.^{1,12} Third, analyzing one year of data removes the need to assess the influence mandatory HAI reporting may have on the aggregate data across years.

The characteristics of hospitals reporting to NHSN remain consistent with the last published report, including a sustained contribution of smaller hospitals.¹ The diversity of healthcare facilities reporting to NHSN may change in future reports as a result of two factors: 1) increased use of NHSN as the operational system to fulfill mandatory HAI reporting requirements in additional states, and 2) the Center for Medicare and Medicaid Services (CMS) Hospital Inpatient Quality Reporting Program, which requires hospitals participating in this program to use NHSN as the tool to report CLABSI data from all adult, pediatric, and neonatal ICUs, beginning January 1, 2011.

Comparisons of these data to previous NHSN Annual Reports reveal several differences. Reporting of DA infections from inpatient wards continues to increase, which is apparent in the 16-fold increase in the number of medical wards reporting CLABSI rates, compared to the first NHSN Annual Report.¹³ In this type of inpatient ward, the pooled mean CLABSI rate was reduced from 2.1 to 1.1 CLABSIs per 1000 central line-days, which could be related to the influx of data from smaller hospitals that generally have lower risks of HAI. Another factor that may have contributed to this reduction is an increase in the implementation and effectiveness of HAI prevention strategies.¹⁴ Further growth in NHSN's coverage, specifically in the number and types of inpatient wards and specialty care areas reporting data, will improve NHSN usefulness in characterizing rates of device-associated infections among patients in those care areas.

In this report, NICU CLABSI rates for each of the two lowest birth weight categories are higher than CLABSI rates in each of the other ICU types, with the exception of the adult burn ICU location. It is unclear if these differences in rates are due to differences in CLABSI prevention practices among these diverse patient groups, or if it suggests a need for



prevention strategies specific to this high-risk NICU population.

Tables 13–20 were included to aid the reader in interpreting the DA infection rates data. One important use of these data is to better understand the distribution of DA infections by type of reporting criterion. For example, nearly 80% of the CLABSIs from adult and pediatric ICU and inpatient wards were identified using the least subjective criterion (1); however, for NICUs, fewer than two-thirds used this criterion. Similarly, the specific site of ventilator-associated pneumonia (VAP) most frequently reported, regardless of location, was the clinical criterion (PNU1). However, in adult and pediatric critical care locations, approximately 41% of VAPs reported used more rigorous criteria that include laboratory findings (PNU2 and PNU3) whereas in NICU locations, only 27% of VAPs were reported using these same criteria.

Another important difference from the previous NHSN Annual Report is that the catheter-associated UTI (CAUTI) rates reflect the revised definition for UTI, implemented in January 2009.^{7,10} This revision included an update to the SUTI criterion, the removal of ASB and the addition of ABUTI. The change in the SUTI criterion removed the use of symptoms that are related to the use of a urinary catheter alone, thereby increasing specificity in the identification of CAUTIs. The specific site of CAUTI was largely reported as SUTI. Due to the significant change in the UTI definition, the CAUTI rates in this report should not be used for the comparison of CAUTIs identified under the previous definition.

As more and diverse types of facilities participate in NHSN, either voluntarily or by mandate, the need for careful scrutiny of the data increases. We will continue to assess how the changing composition of facilities, the changing proportion of data contributed by various types of facilities, and the effects of validation efforts by mandatory reporting states impact the rates and their distributions so that the best possible risk-adjusted comparative data may be provided in future reports.



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 NHSN.^{5,6,7} 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 DA Module. Appendix B gives a step-by-step method for interpretation of percentiles of infection rates or DU ratios. Although a high rate or ratio (>90th percentile) does not necessarily define a problem, it does suggest an area for further investigation. Similarly, a low rate or ratio (<10th percentile) may be the result of inadequate infection detection.

Facilities should use the data in this report and their own data to guide local prevention strategies and other quality improvement efforts aimed at reducing the occurrence of infections as much as possible.

The authors are indebted to the NHSN participants for their ongoing efforts to monitor infections and improve patient safety. We also gratefully acknowledge our colleagues in the Division of Healthcare Quality Promotion who tirelessly support this unique public health network.

The findings and conclusions of the report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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Table 1. NHSN hospitals contributing data used in this report

Hospital type	N (%)
Children's	41 (2.3)
General, including acute, trauma, and teaching	1550 (88.6)
Long Term Acute Care	49 (2.8)
Military	19 (1.1)
Oncology	11 (0.6)
Orthopedic	8 (0.5)
Psychiatric	8 (0.5)
Rehabilitation	19 (1.1)
Surgical	6 (0.3)
Veterans Affairs	29 (1.7)
Women's	4 (0.2)
Women's and Children's	5 (0.3)
Total	1749 (100)

Table 2. NHSN hospitals contributing data used in this report by hospital type and bedsize

Hospital type	Bed size category				Total
	<= 200	201-500	501-1000	> 1000	
	N (%)	N (%)	N (%)	N (%)	
Major teaching	81 (4.5)	117 (6.7)	83 (4.7)	3 (0.1)	284 (16.0)
Graduate teaching	85 (4.9)	69 (3.9)	22 (1.3)	1 (0.1)	177 (10.2)
Limited teaching	113 (6.5)	74 (4.2)	10 (0.6)	0 (0.0)	197 (11.3)
Nonteaching	834 (47.7)	237 (13.6)	19 (1.1)	1 (0.1)	1091 (62.5)
Total	1113(63.6)	497 (28.4)	134 (7.7)	5 (0.3)	1749 (100)

Major: Hospital is an important part of the teaching program of a medical school and the majority of medical students rotate through multiple clinical services.

Graduate: Hospital is used by the medical school for graduate training programs only; i.e., residency and/or fellowships.

Limited: Hospital is used in the medical school's teaching program only to a limited extent.

Table 3. Pooled means and key percentiles of the distribution of laboratory-confirmed central line-associated BSI rates and central line utilization ratios, by type of location, DA module, 2009

Central line-associated BSI rate*					Percentile				
Type of Location	No. of locations+	No. of CLABSI	Central line-days	Pooled mean	10%	25%	50% (median)	75%	90%
Critical Care Units									
Burn	33	193	36,355	5.3	0.2	1.8	3.8	5.9	12.4
Medical Major teaching	135 (134)	740	335,840	2.2	0.2	0.8	1.7	3.1	4.7
Medical All other	191 (183)	461	293,177	1.6	0.0	0.0	1.1	2.4	4.1
Medical Cardiac	252 (246)	556	330,123	1.7	0.0	0.0	1.1	2.5	4.2
Medical/Surgical Major teaching	192	760	446,751	1.7	0.0	0.3	1.3	2.4	3.8
Medical/Surgical All other <= 15 beds	837 (771)	982	693,747	1.4	0.0	0.0	0.0	1.8	3.8
Medical/Surgical All other > 15 beds	324 (323)	1,111	871,750	1.3	0.0	0.3	0.9	1.8	3.0
Neurologic	23	67	36,414	1.8	0.0	1.1	1.7	2.5	4.7
Neurosurgical	79 (78)	194	129,732	1.5	0.0	0.3	1.2	2.5	3.6
Pediatric Cardiothoracic	21	161	65,419	2.5	0.4	0.9	2.7	3.6	4.0
Pediatric Medical	15 (13)	36	13,823	2.6					
Pediatric Medical/Surgical	142 (135)	504	228,206	2.2	0.0	0.0	1.7	3.0	4.5
Respiratory	9	27	12,627	2.1					
Surgical	223 (222)	817	466,224	1.8	0.0	0.5	1.2	2.5	4.2
Surgical Cardiothoracic	219	540	460,406	1.2	0.0	0.0	0.8	1.7	2.5
Trauma	74	439	168,784	2.6	0.0	0.7	2.0	3.7	6.7
Inpatient Wards									
Acute Stroke	5	1	2,039	0.5					
Adult Step Down Unit (post-critical care)	214 (204)	293	194,080	1.5	0.0	0.0	0.8	2.4	3.7
Behavioral Health/Psych	56 (12)	0	2,432	0.0					
Genitourinary	7	12	12,379	1.0					
Gerontology	6	4	5,029	0.8					
Gynecology	21 (9)	6	5,263	1.1					

Table 3, continued

Central line-associated BSI rate*					Percentile				
Type of Location	No. of locations+	No. of CLABSI	Central line-days	Pooled mean	10%	25%	50% (median)	75%	90%
Labor and Delivery	17 (3)	0	400	0.0					
Labor, Delivery, Recovery, Postpartum Suite	32 (4)	0	866	0.0					
Medical	289 (274)	362	317,612	1.1	0.0	0.0	0.6	1.7	3.1
Medical/Surgical	807 (751)	700	674,005	1.0	0.0	0.0	0.0	1.5	2.8
Neurology	17 (16)	19	15,041	1.3					
Neurosurgical	21 (20)	19	14,310	1.3	0.0	0.0	0.0	3.3	5.1
Orthopedic	84 (71)	33	40,666	0.8	0.0	0.0	0.0	0.8	2.7
Orthopedic Trauma	6	13	4,409	2.9					
Pediatric Medical	18 (16)	20	15,568	1.3					
Pediatric Med/Surg	94 (59)	54	42,966	1.3	0.0	0.0	0.0	1.1	3.3
Pediatric Rehabilitation	6 (5)	7	1,306	5.4					
Postpartum	54 (5)	0	1,192	0.0					
Pulmonary	10	17	14,560	1.2					
Rehabilitation	161 (141)	40	64,469	0.6	0.0	0.0	0.0	0.0	1.8
Step down Neonatal ICU (Level II)	11 (3)	1	450	2.2					
Surgical	142 (136)	173	150,799	1.1	0.0	0.0	0.0	1.6	3.4
Vascular Surgery	13 (12)	17	13,190	1.3					
Well Baby Nursery (Level I)	7 (1)	0	901	0.0					

Central line-associated BSI rate*					Percentile				
Type of Location	No. of locations+	No. of CLABSI	Central line-days	Pooled mean	10%	25%	50% (median)	75%	90%
Inpatient Long-Term Care Units									
Long-Term Care	10 (8)	10	5,783	1.7					

Table 3, continued

Central line utilization ratio**					Percentile				
Type of location	No. of locations+	Central line-days	Patient-days	Pooled mean	10%	25%	50% (median)	75%	90%
Critical Care Units									
Burn	33	36,355	73,441	0.50	0.25	0.33	0.46	0.64	0.83
Medical Major teaching	135	335,840	540,411	0.62	0.42	0.51	0.61	0.71	0.79
Medical All other	191 (189)	293,177	682,737	0.43	0.13	0.22	0.44	0.61	0.73
Medical Cardiac	252 (250)	330,123	822,571	0.40	0.17	0.29	0.39	0.53	0.63
Medical/Surgical Major teaching	192	446,751	774,040	0.58	0.30	0.46	0.59	0.67	0.76
Medical/Surgical All other ≤ 15 beds	837 (824)	693,747	1,790,060	0.39	0.10	0.20	0.34	0.50	0.65
Medical/Surgical All other > 15 beds	324	871,750	1,823,287	0.48	0.27	0.41	0.53	0.62	0.71
Neurologic	23	36,414	76,731	0.47	0.18	0.28	0.43	0.61	0.67
Neurosurgical	79	129,732	283,525	0.46	0.23	0.33	0.48	0.57	0.64
Pediatric Cardiothoracic	21	65,419	92,941	0.70	0.31	0.61	0.75	0.85	0.91
Pediatric Medical	15	13,823	34,435	0.40					
Pediatric Medical/Surgical	142 (141)	228,206	457,621	0.50	0.14	0.29	0.41	0.57	0.66
Respiratory	9	12,627	21,605	0.58					
Surgical	223	466,224	776,724	0.60	0.36	0.49	0.61	0.71	0.79
Surgical Cardiothoracic	219	460,406	649,249	0.71	0.43	0.57	0.73	0.83	0.95
Trauma	74	168,784	287,095	0.59	0.44	0.50	0.60	0.67	0.77
Inpatient Wards									
Acute Stroke	5	2,039	15,732	0.13					
Adult Step Down Unit (post-critical care)	214 (213)	194,080	1,059,519	0.18	0.06	0.09	0.16	0.30	0.45
Behavioral Health/Psych	56	2,432	83,531	0.03	0.01	0.01	0.02	0.03	0.05
Genitourinary	7	12,379	51,719	0.24					
Gerontology	6	5,029	38,705	0.13					
Gynecology	21	5,263	60,953	0.09	0.00	0.01	0.02	0.16	0.18

Table 3, continued

Central line utilization ratio**					Percentile				
Type of location	No. of locations+	Central line-days	Patient-days	Pooled mean	10%	25%	50% (median)	75%	90%
Labor and Delivery	17	400	14,316	0.03					
Labor, Delivery, Recovery, Postpartum Suite	32	866	44,595	0.02	0.00	0.01	0.02	0.03	0.05
Medical	289	317,612	1,730,163	0.18	0.05	0.09	0.14	0.20	0.31
Medical/Surgical	807 (804)	674,005	4,739,514	0.14	0.04	0.07	0.11	0.18	0.27
Neurology	17	15,041	94,017	0.16					
Neurosurgical	21	14,310	99,260	0.14	0.04	0.07	0.12	0.16	0.25
Orthopedic	84	40,666	424,227	0.10	0.02	0.05	0.07	0.11	0.16
Orthopedic Trauma	6	4,409	40,226	0.11					
Medical Pediatric	18	15,568	75,442	0.21					
Pediatric Med/Surg	94	42,966	229,584	0.19	0.02	0.04	0.08	0.17	0.36
Pediatric Rehabilitation	6	1,306	15,334	0.09					
Postpartum	54 (53)	1,192	100,598	0.01	0.00	0.01	0.01	0.02	0.04
Pulmonary	10	14,560	57,194	0.25					
Rehabilitation	161	64,469	750,608	0.09	0.03	0.05	0.08	0.11	0.16
Step down Neonatal ICU (Level II)	11 (9)	450	6,286	0.07					
Surgical	142	150,799	865,118	0.17	0.06	0.10	0.15	0.21	0.28
Vascular Surgery	13	13,190	69,098	0.19					
Well Baby Nursery (Level I)	7 (6)	901	9,401	0.10					
Inpatient Long-Term Care Units									
Long-Term Care	10	5,783	43,219	0.13					

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

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

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

+ Number of locations meeting minimum requirements for percentile distributions if less than total number of locations. If this number <20, percentile distributions are not calculated.

Table 4. Pooled means and key percentiles of the distribution of laboratory-confirmed permanent and temporary central line-associated BSI rates and central line utilization ratios, by type of location, DA module, 2009

Permanent Central line-associated BSI rate *					Percentile				
Type of Location	No. of locations+	No. of PCLABS	Permanent Central line-days	Pooled mean	10%	25%	50% (median)	75%	90%
Specialty Care Area									
Bone Marrow Transplant	25 (24)	190	53,944	3.5	0.0	0.0	2.8	4.3	6.9
Hematology/Oncology	59	189	99,646	1.9	0.0	0.0	0.7	2.2	4.6
Pediatric Hematology/Oncology	10	96	32,282	3.0					
Long-Term Acute Care (LTAC)	60 (55)	34	37,365	0.9	0.0	0.0	0.0	1.0	2.7
Solid Organ Transplant	6	7	2,631	2.7					

Temporary Central line-associated BSI rate **					Percentile				
Type of Location	No. of locations+	No. of TCLABS	Temporary Central line-days	Pooled mean	10%	25%	50% (median)	75%	90%
Specialty Care Area									
Bone Marrow Transplant	25 (24)	167	40,426	4.1	0.0	0.0	3.9	6.2	7.5
Hematology/Oncology	51 (49)	173	53,786	3.2	0.0	0.0	1.1	4.9	6.8
Pediatric Hematology/Oncology	9 (8)	31	6,454	4.8					
Long-Term Acute Care (LTAC)	84 (81)	430	257,966	1.7	0.0	0.5	1.3	2.5	4.1
Solid Organ Transplant	9 (8)	47	19,252	2.4					

Table 4, continued

Permanent Central line utilization ratio #					Percentile				
Type of location	No. of locations+	Permanent Central line-days	Patient-days	Pooled mean	10%	25%	50% (median)	75%	90%
Specialty Care Area									
Bone Marrow Transplant	25	53,944	103,814	0.52	0.22	0.32	0.56	0.75	0.87
Hematology/Oncology	59	99,646	284,402	0.35	0.15	0.21	0.33	0.49	0.72
Pediatric Hematology/Oncology	10	32,282	46,449	0.69					
Long-Term Acute Care (LTAC)	60	37,365	291,642	0.13	0.04	0.05	0.08	0.13	0.51
Solid Organ Transplant	6	2,631	28,231	0.09					

Temporary Central line utilization ratio ##					Percentile				
Type of location	No. of locations+	Temporary Central line-days	Patient-days	Pooled mean	10%	25%	50% (median)	75%	90%
Specialty Care Area									
Bone Marrow Transplant	25	40,426	100,318	0.40	0.05	0.18	0.47	0.68	0.77
Hematology/Oncology	51 (50)	53,786	272,554	0.20	0.05	0.11	0.18	0.29	0.37
Pediatric Hematology/Oncology	9	6,454	41,466	0.16					
Long-Term Acute Care (LTAC)	84	257,966	481,748	0.54	0.10	0.29	0.57	0.74	0.85
Solid Organ Transplant	9 (8)	19,252	40,296	0.48					

* $\frac{\text{Number of PCLAB}}{\text{Number of permanent central line-days}} \times 1000$

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

** $\frac{\text{Number of TCLAB}}{\text{Number of temporary central line-days}} \times 1000$

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

BSI, bloodstream infection; PCLAB, permanent central line-associated BSI; TCLAB, temporary central line-associated BSI.

+ Number of locations meeting minimum requirements for percentile distributions if less than total number of locations. If this number < 20, percentile distributions are not calculated.

Table 5. 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, 2009

Urinary catheter-associated UTI rate *					Percentile				
Type of location	No. of locations +	No. of CAUTI	Urinary catheter-days	Pooled mean	10%	25%	50% (median)	75%	90%
Critical care units									
Burn	18	92	20,921	4.4					
Medical Major teaching	54	342	148,501	2.3	0.2	0.9	1.7	3.1	4.9
Medical All other	70 (69)	351	173,724	2.0	0.0	0.3	1.4	2.4	4.5
Medical Cardiac	112 (109)	348	177,455	2.0	0.0	0.7	1.6	3.0	4.0
Medical/Surgical Major teaching	95	593	260,079	2.3	0.0	0.7	1.9	3.0	5.4
Medical/Surgical All other <= 15 beds	270 (259)	449	348,334	1.3	0.0	0.0	0.0	1.8	3.1
Medical/Surgical All other > 15 beds	116 (115)	510	410,556	1.2	0.0	0.4	1.1	1.8	3.0
Neurologic	14	124	32,777	3.8					
Neurosurgical	33	357	81,783	4.4	0.1	1.6	3.6	6.8	10.5
Pediatric Cardiothoracic	9	25	9,187	2.7					
Pediatric Medical	5 (4)	1	1,244	0.8					
Pediatric Medical/Surgical	55 (52)	139	49,935	2.8	0.0	0.0	1.4	3.5	5.5
Respiratory	5	18	7,136	2.5					
Surgical	92	611	235,104	2.6	0.0	0.5	2.0	3.4	5.5
Surgical Cardiothoracic	92	307	184,567	1.7	0.0	0.5	1.2	2.4	3.6
Trauma	42	437	126,916	3.4	0.6	1.7	2.8	4.5	6.7
Specialty Care Areas									
Bone Marrow Transplant	10 (9)	8	4,093	2.0					
Hematology/ Oncology	41 (40)	93	39,459	2.4	0.0	1.0	2.6	4.8	6.0
Pediatric Hematology/ Oncology	5 (3)	2	555	3.6					
Long-Term Acute Care (LTAC)	62	449	169,450	2.6	0.1	0.9	2.1	3.9	6.2

Table 5, continued

Urinary catheter-associated UTI rate *					Percentile				
Type of location	No. of locations +	No. of CAUTI	Urinary catheter-days	Pooled mean	10%	25%	50% (median)	75%	90%
Inpatient Wards									
Adult Step Down Unit (post-critical care)	153 (148)	389	206,562	1.9	0.0	0.0	1.2	2.6	4.3
Behavioral Health/Psych	71 (27)	6	4,526	1.3	0.0	0.0	0.0	0.0	5.0
Genitourinary	6	12	9,992	1.2					
Gynecology	16 (15)	12	11,765	1.0					
Labor and Delivery	21 (15)	5	7,449	0.7					
Labor, Delivery, Recovery, Postpartum Suite	56 (50)	7	20,079	0.3	0.0	0.0	0.0	0.0	1.7
Medical	213 (208)	430	230,952	1.9	0.0	0.0	1.4	2.4	4.3
Medical/Surgical	623 (602)	1,141	711,849	1.6	0.0	0.0	1.0	2.5	4.2
Neurology	11	39	12,583	3.1					
Neurosurgical	17	52	21,828	2.4					
Orthopedic	66 (64)	154	95,010	1.6	0.0	0.0	0.6	2.7	3.5
Orthopedic Trauma	5	14	7,070	2.0					
Pediatric Med/Surg	63 (34)	11	8,293	1.3	0.0	0.0	0.0	0.0	6.2
Pediatric Medical	14 (6)	2	1,249	1.6					
Pediatric Rehabilitation	5 (3)	1	371	2.7					
Postpartum	77 (75)	31	37,566	0.8	0.0	0.0	0.0	0.8	2.9
Pulmonary	5	17	9,917	1.7					
Rehabilitation	147 (132)	258	68,055	3.8	0.0	0.0	2.4	4.8	9.2
Surgical	109	285	155,042	1.8	0.0	0.0	1.4	2.7	4.7
Vascular Surgery	6 (5)	20	6,160	3.2					

Table 5, continued

Urinary catheter-associated UTI rate *					Percentile				
Type of location	No. of locations +	No. of CAUTI	Urinary catheter-days	Pooled mean	10%	25%	50% (median)	75%	90%
Inpatient Long-Term Care Units									
Long-Term Care Unit	10	17	6,962	2.4					

Urinary catheter utilization ratio **					Percentile				
Type of location	No. of locations +	Urinary catheter-days	Patient days	Pooled mean	10%	25%	50% (median)	75%	90%
Critical care units									
Burn	18	20,921	37,161	0.56					
Medical Major teaching	54	148,501	200,735	0.74	0.55	0.65	0.75	0.82	0.88
Medical All other	70	173,724	260,799	0.67	0.37	0.58	0.72	0.80	0.86
Medical Cardiac	112 (111)	177,455	345,315	0.51	0.26	0.40	0.55	0.66	0.77
Medical/Surgical Major teaching	95	260,079	357,500	0.73	0.51	0.68	0.76	0.81	0.85
Medical/Surgical All other <= 15 beds	270 (266)	348,334	518,740	0.67	0.38	0.50	0.65	0.78	0.86
Medical/Surgical All other > 15 beds	116	410,556	570,420	0.72	0.54	0.68	0.77	0.83	0.88
Neurologic	14	32,777	43,184	0.76					
Neurosurgical	33	81,783	106,478	0.77	0.60	0.70	0.78	0.83	0.90
Pediatric Cardiothoracic	9	9,187	36,555	0.25					
Pediatric Medical	5	1,244	8,339	0.15					
Pediatric Medical/Surgical	55	49,935	176,374	0.28	0.10	0.17	0.24	0.31	0.39
Respiratory	5	7,136	11,569	0.62					
Surgical	92	235,104	298,630	0.79	0.59	0.75	0.81	0.86	0.91
Surgical Cardiothoracic	92	184,567	254,438	0.73	0.43	0.63	0.76	0.86	0.94
Trauma	42	126,916	153,275	0.83	0.71	0.78	0.85	0.92	0.95

Table 5, continued

Urinary catheter utilization ratio **					Percentile				
Type of location	No. of locations +	Urinary catheter-days	Patient days	Pooled mean	10%	25%	50% (median)	75%	90%
Specialty Care Areas									
Bone Marrow Transplant	10	4,093	41,627	0.10					
Hematology/Oncology	41	39,459	201,514	0.20	0.10	0.12	0.17	0.27	0.37
Pediatric Hematology/Oncology	5	555	22,647	0.02					
Long-Term Acute Care (LTAC)	62	169,450	331,978	0.51	0.22	0.38	0.55	0.66	0.75
Inpatient Wards									
Adult Step Down Unit (post-critical care)	153 (152)	206,562	848,898	0.24	0.11	0.14	0.23	0.35	0.50
Behavioral Health/Psych	71	4,526	169,133	0.03	0.00	0.01	0.02	0.03	0.04
Genitourinary	6	9,992	46,554	0.21					
Gynecology	16	11,765	60,016	0.20					
Labor and Delivery	21	7,449	38,769	0.19	0.01	0.06	0.14	0.22	0.34
Labor, Delivery, Recovery, Postpartum Suite	56	20,079	125,423	0.16	0.09	0.10	0.15	0.24	0.31
Medical	213	230,952	1,341,028	0.17	0.08	0.12	0.16	0.23	0.30
Medical/Surgical	623 (618)	711,849	3,731,332	0.19	0.10	0.13	0.18	0.23	0.30
Neurology	11	12,583	60,531	0.21					
Neurosurgical	17	21,828	86,450	0.25					
Orthopedic	66 (65)	95,010	345,378	0.28	0.13	0.20	0.27	0.35	0.43
Orthopedic Trauma	5	7,070	37,585	0.19					
Pediatric Med/Surg	63	8,293	139,610	0.06	0.01	0.02	0.04	0.08	0.15
Pediatric Medical	14	1,249	42,533	0.03					
Pediatric Orthopedic	4 (3)	3,249	10,376	0.31					
Pediatric Rehabilitation	5	371	8,182	0.05					
Postpartum	77	37,566	275,824	0.14	0.05	0.09	0.14	0.18	0.24
Pulmonary	5	9,917	37,806	0.26					
Rehabilitation	147	68,055	742,120	0.09	0.03	0.05	0.08	0.10	0.15
Surgical	109	155,042	670,460	0.23	0.14	0.17	0.22	0.28	0.36

Table 5, continued

Urinary catheter utilization ratio **					Percentile				
Type of location	No. of locations +	Urinary catheter-days	Patient days	Pooled mean	10%	25%	50% (median)	75%	90%
Vascular Surgery	6	6,160	40,283	0.15					
Inpatient Long-Term Care Units									
Long-Term Care Unit	10	6,962	48,208	0.14					

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

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

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

+ Number of locations meeting minimum requirements for percentile distributions if less than total number of locations. If this number <20, percentile distributions are not calculated.

Table 6. Pooled means and key percentiles of the distribution of ventilator-associated PNEU rates and ventilator utilization ratios, by type of location, DA module, 2009

Ventilator-associated PNEU rate *					Percentile				
Type of location	No. of locations +	No. of VAP	Ventilator -days	Pooled mean	10%	25%	50% (median)	75%	90%
Critical care units									
Burn	21	109	14,703	7.4	0.0	0.0	2.7	10.9	14.2
Medical Major teaching	75 (74)	263	140,784	1.9	0.0	0.0	1.1	2.9	5.6
Medical All other	97 (92)	178	131,185	1.4	0.0	0.0	0.2	2.2	4.6
Medical Cardiac	125 (116)	149	100,768	1.5	0.0	0.0	0.0	2.4	4.8
Medical/Surgical Major teaching	116 (115)	398	194,776	2.0	0.0	0.0	1.2	3.1	5.6
Medical/Surgical All other <= 15 beds	359 (305)	284	209,206	1.4	0.0	0.0	0.0	1.6	5.1
Medical/Surgical All other > 15 beds	154 (152)	348	295,884	1.2	0.0	0.0	0.7	1.9	3.5
Neurologic	14 (13)	61	15,731	3.9					
Neurosurgical	44 (42)	169	45,019	3.8	0.0	0.0	2.3	4.3	8.5
Pediatric Cardiothoracic	12	15	22,943	0.7					
Pediatric Medical	9 (7)	6	6,411	0.9					
Pediatric Medical/Surgical	72 (70)	113	102,822	1.1	0.0	0.0	0.4	1.5	4.1
Respiratory	6	7	6,548	1.1					
Surgical	124 (122)	645	171,680	3.8	0.0	0.5	2.1	5.1	9.0
Surgical Cardiothoracic	110 (107)	247	115,628	2.1	0.0	0.0	1.3	3.0	6.3
Trauma	47	580	88,644	6.5	0.0	1.2	4.3	10.0	15.7
Specialty Care Areas									
Long-Term Acute Care (LTAC)	45	42	66,665	0.6	0.0	0.0	0.0	0.8	2.3

Table 6, continued

Ventilator-associated PNEU rate *					Percentile				
Type of location	No. of locations +	No. of VAP	Ventilator -days	Pooled mean	10%	25%	50% (median)	75%	90%
Inpatient Wards									
Adult Step Down Unit (post-critical care)	37 (33)	27	18,307	1.5	0.0	0.0	0.0	2.1	4.2
Medical	10 (6)	1	4,558	0.2					
Medical/Surgical	25 (13)	1	10,490	0.1					
Pediatric Med/Surg	5 (4)	0	1,948	0.0					
Pediatric Medical	6 (3)	0	1,090	0.0					
Pulmonary	5	5	4,189	1.2					

Ventilator utilization ratio **					Percentile				
Type of location	No. of locations +	Ventilator-days	Patient-days	Pooled mean	10%	25%	50% (median)	75%	90%
Critical care units									
Burn	21	14,703	45,574	0.32	0.16	0.18	0.30	0.42	0.59
Medical Major teaching	75	140,784	292,844	0.48	0.27	0.37	0.49	0.56	0.69
Medical All other	97 (96)	131,185	354,489	0.37	0.08	0.22	0.38	0.49	0.60
Medical Cardiac	125 (124)	100,768	389,898	0.26	0.07	0.15	0.25	0.36	0.46
Medical/Surgical Major teaching	116	194,776	454,227	0.43	0.21	0.30	0.40	0.53	0.62
Medical/Surgical All other <= 15 beds	359 (352)	209,206	701,388	0.30	0.06	0.12	0.23	0.37	0.48
Medical/Surgical All other > 15 beds	154	295,884	901,241	0.33	0.22	0.29	0.38	0.46	0.54
Neurologic	14	15,731	40,234	0.39					
Neurosurgical	44	45,019	140,989	0.32	0.09	0.23	0.32	0.40	0.49
Pediatric Cardiothoracic	12	22,943	53,000	0.43					

Table 6, continued

Ventilator utilization ratio **					Percentile				
Type of location	No. of locations +	Ventilator -days	Patient-days	Pooled mean	10%	25%	50% (median)	75%	90%
Pediatric Medical/Surgical	72	102,822	247,274	0.42	0.13	0.26	0.35	0.47	0.54
Pediatric Medical	9	6,411	19,067	0.34					
Respiratory	6	6,548	14,941	0.44					
Surgical	124	171,680	428,439	0.40	0.24	0.30	0.38	0.46	0.59
Surgical Cardiothoracic	110	115,628	319,264	0.36	0.18	0.26	0.33	0.44	0.56
Trauma	47	88,644	175,248	0.51	0.36	0.45	0.52	0.60	0.69
Specialty Care Areas									
Long-Term Acute Care (LTAC)	45	66,665	249,282	0.27	0.07	0.12	0.22	0.32	0.53
Inpatient Wards									
Adult Step Down Unit (post-critical care)	37	18,307	160,446	0.11	0.02	0.05	0.10	0.17	0.23
Medical	10	4,558	45,569	0.10					
Medical/Surgical	25 (24)	10,490	99,602	0.11	0.00	0.01	0.02	0.20	0.36
Pediatric Med/Surg	5	1,948	30,887	0.06					
Medical Pediatric	6	1,090	17,432	0.06					
Pulmonary	5	4,189	33,972	0.12					

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

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

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

+ Number of locations meeting minimum requirements for percentile distributions if less than total number of locations. If this number < 20, percentile distributions are not calculated.

Table 7. 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, 2009

Central line-associated BSI rate *					Percentile				
Birth-weight category	No. of locations +	No. of CLABSI	Central line-days	Pooled mean	10%	25%	50% (median)	75%	90%
<=750 grams	172 (150)	291	86,469	3.4	0.0	0.0	2.7	5.0	8.6
751-1000 grams	179 (159)	187	68,320	2.7	0.0	0.0	1.4	4.9	8.8
1001-1500 grams	183 (156)	133	69,926	1.9	0.0	0.0	0.0	2.8	5.8
1501-2500 grams	172 (134)	84	55,896	1.5	0.0	0.0	0.0	1.9	4.7
> 2500 grams	167 (106)	73	55,659	1.3	0.0	0.0	0.0	1.2	3.5

Central line utilization ratio **					Percentile				
Birth-weight category	No. of locations +	Central line-days	Patient-days	Pooled Mean	10%	25%	50% (median)	75%	90%
<=750 grams	172 (164)	86,469	233,812	0.37	0.20	0.27	0.35	0.47	0.57
751-1000 grams	179 (177)	68,320	219,356	0.31	0.17	0.22	0.30	0.40	0.51
1001-1500 grams	183 (180)	69,926	300,033	0.23	0.08	0.14	0.22	0.32	0.45
1501-2500 grams	172 (170)	55,896	352,778	0.16	0.04	0.06	0.11	0.20	0.39
> 2500 grams	167	55,659	285,437	0.19	0.03	0.06	0.13	0.21	0.32

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

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

BSI, bloodstream infection, includes laboratory-confirmed BSI; CLABSI, central line-associated BSI.

+ Number of locations meeting minimum requirements for percentile distributions if less than total number of locations. If this number < 20, percentile distributions are not calculated.

Table 8. 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, 2009

Umbilical catheter-associated BSI rate *					Percentile				
Birth-weight category	No. of locations +	No. of UCAB	Umbilical catheter-days	Pooled mean	10%	25%	50% (median)	75%	90%
<=750 grams	173 (125)	94	22,442	4.2	0.0	0.0	0.0	6.4	12.7
751-1000 grams	176 (124)	52	19,508	2.7	0.0	0.0	0.0	0.8	10.1
1001-1500 grams	180 (123)	22	24,000	0.9	0.0	0.0	0.0	0.0	2.4
1501-2500 grams	178 (106)	11	22,126	0.5	0.0	0.0	0.0	0.0	0.0
> 2500 grams	178 (125)	15	31,030	0.5	0.0	0.0	0.0	0.0	0.0

Umbilical catheter utilization ratio **					Percentile				
Birth-weight category	No. of locations +	Umbilical catheter-days	Patient-days	Pooled mean	10%	25%	50% (median)	75%	90%
<=750 grams	173 (160)	22,442	202,445	0.11	0.06	0.08	0.13	0.21	0.34
751-1000 grams	176 (173)	19,508	195,709	0.10	0.04	0.08	0.11	0.17	0.26
1001-1500 grams	180 (176)	24,000	268,328	0.09	0.03	0.05	0.09	0.14	0.20
1501-2500 grams	178 (176)	22,126	342,955	0.06	0.02	0.03	0.05	0.09	0.14
> 2500 grams	178 (177)	31,030	306,772	0.10	0.04	0.05	0.08	0.15	0.20

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

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

BSI, bloodstream infection, includes laboratory-confirmed BSI; UCAB, umbilical catheter-associated BSI.

+ Number of locations meeting minimum requirements for percentile distributions if less than total number of locations. If this number < 20, percentile distributions are not calculated.

Table 9. 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, 2009

Central line-associated BSI rate *					Percentile				
Birth-weight category	No. of locations +	No. of CLABSI	Central line-days	Pooled mean	10%	25%	50% (median)	75%	90%
<=750 grams	111 (78)	98	29,567	3.3	0.0	0.0	1.8	5.8	10.5
751-1000 grams	125 (99)	84	29,601	2.8	0.0	0.0	0.0	4.0	6.8
1001-1500 grams	148 (103)	59	34,853	1.7	0.0	0.0	0.0	2.1	6.8
1501-2500 grams	142 (78)	41	29,935	1.4	0.0	0.0	0.0	1.8	5.2
> 2500 grams	136 (58)	28	20,334	1.4	0.0	0.0	0.0	0.0	2.9

Central line utilization ratio **					Percentile				
Birth-weight category	No. of locations +	Central line-days	Patient-days	Pooled mean	10%	25%	50% (median)	75%	90%
<=750 grams	111 (93)	29,567	90,059	0.33	0.21	0.28	0.37	0.46	0.58
751-1000 grams	125 (115)	29,601	101,386	0.29	0.12	0.22	0.30	0.41	0.53
1001-1500 grams	148 (136)	34,853	151,963	0.23	0.09	0.14	0.21	0.30	0.42
1501-2500 grams	142 (135)	29,935	198,907	0.15	0.03	0.05	0.11	0.17	0.33
> 2500 grams	136 (121)	20,334	128,207	0.16	0.04	0.06	0.09	0.16	0.29

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

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

BSI, bloodstream infection, includes laboratory-confirmed BSI; CLABSI, central line-associated BSI.

+ Number of locations meeting minimum requirements for percentile distributions if less than total number of locations. If this number < 20, percentile distributions are not calculated.

Table 10. 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, 2009

Umbilical catheter-associated BSI rate *					Percentile				
Birth-weight category	No. of locations +	No. of UCAB	Umbilical catheter-days	Pooled mean	10%	25%	50% (median)	75%	90%
<=750 grams	110 (52)	39	8,800	4.4	0.0	0.0	0.0	8.7	14.6
751-1000 grams	127 (63)	23	8,809	2.6	0.0	0.0	0.0	0.0	8.7
1001-1500 grams	140 (76)	17	11,530	1.5	0.0	0.0	0.0	0.0	3.9
1501-2500 grams	151 (72)	12	11,829	1.0	0.0	0.0	0.0	0.0	0.5
> 2500 grams	150 (75)	13	15,538	0.8	0.0	0.0	0.0	0.0	2.1

Umbilical catheter utilization ratio **					Percentile				
Birth-weight category	No. of locations +	Umbilical catheter-days	Patient-days	Pooled mean	10%	25%	50% (median)	75%	90%
<=750 grams	110 (83)	8,800	63,689	0.14	0.06	0.10	0.18	0.23	0.37
751-1000 grams	127 (105)	8,809	79,681	0.11	0.05	0.08	0.12	0.20	0.27
1001-1500 grams	140 (127)	11,530	124,252	0.09	0.04	0.07	0.10	0.15	0.22
1501-2500 grams	151 (143)	11,829	198,570	0.06	0.02	0.03	0.06	0.10	0.14
> 2500 grams	150 (142)	15,538	162,944	0.10	0.03	0.05	0.08	0.13	0.20

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

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

BSI, bloodstream infection, includes laboratory-confirmed BSI; UCAB, umbilical catheter-associated BSI.

+ Number of locations meeting minimum requirements for percentile distributions if less than total number of locations. If this number < 20, percentile distributions are not calculated.

Table 11. Pooled means and key percentiles of the distribution of ventilator-associated PNEU rates and ventilator utilization ratios for level III NICUs, DA module, 2009

Ventilator-associated PNEU rate *					Percentile				
Birth-weight category	No. of locations +	No. of VAP	Ventilator-days	Pooled mean	10%	25%	50% (median)	75%	90%
<=750 grams	85 (79)	93	51,592	1.8	0.0	0.0	0.2	2.8	6.7
751-1000 grams	86 (72)	34	26,635	1.3	0.0	0.0	0.0	1.8	7.8
1001-1500 grams	90 (62)	17	15,969	1.1	0.0	0.0	0.0	0.0	3.4
1501-2500 grams	88 (45)	7	13,569	0.5	0.0	0.0	0.0	0.0	1.8
> 2500 grams	87 (53)	7	22,930	0.3	0.0	0.0	0.0	0.0	0.7

Ventilator utilization ratio **					Percentile				
Birth-weight category	No. of locations +	Ventilator-days	Patient-days	Pooled mean	10%	25%	50% (median)	75%	90%
<=750 grams	85 (83)	51,592	118,886	0.43	0.25	0.36	0.47	0.56	0.65
751-1000 grams	86 (84)	26,635	100,973	0.26	0.10	0.17	0.24	0.36	0.48
1001-1500 grams	90 (87)	15,969	134,822	0.12	0.03	0.05	0.08	0.15	0.29
1501-2500 grams	88 (85)	13,569	173,799	0.08	0.02	0.03	0.04	0.11	0.20
> 2500 grams	87 (86)	22,930	158,888	0.14	0.03	0.04	0.08	0.18	0.24

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

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

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

+ Number of locations meeting minimum requirements for percentile distributions if less than total number of locations. If this number < 20, percentile distributions are not calculated.

Table 12. Pooled means and key percentiles of the distribution of ventilator-associated PNEU rates and ventilator utilization ratios for level II/III NICUs, DA module, 2009

Ventilator-associated PNEU rate *					Percentile				
Birth-weight category	No. of locations +	No. of VAP	Ventilator-days	Pooled mean	10%	25%	50% (median)	75%	90%
<=750 grams	55 (42)	21	15,284	1.4	0.0	0.0	0.0	1.3	6.0
751-1000 grams	61 (41)	17	11,056	1.5	0.0	0.0	0.0	0.7	5.5
1001-1500 grams	70 (33)	9	7,436	1.2	0.0	0.0	0.0	0.0	4.0
1501-2500 grams	67 (28)	5	6,171	0.8	0.0	0.0	0.0	0.0	1.3
> 2500 grams	71 (28)	4	7,602	0.5	0.0	0.0	0.0	0.0	4.5

Ventilator utilization ratio **					Percentile				
Birth-weight category	No. of locations +	Ventilator-days	Patient-days	Pooled mean	10%	25%	50% (median)	75%	90%
<=750 grams	55 (45)	15,284	42,064	0.36	0.17	0.28	0.39	0.54	0.72
751-1000 grams	61 (51)	11,056	46,730	0.24	0.09	0.15	0.21	0.31	0.45
1001-1500 grams	70 (62)	7,436	63,940	0.12	0.03	0.05	0.07	0.13	0.26
1501-2500 grams	67 (63)	6,171	93,907	0.07	0.01	0.02	0.04	0.08	0.23
> 2500 grams	71 (66)	7,602	82,631	0.09	0.02	0.04	0.06	0.10	0.24

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

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

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

+ Number of locations meeting minimum requirements for percentile distributions if less than total number of locations. If this number < 20, percentile distributions are not calculated.

Table 13. Distribution of criteria for central line-associated laboratory confirmed BSI by location, 2009

Type of Location	LCBI				Total
	Criterion 1		Criterion 2/3		
Critical Care Units					
Burn	183	94.8%	10	5.2%	193
Medical Major teaching	606	81.9%	134	18.1%	740
Medical All other	353	76.6%	108	23.4%	461
Medical Cardiac	432	77.7%	124	22.3%	556
Medical/Surgical Major teaching	596	78.4%	164	21.6%	760
Medical/Surgical All other <= 15 beds	749	76.3%	233	23.7%	982
Medical/Surgical All other > 15 beds	795	71.6%	316	28.4%	1,111
Neurologic	52	77.6%	15	22.4%	67
Neurosurgical	149	76.8%	45	23.2%	194
Pediatric Cardiothoracic	132	82.0%	29	18.0%	161
Pediatric Medical	31	86.1%	5	13.9%	36
Pediatric Medical/Surgical	408	81.0%	96	19.0%	504
Respiratory	24	88.9%	3	11.1%	27
Surgical	631	77.2%	186	22.8%	817
Surgical Cardiothoracic	424	78.5%	116	21.5%	540
Trauma	376	85.6%	63	14.4%	439
Inpatient Wards					
Acute Stroke			1	100.0%	1
Adult Step Down Unit (post-critical care)	244	83.3%	49	16.7%	293
Genitourinary	9	75.0%	3	25.0%	12
Gerontology	3	75.0%	1	25.0%	4
Gynecology	5	83.3%	1	16.7%	6
Medical	289	79.8%	73	20.2%	362
Medical/Surgical	548	78.3%	152	21.7%	700
Neurology	12	63.2%	7	36.8%	19
Neurosurgical	15	78.9%	4	21.1%	19
Orthopedic	24	72.7%	9	27.3%	33
Orthopedic Trauma	11	84.6%	2	15.4%	13
Pediatric Medical	18	90.0%	2	10.0%	20

Table 13, continued

Type of Location	LCBI				Total
	Criterion 1		Criterion 2/3		
Pediatric Med/Surg	38	70.4%	16	29.6%	54
Pediatric Rehabilitation	6	85.7%	1	14.3%	7
Pulmonary	17	100.0%			17
Rehabilitation	37	92.5%	3	7.5%	40
Step down Neonatal ICU (Level II)	1	100.0%			1
Surgical	128	74.0%	45	26.0%	173
Vascular Surgery	12	70.6%	5	29.4%	17
Inpatient Long-Term Care Units					
Long-Term Care	9	90.0%	1	10.0%	10
Total	7,367	78.5%	2,022	21.5%	9,389

See reference 11 for criteria.

BSI, bloodstream infection; *LCBI*, laboratory-confirmed BSI.

Table 14. Distribution of criteria for permanent and temporary central line-associated laboratory confirmed BSI by location, 2009

Type of location	LCBI				Total
	Criterion 1		Criterion 2/3		
Permanent Central Line					
Bone Marrow Transplant	135	71.1%	55	28.9%	190
Hematology/Oncology	141	74.6%	48	25.4%	189
Long-Term Acute Care (LTAC)	27	79.4%	7	20.6%	34
Pediatric Hematology/Oncology	70	72.9%	26	27.1%	96
Solid Organ Transplant	6	85.7%	1	14.3%	7
Total	379	73.4%	137	26.6%	516
Temporary Central Line					
Bone Marrow Transplant	117	70.1%	50	29.9%	167
Hematology/Oncology	136	78.6%	37	21.4%	173
Long-Term Acute Care (LTAC)	351	81.6%	79	18.4%	430
Pediatric Hematology/Oncology	26	83.9%	5	16.1%	31
Solid Organ Transplant	39	83.0%	8	17.0%	47
Total	669	78.9%	179	21.1%	848

See reference 11 for criteria.

BSI, bloodstream infection; *LCBI*, laboratory-confirmed BSI.

Table 15. Distribution of specific sites of urinary catheter-associated UTI by location, 2009

Type of location	SUTI		ABUTI		Total
Critical care units					
Burn	89	96.7%	3	3.3%	92
Medical Major teaching	335	98.0%	7	2.0%	342
Medical All other	346	98.6%	5	1.4%	351
Medical Cardiac	343	98.6%	5	1.4%	348
Medical/Surgical Major teaching	577	97.5%	15	2.5%	592
Medical/Surgical All other <= 15 beds	443	98.7%	6	1.3%	449
Medical/Surgical All other > 15 beds	505	99.0%	5	1.0%	510
Neurologic	122	98.4%	2	1.6%	124
Neurosurgical	356	99.7%	1	0.3%	357
Pediatric Cardiothoracic	24	96.0%	1	4.0%	25
Pediatric Medical	1	100.0%			1
Pediatric Medical/Surgical	135	97.1%	4	2.9%	139
Respiratory	17	94.4%	1	5.6%	18
Surgical	605	99.0%	6	1.0%	611
Surgical Cardiothoracic	304	99.0%	3	1.0%	307
Trauma	432	98.9%	5	1.1%	437
Specialty Care Areas					
Bone Marrow Transplant	8	100.0%			8
Hematology/Oncology	91	97.8%	2	2.2%	93
Pediatric Hematology/ Oncology	2	100.0%			2
Long-Term Acute Care (LTAC)	438	97.6%	11	2.4%	449
Inpatient Wards					
Adult Step Down Unit (post-critical care)	381	97.9%	8	2.1%	389
Behavioral Health/Psych	6	100.0%			6
Genitourinary	12	100.0%			12
Gynecology	12	100.0%			12
Labor and Delivery	5	100.0%			5
Labor, Delivery, Recovery, Postpartum Suite	7	100.0%			7

Table 15, continued

Type of location	SUTI		ABUTI		Total
Medical	422	98.1%	8	1.9%	430
Medical/Surgical	1,121	98.2%	20	1.8%	1,141
Neurology	39	100.0%			39
Neurosurgical	52	100.0%			52
Orthopedic	154	100.0%			154
Orthopedic Trauma	14	100.0%			14
Pediatric Med/Surg	11	100.0%			11
Pediatric Medical	2	100.0%			2
Pediatric Rehabilitation	1	100.0%			1
Postpartum	31	100.0%			31
Pulmonary	16	94.1%	1	5.9%	17
Rehabilitation	257	99.6%	1	0.4%	258
Surgical	282	98.9%	3	1.1%	285
Vascular Surgery	20	100.0%			20
Inpatient Long-Term Care Units					
Long-Term Care Unit	17	100.0%			17
Total	8,035	98.5%	123	1.5%	8,158

See reference 10 for criteria.

Table 16. Distribution of specific sites of ventilator-associated pneumonia by location, 2009

Type of location	PNU1		PNU2		PNU3		Total
Critical care units							
Burn	42	38.5%	63	57.8%	4	3.7%	109
Medical Major teaching	173	65.8%	89	33.8%	1	0.4%	263
Medical All other	118	66.3%	57	32.0%	3	1.7%	178
Medical Cardiac	90	60.4%	59	39.6%			149
Medical/Surgical Major teaching	228	57.3%	166	41.7%	4	1.0%	398
Medical/Surgical All other <= 15 beds	203	71.5%	76	26.8%	5	1.8%	284
Medical/Surgical All other > 15 beds	227	65.2%	118	33.9%	3	0.9%	348
Neurologic	32	52.5%	29	47.5%			61
Neurosurgical	98	58.0%	71	42.0%			169
Pediatric Cardiothoracic	6	40.0%	8	53.3%	1	6.7%	15
Pediatric Medical	5	83.3%	1	16.7%			6
Pediatric Medical/Surgical	81	71.7%	32	28.3%			113
Respiratory	3	42.9%	3	42.9%	1	14.3%	7
Surgical	360	55.8%	276	42.8%	9	1.4%	645
Surgical Cardiothoracic	155	62.8%	80	32.4%	12	4.9%	247
Trauma	279	48.1%	299	51.6%	2	0.3%	580
Specialty Care Areas							
Long-Term Acute Care (LTAC)	31	73.8%	10	23.8%	1	2.4%	42
Inpatient Wards							
Adult Step Down Unit (post-critical care)	24	88.9%	3	11.1%			27
Medical	1	100.0%					1
Medical/Surgical			1	100.0%			1
Pulmonary	3	60.0%	2	40.0%			5
Total	2,159	59.2%	1,443	39.6%	46	1.3%	3,648

See reference 7 for criteria.

Table 17. Distribution of specific sites and criteria for device-associated BSI among Level III NICUs by birthweight, 2009

Central line-associated BSI					
Birth-weight category	LCBI				Total
	Criterion 1		Criterion 2/3		
<= 750 grams	190	65.3%	101	34.7%	291
751-1000 grams	121	64.7%	66	35.3%	187
1001-1500 grams	96	72.2%	37	27.8%	133
1501-2500 grams	57	67.9%	27	32.1%	84
> 2500 grams	46	63.0%	27	37.0%	73
Total	510	66.4%	258	33.6%	768

Umbilical catheter-associated BSI					
Birth-weight category	LCBI				Total
	Criterion 1		Criterion 2/3		
<= 750 grams	56	59.6%	38	40.4%	94
751-1000 grams	33	63.5%	19	36.5%	52
1001-1500 grams	11	50.0%	11	50.0%	22
1501-2500 grams	8	72.7%	3	27.3%	11
> 2500 grams	11	73.3%	4	26.7%	15
Total	119	61.4%	75	38.7%	194

See reference 11 for criteria.

BSI, bloodstream infection; LCBI, laboratory confirmed bloodstream infection.

Table 18. Distribution of specific sites and criteria for device-associated BSI among Level II/III NICUs by birthweight, 2009

Central line-associated BSI					
Birth-weight category	LCBI				Total
	Criterion 1		Criterion 2/3		
<= 750 grams	60	61.2%	38	38.8%	98
751-1000 grams	55	65.5%	29	34.5%	84
1001-1500 grams	37	62.7%	22	37.3%	59
1501-2500 grams	26	63.4%	15	36.6%	41
> 2500 grams	22	78.6%	6	21.4%	28
Total	200	64.5%	110	35.5%	310

Umbilical catheter-associated BSI					
Birth-weight category	LCBI				Total
	Criterion 1		Criterion 2/3		
<= 750 grams	21	53.8%	18	46.2%	39
751-1000 grams	11	47.8%	12	52.2%	23
1001-1500 grams	10	58.8%	7	41.2%	17
1501-2500 grams	7	58.3%	5	41.7%	12
> 2500 grams	6	46.2%	7	53.8%	13
Total	55	52.9%	49	47.1%	104

See reference 11 for criteria.

BSI, bloodstream infection; LCBI, laboratory confirmed bloodstream infection.

Table 19. Distribution of specific sites of ventilator-associated pneumonia among Level III NICUs by birthweight, 2009

Birth-weight category	PNU1		PNU2		PNU3		Total
	Count	Percentage	Count	Percentage	Count	Percentage	
<= 750 grams	73	78.5%	19	20.4%	1	1.1%	93
751-1000 grams	26	76.5%	8	23.5%	0	0.0%	34
1001-1500 grams	11	64.7%	6	35.3%	0	0.0%	17
1501-2500 grams	5	71.4%	2	28.6%	0	0.0%	7
> 2500 grams	6	85.7%	1	14.3%	0	0.0%	7
Total	121	76.6%	36	22.8%	1	0.6%	158

See reference 7 for criteria.

Table 20. Distribution of specific sites of ventilator-associated pneumonia among Level II/III NICUs by birthweight, 2009

Birth-weight category	PNU1		PNU2		PNU3		Total
	Count	Percentage	Count	Percentage	Count	Percentage	
<= 750 grams	14	66.7%	3	14.3%	4	19.0%	21
751-1000 grams	10	58.8%	4	23.5%	3	17.6%	17
1001-1500 grams	6	66.7%	3	33.3%	0	0.0%	9
1501-2500 grams	3	60.0%	2	40.0%	0	0.0%	5
> 2500 grams	3	75.0%	1	25.0%	0	0.0%	4
Total	36	64.3%	13	23.2%	7	12.5%	56

See reference 7 for criteria.

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 upon 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, e.g., the type of location or a birthweight category in a NICU.
- Step 3:** Select the infections to be included 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 one or more central lines in place; five on day 2; two on day 3; five on day 4; three on day 5; four on day 6; and four 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:

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

Example: 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 Device Utilization (DU) Ratio

- Steps 1,2,4:** 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, i.e., <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 if 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 it 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 an outlier which may indicate a problem.

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

- Step 6:** If it 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. Since the ventilator is a significant risk factor for pneumonia, you may want to limit the duration of ventilation whenever possible (i.e., decrease unnecessary use) while at the same time optimize infection prevention strategies in patients for which ventilator use is required.



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