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National Healthcare Safety Network (NHSN) report, data summary for 2009, device-associated module

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This report is a summary of Device-Associated (DA) module data collected by hospitals participating in the National Healthcare Safety Network (NHSN) for events occurring between January and December 2009 and reported to the Centers for Disease Control and Prevention (CDC) by October 18, 2010. This report updates previously published DA module data from the NHSN and provides contemporary comparative rates.[1] Procedure-Associated module data will be reported separately. Surgical site infection data will be reported as standardized infection ratios using new logistic regression models, and postprocedure pneumonia rates for 2009 are available on the NHSN's public Web site. This report complements other NHSN reports, including national and state-specific standardized infection ratios for selected health care–associated infections (HAIs).[2-4]

The NHSN was established in 2005 to integrate and supersede 3 legacy surveillance systems at the CDC: the National Nosocomial Infections Surveillance system, the Dialysis Surveillance Network, and the National Surveillance System for Healthcare Workers. NHSN data collection, reporting, and analysis are organized into 3 components—Patient Safety, Healthcare Personnel Safety, and Biovigilance—and use standardized methods and definitions in accordance with specific module protocols.[5-7] 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.[7] The 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 has been published separately.[8] For this report, only data from the Patient Safety component are presented. NHSN facilities report their HAI surveillance data voluntarily or in response to state mandatory reporting requirements. The CDC aggregates these data into a single national database for the stated purposes in place in 2009, as follows:

- Collect data from a sample of US health care facilities to permit valid estimation of the magnitude of adverse events among patients and health care personnel.
- Collect data from a sample of US health care facilities 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 interfacility comparisons and local quality improvement activities.
- Assist facilities in developing surveillance and analysis methods that permit timely recognition of patient and health care worker safety problems and prompt intervention with appropriate measures.
- Conduct collaborative research studies with NHSN member facilities (eg, describe the epidemiology of

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emerging HAIs 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).

The identity of each NHSN facility is kept confidential by the 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

Health care facility personnel responsible for infection prevention and patient safety may choose, taking into account state mandates and prevention initiatives, to collect data on central line–associated primary bloodstream infections (CLABSIs), ventilator-associated pneumonia (VAP), or urinary catheter–associated urinary tract infections (CAUTIs) that occur in patients staying in various care locations, such as a critical care unit, intensive care unit (ICU), specialty care area, or ward. In the NHSN, these locations are further characterized according to patient population as adults, children, or infants (in the tables, pediatric and nursery locations are so noted). In neonatal ICU (NICU) locations (level III or level II/III), infection preventionists collect data on central line–associated and umbilical catheter–associated primary bloodstream infections (BSIs) or VAP for each of 5 birth weight categories (≤750 g, 751-1,000 g, 1,001-1,500 g, 1,501-2,500 g, and >2,500 g); data on CAUTIs are not collected in any neonatal location. Corresponding location-specific denominator data consisting of patient-days and specific device-days are also collected by infection preventionists or other trained personnel.

Four new locations—acute stroke ward, orthopedic trauma ward, pediatric rehabilitation ward, and pulmonary ward—had sufficient data to warrant inclusion in this report. Locations were further stratified by bed size or teaching status if pooled mean rates and percentile distributions differed significantly between 2 groups. The data for adult combined medical/surgical ICUs were split into 2 groups by type of hospital: ''major teaching'' and ''all others.'' The facilities self-identified their 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 2 groups by unit bed size, ≤15 beds and >15 beds. The data for adult medical ICUs were split into 2 groups by type of hospital as defined earlier. We assessed the potential impact of teaching status on device-associated infection rates and distributions for additional critical care and inpatient ward locations and found no consistent significant differences between the ''major teaching'' and ''all other'' groups.

Table 1. NHSN hospitals contributing data used in this report

Hospital type	n (%)
Children's	41 (2.3)
General, including acute, trauma, and teaching	1,550 (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	1,749 (100)

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. The device utilization (DU) ratio of a location is one measure of invasive practices in that location and represents an extrinsic risk factor for HAIs.[9] The DU ratio also may serve as a marker for the 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

Table 2. NHSN hospitals contributing data used in this report, by hospital type and bed size

	Bed size category, n (%)				
Hospital type	**≤200**	**201-500**	**501-1,000**	**>1,000**	**Total**
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)	1,091 (62.5)
Total	1,113 (63.6)	497 (28.4)	134 (7.7)	5 (0.3)	1,749 (100)

NOTE. 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 (ie, residency and/or fellowships).
Limited: Hospital is used in the medical school's teaching program to only a limited extent.

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

CLABSI rate*

Type of location	No. of Locations†	No. of CLABSIs	Central line days	Pooled mean	Percentile 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/psychiatry	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					
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 medical/surgical	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 NICU (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					
Inpatient long-term care units									
Long-term care	10 (8)	10	5,783	1.7					

Central line utilization ratio‡

Type of location	No. of Locations†	Central line days	Patient days	Pooled mean	Percentile 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

Continued

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%
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/psychiatry	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
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					
Pediatric medical	18	15,568	75,442	0.21					
Pediatric medical/surgical	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 NICU (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					

CLABSI, central line-associated bloodstream infection; *NICU*, neonatal intensive care unit.

* $\frac{\text{Number of CLABSI}}{\text{Number of cenral line days}} \times 1,000$

†Number of locations in parentheses are those meeting minimum requirements for percentile distributions if less than the total number of locations. If this number is <20, then percentile distributions are not calculated.

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

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 2,449 facilities eligible to report to the NHSN at the end of 2009, 1,942 had filed monthly reporting plans signaling their intent to follow one or more of the Patient Safety Component modules for

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

Permanent CLABSI rate*

Type of location	No. of Locations†	No. of Permanent CLABSIs	Permanent central line days	Pooled mean	Percentile				
					10%	25%	50% (median)	75%	90%
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	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 CLABSI rate‡

Type of location	No. of Locations†	No. of Temporary CLABSIs	Temporary central line days	Pooled mean	Percentile				
					10%	25%	50% (median)	75%	90%
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	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					

Permanent central line utilization ratio§

Type of location	No. of Locations†	Permanent central line days	Patient days	Pooled mean	Percentile				
					10%	25%	50% (median)	75%	90%
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	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¶

Type of location	No. of Locations†	Temporary central line days	Patient days	Pooled mean	Percentile				
					10%	25%	50% (median)	75%	90%
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	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					

CLABSI, central line-associated bloodstream infection.

*$\frac{\text{Number of permanent CLABSI}}{\text{Number of permanent central line days}} \times 1,000$

†Number of locations in parentheses are those meeting minimum requirements for percentile distributions if less than the total number of locations. If this number < 20, then percentile distributions are not calculated.

‡$\frac{\text{Number of temporary CLABSI}}{\text{Number of temporary central line days}} \times 1,000$

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

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

Table 5. Pooled means and key percentiles of the distribution of CAUTI rates and urinary catheter utilization ratios, by type of location, DA module, 2009

CAUTI rates*

Type of location	No. of Locations†	No. of CAUTIs	Urinary catheter days	Pooled mean	Percentile 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	62	449	169,450	2.6	0.1	0.9	2.1	3.9	6.2
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/psychiatry	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 medical/surgical	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					
Inpatient long-term care units									
Long-term care unit	10	17	6,962	2.4					

Urinary catheter utilization ratio‡

Type of location	No. of Locations†	Urinary catheter days	Patient days	Pooled mean	Percentile 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

Continued

Table 5. Continued

Type of location	No. of Locations[†]	Urinary catheter days	Patient days	Pooled mean	Percentile				
					10%	25%	50% (median)	75%	90%
Urinary catheter utilization ratio[‡]									
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
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	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/psychiatry	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 medical/surgical	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
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					

CAUTI, urinary catheter-associated urinary tract infection.

*$\frac{\text{Number of CAUTI}}{\text{Number of urinary catheter days}} \times 1,000$

[†]Number of locations in parentheses are those meeting minimum requirements for percentile distributions if less than the total number of locations. If this number is <20, then percentile distributions are not calculated.

[‡]$\frac{\text{Number of urinary catheter days}}{\text{Number of patient days}}$

at least 1 month, and 1,749 had reported at least denominator data for some patient cohorts under surveillance during 2009. These 1,749 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). In addition, 77% of the hospitals included in this report are located in states with a mandate for reporting DA module data to the NHSN. Where the data volume was sufficient for this report, we

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

VAP rate*

Type of location	No. of Locations†	No. of VAPs	Ventilator days	Pooled mean	Percentile				
					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	45	42	66,665	0.6	0.0	0.0	0.0	0.8	2.3
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 medical/surgical	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‡

Type of location	No. of Locations†	Ventilator days	Patient days	Pooled mean	Percentile				
					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					
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	45	66,665	249,282	0.27	0.07	0.12	0.22	0.32	0.53

Continued

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%
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 medical/surgical	5	1,948	30,887	0.06					
Pediatric medical	6	1,090	17,432	0.06					
Pulmonary	5	4,189	33,972	0.12					

VAP, ventilator-associated pneumonia.

*$\frac{\text{Number of VAP}}{\text{Number of ventilator days}} \times 1,000$

†Number of locations in parentheses are those meeting minimum requirements for percentile distributions if less than the total number of locations. If this number is <20, then percentile distributions are not calculated.

‡$\frac{\text{Number of ventilator days}}{\text{Number of patient days}}$

Table 7. Pooled means and key percentiles of the distribution of CLABSI rates and central line utilization ratios for level III NICUs, DA module, 2009

CLABSI rate*									
					Percentile				
Birth weight category	No. of Locations†	No. of CLABSIs	Central line days	Pooled mean	10%	25%	50% (median)	75%	90%
≤750 g	172 (150)	291	86,469	3.4	0.0	0.0	2.7	5.0	8.6
751-1,000 g	179 (159)	187	68,320	2.7	0.0	0.0	1.4	4.9	8.8
1,001-1,500 g	183 (156)	133	69,926	1.9	0.0	0.0	0.0	2.8	5.8
1,501-2,500 g	172 (134)	84	55,896	1.5	0.0	0.0	0.0	1.9	4.7
>2,500 g	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 g	172 (164)	86,469	233,812	0.37	0.20	0.27	0.35	0.47	0.57
751-1,000 g	179 (177)	68,320	219,356	0.31	0.17	0.22	0.30	0.40	0.51
1,001-1,500 g	183 (180)	69,926	300,033	0.23	0.08	0.14	0.22	0.32	0.45
1,501-2,500 g	172 (170)	55,896	352,778	0.16	0.04	0.06	0.11	0.20	0.39
>2,500 g	167	55,659	285,437	0.19	0.03	0.06	0.13	0.21	0.32

CLABSI, central line-associated bloodstream infection; *NICU*, neonatal intensive care unit.

*$\frac{\text{Number of CLABSI}}{\text{Number of central line days}} \times 1,000$

†Number of locations in parentheses are those meeting minimum requirements for percentile distributions if less than the total number of locations. If this number is <20, then percentile distributions are not calculated.

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

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 definition of UTI was revised in January 2009. This revision included an update to the

Table 8. Pooled means and key percentiles of the distribution of UCAB rates and umbilical catheter utilization ratios for level III NICUs, DA module, 2009

UCAB rate*

Birth weight category	No. of Locations†	No. of UCABs	Umbilical catheter days	Pooled mean	Percentile				
					10%	25%	50% (median)	75%	90%
≤750 g	173 (125)	94	22,442	4.2	0.0	0.0	0.0	6.4	12.7
751-1,000 g	176 (124)	52	19,508	2.7	0.0	0.0	0.0	0.8	10.1
1,001-1,500 g	180 (123)	22	24,000	0.9	0.0	0.0	0.0	0.0	2.4
1,501-2,500 g	178 (106)	11	22,126	0.5	0.0	0.0	0.0	0.0	0.0
>2,500 g	178 (125)	15	31,030	0.5	0.0	0.0	0.0	0.0	0.0

Umbilical catheter utilization ratio‡

Birth weight category	No. of Locations†	Umbilical catheter days	Patient days	Pooled mean	Percentile				
					10%	25%	50% (median)	75%	90%
≤750 g	173 (160)	22,442	202,445	0.11	0.06	0.08	0.13	0.21	0.34
751-1,000 g	176 (173)	19,508	195,709	0.10	0.04	0.08	0.11	0.17	0.26
1,001-1,500 g	180 (176)	24,000	268,328	0.09	0.03	0.05	0.09	0.14	0.20
1,501-2,500 g	178 (176)	22,126	342,955	0.06	0.02	0.03	0.05	0.09	0.14
>2,500 g	178 (177)	31,030	306,772	0.10	0.04	0.05	0.08	0.15	0.20

UCAB, umbilical catheter-associated bloodstream infection; *NICU*, neonatal intensive care unit.

* $\frac{\text{Number of UCAB}}{\text{Number of umbilical catheter days}} \times 1,000$

†Number of locations in parentheses are those meeting minimum requirements for percentile distributions if less than the total number of locations. If this number is <20, then percentile distributions are not calculated.

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

Table 9. Pooled means and key percentiles of the distribution of CLABSI rates and central line utilization ratios for level II/III NICUs, DA module, 2009

CLABSI rate*

Birth weight category	No. of Locations†	No. of CLABSIs	Central line days	Pooled mean	Percentile				
					10%	25%	50% (median)	75%	90%
≤750 g	111 (78)	98	29,567	3.3	0.0	0.0	1.8	5.8	10.5
751-1,000 g	125 (99)	84	29,601	2.8	0.0	0.0	0.0	4.0	6.8
1,001-1,500 g	148 (103)	59	34,853	1.7	0.0	0.0	0.0	2.1	6.8
1,501-2,500 g	142 (78)	41	29,935	1.4	0.0	0.0	0.0	1.8	5.2
>2,500 g	136 (58)	28	20,334	1.4	0.0	0.0	0.0	0.0	2.9

Central line utilization ratio‡

Birth weight category	No. of Locations†	Central line days	Patient days	Pooled mean	Percentile				
					10%	25%	50% (median)	75%	90%
≤750 g	111 (93)	29,567	90,059	0.33	0.21	0.28	0.37	0.46	0.58
751-1,000 g	125 (115)	29,601	101,386	0.29	0.12	0.22	0.30	0.41	0.53
1,001-1,500 g	148 (136)	34,853	151,963	0.23	0.09	0.14	0.21	0.30	0.42
1,501-2,500 g	142 (135)	29,935	198,907	0.15	0.03	0.05	0.11	0.17	0.33
>2,500 g	136 (121)	20,334	128,207	0.16	0.04	0.06	0.09	0.16	0.29

CLABSI, central line-associated bloodstream infection; *NICU*, neonatal intensive care unit.

* $\frac{\text{Number of CLABSI}}{\text{Number of cenral line days}} \times 1,000$

†Number of locations in parentheses are those meeting minimum requirements for percentile distributions if less than the total number of locations. If this number is <20, then percentile distributions are not calculated.

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

Table 10. Pooled means and key percentiles of the distribution of UCAB rates and umbilical catheter utilization ratios for level II/III NICUs, DA module, 2009

UCAB rate*

Birth weight category	No. of Locations†	No. of UCABs	Umbilical catheter days	Pooled mean	Percentile				
					10%	25%	50% (median)	75%	90%
≤750 g	110 (52)	39	8,800	4.4	0.0	0.0	0.0	8.7	14.6
751-1,000 g	127 (63)	23	8,809	2.6	0.0	0.0	0.0	0.0	8.7
1,001-1,500 g	140 (76)	17	11,530	1.5	0.0	0.0	0.0	0.0	3.9
1,501-2,500 g	151 (72)	12	11,829	1.0	0.0	0.0	0.0	0.0	0.5
>2,500 g	150 (75)	13	15,538	0.8	0.0	0.0	0.0	0.0	2.1

Umbilical catheter utilization ratio‡

Birth weight category	No. of Locations†	Umbilical catheter days	Patient days	Pooled mean	Percentile				
					10%	25%	50% (median)	75%	90%
≤750 g	110 (83)	8,800	63,689	0.14	0.06	0.10	0.18	0.23	0.37
751-1,000 g	127 (105)	8,809	79,681	0.11	0.05	0.08	0.12	0.20	0.27
1,001-1,500 g	140 (127)	11,530	124,252	0.09	0.04	0.07	0.10	0.15	0.22
1,501-2,500 g	151 (143)	11,829	198,570	0.06	0.02	0.03	0.06	0.10	0.14
>2,500 g	150 (142)	15,538	162,944	0.10	0.03	0.05	0.08	0.13	0.20

UCAB, umbilical catheter-associated bloodstream infection; *NICU*, neonatal intensive care unit.

*$\frac{\text{Number of UCAB}}{\text{Number of umbilical catheter days}} \times 1,000$

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

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

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

VAP rate*

Birth weight category	No. of Locations†	No. of VAPs	Ventilator days	Pooled mean	Percentile				
					10%	25%	50% (median)	75%	90%
≤750 g	85 (79)	93	51,592	1.8	0.0	0.0	0.2	2.8	6.7
751-1,000 g	86 (72)	34	26,635	1.3	0.0	0.0	0.0	1.8	7.8
1,001-1,500 g	90 (62)	17	15,969	1.1	0.0	0.0	0.0	0.0	3.4
1,501-2,500 g	88 (45)	7	13,569	0.5	0.0	0.0	0.0	0.0	1.8
>2,500 g	87 (53)	7	22,930	0.3	0.0	0.0	0.0	0.0	0.7

Ventilator utilization ratio‡

Birth weight category	No. of Locations†	Ventilator days	Patient days	Pooled mean	Percentile				
					10%	25%	50% (median)	75%	90%
≤750 g	85 (83)	51,592	118,886	0.43	0.25	0.36	0.47	0.56	0.65
751-1,000 g	86 (84)	26,635	100,973	0.26	0.10	0.17	0.24	0.36	0.48
1,001-1,500 g	90 (87)	15,969	134,822	0.12	0.03	0.05	0.08	0.15	0.29
1,501-2,500 g	88 (85)	13,569	173,799	0.08	0.02	0.03	0.04	0.11	0.20
>2,500 g	87 (86)	22,930	158,888	0.14	0.03	0.04	0.08	0.18	0.24

VAP, ventilator-associated pneumonia; *NICU*, neonatal intensive care unit.

*$\frac{\text{Number of VAP}}{\text{Number of ventilator days}} \times 1,000$

†Number of locations in parentheses are those meeting minimum requirements for percentile distributions if less than the total number of locations. If this number is <20, then percentile distributions are not calculated.

‡$\frac{\text{Number of ventilator days}}{\text{Number of patient days}}$

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

VAP rate*

Birth weight category	No. of Locations†	No. of VAP	Ventilator days	Pooled mean	Percentile				
					10%	25%	50% (median)	75%	90%
≤750 g	55 (42)	21	15,284	1.4	0.0	0.0	0.0	1.3	6.0
751-1,000 g	61 (41)	17	11,056	1.5	0.0	0.0	0.0	0.7	5.5
1,001-1,500 g	70 (33)	9	7,436	1.2	0.0	0.0	0.0	0.0	4.0
1,501-2,500 g	67 (28)	5	6,171	0.8	0.0	0.0	0.0	0.0	1.3
>2,500 g	71 (28)	4	7,602	0.5	0.0	0.0	0.0	0.0	4.5

Ventilator utilization ratio‡

Birth weight category	No. of Locations†	Ventilator days	Patient days	Pooled mean	Percentile				
					10%	25%	50% (median)	75%	90%
≤750 g	55 (45)	15,284	42,064	0.36	0.17	0.28	0.39	0.54	0.72
751-1,000 g	61 (51)	11,056	46,730	0.24	0.09	0.15	0.21	0.31	0.45
1,001-1,500 g	70 (62)	7,436	63,940	0.12	0.03	0.05	0.07	0.13	0.26
1,501-2,500 g	67 (63)	6,171	93,907	0.07	0.01	0.02	0.04	0.08	0.23
>2,500 g	71 (66)	7,602	82,631	0.09	0.02	0.04	0.06	0.10	0.24

VAP, ventilator-associated pneumonia.

*$\frac{\text{Number of VAP}}{\text{Number of ventilator days}} \times 1,000$

†Number of locations in parentheses are those meeting minimum requirements for percentile distributions if less than the total number of locations. If this number is <20, percentile distributions are not calculated.

‡$\frac{\text{Number of ventilator days}}{\text{Number of patient days}}$

Table 13. Distribution of criteria for laboratory-confirmed CLABSI by location, 2009

Type of location	LCBI, n (%)				Total
	Criterion 1		Criteria 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

Continued

Table 13. Continued

Type of location	LCBI, n (%) Criterion 1		Criteria 2/3		Total
Orthopedic trauma	11	(84.6)	2	(15.4)	13
Pediatric medical	18	(90.0)	2	(10.0)	20
Pediatric medical/surgical	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 NICU (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					0
Long-term care	9	(90.0)	1	(10.0)	10
Total	7,367	(78.5)	2,022	(21.5)	9,389

NOTE. LCBI Criterion 1: Patient has a recognized pathogen cultured from one or more blood cultures *and* organism cultured from blood is not related to an infection at another site.[11] LCBI Criterion 2: Patient has at least one of the following signs or symptoms: fever (>38°C), chills, or hypotension and signs *and* symptoms and positive laboratory results are not related to an infection at another site *and* common skin contaminant (ie, diphtheroids [*Corynebacterium* spp], *Bacillus* [not *B anthracis*] spp, *Propionibacterium* spp, coagulase-negative staphylococci [including *S epidermidis*], *viridans* group streptococci, *Aerococcus* spp, *Micrococcus* spp) is cultured from two or more blood cultures drawn on separate occasions.[11] LCBI Criterion 3: Patient <1 year of age has at least one of the following signs or symptoms: fever (>38°C core) hypothermia (<36°C core), apnea, or bradycardia *and* signs and symptoms and positive laboratory results are not related to an infection at another site *and* common skin contaminant (ie, diphtheroids [*Corynebacterium* spp], *Bacillus* [not *B anthracis*] spp, *Propionibacterium* spp, coagulase-negative staphylococci [including *S epidermidis*], *viridans* group streptococci, *Aerococcus* spp, *Micrococcus* spp) is cultured from two or more blood cultures drawn on separate occasions.[11]
CLABSI, central line-associated bloodstream infection; *LCBI*, laboratory confirmed BSI; *NICU*, neonatal intensive care unit.

Table 14. Distribution of criteria for permanent and temporary laboratory-confirmed CLABSI by location, 2009

Type of location	LCBI, n (%) Criterion 1		Criteria 2/3		Total
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	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	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

NOTE. LCBI Criterion 1: Patient has a recognized pathogen cultured from one or more blood cultures *and* organism cultured from blood is not related to an infection at another site.[11] LCBI Criterion 2: Patient has at least one of the following signs or symptoms: fever (>38°C), chills, or hypotension and signs *and* symptoms and positive laboratory results are not related to an infection at another site *and* common skin contaminant (ie, diphtheroids [*Corynebacterium* spp], *Bacillus* [not *B anthracis*] spp, *Propionibacterium* spp, coagulase-negative staphylococci [including *S epidermidis*], *viridans* group streptococci, *Aerococcus* spp, *Micrococcus* spp) is cultured from two or more blood cultures drawn on separate occasions.[11] LCBI Criterion 3: Patient <1 year of age has at least one of the following signs or symptoms: fever (>38°C core) hypothermia (<36°C core), apnea, or bradycardia *and* signs and symptoms and positive laboratory results are not related to an infection at another site *and* common skin contaminant (ie, diphtheroids [*Corynebacterium* spp], *Bacillus* [not *B anthracis*] spp, *Propionibacterium* spp, coagulase-negative staphylococci [including *S epidermidis*], *viridans* group streptococci, *Aerococcus* spp, *Micrococcus* spp) is cultured from two or more blood cultures drawn on separate occasions.[11]
CLABSI, central line-associated bloodstream infection; *LCBI*, laboratory-confirmed bloodstream infection.

criteria for symptomatic UTI (SUTI), the removal of asymptomatic bacteriuria (ASB), and the addition of asymptomatic bacteremic UTI (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 criterion for clinical sepsis was discontinued in January 2010.[7,11] Therefore, the CLABSI rate tables exclude all BSIs that were reported using this criterion in 2009. This allows direct comparison of unpublished hospital-specific CLABSI rates collected using the changed BSI definition with the aggregate data included in this report.

Tables 13-20 provide data on select attributes of the device-associated infections for each location. For

Table 15. Distribution of specific sites of CAUTI by location, 2009

Type of location	SUTI, n	(%)	ABUTI, n	(%)	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 transplantation	8	(100.0)			8
Hematology/oncology	91	(97.8)	2	(2.2)	93
Pediatric hematology/oncology	2	(100.0)			2
Long-term acute care	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/psychiatry	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
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, medical/surgical	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

SUTI, symptomatic UTI[7]; *ABUTI*, asymptomatic bacteremic UTI.[7]

example, Tables 13, 14, 17, and 18 present 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 (eg, 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 were recently used as baseline data (ie, referent population) for calculating standardized infection ratios and measuring progress toward infection prevention goals in the US Department of Health

Table 16. Distribution of specific sites of VAP by location, 2009

Type of location	PNU1, n (%)		PNU2, n (%)		PNU3, n (%)		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	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

PNU1, clinically defined pneumonia[7]; *PNU2*, pneumonia with specific laboratory findings (7); *PNU3*, pneumonia in immunocompromised patients.[7]

Table 17. Distribution of specific sites and criteria for device-associated BSIs among level III NICUs by birth weight, 2009

Birth weight category	LCBI, n (%)				Total
	Criterion 1		Criteria 2/3		
CLABSI					
≤750 g	190	(65.3)	101	(34.7)	291
751-1,000 g	121	(64.7)	66	(35.3)	187
1,001-1,500 g	96	(72.2)	37	(27.8)	133
1,501-2,500 g	57	(67.9)	27	(32.1)	84
>2,500 g	46	(63.0)	27	(37.0)	73
Total	510	(66.4)	258	(33.6)	768
UCAB					
≤750 g	56	(59.6)	38	(40.4)	94
751-1,000 g	33	(63.5)	19	(36.5)	52
1,001-1,500 g	11	(50.0)	11	(50.0)	22
1,501-2,500 g	8	(72.7)	3	(27.3)	11
>2,500 g	11	(73.3)	4	(26.7)	15
Total	119	(61.4)	75	(38.7)	194

NOTE. LCBI Criterion 1: Patient has a recognized pathogen cultured from one or more blood cultures *and* organism cultured from blood is not related to an infection at another site.[11]

LCBI Criterion 2: Patient has at least one of the following signs or symptoms: fever (>38°C), chills, or hypotension and signs *and* symptoms and positive laboratory results are not related to an infection at another site *and* common skin contaminant (ie, diphtheroids [C*orynebacterium* spp], *Bacillus* [not *B anthracis*] spp, *Propionibacterium* spp, coagulase-negative staphylococci [including *S epidermidis*], *viridans* group streptococci, *Aerococcus* spp, *Micrococcus* spp) is cultured from two or more blood cultures drawn on separate occasions.[11]

LCBI Criterion 3: Patient <1 year of age has at least one of the following signs or symptoms: fever (>38°C core) hypothermia (<36°C core), apnea, or bradycardia and signs *and* symptoms and positive laboratory results are not related to an infection at another site *and* common skin contaminant (ie, diphtheroids [C*orynebacterium* spp], *Bacillus* [not *B anthracis*] spp, *Propionibacterium* spp, coagulase-negative staphylococci [including *S epidermidis*], *viridans* group streptococci, *Aerococcus* spp, *Micrococcus* spp) is cultured from two or more blood cultures drawn on separate occasions.[11]

CLABSI, central line-associated BSI; *LCBI*, laboratory-confirmed BSI; *UCAB*, umbilical catheter-associated BSI.

Table 18. Distribution of specific sites and criteria for device-associated BSIs among level II/III NICUs by birth weight, 2009

	LCBI, n (%)				
Birth weight category	**Criterion 1**		**Criteria 2/3**		**Total**
CLABSI					
≤750 g	60	(61.2)	38	(38.8)	98
751-1,000 g	55	(65.5)	29	(34.5)	84
1,001-1,500 g	37	(62.7)	22	(37.3)	59
1,501-2,500 g	26	(63.4)	15	(36.6)	41
>2,500 g	22	(78.6)	6	(21.4)	28
Total	200	(64.5)	110	(35.5)	310
UCAB					
≤750 g	21	(53.8)	18	(46.2)	39
751-1,000 g	11	(47.8)	12	(52.2)	23
1,001-1,500 g	10	(58.8)	7	(41.2)	17
1,501-2,500 g	7	(58.3)	5	(41.7)	12
>2,500 g	6	(46.2)	7	(53.8)	13
Total	55	(52.9)	49	(47.1)	104

NOTE. LCBI Criterion 1: Patient has a recognized pathogen cultured from one or more blood cultures *and* organism cultured from blood is not related to an infection at another site.[11]

LCBI Criterion 2: Patient has at least one of the following signs or symptoms: fever (>38°C), chills, or hypotension and signs *and* symptoms and positive laboratory results are not related to an infection at another site *and* common skin contaminant (ie, diphtheroids [C*orynebacterium* spp], *Bacillus* [not *B anthracis*] spp, *Propionibacterium* spp, coagulase-negative staphylococci [including *S epidermidis*], *viridans* group streptococci, *Aerococcus* spp, *Micrococcus* spp) is cultured from two or more blood cultures drawn on separate occasions.[11]

LCBI Criterion 3: Patient <1 year of age has at least one of the following signs or symptoms: fever (>38°C core) hypothermia (<36°C core), apnea, or bradycardia and signs *and* symptoms and positive laboratory results are not related to an infection at another site *and* common skin contaminant (ie, diphtheroids [C*orynebacterium* spp], *Bacillus* [not *B anthracis*] spp, *Propionibacterium* spp, coagulase-negative staphylococci [including *S epidermidis*], *viridans* group streptococci, *Aerococcus* spp, *Micrococcus* spp) is cultured from two or more blood cultures drawn on separate occasions.[11]

CLABSI, central line-associated BSI; *LCBI*, laboratory-confirmed BSI; *UCAB*, umbilical catheter-associated BSI.

Table 19. Distribution of specific sites of VAP among level III NICUs by birth weight, 2009

Birth weight category	**PNU1, n (%)**		**PNU2, n (%)**		**PNU3, n (%)**		**Total**
≤750 g	73	(78.5)	19	(20.4)	1	(1.1)	93
751-1,000 g	26	(76.5)	8	(23.5)	0	(0.0)	34
1,001-1,500 g	11	(64.7)	6	(35.3)	0	(0.0)	17
1,501-2,500 g	5	(71.4)	2	(28.6)	0	(0.0)	7
>2,500 g	6	(85.7)	1	(14.3)	0	(0.0)	7
Total	121	(76.6)	36	(22.8)	1	(0.6)	158

PNU1, clinically defined pneumonia[7]; *PNU2*, pneumonia with specific laboratory findings (7); *PNU3*, pneumonia in immunocompromised patients.[7]

Table 20. Distribution of specific sites of VAP among level II/III NICUs by birth weight, 2009

Birth weight category	**PNU1, n (%)**		**PNU2, n (%)**		**PNU3, n (%)**		**Total**
≤750 g	14	(66.7)	3	(14.3)	4	(19.0)	21
751-1,000 g	10	(58.8)	4	(23.5)	3	(17.6)	17
1,001-1,500 g	6	(66.7)	3	(33.3)	0	(0.0)	9
1,501-2,500 g	3	(60.0)	2	(40.0)	0	(0.0)	5
>2,500 g	3	(75.0)	1	(25.0)	0	(0.0)	4
Total	36	(64.3)	13	(23.2)	7	(12.5)	56

PNU1, clinically defined pneumonia[7]; *PNU2*, pneumonia with specific laboratory findings (7); *PNU3*, pneumonia in immunocompromised patients.[7]

and Human Services' HAI Action Plan.[1,12] Third, analyzing 1 year of data removes the need to evaluate the possible influence of mandatory HAI reporting on the aggregate data across years.

The characteristics of hospitals reporting to the NHSN are consistent with the last published report, including a sustained contribution of smaller hospitals.[1] The diversity of health care facilities reporting to the NHSN may change in future reports as a result of 2 factors: increased use of the NHSN as the operational system to fulfill mandatory HAI reporting requirements in additional states and the Center for Medicare and Medicaid Services Hospital Inpatient Quality Reporting Program, which requires hospitals participating in this

program to use the NHSN as the tool for reporting CLABSI data from all adult, pediatric, and neonatal ICUs beginning on January 1, 2011.

Comparing these data to previous NHSN annual reports reveals several differences. Reporting of device-associated infections from inpatient wards continues to increase, as demonstrated by the 16-fold increase in the number of medical wards reporting CLABSI rates compared with 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 1,000 central line-days, which might be related to the influx of data from smaller hospitals that generally have a lower risk of HAIs. Another factor that might have contributed to this reduction is an increase in the implementation and effectiveness of HAI prevention strategies.[14] Further growth in the NHSN's coverage, specifically in the number and types of inpatient wards and specialty care areas reporting data, will improve the usefulness of the NHSN 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 whether these differences in rates are due to differences in CLABSI prevention practices among these diverse patient groups, or if they suggest a need for prevention strategies specific to this high-risk NICU population.

Tables 13-20 were included to aid the reader in interpreting the data on device-associated infection rates. One important use of these data is to better understand the distribution of device-associated 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 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 related to the use of a urinary catheter alone, thereby increasing specificity in the identification of CAUTIs. The specific site of CAUTIs were largely reported as SUTIs. Because of the significant change in the definition of UTI, the CAUTI rates presented 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 the 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 the NHSN.[5-7] 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 provides 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.

We 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 this 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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APPENDIX A: CALCULATING A DEVICE-ASSOCIATED INFECTION RATE AND DEVICE UTILIZATION RATIO WITH DA MODULE DATA

Calculation of device-associated infection rate

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

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

Step 3: Select the infections to be included in the numerator. These 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 serves 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: 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 1-7, we have $5 + 5 + 2 + 5 + 3 + 4 + 4 = 28$ central line-days for the first week. If we continue for the entire month, then 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 1,000 device-days) using the following formula:

$$\frac{\text{Number of device} - \text{associated infections for an infection site}}{\text{Number of device} - \text{day}} \times 1,000$$

Example:

$$\text{CLABSI rate per 1000 central line} - \text{days} = \frac{\text{Number of CLABSI}}{\text{Number of central line} - \text{days}} \times 1,000$$

Calculation of DU Ratio

Steps 1, 2, and 4: Same as for the device-associated infection rate, 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 count the patients in the unit from days 1-7, then we add $10 + 12 + 11 + 13 + 10 + 6 + 10$, for a total of 72 patient-days for the first week of the month. If we continue for the entire month, then the number of patient-days for the month is simply the sum of the daily counts.

Step 5: Calculate the DU ratio using the following formula:

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

With the number of device-days and patient-days from the foregoing examples, 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, that is, <50 device-days or patient-days.

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

APPENDIX B: INTERPRETING PERCENTILES OF INFECTION RATES AND DU RATIOS

Step 1: Evaluate the rate (ratio) that 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 have lower rates (ratios) and 25% of the hospitals have 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 have lower rates (ratios) and 75% of the hospitals have higher rates (ratios).

Step 7: If the rate (ratio) is below the 25th percentile, determine whether it is below the 10th percentile. If so, 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 DU ratios should be examined together so that preventive measures may be targeted appropriately. Consider the following example. You find that the VAP rate for a certain type of ICU is consistently above the 90th percentile and that the ventilator utilization ratio is routinely between the 75th and 90th percentile. Because ventilator use is a significant risk factor for pneumonia, you may want to limit the duration of ventilation whenever possible (ie, decrease unnecessary use) while at the same time optimizing infection prevention strategies in patients requiring ventilation.