

National Healthcare Safety Network (NHSN) Report, data summary for 2006 through 2007, issued November 2008

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This report is a summary of device-associated and procedure-associated module data collected and reported by hospitals participating in the National Healthcare Safety Network (NHSN) from January 2006 through December 2007 as reported to the NHSN by March 24, 2008. This report updates previously published device-associated module data from NHSN and surgical site infection (SSI) rate data from the National Nosocomial Infections Surveillance (NNIS) system.^{1,2}

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

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

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

METHODS

The NHSN has both Patient Safety and Healthcare Personnel Safety surveillance components. Within the Patient Safety Component, data are collected using standardized methods and definitions^{3,4} and are grouped into specific module protocols⁵ as follows:

- Device-associated: see section below;
- Procedure-associated: see section below; and
- Medication-associated: for certain locations, facilities choose to report susceptibility data for selected organisms and/or antimicrobial use data for selected agents.

The modules may be used singly or simultaneously, but, once selected, they must be used for a minimum of 1 calendar month. All infections are categorized using standard CDC definitions that include laboratory and clinical criteria.⁴ Although the device-associated module may also be used by facilities other than hospitals, including outpatient dialysis centers, this report

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

Am J Infect Control 2008;36:609-26.

0196-6553/\$0.00

This is a US government work. There are no restrictions on its use.

doi:10.1016/j.ajic.2008.08.001

Table 1. NHSN hospitals contributing data used in this report

| Hospital type | N (%) |
|--|------------|
| Children's | 18 (2.9) |
| General, including acute, trauma, and teaching | 560 (90.1) |
| Military | 5 (0.8) |
| Oncology | 3 (0.5) |
| Orthopedic | 1 (0.2) |
| Veterans Affairs | 28 (4.5) |
| Women's | 3 (0.5) |
| Women's and children's | 3 (0.5) |
| Total | 621 (100) |

focuses only on device-associated module data reported by hospitals. A report of data from this module for outpatient dialysis centers was published separately.⁶ Data from the medication-associated module will be published in a separate report.

Device-associated module

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

Procedure-associated module

IPs select from the NHSN operative procedure category list those in- and/or outpatient procedures for which they wish to monitor surgical patients for SSIs or postprocedure pneumonias (PPPs). During the month chosen for surveillance, data are collected on every patient undergoing procedures within the selected procedure category, including information on risk factors for SSI such as duration of procedure in minutes, wound class, and American Society of Anesthesiology (ASA) score.⁵ Unlike the NNIS system, the NHSN operative procedure list does not include

“catch all” procedure categories, such as “OCVS, other cardiovascular.”

RESULTS

There were 923 hospitals enrolled in the NHSN at the end of 2007, of which 646 had filed monthly reporting plans signaling their intent to follow one or more of the Patient Safety Component modules for at least 1 month. From this group, a total of 621 hospitals had reported at least denominator data in 2006 and/or 2007. Characteristics of these 621 NHSN hospitals from 45 states and the District of Columbia that contributed data for this report are shown in Tables 1 and 2. For the device-associated module where data volume was sufficient for this second report, we tabulated device-associated infection rates and device utilization (DU) ratios for January 2006 through December 2007 (Tables 3-12). Data on select attributes of the device-associated infections are provided in Tables 13 to 20. For the procedure-associated module where sufficient data existed, we tabulated procedure-associated infection rates for this same period (Tables 21-24).

Tables 3 to 6 update and augment previously published device-associated rates and DU ratios by type of non-NICU locations.¹ For inclusion in these Tables, the pooled mean infection rates and DU ratios required data from at least 10 different locations of a given type. For the percentile distributions, data from at least 20 different locations are required 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 varies in the Tables. The central line-associated BSI (CLABSI) rates in Tables 3 and 4 exclude all BSIs that were reported using criterion 2b or 3b of the definition because these criteria were discontinued in January 2008 and the rates in Tables 3 and 4 will be incorporated into the NHSN reporting tool for comparative purposes.

Seven new locations—pediatric medical ICU, neurologic ICU, adult step down unit, rehabilitation ward, surgical ward, bone marrow transplant specialty care area, and hematology/oncology specialty care area—had sufficient data to be included in this report. The number of locations that were neurologic ICU, pediatric medical ICU, rehabilitation ward, or surgical ward was not adequate to provide distributions of any infection rates and DU ratios. For burn ICU and adult step down unit, there were insufficient data for ventilator-associated pneumonia and catheter-associated UTI rate and corresponding DU ratio distributions.

The data for adult combined medical/surgical ICUs were split into 2 groups by type of hospital: “major teaching” and “all others.” Major teaching status was defined as a hospital that is an important part of the

Table 2. Bed size categories of NHSN contributing hospitals

| Hospital type | Bed size category | | | | Total |
|-------------------|-------------------|------------|-----------|---------|------------|
| | ≤ 200 | 201-500 | 501-1000 | > 1000 | |
| | N (%) | N (%) | N (%) | N (%) | |
| Major teaching | 25 (4.0) | 83 (13.4) | 64 (10.3) | 2 (0.3) | 174 (28.0) |
| Graduate teaching | 21 (3.4) | 53 (8.5) | 13 (2.1) | 0 (0.0) | 87 (14.0) |
| Limited teaching | 27 (4.4) | 24 (3.8) | 9 (1.5) | 0 (0.0) | 60 (9.7) |
| Nonteaching | 200 (32.2) | 90 (14.5) | 10 (1.6) | 0 (0.0) | 300 (48.3) |
| Total | 273 (44.0) | 250 (40.2) | 96 (15.5) | 2 (0.3) | 621 (100) |

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

teaching program of a medical school and the majority of medical students rotates through multiple clinical services (see also footnote to Table 2).

For the device-associated module, in non-NICU non-SCA locations, the device-days consisted of the total number of central line-days, urinary catheter-days, or ventilator-days. The DU of a location is one measure of invasive practices in that location and constitutes an extrinsic risk factor for health care-associated infection.⁷ DU may also serve as a marker for severity of illness of patients, that is, patients' intrinsic susceptibility to infection.

Tables 7 to 12 update and augment the previously published, device-associated rates and DU ratios by birth-weight category for NICU locations.¹ For NICUs in the device-associated module, device-days consist of the total number of central line-days, umbilical catheter-days, or ventilator-days. Each of the analyses of NICU data excluded rates or DU ratios for units that did not report at least 50 device-days or patient-days. Because of this, the number of units contributing data varies in the Tables. Although the percentile distribution of the rates is provided, for some birth-weight categories the number of umbilical catheter-associated BSI and ventilator-associated pneumonias and their corresponding device-days is still small, and the data should be considered provisional.

Tables 13 to 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 adult and pediatric ICUs and wards, only laboratory-confirmed BSI are allowed and shown, and clinical sepsis is included as a valid BSI event for neonates in NICU. For some of the patient care locations in these Tables, the number of CLABSI does not exactly match those shown in the rates Tables because of an omission in the business logic in an early version of the NHSN Web interface. A total of 33 device-associated

laboratory-confirmed BSIs for adult and pediatric ICU/wards did not have a criterion reported; the same was true for 5 of these infections in level III NICUs, and 1 in level II/III NICUs.

Table 21 is new for this report and provides data on PPP rates by procedure. Note that, although pooled means and percentile distributions are included, the volume of data is low, and the rates should be considered provisional.

Tables 22 to 24 update and augment previously published SSI rates by procedure type, and NNIS risk index categories are new for this report as well.² A hospital's procedure-associated module data were excluded from the pool if the hospital did not report at least 20 NHSN operative procedures. For inclusion in these Tables, the pooled mean infection rates required data from at least 10 different hospitals. For the percentile distributions, data from at least 20 different hospitals are required. Ten new procedures—AAA, AVSD, BILI, BRST, CEA, PACE, PVBV, RFUSN, outpatient HER, and outpatient LAM—had sufficient data to be included in this report (see Table 22 for description and data).

DISCUSSION

The composition of hospitals reporting to NHSN has changed since the first report published over a year ago. As reflected in the hospital characteristics shown in Tables 1 and 2, there has been a disproportionately large influx of smaller hospitals. This change is likely due to 2 reasons: (1) New York, South Carolina, and Vermont had mandatory HAI reporting laws that required data to be reported through the NHSN to their respective responsible state agencies, and (2) enrollment in the NHSN was opened to all hospitals regardless of size in June 2007. As more states elect to use NHSN as their system for meeting mandatory HAI reporting requirements and as enrollment is opened to more types of facilities, eg, long-term acute

Table 3. Pooled means and key percentiles of the distribution of central line-associated BSI rates and central line utilization ratios, by type of location, DA module, 2006 through 2007

| Type of location | Central line-associated BSI rate* | | | | Percentile | | | | |
|--|---|-------------------|-------------------|-------------|------------|------|--------------|------|------|
| | No. of locations | No. of CLABSI | Central line-days | Pooled mean | 10% | 25% | 50% (median) | 75% | 90% |
| Critical care units | | | | | | | | | |
| Burn | 22 | 239 | 42,452 | 5.6 | 0.0 | 1.5 | 3.8 | 8.2 | 13.5 |
| Coronary | 121 | 373 | 181,079 | 2.1 | 0.0 | 0.0 | 1.3 | 2.8 | 5.3 |
| Surgical cardiothoracic | 97 | 397 | 275,194 | 1.4 | 0.0 | 0.0 | 1.2 | 1.9 | 3.4 |
| Medical | 144 | 1073 | 454,839 | 2.4 | 0.0 | 0.6 | 1.9 | 3.6 | 5.3 |
| Medical/surgical, major teaching | 104 | 692 | 342,214 | 2.0 | 0.0 | 0.5 | 1.5 | 3.0 | 4.2 |
| Medical/surgical, all others | 343 | 972 | 662,489 | 1.5 | 0.0 | 0.0 | 0.6 | 2.0 | 3.6 |
| Pediatric medical/surgical | 71 | 404 | 140,848 | 2.9 | 0.0 | 0.0 | 2.1 | 3.8 | 6.0 |
| Pediatric medical | 10 | 6 | 6256 | 1.0 | | | | | |
| Neurologic | 15 | 31 | 25,440 | 1.2 | | | | | |
| Neurosurgical | 39 | 173 | 68,550 | 2.5 | 0.0 | 0.0 | 1.9 | 3.8 | 6.2 |
| Surgical | 128 | 881 | 383,126 | 2.3 | 0.0 | 0.5 | 1.7 | 3.1 | 5.1 |
| Trauma | 32 | 435 | 107,620 | 4.0 | 0.3 | 1.5 | 4.0 | 5.7 | 7.7 |
| Inpatient wards | | | | | | | | | |
| Adult step down unit (postcritical care) | 24 | 61 | 24,981 | 2.4 | 0.0 | 0.0 | 0.7 | 2.7 | 3.5 |
| Medical | 40 | 111 | 60,257 | 1.8 | 0.0 | 0.0 | 0.0 | 2.2 | 3.4 |
| Medical/surgical | 82 | 169 | 132,133 | 1.3 | 0.0 | 0.0 | 0.0 | 1.6 | 4.0 |
| Rehabilitation | 11 | 2 | 3705 | 0.5 | | | | | |
| Surgical | 18 | 40 | 24,254 | 1.6 | | | | | |
| Type of location | Central line utilization ratio [†] | | | | Percentile | | | | |
| | No. of locations | Central line-days | Patient-days | Pooled mean | 10% | 25% | 50% (median) | 75% | 90% |
| Critical care units | | | | | | | | | |
| Burn | 24 | 42,452 | 72,329 | 0.59 | 0.24 | 0.34 | 0.52 | 0.71 | 0.82 |
| Coronary | 122 | 181,079 | 453,850 | 0.40 | 0.17 | 0.26 | 0.37 | 0.50 | 0.61 |
| Surgical cardiothoracic | 99 | 275,194 | 382,960 | 0.72 | 0.48 | 0.60 | 0.75 | 0.88 | 0.93 |
| Medical | 149 | 454,839 | 785,602 | 0.58 | 0.27 | 0.42 | 0.56 | 0.68 | 0.77 |
| Medical/surgical, major teaching | 104 | 342,214 | 581,286 | 0.59 | 0.37 | 0.46 | 0.58 | 0.71 | 0.75 |
| Medical/surgical, all others | 362 | 662,489 | 1,428,609 | 0.46 | 0.14 | 0.27 | 0.42 | 0.56 | 0.67 |
| Pediatric medical/surgical | 75 | 140,848 | 303,879 | 0.46 | 0.21 | 0.30 | 0.40 | 0.52 | 0.61 |
| Pediatric medical | 10 | 6256 | 16,569 | 0.38 | | | | | |
| Neurologic | 15 | 25,440 | 59,027 | 0.43 | | | | | |
| Neurosurgical | 39 | 68,550 | 154,242 | 0.44 | 0.26 | 0.36 | 0.46 | 0.60 | 0.70 |
| Surgical | 128 | 383,126 | 624,986 | 0.61 | 0.39 | 0.50 | 0.62 | 0.69 | 0.76 |
| Trauma | 32 | 107,620 | 166,487 | 0.65 | 0.51 | 0.56 | 0.64 | 0.71 | 0.80 |
| Inpatient wards | | | | | | | | | |
| Adult step down unit (postcritical care) | 27 | 24,981 | 97,615 | 0.26 | 0.03 | 0.09 | 0.21 | 0.33 | 0.46 |
| Medical | 40 | 60,257 | 256,098 | 0.24 | 0.07 | 0.14 | 0.18 | 0.27 | 0.57 |
| Medical/surgical | 92 | 132,133 | 638,229 | 0.21 | 0.03 | 0.07 | 0.11 | 0.22 | 0.35 |
| Rehabilitation | 11 | 3705 | 42,061 | 0.09 | | | | | |
| Surgical | 18 | 24,254 | 97,235 | 0.25 | | | | | |

NOTE. See Horan et al⁴ for criteria.* = $\frac{\text{Number of CLABSI}}{\text{Number of central line-days}} \times 100$ † = $\frac{\text{Number of central line-days}}{\text{Number of CLABSI}}$

BSI, bloodstream infection including criteria 1 and 2a only; CLABSI, central line-associated BSI.

care and ambulatory surgery centers, we expect to have a more diverse group of health care facilities reporting in the future.

Comparisons of these data to those of the same locations from the last NHSN Report reveal several

changes. As noted in the results, all CLABSI rates exclude BSIs reported using criterion 2b or 3b because of a recent change in the BSI definition.⁸ This allows current hospital CLABSI rates collected using the changed BSI definition to be compared directly with

Table 4. Pooled means and key percentiles of the distribution of permanent central line-associated BSI rates and central line utilization ratios, by type of location, DA module, 2006 through 2007

| Permanent central line-associated BSI rate* | | | | | Percentile | | | | |
|---|------------------|-----------------------------|-----------------------------|-------------|------------|-----|--------------|-----|-----|
| Type of location | No. of locations | No. of PCLAB | Permanent central line-days | Pooled mean | 10% | 25% | 50% (median) | 75% | 90% |
| Specialty care area | | | | | | | | | |
| Bone marrow transplant | 11 | 110 | 28,251 | 3.9 | | | | | |
| Hematology/oncology | 10 | 44 | 25,740 | 1.7 | | | | | |
| 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 | 11 | 28,251 | 42,459 | 0.67 | | | | | |
| Hematology/oncology | 10 | 25,740 | 69,487 | 0.37 | | | | | |

NOTE. See Horan et al⁴ for criteria.

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

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

BSI, bloodstream infection including criteria 1 and 2a only; PCLAB, permanent central line-associated BSI.

the aggregate data included in this report. Another important change is the differing composition of reporting hospitals, which is apparent in the nearly 3.5-fold increase in the number of medical/surgical ICUs from non-major teaching hospitals reporting CLABSI rates. In this type of ICU, the pooled mean CLABSI rates were reduced from 2.2 to 1.5 CLABSIs per 1000 central line-days. This reduction may be due to the definition change, the increased contribution of data from smaller hospitals that generally have lower risks of HAI, and an increase in the implementation and effectiveness of HAI prevention strategies.⁹ As the number and types of inpatient wards and specialty care areas reporting data grow over time, we will be better able to characterize the risk of device-associated infections among these patients.

In this report, most of the device-associated rates in NICUs were lower compared with the previous report. However, although the number of device-days and patient-days nearly tripled in each birth-weight group, the device utilization ratios stayed essentially the same. This suggests that prevention efforts may be having the desired effects.^{9,10}

Tables 13 to 20 were included to aid the reader in interpreting the device-associated infection rates data. One important use of these data is to allow comparisons of past CLABSI rate data that included BSIs reported using criterion 2b or 3b. For example, to calculate the CLABSI rate for medical units including those BSIs reported with criteria 2b, one would simply

need to add the number of laboratory-confirmed BSIs under criterion 2b for medical ICUs in Table 13 (ie, 164) to the number of CLABSIs in Table 3 for medical ICUs (1073) and divide this sum by the corresponding central line-days and multiply by 1000. Another use is to understand better the distribution of device-associated infections by type of reporting criterion. For example, most of the CLABSIs from adult and pediatric ICU and inpatient wards were identified using the most objective criterion (1); however, for NICUs, fewer than half used this criterion. Similarly, the specific site of ventilator-associated pneumonia most frequently reported, regardless of location, was the clinical criterion (PNU1). However, in adult and pediatric locations, nearly 40% of ventilator-associated pneumonias reported used the more rigorous criteria of PNU2 and PNU3. The specific site of catheter-associated UTI most frequently reported was symptomatic UTI. However, the distinction between this type of UTI and asymptomatic bacteriuria is often only the presence of fever, which can be difficult to attribute completely to infection versus other processes in critically ill patients.

We assessed the potential impact of mandatory reporting on the pooled mean CLABSI rates for those types of ICUs required by New York, South Carolina, or Vermont and found no significant differences with or without these states' data.

In this first report of pooled mean PPP rates, we find that they are very low, ranging from 0% for vaginal

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, 2006 through 2007

| Type of location | Urinary catheter-associated UTI rate* | | | | Percentile | | | | |
|--|---|-----------------------|-----------------------|-------------|------------|------|--------------|------|------|
| | No. of locations | No. of CAUTI | Urinary catheter-days | Pooled mean | 10% | 25% | 50% (median) | 75% | 90% |
| Critical care units | | | | | | | | | |
| Burn | 16 | 217 | 28,326 | 7.7 | | | | | |
| Coronary | 56 | 636 | 143,926 | 4.4 | 0.6 | 2.7 | 3.8 | 6.1 | 8.5 |
| Surgical cardiothoracic | 48 | 506 | 156,199 | 3.2 | 0.0 | 1.6 | 2.6 | 4.1 | 6.1 |
| Medical | 68 | 1419 | 347,465 | 4.1 | 0.6 | 1.9 | 3.7 | 5.5 | 7.9 |
| Medical/surgical, major teaching | 59 | 981 | 299,628 | 3.3 | 0.7 | 1.7 | 2.9 | 4.3 | 6.2 |
| Medical/surgical, all others | 130 | 1603 | 514,552 | 3.1 | 0.0 | 1.0 | 2.6 | 4.3 | 6.5 |
| Pediatric medical/surgical | 37 | 222 | 44,542 | 5.0 | 0.0 | 0.0 | 3.0 | 6.6 | 9.8 |
| Neurosurgical | 20 | 485 | 71,658 | 6.8 | 0.4 | 3.3 | 6.5 | 8.1 | 10.5 |
| Surgical | 65 | 1145 | 282,600 | 4.1 | 0.4 | 1.5 | 3.1 | 4.9 | 9.2 |
| Trauma | 21 | 624 | 109,849 | 5.7 | 1.8 | 3.5 | 5.7 | 7.1 | 7.5 |
| Inpatient wards | | | | | | | | | |
| Adult step down unit (postcritical care) | 20 | 109 | 23,430 | 4.7 | | | | | |
| Medical | 20 | 220 | 38,316 | 5.7 | 0.0 | 1.6 | 4.2 | 7.7 | 8.5 |
| Medical/surgical | 63 | 341 | 68,758 | 5.0 | 0.0 | 0.6 | 3.4 | 7.2 | 9.2 |
| Rehabilitation | 13 | 98 | 5821 | 16.8 | | | | | |
| Surgical | 11 | 97 | 18,573 | 5.2 | | | | | |
| Type of location | Urinary catheter utilization [†] | | | | Percentile | | | | |
| | No. of locations | Urinary catheter-days | Patient days | Pooled mean | 10% | 25% | 50% (median) | 75% | 90% |
| Critical care units | | | | | | | | | |
| Burn | 16 | 28,326 | 43,317 | 0.65 | | | | | |
| Coronary | 56 | 143,926 | 242,052 | 0.59 | 0.31 | 0.48 | 0.62 | 0.70 | 0.78 |
| Surgical cardiothoracic | 49 | 156,199 | 196,708 | 0.79 | 0.49 | 0.71 | 0.83 | 0.88 | 0.95 |
| Medical | 68 | 347,465 | 458,606 | 0.76 | 0.63 | 0.71 | 0.76 | 0.83 | 0.87 |
| Medical/surgical, major teaching | 59 | 299,628 | 379,416 | 0.79 | 0.63 | 0.76 | 0.80 | 0.85 | 0.91 |
| Medical/surgical, all others | 132 | 514,552 | 715,845 | 0.72 | 0.54 | 0.67 | 0.79 | 0.84 | 0.89 |
| Pediatric medical/surgical | 39 | 44,542 | 158,304 | 0.28 | 0.13 | 0.18 | 0.26 | 0.33 | 0.41 |
| Neurosurgical | 20 | 71,658 | 88,576 | 0.81 | 0.69 | 0.77 | 0.82 | 0.88 | 0.91 |
| Surgical | 65 | 282,600 | 349,008 | 0.81 | 0.64 | 0.77 | 0.83 | 0.88 | 0.94 |
| Trauma | 21 | 109,849 | 121,015 | 0.91 | 0.82 | 0.88 | 0.90 | 0.94 | 0.96 |
| Inpatient wards | | | | | | | | | |
| Adult step down unit (postcritical care) | 20 | 23,430 | 68,283 | 0.34 | | | | | |
| Medical | 20 | 38,316 | 148,890 | 0.26 | 0.12 | 0.17 | 0.24 | 0.28 | 0.43 |
| Medical/surgical | 69 | 68,758 | 309,870 | 0.22 | 0.11 | 0.16 | 0.22 | 0.27 | 0.30 |
| Rehabilitation | 13 | 5821 | 48,151 | 0.12 | | | | | |
| Surgical | 11 | 18,573 | 59,977 | 0.31 | | | | | |

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

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

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

hysterectomy to 1.32% for abdominal aortic aneurysm repair procedures. Because of the limited number of pneumonia infections for most procedures, these data should be considered provisional.

The risk of SSI varies by procedure and risk category as reported previously.² However, for selected procedures where the use of a laparoscope had been shown to lower SSI risk, there were insufficient data at this

time to differentiate risk beyond the basic 3 factors of the NNIS risk index. Thus, SSI rates by procedure and risk category were combined into a single Table (Table 22). Furthermore, the cut point for the duration of procedure is now shown in minutes and is the exact 75th percentile of that distribution. Previously, the cut point was the minutes rounded to the nearest whole number of hours. We believe this change provides a more

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, 2006 through 2007

| Type of location | Ventilator-associated PNEU rate* | | | | Percentile | | | | |
|--|----------------------------------|-----------------|-----------------|-------------|------------|------|--------------|------|------|
| | No. of locations | No. of VAP | Ventilator-days | Pooled mean | 10% | 25% | 50% (median) | 75% | 90% |
| Burn | 19 | 243 | 22,765 | 10.7 | | | | | |
| Coronary | 72 | 211 | 83,446 | 2.5 | 0.0 | 0.0 | 1.2 | 3.3 | 4.9 |
| Surgical cardiothoracic | 70 | 523 | 112,400 | 4.7 | 0.0 | 1.4 | 3.4 | 7.1 | 13.1 |
| Medical | 93 | 656 | 257,631 | 2.5 | 0.0 | 1.0 | 1.9 | 4.0 | 6.1 |
| Medical/surgical, major teaching | 79 | 692 | 209,617 | 3.3 | 0.5 | 1.3 | 2.3 | 4.1 | 7.7 |
| Medical/surgical, all others | 187 | 808 | 344,085 | 2.3 | 0.0 | 0.0 | 1.5 | 3.4 | 5.7 |
| Pediatric medical/surgical | 50 | 176 | 85,809 | 2.1 | 0.0 | 0.0 | 0.7 | 3.2 | 4.1 |
| Neurologic | 11 | 101 | 14,180 | 7.1 | | | | | |
| Neurosurgical | 26 | 263 | 40,748 | 6.5 | 0.0 | 3.2 | 4.5 | 6.5 | 11.7 |
| Surgical | 87 | 954 | 178,405 | 5.3 | 0.7 | 2.1 | 4.5 | 7.1 | 10.5 |
| Trauma | 25 | 719 | 76,926 | 9.3 | 0.5 | 2.7 | 8.3 | 11.1 | 16.7 |
| Inpatient wards | | | | | | | | | |
| Adult step down unit (postcritical care) | 15 | 23 | 5021 | 4.6 | | | | | |
| Type of location | Ventilator utilization ratio† | | | | Percentile | | | | |
| | No. of locations | Ventilator-days | Patient-days | Pooled mean | 10% | 25% | 50% (median) | 75% | 90% |
| Critical care units | | | | | | | | | |
| Burn | 19 | 22,765 | 55,285 | 0.41 | | | | | |
| Coronary | 74 | 83,446 | 304,885 | 0.27 | 0.09 | 0.14 | 0.26 | 0.32 | 0.43 |
| Surgical cardiothoracic | 73 | 112,400 | 290,898 | 0.39 | 0.18 | 0.24 | 0.35 | 0.45 | 0.53 |
| Medical | 94 | 257,631 | 573,167 | 0.45 | 0.23 | 0.32 | 0.45 | 0.56 | 0.63 |
| Medical/surgical, major teaching | 81 | 209,617 | 471,619 | 0.44 | 0.22 | 0.31 | 0.44 | 0.58 | 0.65 |
| Medical/surgical, all others | 207 | 344,085 | 990,010 | 0.35 | 0.11 | 0.22 | 0.33 | 0.43 | 0.53 |
| Pediatric medical/surgical | 54 | 85,809 | 206,380 | 0.42 | 0.14 | 0.25 | 0.37 | 0.49 | 0.55 |
| Neurologic | 11 | 14,180 | 36,669 | 0.39 | | | | | |
| Neurosurgical | 26 | 40,748 | 107,095 | 0.38 | 0.25 | 0.29 | 0.36 | 0.44 | 0.48 |
| Surgical | 87 | 178,405 | 437,594 | 0.41 | 0.21 | 0.29 | 0.40 | 0.50 | 0.59 |
| Trauma | 25 | 76,926 | 131,941 | 0.58 | 0.41 | 0.49 | 0.56 | 0.65 | 0.76 |
| Inpatient wards | | | | | | | | | |
| Adult step down unit (postcritical care) | 15 | 5021 | 68,430 | 0.07 | | | | | |

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

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

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

accurate and consistent determination of the NNIS risk index level.

When compared with the last NNIS report, these SSI rates were very similar or slightly lower. However, the number of SSI reported in Table 24 is substantially less than its counterpart in the last NNIS report and should be interpreted with caution. In addition, we assessed the potential impact of mandatory reporting on the SSI rates for colon surgery (required by New York), coronary artery bypass graft (required by New York and South Carolina), abdominal hysterectomy (required by South Carolina and Vermont), and vaginal hysterectomy (required by South Carolina). There was insufficient evidence to warrant

further stratification by mandatory versus voluntary reporting status. 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 them, and the effects of validation efforts by mandatory reporting states impact the rates and their distributions to provide the best possible risk-adjusted comparative data 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

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, 2006 through 2007

| 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 g | 82 | 225 | 60,850 | 3.7 | 0.0 | 0.0 | 2.3 | 4.9 | 9.0 |
| 751-1000 g | 84 | 185 | 55,445 | 3.3 | 0.0 | 0.0 | 2.4 | 4.5 | 7.3 |
| 1001-1500 g | 83 | 144 | 55,874 | 2.6 | 0.0 | 0.0 | 1.6 | 3.6 | 6.1 |
| 1501-2500 g | 71 | 105 | 44,402 | 2.4 | 0.0 | 0.0 | 1.1 | 3.3 | 6.0 |
| >2500 g | 61 | 87 | 42,611 | 2.0 | 0.0 | 0.0 | 0.0 | 3.1 | 5.4 |
| 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 | 88 | 60,850 | 177,542 | 0.34 | 0.19 | 0.29 | 0.35 | 0.44 | 0.53 |
| 751-1000 g | 91 | 55,445 | 175,397 | 0.32 | 0.18 | 0.22 | 0.31 | 0.40 | 0.51 |
| 1001-1500 g | 94 | 55,874 | 238,102 | 0.23 | 0.09 | 0.16 | 0.22 | 0.31 | 0.38 |
| 1501-2500 g | 93 | 44,402 | 273,739 | 0.16 | 0.03 | 0.07 | 0.12 | 0.20 | 0.33 |
| >2500 g | 87 | 42,611 | 213,322 | 0.20 | 0.05 | 0.07 | 0.13 | 0.19 | 0.30 |

NOTE. See Horan et al⁴ for criteria.

BSI, bloodstream infection including criteria 1, 2a, and 3a only; CLABSI, central line-associated BSI.

* $\frac{\text{Number of CLABSI}}{\text{Number of central line-days}} \times 1000$ † $\frac{\text{Number of central line-days}}{\text{Number of patient-days}}$ **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, 2006 through 2007

| 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 g | 71 | 79 | 16,762 | 4.7 | 0.0 | 0.0 | 0.0 | 7.7 | 14.7 |
| 751-1000 g | 70 | 39 | 15,034 | 2.6 | 0.0 | 0.0 | 0.0 | 4.1 | 8.8 |
| 1001-1500 g | 67 | 32 | 16,681 | 1.9 | 0.0 | 0.0 | 0.0 | 2.8 | 7.8 |
| 1501-2500 g | 62 | 15 | 16,321 | 0.9 | 0.0 | 0.0 | 0.0 | 0.0 | 3.0 |
| >2500 g | 68 | 22 | 22,978 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 3.7 |
| 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 g | 85 | 16,762 | 155,133 | 0.11 | 0.05 | 0.08 | 0.12 | 0.20 | 0.28 |
| 751-1000 g | 87 | 15,034 | 151,822 | 0.10 | 0.05 | 0.06 | 0.11 | 0.18 | 0.24 |
| 1001-1500 g | 90 | 16,681 | 207,079 | 0.08 | 0.03 | 0.05 | 0.08 | 0.14 | 0.19 |
| 1501-2500 g | 92 | 16,321 | 250,858 | 0.07 | 0.02 | 0.03 | 0.06 | 0.10 | 0.14 |
| >2500 g | 89 | 22,978 | 219,705 | 0.10 | 0.05 | 0.06 | 0.09 | 0.15 | 0.20 |

NOTE. See Horan et al⁴ for criteria.

BSI, bloodstream infection including criteria 1, 2a and 3a only; UCAB, umbilical catheter-associated BSI.

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

Table 9. Pooled means and key percentiles of the distribution of central line-associated BSI rates and central line utilization ratios for level II/III NICUs, DA module, 2006 through 2007

| 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 g | 44 | 112 | 31,202 | 3.6 | 0.0 | 0.0 | 1.2 | 5.7 | 9.2 |
| 751-1000 g | 48 | 83 | 25,852 | 3.2 | 0.0 | 0.0 | 2.5 | 5.5 | 10.7 |
| 1001-1500 g | 49 | 63 | 30,026 | 2.1 | 0.0 | 0.0 | 0.2 | 3.1 | 7.7 |
| 1501-2500 g | 40 | 26 | 21,431 | 1.2 | 0.0 | 0.0 | 0.0 | 2.1 | 4.0 |
| >2500 g | 35 | 21 | 21,031 | 1.0 | 0.0 | 0.0 | 0.0 | 0.9 | 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 g | 48 | 31,202 | 73,972 | 0.42 | 0.25 | 0.32 | 0.37 | 0.47 | 0.56 |
| 751-1000 g | 55 | 25,852 | 71,974 | 0.36 | 0.19 | 0.26 | 0.34 | 0.46 | 0.58 |
| 1001-1500 g | 63 | 30,026 | 104,546 | 0.29 | 0.11 | 0.17 | 0.25 | 0.33 | 0.39 |
| 1501-2500 g | 61 | 21,431 | 116,442 | 0.18 | 0.03 | 0.06 | 0.12 | 0.18 | 0.31 |
| > 2500 g | 55 | 21,031 | 85,126 | 0.25 | 0.04 | 0.07 | 0.14 | 0.23 | 0.31 |

See Horan et al⁴ for criteria.

BSI, bloodstream infection including criteria 1, 2a and 3a only; CLABSI, central line-associated BSI.

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

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

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, 2006 through 2007

| 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 g | 36 | 56 | 9418 | 4.7 | 0.0 | 0.0 | 5.3 | 8.1 | 16.8 |
| 751-1000 g | 37 | 17 | 8696 | 2.6 | 0.0 | 0.0 | 0.0 | 4.2 | 12.4 |
| 1001-1500 g | 38 | 12 | 8957 | 1.9 | 0.0 | 0.0 | 0.0 | 0.0 | 5.9 |
| 1501-2500 g | 38 | 6 | 8806 | 0.9 | 0.0 | 0.0 | 0.0 | 0.0 | 1.9 |
| >2500 g | 40 | 9 | 13,055 | 1.0 | 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 g | 45 | 9418 | 61,589 | 0.15 | 0.07 | 0.11 | 0.19 | 0.27 | 0.31 |
| 751-1000 g | 54 | 8696 | 66,884 | 0.13 | 0.07 | 0.10 | 0.15 | 0.19 | 0.25 |
| 1001-1500 g | 62 | 8957 | 97,690 | 0.09 | 0.04 | 0.06 | 0.09 | 0.13 | 0.16 |
| 1501-2500 g | 60 | 8806 | 123,858 | 0.07 | 0.03 | 0.05 | 0.07 | 0.10 | 0.12 |
| >2500 g | 62 | 13,055 | 97,878 | 0.13 | 0.03 | 0.06 | 0.10 | 0.15 | 0.23 |

See Horan et al⁴ for criteria.

BSI, bloodstream infection including criteria 1, 2a and 3a only; UCAB, umbilical catheter-associated BSI.

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

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

Table 11. Pooled means and key percentiles of the distribution of ventilator-associated PNEU rates and ventilator utilization ratios for level III NICUs, DA module, 2006 through 2007

| 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 g | 49 | 144 | 55,554 | 2.6 | 0.0 | 0.0 | 0.9 | 3.3 | 7.5 |
| 751-1000 g | 50 | 72 | 33,988 | 2.1 | 0.0 | 0.0 | 0.0 | 3.7 | 9.0 |
| 1001-1500 g | 48 | 32 | 22,052 | 1.5 | 0.0 | 0.0 | 0.0 | 2.1 | 5.2 |
| 1501-2500 g | 38 | 17 | 16,296 | 1.0 | 0.0 | 0.0 | 0.0 | 1.4 | 5.7 |
| >2500 g | 43 | 17 | 19,922 | 0.9 | 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 g | 51 | 55,554 | 111,140 | 0.50 | 0.34 | 0.44 | 0.50 | 0.65 | 0.86 |
| 751-1000 g | 52 | 33,988 | 105,836 | 0.32 | 0.12 | 0.21 | 0.30 | 0.42 | 0.61 |
| 1001-1500 g | 52 | 22,052 | 146,551 | 0.15 | 0.07 | 0.09 | 0.14 | 0.21 | 0.36 |
| 1501-2500 g | 54 | 16,296 | 177,783 | 0.09 | 0.02 | 0.04 | 0.06 | 0.15 | 0.28 |
| > 2500 g | 53 | 19,922 | 139,997 | 0.14 | 0.04 | 0.05 | 0.11 | 0.19 | 0.24 |

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

* $\frac{\text{Number of VAP}}{\text{Number of ventilator-days}} \times 1000$ † $\frac{\text{Number of ventilator-days}}{\text{Number of patient-days}}$ **Table 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, 2006 through 2007

| 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 g | 35 | 67 | 20,088 | 3.3 | 0.0 | 0.0 | 1.4 | 5.3 | 14.1 |
| 751-1000 g | 32 | 47 | 13,061 | 3.6 | 0.0 | 0.0 | 1.0 | 5.7 | 8.8 |
| 1001-1500 g | 31 | 11 | 7794 | 1.4 | 0.0 | 0.0 | 0.0 | 0.5 | 4.6 |
| 1501-2500 g | 27 | 6 | 6007 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.6 |
| >2500 g | 30 | 7 | 8704 | 0.8 | 0.0 | 0.0 | 0.0 | 0.0 | 2.3 |

| Ventilator utilization ratio† | | | | | Percentile | | | | |
|-------------------------------|------------------|-----------------|--------------|-------------|------------|------|--------------|------|------|
| Birth-weight category | No. of locations | Ventilator-days | Patient-days | Pooled mean | 10% | 25% | 50% (median) | 75% | 90% |
| ≤750 g | 36 | 20,088 | 42,535 | 0.47 | 0.31 | 0.41 | 0.52 | 0.59 | 0.75 |
| 751-1000 g | 39 | 13,061 | 42,684 | 0.31 | 0.15 | 0.21 | 0.31 | 0.40 | 0.47 |
| 1001-1500 g | 41 | 7794 | 60,595 | 0.13 | 0.05 | 0.07 | 0.10 | 0.14 | 0.25 |
| 1501-2500 g | 44 | 6007 | 81,468 | 0.07 | 0.01 | 0.03 | 0.04 | 0.09 | 0.20 |
| >2500 g | 43 | 8704 | 60,817 | 0.14 | 0.03 | 0.06 | 0.10 | 0.15 | 0.26 |

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

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

Table 13. Distribution of criteria for central line-associated laboratory confirmed BSI by location, 2006 through 2007

| Type of location | LCBI | | | | | | Total |
|--|-------------|------|--------------|------|--------------|------|-------|
| | Criterion 1 | | Criterion 2a | | Criterion 2b | | |
| | N | % | N | % | N | % | N |
| Critical care units | | | | | | | |
| Burn | 216 | 84.0 | 23 | 8.9 | 18 | 7.0 | 257 |
| Coronary | 292 | 66.5 | 79 | 18.0 | 68 | 15.5 | 439 |
| Medical | 905 | 73.6 | 160 | 13.0 | 164 | 13.3 | 1229 |
| Medical/surgical, major teaching | 520 | 62.4 | 168 | 20.1 | 146 | 17.5 | 834 |
| Medical/surgical, all others | 682 | 57.2 | 286 | 24.0 | 225 | 18.9 | 1193 |
| Neurologic | 25 | 62.5 | 6 | 15.0 | 9 | 22.5 | 40 |
| Neurosurgical | 136 | 59.4 | 36 | 15.7 | 57 | 24.9 | 229 |
| Pediatric medical | 6 | 75.0 | 0 | 0.0 | 2 | 25.0 | 8 |
| Pediatric medical/surgical | 343 | 59.4 | 58 | 10.1 | 173 | 30.0 | 577 |
| Surgical cardiothoracic | 305 | 70.0 | 86 | 19.7 | 45 | 10.3 | 436 |
| Surgical | 716 | 69.9 | 160 | 15.6 | 148 | 14.5 | 1024 |
| Trauma | 384 | 81.4 | 48 | 10.2 | 40 | 8.5 | 472 |
| Inpatient wards | | | | | | | |
| Adult step down unit (postcritical care) | 40 | 62.5 | 18 | 28.1 | 6 | 9.4 | 64 |
| Medical | 93 | 79.5 | 18 | 15.4 | 6 | 5.1 | 117 |
| Medical/surgical | 131 | 71.2 | 38 | 20.7 | 15 | 8.2 | 184 |
| Rehabilitation | 0 | 0.0 | 2 | 66.7 | 1 | 33.3 | 3 |
| Surgical | 27 | 58.7 | 13 | 28.3 | 6 | 13.0 | 46 |
| Total | 4821 | 67.4 | 1199 | 16.8 | 1129 | 15.8 | 7152 |

NOTE. See Horan et al⁴ for criteria.
BSI, bloodstream infection; LCBI, laboratory-confirmed BSI.

Table 14. Distribution of criteria for permanent central line-associated laboratory confirmed BSI by location, 2006 through 2007

| Type of location | LCBI | | | | | | Total |
|------------------------|-------------|------|--------------|------|--------------|------|-------|
| | Criterion 1 | | Criterion 2a | | Criterion 2b | | |
| | N | % | N | % | N | % | |
| Specialty care area | | | | | | | |
| Bone marrow transplant | 77 | 54.6 | 32 | 22.7 | 32 | 22.7 | 141 |
| Hematology/oncology | 23 | 41.8 | 21 | 38.2 | 11 | 20.0 | 55 |
| Total | 100 | 51.0 | 53 | 27.0 | 43 | 21.9 | 196 |

NOTE. See Horan et al⁴ for criteria.
BSI, bloodstream infection; LCBI, laboratory-confirmed BSI.

Table 15. Distribution of specific sites of urinary catheter-associated UTI by location, 2006 through 2007

| Type of location | ASB | | | | SUTI | | Total |
|--|------|------|------|------|------|---|-------|
| | N | % | N | % | N | % | |
| Critical care units | | | | | | | |
| Burn | 51 | 23.5 | 166 | 76.5 | | | 217 |
| Coronary | 311 | 48.9 | 325 | 51.1 | | | 636 |
| Medical | 544 | 38.3 | 875 | 61.7 | | | 1419 |
| Medical/surgical, major teaching | 334 | 34.0 | 647 | 66.0 | | | 981 |
| Medical/surgical, all others | 759 | 47.3 | 844 | 52.7 | | | 1603 |
| Neurosurgical | 147 | 30.3 | 338 | 69.7 | | | 485 |
| Pediatric medical/surgical | 51 | 23.0 | 171 | 77.0 | | | 222 |
| Surgical cardiothoracic | 218 | 43.1 | 288 | 56.9 | | | 506 |
| Surgical | 497 | 43.4 | 648 | 56.6 | | | 1145 |
| Trauma | 145 | 23.2 | 479 | 76.8 | | | 624 |
| Inpatient wards | | | | | | | |
| Adult step down unit (postcritical care) | 46 | 42.2 | 63 | 57.8 | | | 109 |
| Medical | 122 | 55.5 | 98 | 44.5 | | | 220 |
| Medical/surgical | 189 | 55.4 | 152 | 44.6 | | | 341 |
| Rehabilitation | 53 | 54.1 | 45 | 45.9 | | | 98 |
| Surgical | 55 | 56.7 | 42 | 43.3 | | | 97 |
| Total | 3522 | 40.5 | 5181 | 59.5 | | | 8703 |

NOTE. See Horan et al⁴ for criteria.

Table 16. Distribution of specific sites of ventilator-associated pneumonia by location, 2006 through 2007

| Type of location | PNU1 | | PNU2 | | PNU3 | | Total |
|--|------|-------|------|-------|------|------|-------|
| | N | % | N | % | N | % | |
| Critical care units | | | | | | | |
| Burn | 171 | 70.4 | 71 | 29.2 | 1 | 0.4 | 243 |
| Coronary | 126 | 59.7 | 83 | 39.3 | 2 | 0.9 | 211 |
| Medical | 497 | 75.8 | 154 | 23.5 | 5 | 0.8 | 656 |
| Medical/surgical, major teaching | 443 | 64.0 | 248 | 35.8 | 1 | 0.1 | 692 |
| Medical/surgical, all others | 420 | 52.0 | 383 | 47.4 | 5 | 0.6 | 808 |
| Neurologic | 77 | 76.2 | 24 | 23.8 | 0 | 0.0 | 101 |
| Neurosurgical | 158 | 60.1 | 105 | 39.9 | 0 | 0.0 | 263 |
| Pediatric medical/surgical | 135 | 76.7 | 39 | 22.2 | 2 | 1.1 | 176 |
| Surgical cardiothoracic | 293 | 56.0 | 228 | 43.6 | 2 | 0.4 | 523 |
| Surgical | 626 | 65.6 | 293 | 30.7 | 35 | 3.7 | 954 |
| Trauma | 323 | 44.9 | 394 | 54.8 | 2 | 0.3 | 719 |
| Inpatient wards | | | | | | | |
| Adult step down unit (postcritical care) | 19 | 82.6% | 4 | 17.4% | 0 | 0.0% | 23 |
| Total | 3288 | 61.2% | 2026 | 37.7% | 55 | 1.0% | 5369 |

NOTE. See Horan et al⁴ for criteria.**Table 17.** Distribution of specific sites and criteria for device-associated BSI among level III NICUs by birth weight, 2006 through 2007

| Birth-weight category | LCBI | | | | | | CSEP | | Total |
|-----------------------------------|-------------|------|-----------------|------|-----------------|------|------|------|-------|
| | Criterion 1 | | Criterion 2a/3a | | Criterion 2b/3b | | N | % | |
| | N | % | N | % | N | % | | | N |
| Central line-associated BSI | | | | | | | | | |
| ≤750 g | 152 | 44.8 | 45 | 13.3 | 117 | 34.5 | 25 | 7.4 | 339 |
| 750-1000 g | 133 | 48.7 | 37 | 13.6 | 88 | 32.2 | 15 | 5.5 | 273 |
| 1001-1500 g | 100 | 45.7 | 32 | 14.6 | 75 | 34.2 | 12 | 5.5 | 219 |
| 1501-2500 g | 69 | 46.9 | 28 | 19.0 | 42 | 28.6 | 8 | 5.4 | 147 |
| >2500 g | 50 | 40.7 | 20 | 16.3 | 37 | 30.1 | 16 | 13.0 | 123 |
| Total | 504 | 45.8 | 162 | 14.7 | 359 | 32.6 | 76 | 6.9 | 1101 |
| Umbilical catheter-associated BSI | | | | | | | | | |
| ≤750 g | 52 | 44.1 | 13 | 11.0 | 40 | 33.9 | 13 | 11.0 | 118 |
| 750-1000 g | 24 | 35.8 | 10 | 14.9 | 28 | 41.8 | 5 | 7.5 | 67 |
| 1001-1500 g | 21 | 45.7 | 6 | 13.0 | 14 | 30.4 | 5 | 10.9 | 46 |
| 1501-2500 g | 10 | 45.5 | 2 | 9.1 | 7 | 31.8 | 3 | 13.6 | 22 |
| >2500 g | 12 | 41.4 | 5 | 17.2 | 7 | 24.1 | 5 | 17.2 | 29 |
| Total | 119 | 42.2 | 36 | 12.8 | 96 | 34.0 | 31 | 11.0 | 282 |

NOTE. See Horan et al⁴ for criteria.

BSI, bloodstream infection; LCBI, laboratory confirmed bloodstream infection; CSEP, clinical sepsis.

Table 18. Distribution of specific sites and criteria for device-associated BSI among level II/III NICUs by birth weight, 2006 through 2007

| Birth-weight category | LCBI | | | | | | CSEP | | Total |
|-----------------------------------|-------------|------|-----------------|------|-----------------|------|------|-----|-------|
| | Criterion 1 | | Criterion 2a/3a | | Criterion 2b/3b | | N | % | N |
| | N | % | N | % | N | % | | | |
| Central line-associated BSI | | | | | | | | | |
| ≤750 g | 77 | 44.5 | 28 | 16.2 | 61 | 35.3 | 7 | 4.0 | 173 |
| 750-1000 g | 57 | 47.1 | 25 | 20.7 | 38 | 31.4 | 1 | 0.8 | 121 |
| 1001-1500 g | 44 | 47.3 | 14 | 15.1 | 31 | 33.3 | 4 | 4.3 | 93 |
| 1501-2500 g | 17 | 36.2 | 9 | 19.1 | 21 | 44.7 | 0 | 0.0 | 47 |
| >2500 g | 12 | 20.7 | 7 | 12.1 | 37 | 63.8 | 2 | 3.4 | 58 |
| Total | 207 | 42.1 | 83 | 16.9 | 188 | 38.2 | 14 | 2.8 | 492 |
| Umbilical catheter-associated BSI | | | | | | | | | |
| ≤750 g | 35 | 53.0 | 18 | 27.3 | 10 | 15.2 | 3 | 4.5 | 66 |
| 750-1000 g | 15 | 38.5 | 2 | 5.1 | 22 | 56.4 | 0 | 0.0 | 39 |
| 1001-1500 g | 10 | 37.0 | 2 | 7.4 | 15 | 55.6 | 0 | 0.0 | 27 |
| 1501-2500 g | 5 | 50.0 | 1 | 10.0 | 4 | 40.0 | 0 | 0.0 | 10 |
| >2500 g | 4 | 20.0 | 4 | 20.0 | 11 | 55.0 | 1 | 5.0 | 20 |
| Total | 69 | 42.6 | 27 | 16.7 | 62 | 38.3 | 4 | 2.5 | 162 |

NOTE. See Horan et al⁴ for criteria.

BSI, bloodstream infection; LCBI, laboratory confirmed bloodstream infection; CSEP, clinical sepsis

Table 19. Distribution of specific sites of ventilator-associated pneumonia among level III NICUs by birth weight, 2006 through 2007

| Birth-weight category | PNU1 | | PNU2 | | PNU3 | | Total |
|-----------------------|------|------|------|------|------|-----|-------|
| | N | % | N | % | N | % | N |
| ≤750 g | 121 | 84.0 | 23 | 16.0 | 0 | 0.0 | 144 |
| 750-1000 g | 52 | 72.2 | 20 | 27.8 | 0 | 0.0 | 72 |
| 1001-1500 g | 26 | 81.3 | 6 | 18.8 | 0 | 0.0 | 32 |
| 1501-2500 g | 12 | 70.6 | 4 | 23.5 | 1 | 5.9 | 17 |
| >2500 g | 14 | 82.4 | 3 | 17.6 | 0 | 0.0 | 17 |
| Total | 225 | 79.8 | 56 | 19.9 | 1 | 0.4 | 282 |

NOTE. See Horan et al⁴ for criteria.

Table 20. Distribution of specific sites of ventilator-associated pneumonia among level II/III NICUs by birth weight, 2006 through 2007

| Birth-weight category | PNU1 | | PNU2 | | PNU3 | | Total |
|-----------------------|------|------|------|------|------|-----|-------|
| | N | % | N | % | N | % | N |
| ≤750 g | 44 | 65.7 | 21 | 31.3 | 2 | 3.0 | 67 |
| 750-1000 g | 39 | 83.0 | 7 | 14.9 | 1 | 2.1 | 47 |
| 1001-1500 g | 7 | 63.6 | 4 | 36.4 | 0 | 0.0 | 11 |
| 1501-2500 g | 5 | 83.3 | 1 | 16.7 | 0 | 0.0 | 6 |
| >2500 g | 5 | 71.4 | 2 | 28.6 | 0 | 0.0 | 7 |
| Total | 100 | 72.5 | 35 | 25.4 | 3 | 2.2 | 138 |

NOTE. See Horan et al⁴ for criteria.

Table 21. Pooled means and key percentiles of the distribution of postprocedure pneumonia rates,* PA module, 2006 through 2007

| PPP rate-inpatient procedures | | | | | | Percentile | | | | |
|-------------------------------|---|------------------|------------|-------------------|-------------|------------|------|--------------|------|------|
| Procedure code | Operative procedure description | No. of hospitals | No. of PPP | No. of procedures | Pooled mean | 10% | 25% | 50% (median) | 75% | 90% |
| AAA | Abdominal aortic aneurysm repair | 13 | 4 | 302 | 1.32 | | | | | |
| CARD | Cardiac surgery | 21 | 29 | 2797 | 1.04 | 0.00 | 0.00 | 0.40 | 1.98 | 3.42 |
| CBGB | Coronary bypass w/chest and donor incisions | 35 | 117 | 12,683 | 0.92 | 0.00 | 0.00 | 0.21 | 1.25 | 2.64 |
| CBGC | Coronary bypass graft with chest incision | 29 | 5 | 535 | 0.93 | | | | | |
| COLO | Colon surgery | 25 | 28 | 4635 | 0.60 | 0.00 | 0.00 | 0.00 | 0.74 | 1.10 |
| CSEC | Cesarean section | 15 | 2 | 4490 | 0.04 | | | | | |
| FUSN | Spinal fusion | 17 | 7 | 4871 | 0.14 | | | | | |
| FX | Open reduction of fracture | 11 | 4 | 2256 | 0.18 | | | | | |
| HPRO | Hip prosthesis | 33 | 14 | 7760 | 0.18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.47 |
| HYST | Abdominal hysterectomy | 20 | 1 | 4794 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| KPRO | Knee prosthesis | 34 | 7 | 12,758 | 0.05 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| LAM | Laminectomy | 11 | 1 | 4614 | 0.02 | | | | | |
| PVBY | Peripheral vascular bypass surgery | 10 | 2 | 841 | 0.24 | | | | | |
| VHYS | Vaginal hysterectomy | 24 | 0 | 2048 | 0.00 | | | | | |

*Per 100 operations.

PPP, postprocedure pneumonia.

Table 22. SSI rates* by operative procedure and risk index category, PA module, 2006 through 2007

| SSI rate-inpatient procedures | | | | | | |
|-------------------------------|--|--------------------------|---------------------|-------------------|------------|-------------|
| Procedure code | Operative procedure description | Duration cut point (min) | Risk index category | No. of procedures | No. of SSI | Pooled mean |
| AAA | Abdominal aortic aneurysm repair | 225 | 0,1 | 881 | 16 | 1.82 |
| AAA | Abdominal aortic aneurysm repair | 225 | 2,3 | 288 | 15 | 5.21 |
| APPY | Appendix surgery | 81 | 0,1 | 2691 | 40 | 1.49 |
| APPY | Appendix surgery | 81 | 2,3 | 372 | 13 | 3.49 |
| AVSD | Arteriovenostomy for renal dialysis | 111 | 0,1,2,3 | 606 | 6 | 0.99 |
| BILI | Bile duct, liver or pancreatic surgery | 330 | 0,1 | 422 | 37 | 8.77 |
| BILI | Bile duct, liver or pancreatic surgery | 330 | 2,3 | 202 | 33 | 16.34 |
| BRST | Breast surgery | 202 | 0 | 997 | 8 | 0.80 |
| BRST | Breast surgery | 202 | 1 | 914 | 25 | 2.74 |
| CARD | Cardiac surgery | 300 | 0,1 | 10,382 | 121 | 1.17 |
| CARD | Cardiac surgery | 300 | 2,3 | 3396 | 58 | 1.71 |
| CBGB | Coronary bypass w/chest and donor incision | 300 | 0 | 1003 | 3 | 0.30 |
| CBGB | Coronary bypass w/chest and donor incision | 300 | 1 | 47,296 | 1399 | 2.96 |
| CBGB | Coronary bypass w/chest and donor incision | 300 | 2,3 | 15,706 | 767 | 4.88 |
| CBGC | Coronary bypass graft with chest incision | 285 | 0,1 | 3495 | 57 | 1.63 |
| CBGC | Coronary bypass graft with chest incision | 285 | 2,3 | 1147 | 33 | 2.88 |
| CEA | Carotid endarterectomy | 133 | 0,1,2,3 | 2615 | 11 | 0.42 |
| CHOL | Gallbladder surgery | 121 | 0,1,2,3 | 3337 | 23 | 0.69 |
| COLO | Colon surgery | 188 | 0 | 9539 | 399 | 4.18 |
| COLO | Colon surgery | 188 | 1 | 16,537 | 1004 | 6.07 |
| COLO | Colon surgery | 188 | 2 | 7270 | 582 | 8.01 |
| COLO | Colon surgery | 188 | 3 | 810 | 88 | 10.86 |
| CRAN | Craniotomy | 219 | 0,1 | 4596 | 99 | 2.15 |
| CRAN | Craniotomy | 219 | 2,3 | 1048 | 49 | 4.68 |
| CSEC | Cesarean section | 57 | 0 | 12,351 | 185 | 1.50 |
| CSEC | Cesarean section | 57 | 1,2,3 | 5951 | 157 | 2.64 |
| FUSN | Spinal fusion | 240 | 0 | 11,780 | 85 | 0.72 |
| FUSN | Spinal fusion | 240 | 1 | 9559 | 186 | 1.95 |
| FUSN | Spinal fusion | 240 | 2,3 | 2543 | 105 | 4.13 |
| FX | Open reduction of fracture | 137 | 0 | 2143 | 23 | 1.07 |

Continued

Table 22. Continued

| SSI rate-inpatient procedures | | | | | | |
|--------------------------------|------------------------------------|--------------------------|---------------------|-------------------|------------|-------------|
| Procedure code | Operative procedure description | Duration cut point (min) | Risk index category | No. of procedures | No. of SSI | Pooled mean |
| FX | Open reduction of fracture | 137 | 1 | 3376 | 57 | 1.69 |
| FX | Open reduction of fracture | 137 | 2,3 | 714 | 19 | 2.66 |
| GAST | Gastric surgery | 168 | 0,1 | 3807 | 70 | 1.84 |
| GAST | Gastric surgery | 168 | 2,3 | 1090 | 53 | 4.86 |
| HER | Herniorrhaphy | 133 | 0 | 1182 | 12 | 1.02 |
| HER | Herniorrhaphy | 133 | 1 | 1499 | 37 | 2.47 |
| HER | Herniorrhaphy | 133 | 2,3 | 596 | 26 | 4.36 |
| HPRO | Hip prosthesis | 123 | 0 | 17,521 | 131 | 0.75 |
| HPRO | Hip prosthesis | 123 | 1 | 22,681 | 380 | 1.68 |
| HPRO | Hip prosthesis | 123 | 2,3 | 5492 | 163 | 2.97 |
| HYST | Abdominal hysterectomy | 138 | 0 | 13,529 | 152 | 1.12 |
| HYST | Abdominal hysterectomy | 138 | 1 | 6422 | 155 | 2.41 |
| HYST | Abdominal hysterectomy | 138 | 2,3 | 1419 | 62 | 4.37 |
| KPRO | Knee prosthesis | 122 | 0 | 29,264 | 198 | 0.68 |
| KPRO | Knee prosthesis | 122 | 1 | 31,979 | 359 | 1.12 |
| KPRO | Knee prosthesis | 122 | 2,3 | 7955 | 145 | 1.82 |
| LAM | Laminectomy | 167 | 0 | 13,144 | 96 | 0.73 |
| LAM | Laminectomy | 167 | 1 | 9549 | 106 | 1.11 |
| LAM | Laminectomy | 167 | 2,3 | 2545 | 62 | 2.44 |
| PACE | Pacemaker surgery | 65 | 0,1,2,3 | 1812 | 4 | 0.22 |
| PVBY | Peripheral vascular bypass surgery | 228 | 0 | 300 | 6 | 2.00 |
| PVBY | Peripheral vascular bypass surgery | 228 | 1,2,3 | 3376 | 226 | 6.69 |
| REC | Rectal surgery | 253 | 0,1,2 | 736 | 21 | 2.85 |
| RFUSN | Refusion of spine | 312 | 0,1 | 500 | 13 | 2.60 |
| RFUSN | Refusion of spine | 312 | 2,3 | 81 | 8 | 9.88 |
| SB | Small bowel surgery | 206 | 0 | 535 | 14 | 2.62 |
| SB | Small bowel surgery | 206 | 1,2,3 | 2265 | 143 | 6.31 |
| VHYS | Vaginal hysterectomy | 132 | 0 | 5893 | 45 | 0.76 |
| VHYS | Vaginal hysterectomy | 132 | 1,2,3 | 2941 | 37 | 1.26 |
| VSHN | Ventricular shunt | 80 | 0 | 572 | 16 | 2.80 |
| VSHN | Ventricular shunt | 80 | 1,2,3 | 2791 | 144 | 5.16 |
| XLAP | Exploratory abdominal surgery | 210 | 0,1,2,3 | 3011 | 59 | 1.96 |
| SSI rate-outpatient procedures | | | | | | |
| Procedure code | Operative procedure description | Duration cut point (min) | Risk index category | No. of procedures | No. of SSI | Pooled mean |
| HER | Herniorrhaphy | 63 | 0 | 1768 | 7 | 0.40 |
| HER | Herniorrhaphy | 63 | 1 | 1092 | 12 | 1.10 |
| HER | Herniorrhaphy | 63 | 2,3 | 207 | 7 | 3.38 |
| LAM | Laminectomy | 90 | 0,1,2,3 | 302 | 4 | 1.32 |

SSI, surgical site infection.

*Per 100 operations.

with the methods described for NHSN.^{3,5,8} You should also refer to [Appendices A and B](#) for further instructions. [Appendix A](#) discusses the calculation of infection rates and DU ratios for the device-associated module. [Appendix B](#) gives a step-by-step method for interpretation of percentiles of infection rates or DU ratios. 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. Hospitals should use these data to guide local prevention strategies and other quality improvement efforts aimed at reducing the occurrence of infections as much as possible.

Table 23. Percentiles of the distribution of SSI rates,* PA module, 2006 through 2007

| SSI percentiles-inpatient procedures | | | | | Percentile | | | | |
|--------------------------------------|--|---------------------|------------------|-------------|------------|------|--------------|------|-------|
| Procedure code | Operative procedure description | Risk index category | No. of hospitals | Pooled mean | 10% | 25% | 50% (median) | 75% | 90% |
| CARD | Cardiac surgery | 0,1 | 64 | 1.17 | 0.00 | 0.00 | 0.66 | 1.58 | 2.91 |
| CARD | Cardiac surgery | 2,3 | 46 | 1.71 | 0.00 | 0.00 | 1.10 | 2.79 | 3.65 |
| CBGB | Coronary bypass w/chest and donor incision | 1 | 160 | 2.96 | 0.00 | 1.18 | 2.48 | 4.09 | 5.34 |
| CBGB | Coronary bypass w/chest and donor incision | 2,3 | 134 | 4.88 | 0.00 | 2.00 | 3.80 | 6.52 | 10.08 |
| CBGC | Coronary bypass graft with chest incision | 0,1 | 55 | 1.63 | 0.00 | 0.00 | 0.00 | 3.30 | 5.08 |
| CEA | Carotid endarterectomy | 0,1,2,3 | 21 | 0.42 | 0.00 | 0.00 | 0.00 | 0.94 | 1.48 |
| COLO | Colon surgery | 0 | 121 | 4.18 | 0.00 | 0.95 | 3.70 | 6.02 | 9.44 |
| COLO | Colon surgery | 1 | 184 | 6.07 | 0.00 | 2.22 | 4.76 | 8.33 | 12.50 |
| COLO | Colon surgery | 2 | 123 | 8.01 | 0.00 | 2.11 | 6.06 | 9.56 | 15.83 |
| CRAN | Craniotomy | 0,1 | 27 | 2.15 | 0.00 | 0.00 | 1.61 | 2.10 | 4.27 |
| CSEC | Cesarean section | 0 | 32 | 1.50 | 0.00 | 0.29 | 1.33 | 3.05 | 3.44 |
| CSEC | Cesarean section | 1,2,3 | 33 | 2.64 | 0.00 | 0.19 | 1.99 | 4.00 | 8.41 |
| FUSN | Spinal fusion | 0 | 59 | 0.72 | 0.00 | 0.00 | 0.37 | 0.99 | 1.78 |
| FUSN | Spinal fusion | 1 | 59 | 1.95 | 0.00 | 0.71 | 1.54 | 2.70 | 3.81 |
| FUSN | Spinal fusion | 2,3 | 38 | 4.13 | 0.00 | 1.94 | 4.00 | 5.52 | 9.21 |
| FX | Open reduction of fracture | 1 | 23 | 1.69 | 0.00 | 0.69 | 1.52 | 2.43 | 4.08 |
| GAST | Gastric surgery | 0,1 | 23 | 1.84 | 0.00 | 0.70 | 1.48 | 2.90 | 3.80 |
| HPRO | Hip prosthesis | 0 | 110 | 0.75 | 0.00 | 0.00 | 0.28 | 1.04 | 2.04 |
| HPRO | Hip prosthesis | 1 | 127 | 1.68 | 0.00 | 0.00 | 1.35 | 2.13 | 3.01 |
| HPRO | Hip prosthesis | 2,3 | 69 | 2.97 | 0.00 | 0.00 | 2.21 | 4.00 | 6.89 |
| HYST | Abdominal hysterectomy | 0 | 84 | 1.12 | 0.00 | 0.00 | 0.70 | 1.95 | 2.67 |
| HYST | Abdominal hysterectomy | 1 | 67 | 2.41 | 0.00 | 0.00 | 1.88 | 3.60 | 7.78 |
| HYST | Abdominal hysterectomy | 2,3 | 24 | 4.37 | 0.00 | 0.00 | 3.13 | 5.66 | 8.63 |
| KPRO | Knee prosthesis | 0 | 126 | 0.68 | 0.00 | 0.00 | 0.32 | 0.90 | 1.46 |
| KPRO | Knee prosthesis | 1 | 138 | 1.12 | 0.00 | 0.00 | 0.77 | 1.49 | 2.63 |
| KPRO | Knee prosthesis | 2,3 | 89 | 1.82 | 0.00 | 0.00 | 1.63 | 2.81 | 5.00 |
| LAM | Laminectomy | 0 | 50 | 0.73 | 0.00 | 0.00 | 0.56 | 1.44 | 2.36 |
| LAM | Laminectomy | 1 | 51 | 1.11 | 0.00 | 0.00 | 0.98 | 1.99 | 2.41 |
| LAM | Laminectomy | 2,3 | 34 | 2.44 | 0.00 | 0.00 | 1.67 | 3.18 | 4.17 |
| PVBY | Peripheral vascular bypass surgery | 1,2,3 | 36 | 6.69 | 0.00 | 2.87 | 4.69 | 7.69 | 12.05 |
| VHYS | Vaginal hysterectomy | 0 | 54 | 0.76 | 0.00 | 0.00 | 0.00 | 1.74 | 2.13 |
| VHYS | Vaginal hysterectomy | 1,2,3 | 40 | 1.26 | 0.00 | 0.00 | 0.00 | 1.15 | 3.61 |

SSI, surgical site infection.

*Per 100 operations.

Table 24. SSI rates* following inpatient coronary artery bypass graft procedure, by risk index category and specific site, PA module, 2006 through 2007

| Risk index category | 0 | | 1 | | 2,3 | |
|-------------------------------|----------|-------------|-------------|-------------|------------|-------------|
| | No. SSI | Rate | No. SSI | Rate | No. SSI | Rate |
| Secondary (donor site) | 1 | 0.10 | 362 | 0.77 | 266 | 1.69 |
| Superficial incisional | 1 | 0.10 | 288 | 0.61 | 211 | 1.34 |
| Deep incisional | 0 | 0.00 | 74 | 0.16 | 55 | 0.35 |
| Primary (chest site) | 2 | 0.20 | 1037 | 2.19 | 501 | 3.19 |
| Superficial incisional | 1 | 0.10 | 451 | 0.95 | 197 | 1.26 |
| Deep incisional | 1 | 0.10 | 315 | 0.67 | 162 | 1.03 |
| Organ/space | 0 | 0.00 | 271 | 0.57 | 142 | 0.90 |
| Total | 3 | 0.30 | 1399 | 2.96 | 767 | 4.88 |

NOTE. Denominators for the risk categories are as follows: category 0 = 1003; category 1 = 47,296; category 2,3 = 15,706.

CBGB, coronary artery bypass graft with primary (chest) and secondary (donor) incisions.

*Per 100 operations.

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

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

Calculation of device-associated infection rate

- Step 1 Decide on the time period for your analysis. It may be a month, a quarter, 6 months, a year, or some other period.
- Step 2 Select the patient population for analysis, eg, the type of location or a birth-weight category in a NICU.
- Step 3 Select the infections to be used in the numerator. They must be site specific and must have occurred in the selected patient population. Their date of onset must be during the selected time period.

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

Example: Five patients on the first day of the month had 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 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:

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

Calculation of DU ratio

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

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

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

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

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

- Step 6 Examine the size of the denominator for your hospital's rate or ratio. Rates or ratios may not be good estimates of the "true" rate or ratio for your hospital if the denominator is small, ie, <50 device-days or patient-days.
- Step 7 Compare your hospital's location-specific rates or ratios with those found in the Tables of this report. Refer to [Appendix 2](#) for interpretation of the percentiles of the rates/ratios.

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

- Step 1 Evaluate the rate (ratio) you have calculated for your hospital and confirm that the variables in the rate (both numerator and denominator) are identical to the rates (ratios) in the Table.
- Step 2 Examine the percentiles in each of the Tables and look for the 50th percentile (or median). At the 50th percentile, 50% of the hospitals have lower rates (ratios) than the median, and 50% have higher rates (ratios).
- Step 3 Determine whether your hospital's rate (ratio) is above or below this median.

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

- Step 4 If your hospital's rate or ratio is above the median, determine whether the rate (ratio) is

above the 75th percentile. At the 75th percentile, 75% of the hospitals had lower rates (ratios), and 25% of the hospital had higher rates (ratios).

- Step 5 If the rate (ratio) is above the 75th percentile, determine whether it is above the 90th percentile. If it is, then the rate (ratio) is an outlier, which *may* indicate a problem.

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

- Step 6 If your hospital's rate or ratio is below the median, determine whether the rate (ratio) is below the 25th percentile. At the 25th percentile, 25% of the hospitals had lower rates (ratios), and 75% of the hospitals had higher rates (ratios).
- Step 7 If the rate (ratio) is below the 25th percentile, determine whether it is below the 10th percentile. If the rate is, then it is a low outlier, which may be due to underreporting of infections. If the ratio is below the 10th percentile, it is a low outlier and may be due to infrequent and/or short duration of device use.

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