

**CENTRAL LINE-ASSOCIATED
BLOODSTREAM INFECTIONS IN UTAH
2011 ANNUAL and 2012 INTERIM REPORT**

Utah Department of Health
Division of Disease Control and Prevention
Bureau of Epidemiology

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Introduction

Anyone who has invasive medical treatment, surgery or is hospitalized is potentially at risk of acquiring a healthcare-associated infection (HAI). Various types of invasive devices may be used when patients are ill. Use of such devices can impair patients' natural defenses against germs and the longer these devices are in place, the greater the risk of infection.

One type of invasive device used is a central line catheter. A catheter is a tube placed in a large vein in the neck, chest, or groin that ends at, or close to, the heart to give medication or fluids, collect blood for medical tests or monitor blood flow. Use of these catheters places patients at potential risk for a central line-associated bloodstream infection (CLABSI).

CLABSIs continue to be among the most deadly and costly healthcare-associated infections in the United States. Forty-eight percent of intensive care unit (ICU) patients have central lines. An estimated 82,000 CLABSIs occur in ICUs every year and up to 28,000 deaths were attributable to these infections. The associated cost for each bloodstream infection is estimated to be between \$3,700 and \$29,000.¹

Background

Identifying HAIs requires an organized approach involving several different types of activity. It is important to determine if infections are healthcare-associated or already present upon facility admission. Because of the concerns with these deadly and costly HAIs, beginning in 2008, the Utah Department of Health (UDOH) required facilities to report CLABSI ICU rates for patients older than one year of age. (Rule 386-705, Epidemiology, Healthcare-Associated Infection). Initially, facilities submitted data to the UDOH for the annual HAI report. In 2011, the Centers for Medicare and Medicaid Services (CMS) required facilities to report data to the National Healthcare Safety Network (NHSN) for payment reimbursement.

Previous reports of HAIs published by the UDOH have not identified facilities by name. However, during the 2012 Utah Legislative Session, House Bill (HB) 55 was passed requiring the Utah Department of Health (UDOH) to access and analyze facility-specific NHSN data and publish an annual HAI report for the public in which facilities are identified by name. HB 55 also requires that the UDOH conduct validation activities.

Report Overview

This interim report (May 2013) was developed by the UDOH, in partnership with the UDOH's HAI advisory group, *Utah Healthcare Infection Prevention Governance Committee* (UHIP GC).⁺ In accordance with HB 55, this report compares data for identified facilities. For 2011, this report includes the full year's data. However, for 2012, due to CMS reporting deadlines, the final two quarters of 2012 data are not yet available, and the report only contains data for the first two quarters of 2012. Thus, 2011 and 2012 data in the report do not cover comparable time frames and should not be compared. These data are complete at the time of report generation. A final year-end report for 2012 will be published in October 2013; thereafter, annual year-end reports will be published every October. Future reports will also include all infections required to be reported to NHSN by CMS according to the [CMS Healthcare Facility HAI Reporting Requirements timeline](#).

CLABSI data for 2011 were reported by acute care facilities with intensive care units (ICU). ICU types include trauma, respiratory, cardiac, medical, burn, pediatric, surgical, neonatal and neurosurgical. Facilities are categorized as peer groups based on similar characteristics such as severity of illness of hospitalized patients and length of stay (Tables 2, 3). Peer groups are used for a variety of purposes, including making objective comparisons across healthcare facilities and assessing quality of care.

In this report, peer groups are used to account for differences in the type of patients ICUs treat and to adjust for several risk factors that have been found to be most associated with differences in infection rates. Additionally, this report compares the *actual* number of HAIs to the *expected* number of HAIs based on the national standard for a specific group of patients. This comparison is referred to as the standardized infection ratio (SIR). An SIR greater than 1.0 indicates that more HAIs were observed than predicted, accounting for differences in the types of patients treated; an SIR less than 1.0 indicates that fewer HAIs were observed than predicted.

Prior to 2011, the SIR was not included in the UDOH's annual CLABSI reports. The UDOH identified infection rates of reporting facilities from information submitted to the UDOH, rather than information submitted to the NHSN.⁺⁺ Results show that CLABSIs from 2008 through 2011 in Utah hospitals ranged from a rate of 1.3 to 2.2 per 1,000 central line days with an average rate of 1.7. The information is pertinent because it identifies the current trend for CLABSIs within ICUs in the state of Utah. Recognition of the infection burden is necessary to promote proven interventions and prevention strategies.

⁺The Utah Healthcare Infection Prevention Governance Committee (http://health.utah.gov/epi/HAI/governance_committee.html) is a multi-disciplinary panel of state leaders in patient safety, infectious diseases, and infection control. Membership is comprised of a broad base of care delivery groups across the State and organized under and staffed by the Utah Department of Health.

⁺⁺The expected number of CLABSIs is determined by NHSN and is calculated by multiplying the national CLABSI rate from patients with central lines by the observed number of central line days for each ICU type.

In 2011, 96 CLABSIs were reported in Utah and associated with 71,567 central line catheter days. Compared to the national standard, patients in Utah hospitals had 37 percent fewer CLABSIs in 2011 than would have been predicted. Twenty-five facilities met the criteria for required CLABSI reporting. Of these 25, three facilities had significantly fewer infections, and one facility had significantly higher infections compared to what is expected nationally. Eleven facilities did not have enough usage of central line catheter days to provide an accurate assessment of their performance² (Figure 1).

In Utah, the most common pathogens (germs) during 2011 associated with CLABSIs were coagulase-negative staphylococci (CoNS), *Staphylococcus aureus*, and *Candida non-albicans*. It is important to note that methicillin-resistant *Staphylococcus aureus* (MRSA) was not one of the most commonly reported CLABSI pathogens in Utah.

Data Quality Validation

A validation audit was conducted in January 2013 based on standards recommended by the UHIP GC. Validation was conducted by UDOH HAI Prevention Program staff, which conducted site visits and interviewed the infection prevention and control program staff of five facilities. The interview with staff included discussion on ways to improve standardized data collection. The focus of the validation was to determine how NHSN CLABSI standards were interpreted and applied to data collection.

The validation audit revealed that interpretation of NHSN standards varied between facilities. These standards are challenging because NHSN definitions are complex, sometimes requiring individual interpretation, and may involve tracking and linking information from multiple staff members and sources (i.e., laboratory, admissions and clinical data), in paper and/or electronic format. While all facility infection preventionists (IP) appeared to understand the NHSN CLABSI definitions appropriately, difficulties with applying the NHSN standards were noted in several facilities, which could have led to over or under counting of their facility's central line-associated bloodstream infections.

Conclusion

Users of this report should interpret this data with caution. Validation could only be performed on a small sample of reporting healthcare facilities due to resource and time constraints. Therefore, these findings may not fully represent NHSN data quality throughout the state. Conclusions regarding the quality of healthcare provided by facilities reporting CLABSIs that occur in ICUs should not be based on these data alone. Consumers should always consult with their trusted medical providers, insurance carriers, and reputable Web sites, such as the [CMS Hospital Compare](#) when considering healthcare options.

Figure 1. ICU central line-associated bloodstream infections in Utah, 2011⁺

| HOSPITAL | CLABSIs |
|-------------------------------------|---------|
| American Fork Hospital | ■ |
| Davis Hospital and Medical Center | ◆ |
| Dixie Regional Hospital | ■ |
| Intermountain Medical Center | ■ |
| Jordan Valley Hospital | ■ |
| LDS Hospital | ■ |
| McKay Dee Hospital Center | ■ |
| Ogden Regional Medical Center | ■ |
| Primary Children's Medical Center | ■ |
| Salt Lake Regional Medical Center | ■ |
| St. Mark's Hospital | ● |
| Timpanogos Regional Hospital | ■ |
| University Hospital | ● |
| Utah Valley Regional Medical Center | ● |
| State of Utah | ● |

| | |
|---|---|
| ● | Significantly fewer infections than national standard |
| ■ | Not significantly different from national standard |
| ◆ | Significantly more infections than national standard |

⁺Source: NHSN data. Only hospitals with more than 50 central line days or more than 1 expected CLABSI event are shown. Omitted facilities include Alta View Hospital, Ashley Regional Medical Center, Cache Valley Specialty Hospital, Castlevue Hospital, Lakeview Hospital, Logan Regional Hospital, Mountain View Hospital, Mountain West Medical Center, Riverton Hospital, Uintah Basin Medical Center, and Valley View Medical Center.

Definitions

The following definitions are used in this report.

- 1. Central Line** - A catheter (tube) placed in a large vein in the neck, chest, or groin that ends at, or close to, the heart to give medication or fluids, collect blood for medical tests or monitor blood flow.
- 2. Central Line Days** - Refers to the number of patients with a central line in place. Central line days are calculated by recording the number of patients who have a central line for each day of the month at the same time each day for a specific care location. At the end of the month, the sum of all days is recorded. For purposes of this report, the total is recorded as the sum of all days in a year. Patients with more than one central line are counted as one central line day.
- 3. Central Line-Associated Bloodstream Infection (CLABSI)** - A serious infection that occurs when germs (usually bacteria) that are not related to another infection enter the bloodstream through the central line catheter (tube).
- 4. Confidence Interval** - A confidence interval represents a possible range of values in which there is a 95 percent probability that the true value is within this range.
- 5. Healthcare-Associated Infection (HAI)** - An infection that develops in a person who is cared for in any setting where healthcare is delivered (i.e., acute care hospital, skilled nursing facility, dialysis center, etc.) that was not developing or present at the time of admission to that healthcare setting.
- 6. Intensive Care Unit (ICU)** - An area in the hospital where severely ill patients are closely monitored and receive advanced life support.
- 7. Hospital Facility Types:**
 - Multi-Specialty Hospitals** - Hospitals with specialized ICUs, such as thoracic, trauma, respiratory, cardiac, medical, burn, pediatric, surgical, and neurosurgical.
 - Medical/Surgical Hospitals** - Hospitals that have an ICU combining medical and surgical care.
- 8. Pathogen** - An agent that causes disease, such as a bacterium, virus or fungus.

9. Peer Group - A risk-adjusted group of hospitals determined by the type and complexity of patients cared for in the hospital or ICU.

10. Standardized Infection Ratio (SIR) - A statistic used to calculate, track and interpret the number of new HAIs. The SIR is determined by comparing the actual number of HAIs to the expected number of HAIs for a specific group of patients. The expected number of CLABSIs is determined by NHSN and is calculated by multiplying the national CLABSI rate from patients with central lines by the observed number of central line days for each ICU type.

Table 1. Overview of licensed hospitals in Utah, 2011⁺

| Utah licensed hospitals⁺⁺ | 2011 |
|---|-------------|
| Number of licensed hospitals in Utah: | 60 |
| Number of licensed hospitals with ICUs: | 25 |
| Number of licensed hospitals with ICUs that reported: | 25 |
| Number of licensed hospitals with ICUs with less than 50 central line days: | 11 |
| Number of central line-associated bloodstream infection events:¹ | 96 |
| Number of expected central line-associated bloodstream infection events:² | 153 |
| State rate for central line-associated bloodstream infections:³ | 1.34 |

*Source: UDOH data.

⁺⁺Utah licensed hospitals include: acute care, long-term acute care, critical access, rehabilitation, psychiatric, government and children's hospitals.

¹Number of central line-associated bloodstream infection events: the total number of central line-associated bloodstream infections reported per year.

²Number of expected central line-associated bloodstream infection events: the number of central line-associated bloodstream infection events anticipated to occur in an ICU per year based on the baseline United States experience.

³State rate for central line-associated bloodstream infections: the total number of central line-associated bloodstream infections in Utah that occurred per 1,000 central line days.

NOTE: Final 2012 data will be reported in the 2012 year-end report.

Table 2. CLABSI data by peer group, Utah, 2011⁺

| | Number of central line days ¹ | Number of CLABSI events ² | Expected number of CLABSI events ³ | CLABSI rate per 1,000 central line days ⁴ | Standardized Infection Ratio ⁵ | 95% Confidence Interval ⁶ |
|-------------------------------------|--|--------------------------------------|---|--|---|--------------------------------------|
| State of Utah Overall | | | | | | |
| | 71,567 | 96 | 152.96 | 1.34 | 0.63 | 0.51 - 0.77 |
| Peer Group 1 | | | | | | |
| Intermountain Medical Center | 14,215 | 24 | 32.19 | 1.68 | 0.75 | 0.48 - 1.11 |
| University Hospital | 13,585 | 19 | 39.30 | 1.40 | 0.48 | 0.29 - 0.76 |
| Peer Group 2 | | | | | | |
| McKay Dee Hospital Center | 3,816 | 6 | 6.67 | 1.57 | 0.90 | 0.33 - 1.96 |
| Salt Lake Regional Medical Center | 1,689 | 2 | 2.53 | 1.18 | 0.79 | 0.10 - 2.85 |
| St. Mark's Hospital | 3,036 | 0 | 4.94 | 0 | 0 | 0 - 0.75 |
| Utah Valley Regional Medical Center | 10,249 | 4 | 18.90 | 0.39 | 0.21 | 0.06 - 0.54 |
| Peer Group 3 | | | | | | |
| Davis Hospital and Medical Center | 910 | 8 | 1.60 | 8.79 | 4.99 | 2.16 - 9.84 |
| Jordan Valley Medical Center* | 1,970 | 3 | 2.77 | 1.52 | 1.08 | 0.22 - 3.17 |
| LDS Hospital | 1,652 | 2 | 3.47 | 1.21 | 0.58 | 0.07 - 2.08 |
| Lakeview Hospital | 610 | 1 | 0.92 | 1.64 | N/A [‡] | N/A [‡] |
| Mountain View Hospital | 223 | 0 | 0.34 | 0 | N/A [‡] | N/A [‡] |
| Ogden Regional Medical Center | 2,254 | 1 | 3.75 | 0.44 | 0.27 | 0.01 - 1.49 |

⁺Source: NHSN data.

*Includes Pioneer Valley Hospital.

[‡]SIR estimates are not reliable when the expected number is less than one. Consequently, SIRs are not provided for healthcare facilities with an expected number less than one.

¹Number of central line days: the total number of days that a patient has a central line.

²Number of central line-associated bloodstream infection events: the total number of central line-associated bloodstream infections reported per year.

³Expected number of central line-associated bloodstream infection events: the number of central line-associated bloodstream infection events anticipated to occur in an ICU per year.

⁴Central line-associated bloodstream infection rate: the total number of central line-associated bloodstream infections that occurred per 1,000 central line days.

⁵Standardized Infection Ratio: compares the total number of central line-associated bloodstream infection events in a hospital's ICU to a national benchmark. Rates are adjusted based on the type and size of a hospital or ICU.

⁶Confidence Interval: a possible range of values in which there is a 95% probability that the true value is within this range.

Table 2 (continued). CLABSI data by peer group, Utah, 2011⁺

| | Number of central line days ¹ | Number of CLABSI events ² | Expected number of CLABSI events ³ | CLABSI rate per 1,000 central line days ⁴ | Standardized Infection Ratio ⁵ | 95% Confidence Interval ⁶ |
|---|--|--------------------------------------|---|--|---|--------------------------------------|
| State of Utah Overall | | | | | | |
| | 71,567 | 96 | 152.96 | 1.34 | 0.63 | 0.51 - 0.77 |
| Peer Group 4 | | | | | | |
| Alta View Hospital | 369 | 0 | 0.55 | 0 | N/A [‡] | N/A [‡] |
| American Fork Hospital | 933 | 1 | 1.40 | 1.07 | 0.71 | 0.02 - 3.98 |
| Riverton Hospital | 153 | 0 | 0.23 | 0 | N/A [‡] | N/A [‡] |
| Timpanogos Regional Hospital | 1,845 | 0 | 2.43 | 0 | 0 | 0 - 1.52 |
| Peer Group 5 | | | | | | |
| Ashley Regional Medical Center | 25 | 0 | 0.04 | 0 | N/A [‡] | N/A [‡] |
| Castleview Hospital | 34 | 0 | 0.05 | 0 | N/A [‡] | N/A [‡] |
| Dixie Regional Medical Center | 2716 | 1 | 4.30 | 0.37 | 0.23 | 0.01 - 1.30 |
| Logan Regional Hospital | 423 | 0 | 0.79 | 0 | N/A [‡] | N/A [‡] |
| Valley View Medical Center | 235 | 0 | 0.45 | 0 | N/A [‡] | N/A [‡] |
| Peer Group 6 | | | | | | |
| Mountain West Medical Center | 89 | 0 | 0.17 | 0 | N/A [‡] | N/A [‡] |
| Uintah Basin Medical Center | 61 | 0 | 0.09 | 0 | N/A [‡] | N/A [‡] |
| Non-comparable Specialty Facilities* | | | | | | |
| Cache Valley Specialty Hospital | 10 | 0 | 0.02 | 0 | N/A [‡] | N/A [‡] |
| Primary Children's Medical Center | 10,465 | 24 | 25.34 | 2.29 | 0.95 | 0.61 - 1.41 |

⁺Source: NHSN data.

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*Facilities listed here do not meet the standards to be listed in Peer Groups 1 – 6. Rates of these facilities should not be compared to each other or to other facilities.

¹Number of central line days: the total number of days that a patient has a central line.

²Number of central line-associated bloodstream infection events: the total number of central line-associated bloodstream infections reported per year.

³Expected number of central line-associated bloodstream infection events: the number of central line-associated bloodstream infection events anticipated to occur in an ICU per year.

⁴Central line-associated bloodstream infection rate: the total number of central line-associated bloodstream infections that occurred per 1,000 central line days.

⁵Standardized Infection Ratio: compares the total number of central line-associated bloodstream infection events in a hospital's ICU to a national benchmark. Rates are adjusted based on the type and size of a hospital or ICU.

⁶Confidence Interval: a possible range of values in which there is a 95% probability that the true value is within this range.

Table 3. CLABSI data by peer group, Utah, January – June 2012⁺

| | Number of central line days ¹ | Number of CLABSI events ² | Expected number of CLABSI events ³ | CLABSI rate per 1,000 central line days ⁴ | Standardized Infection Ratio ⁵ | 95% Confidence Interval ⁶ |
|--|--|--------------------------------------|---|--|---|--------------------------------------|
| State of Utah Overall⁷ | | | | | | |
| | N/A | N/A | N/A | N/A | N/A | N/A |
| Peer Group 1 | | | | | | |
| Intermountain Medical Center | 7,148 | 9 | 16.54 | 1.26 | 0.54 | 0.25-1.03 |
| University Hospital | 6,083 | 12 | 17.89 | 1.97 | 0.67 | 0.35-1.17 |
| Peer Group 2 | | | | | | |
| McKay Dee Hospital Center | 1,818 | 3 | 3.14 | 1.65 | 0.95 | 0.20-2.79 |
| Salt Lake Regional Medical Center | 848 | 4 | 1.27 | 4.72 | 3.15 | 0.86-8.05 |
| St. Mark's Hospital | 1,193 | 0 | 2.06 | 0 | 0 | 0-1.79 |
| Utah Valley Regional Medical Center | 5,514 | 6 | 9.89 | 1.09 | 0.61 | 0.22-1.32 |
| Peer Group 3 | | | | | | |
| Davis Hospital and Medical Center | 386 | 2 | 0.70 | 5.18 | N/A [‡] | N/A [‡] |
| Jordan Valley Medical Center* | 1,185 | 1 | 1.76 | 0.84 | 0.57 | 0.01-3.16 |
| Lakeview Hospital | 362 | 0 | 0.54 | 0 | N/A [‡] | N/A [‡] |
| LDS Hospital | 950 | 3 | 2.00 | 3.16 | 1.50 | 0.31-4.40 |
| Mountain View Hospital | 179 | 1 | 0.27 | 5.59 | N/A [‡] | N/A [‡] |
| Ogden Regional Medical Center | 1,055 | 2 | 2.03 | 1.90 | 0.98 | 0.12-3.55 |

⁺Source: NHSN data. The complete 2012 Utah data is not yet available; therefore, the first two quarters of 2012 should not be compared to the 2011 complete year data.

*Includes Pioneer Valley Hospital.

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Table 3 (continued). CLABSI data by peer group, Utah, 2012⁺

| | Number of central line days ¹ | Number of CLABSI events ² | Expected number of CLABSI events ³ | CLABSI rate per 1,000 central line days ⁴ | Standardized Infection Ratio ⁵ | 95% Confidence Interval ⁶ |
|---|--|--------------------------------------|---|--|---|--------------------------------------|
| State of Utah Overall⁷ | | | | | | |
| | N/A | N/A | N/A | N/A | N/A | N/A |
| Peer Group 4 | | | | | | |
| Alta View Hospital | 169 | 0 | 0.25 | 0 | N/A [‡] | N/A [‡] |
| American Fork Hospital | 377 | 0 | 0.57 | 0 | N/A [‡] | N/A [‡] |
| Riverton Hospital | 64 | 0 | 0.01 | 0 | N/A [‡] | N/A [‡] |
| Timpanogos Regional Hospital | 697 | 0 | 0.87 | 0 | N/A | N/A |
| Peer Group 5 | | | | | | |
| Ashley Regional Medical Center | 8 | 0 | 0.01 | 0 | N/A [‡] | N/A [‡] |
| Castleview Hospital | 18 | 0 | 0.03 | 0 | N/A [‡] | N/A [‡] |
| Dixie Regional Medical Center | 1,121 | 0 | 1.79 | 0 | 0 | 0-2.15 |
| Logan Regional Hospital | 242 | 0 | 0.43 | 0 | N/A [‡] | N/A [‡] |
| Valley View Medical Center | 121 | 0 | 0.23 | 0 | N/A [‡] | N/A [‡] |
| Peer Group 6 | | | | | | |
| Mountain West Medical Center | 49 | 1 | 0.09 | 20.4 | N/A [‡] | N/A [‡] |
| Uintah Basin Medical Center | 22 | 0 | 0 | 0 | N/A [‡] | N/A [‡] |
| Non-comparable Specialty Facilities* | | | | | | |
| Cache Valley Specialty Hospital | 1 | 0 | 0 | 0 | 0 | N/A [‡] |
| Primary Children's Medical Center | 5,764 | 13 | 13.81 | 2.26 | 0.94 | 0.50-1.61 |

⁺Source: NHSN data. The complete 2012 Utah data is not yet available; therefore, the first two quarters of 2012 should not be compared to the 2011 complete year data.

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⁵Standardized Infection Ratio: compares the total number of central line-associated bloodstream infection events in a hospital's ICU to a national benchmark. Rates are adjusted based on the type and size of a hospital or ICU.

⁶Confidence Interval: a possible range of values in which there is a 95% probability that the true value is within this range.

⁷The complete 2012 Utah data is not yet available.

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1. How-to-Guide: Prevent Central Line-Associated Bloodstream Infections. Cambridge, MA: Institute for Healthcare Improvement; 2012.
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