



DELAWARE HEALTH AND SOCIAL SERVICES

Division of Public Health

Bureau of Epidemiology

**Standardized Infection Ratios and Rates for Central Line Associated Bloodstream
Infections (CLABSIs) and Central Line Utilization Ratios
Delaware Intensive Care Units
April – June, 2011**

Delaware Health and Social Services
Division of Public Health
Health Promotion and Disease Prevention
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Notes:

For a full description of the background and methodology for this report, please refer to Delaware Hospital Infection Reporting Data: 2010, which can be found at the following website:

http://www.dhss.delaware.gov/dhss/dph/epi/files/hai_report_2010.pdf

The data in this report were accurate at the time prepared and do not reflect updates based on hospital findings that may have occurred subsequently.

Standardized Infection Ratio (SIR) Analyses

A new addition to the 2011 editions of this report is the Standardized Infection Ratio (SIR). The SIR provides an overall score for central line-associated bloodstream infections (CLABSIs) at each hospital based on the expected or predicted number of CLABSIs. One advantage of the SIR is that the observed and expected numbers can each be pooled to calculate an aggregate SIR for the entire state.

Calculation:

The SIR is the ratio of the observed number of CLABSIs to the expected number of CLABSIs. The expected or predicted number of infections is calculated based on national-level data from the National Health and Safety Network (NHSN). Expected numbers are adjusted by type of patient-care location, hospital affiliation with a medical school and bed size of the location. The SIR is calculated only if the expected number of CLABSIs is greater than or equal to one. If the expected number is less than one, the central line count is too low to calculate an accurate SIR.

Interpretation:

A hospital's SIR value is compared to 1.0. An SIR of 1.0 indicates that the number of CLABSIs observed is no different than that expected based on the experience of the NHSN comparison population. If the SIR value is greater than 1.0, there are more CLABSIs than expected and if the SIR value is less than 1.0, fewer CLABSIs occurred than expected.

Since the SIR is an estimate based on calculations of reported data, confidence intervals (CIs) are calculated to allow for accurate interpretation. The 95% confidence interval provides a range of values in which the SIR will fall 95% of the time. If the confidence interval includes the value of 1.0, the SIR should be interpreted as if it was 1.0; that is there is no statistical difference between the observed and expected numbers of infections. If the confidence interval of the SIR does not include 1.0 then the number of observed infections is either significantly higher or lower than the number expected. In these instances the SIR is said to be statistically different from 1.0 at the 5% probability level. The probability level that determines statistical significance depends upon several factors, including the number of central line days, number of infections and the statistical testing methodology.

Results:

- In six of the eight hospitals, the SIR is not calculated because the expected number of CLABSIs is less than one.
- In two hospitals the observed number of CLABSIs is not statistically different than that expected.
- When data for all eight hospitals are combined, the observed number of CLABSIs is significantly lower than the expected number of CLABSIs: SIR = 0.13; 1 observed versus 7.9 expected; 95% CI = 0.00, 0.71.

CLABSI Rate Analyses

The CLABSI rate is calculated per 1,000 central line-days by dividing the number of CLABSIs by the number of central line-days and multiplying the result by 1,000.

Results: In all eight hospitals, the CLABSI rate is not statistically different than the NHSN rate.

Central Line Utilization Ratio Analyses

A central line utilization ratio is also calculated. This measure allows hospitals to determine if use of central lines in their ICU setting is greater than, less than or equal to the NHSN benchmark usage rates for like units.

Results:

- In six hospitals, the central line utilization ratio is statistically higher than the NHSN ratio.
- In one hospital, the central line utilization ratio is statistically lower than the NHSN ratio.
- In one hospital, the central line utilization ratio is not statistically different than the NHSN ratio.

**Standardized Infection Ratios (SIRs) with 95% Confidence Intervals for
Central Line Associated Bloodstream Infections (CLABSIs) in Delaware by Hospital,
2nd Quarter (April – June) 2011**

Hospital	Number of Infections (CLABSIs)	Number of Central Line Days¹	Expected Number of Infections²	SIR³	95% Confidence Interval⁴	P value⁵	Interpretation
A. I. duPont Hospital for Children	1	955	2.87	0.35	0.01, 1.95	0.2202	# of infections is not statistically different than expected
Christiana Care Health System-Christiana Hospital	0	1,177	2.24	0.00	---, 1.65	0.1069	# of infections is not statistically different than expected
Christiana Care Health System – Wilmington Hospital	0	187	0.28	---	---	---	---
St. Francis Hospital	0	360	0.68	---	---	---	---
BayHealth Medical Center – Kent General Hospital	0	297	0.45	---	---	---	---
BayHealth Medical Center-Milford Memorial Hospital	0	176	0.26	---	---	---	---
Beebe Medical Center	0	453	0.68	---	---	---	---
Nanticoke Memorial Hospital	0	274	0.41	---	---	---	---
All 8 Hospitals	1	3,879	7.87	0.13	0.00, 0.71	0.0034	# of infections is statistically lower than expected

¹ The total number of days of exposure to the device (central line) by all of the patients in the selected population (ICU) during the selected time period (July - September 2011).

² Calculated by NHSN using pooled data from like hospitals

³ The SIR is calculated only if the expected number of CLABSIs is greater than or equal to one. If the expected number is less than one, the central line day count is too low to calculate an accurate SIR.

⁴ Lower and upper limits of 95% confidence interval

⁵ The probability value from a significance test comparing the observed number of hospital infections to the expected number of infections. Significance criterion is $p < 0.05$ (95% confidence)

Central Line Associated Bloodstream Infection (CLABSI) Rates in Intensive Care Units
Delaware, 2nd Quarter (April - June) 2011 (Delaware statistics)
And as reported by the National Health Safety Network (2009) (NHSN statistics)

Hospital	Number of Infections	Number of Central Line days ⁶	Hospital CLABSI Rate/1000 ⁷	NHSN CLABSI Rate/1000 ⁸	CLABSI Rate Percentile ⁹	p value ¹⁰	Interpretation ¹¹
A. I. duPont Hospital for Children	1	955	1.0	2.2	40%	0.3773	Rate is not statistically different than NHSN rate
Christiana Care Health System-Christiana Hospital	0	1,177	0.0	1.6	25%	0.1571	Rate is not statistically different than NHSN rate
Christiana Care Health System – Wilmington Hospital	0	187	0.0	1.4	50%	0.7674	Rate is not statistically different than NHSN rate
St. Francis Hospital	0	360	0.0	1.6	25%	0.5677	Rate is not statistically different than NHSN rate
BayHealth Medical Center – Kent General Hospital	0	297	0.0	1.4	50%	0.6568	Rate is not statistically different than NHSN rate
BayHealth Medical Center – Milford Memorial Hospital	0	176	0.0	1.4	50%	0.7795	Rate is not statistically different than NHSN rate
Beebe Medical Center	0	453	0.0	1.3	10%	0.5614	Rate is not statistically different than NHSN rate
Nanticoke Memorial Hospital	0	274	0.0	1.4	50%	0.6785	Rate is not statistically different than NHSN rate

⁶ The total number of days of exposure to the device (central line) by all of the patients in the selected population (ICU) during the selected time period (January – March 2011).

⁷ (Infections/device-days) x 1000

⁸ Rate for all participating NHSN hospitals of that location type (the patient care area to which a patient is assigned while receiving care while in the facility).

⁹ An estimate of where the local facility rate falls on the distribution of the rate for all NHSN facilities of that type of location. For example, a percentile of 75% means that 75% of NHSN hospitals were below this rate.

¹⁰ The probability value from a significance test comparing the local hospital to the NHSN aggregate rate.

^ySignificance criterion is p<0.05 (95% confidence)

Central Line Utilization Ratios in Intensive Care Units
Delaware, 2nd Quarter (April - June) 2011 (Delaware statistics)
And as reported by the National Health Safety Network (2009) (NHSN statistics)

Hospital	Number of Central Line Days ¹²	Number of Patient Days ¹³	Utilization Ratio ¹⁴	NHSN Utilization Ratio ¹⁵	Utilization Ratio Percentile ¹⁶	P value ¹⁷	Interpretation ¹⁸
A. I. duPont Hospital for Children	955	1,429	0.67	0.50	91%	0.0000	Utilization ratio is significantly higher than NHSN ratio
Christiana Care Health System-Christiana Hospital	1,177	1,805	0.65	0.43	86%	0.0000	Utilization ratio is significantly higher than NHSN ratio
Christiana Care Health System – Wilmington Hospital	187	437	0.43	0.39	59%	0.0462	Utilization ratio is significantly higher than NHSN ratio
St. Francis Hospital	360	563	0.64	0.43	74%	0.0000	Utilization ratio is significantly higher than NHSN ratio
BayHealth Medical Center – Kent General Hospital	297	959	0.31	0.39	43%	0.0000	Utilization ratio is significantly lower than NHSN ratio
BayHealth Medical Center – Milford Memorial Hospital	176	434	0.41	0.39	59%	0.2360	Utilization ratio is not significantly different than NHSN ratio
Beebe Medical Center	453	827	0.55	0.48	44%	0.0000	Utilization ratio is significantly higher than NHSN ratio
Nanticoke Memorial Hospital	274	399	0.69	0.39	91%	0.0000	Utilization ratio is significantly higher than NHSN ratio

¹² The total number of days of exposure to the device (central line) by all of the patients in the selected population (ICU) during the selected time period (July - September 2011).

¹³ The total number of days that patients are in the location during the selected time period.

¹⁴ Central line days/patient days

¹⁵ Ratio for all participating NHSN hospitals of that location type (the patient care area to which a patient is assigned while receiving care while in the facility).

¹⁶ An estimate of where the local facility ratio falls on the distribution of the ratio for all facilities of that type of location. For example, a percentile of 75% means that 75% of NHSN hospitals were below this ratio.

¹⁷ The probability value from a significance test comparing the local hospital to the NHSN aggregate ratio.

¹⁸ Significance criterion is $p < 0.05$ (95% confidence)