

Trends in Central Line-associated Bloodstream Infection (CLABSI) Reporting in Illinois Acute Care and Critical Access Hospitals, 2009 – 2017

Since October 2008, Illinois hospitals have been reporting CLABSI data from adult intensive care units (ICUs) to the Illinois Department of Public Health through the Centers for Disease Control and Prevention’s National Healthcare Safety Network (NHSN). Reporting of CLABSI data from pediatric ICUs (PICUs) and neonatal ICUs (NICUs) commenced in October 2009. This report focuses on trends in NHSN CLABSI data, by type of ICU, across Illinois acute care and critical access hospitals from 2009 – 2017.

Standardized Infection Ratio (SIR)

NHSN uses risk models that determine the predicted number of CLABSI events at a facility based on the national baseline data, adjusting for statistically significant risk factors. The CLABSI SIR is a measure that compares a facility’s burden of CLABSI events to that of the national referent population. A facility’s SIR is calculated as the actual, or observed, number of healthcare-associated incident cases reported by the facility divided by the predicted number of infections.

The corresponding 95% confidence interval (CI) is a statistical measure that shows a range of estimated possible values for the SIR. The upper and lower bounds of the interval are used to determine the statistical significance and precision of the SIR. The SIR and 95% CI are interpreted as follows:

- If the 95% CI includes 1 (i.e., lower bound is <1.00 and upper bound is >1.00), the hospital's number of infections is **similar** to (not significantly different from) the predicted number.
- If the SIR is >1.0 and the 95% CI does not include 1, the hospital had a significantly **higher** number of infections than predicted.
- If the SIR is <1.0 and the 95% CI does not include 1, the hospital had a significantly **lower** number of infections than predicted.

NHSN 2015 Baseline

Before 2015, the CLABSI SIR for acute care and critical access settings was calculated using the NHSN-published device-associated national pooled means (2006-2008 baseline time period) for each location type (e.g., adult ICU vs PICU). Starting with 2015 data, the CDC modified the NHSN risk models and updated the national referent population (referred to as the “2015 baseline”). Additionally, NHSN started using four separate statistical models based on facility type: acute care hospital, critical access hospital, inpatient rehabilitation facility, and long-term acute care hospital.

Due to the difference in baseline data and risk adjustment factors, SIRs from 2009 – 2014 are not directly comparable to those from 2015 and beyond. The 2009 – 2014 SIRs under the previous baseline are included and displayed in this report for contextual purpose only and as an indicator of past progress. SIRs under the 2015 baseline will be used in the current and future trend report updates.

Historical trend reports may be found on the Illinois Hospital Report Card website (State Reports of Current Interest):

http://www.healthcarereportcard.illinois.gov/contents/view/State_Reports_of_Current_Interest

CLABSI Risk Adjustment Factors

Under the 2015 baseline, the CLABSI risk model for acute care hospitals (non-NICU locations) is adjusted for: the CDC location type, medical school affiliation, facility bed size, and facility type. For acute care hospital NICUs, only birthweight was a statistically significant predictor. None of the risk factors were significant predictors of CLABSI in critical access settings. Therefore, the predicted number of events is calculated using the overall (unadjusted) national CLABSI experience in critical access hospitals.

Additional information regarding these CLABSI risk models and SIR calculations can be found at: <https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sir-guide.pdf>

Summary Tables and Results

Table 1 summarizes CLABSIs in Illinois acute care hospitals in 2017. Across all acute care ICUs, there were 318 CLABSIs reported compared to 458 predicted, for an SIR of 0.69 (95% CI: 0.621, 0.774). Adult ICUs and NICUs saw significantly fewer infections compared to the 2015 national referent population (32% and 49%, respectively). Although PICUs saw 11% fewer CLABSIs than predicted, this was not a statistically significant result.

Illinois critical access settings reported zero CLABSIs among 15 adult ICUs in 2017 (Table 2). Because these hospitals had so few central line days, the predicted number of CLABSIs was less than one and an SIR could not be calculated. Therefore, no statistical conclusion could be reached.

Figures 1 – 3 show the trends of CLABSI SIRs in acute care hospitals from 2009 – 2017. Reporting years 2009 – 2014 are based on the 2006-2008 national baseline and include data from acute care and critical access settings combined. The 2015 – 2017 SIRs are based on the 2015 baseline and include acute care only because SIRs could not be calculated for critical access. SIRs calculated under the old baseline are not comparable to those under the new baseline, so blue vertical lines in the figures denote a break between when the old versus new baselines were used.

Table 1. CLABSIs in Illinois acute care hospitals, by type of intensive care unit (ICU), 2017

ICU Type	Number of Units Reporting	Number of CLABSIs		Standardized Infection Ratio (SIR)	95% Confidence Interval (SIR)		Statistical Interpretation
		Observed	Predicted		Lower	Upper	
All ICU Combined	247	318	458	0.69	0.621	0.774	Lower
Adult ICU	184	195	287	0.68	0.588	0.779	Lower
Neonatal ICU	43	39	76	0.51	0.370	0.694	Lower
Pediatric ICU	20	42	47	0.89	0.648	1.188	Similar

Table 2. CLABSIs in Illinois critical access hospital ICUs, 2017

ICU Type	Number of Units Reporting	Number of CLABSIs		Standardized Infection Ratio (SIR)	95% Confidence Interval (SIR)		Statistical Interpretation
		Observed	Predicted		Lower	Upper	
Adult ICU	15	0	0.15	.	-	-	No conclusion

Figure 1. Trend of CLABSI SIRs in Illinois hospitals, adult ICUs, 2009 – 2017

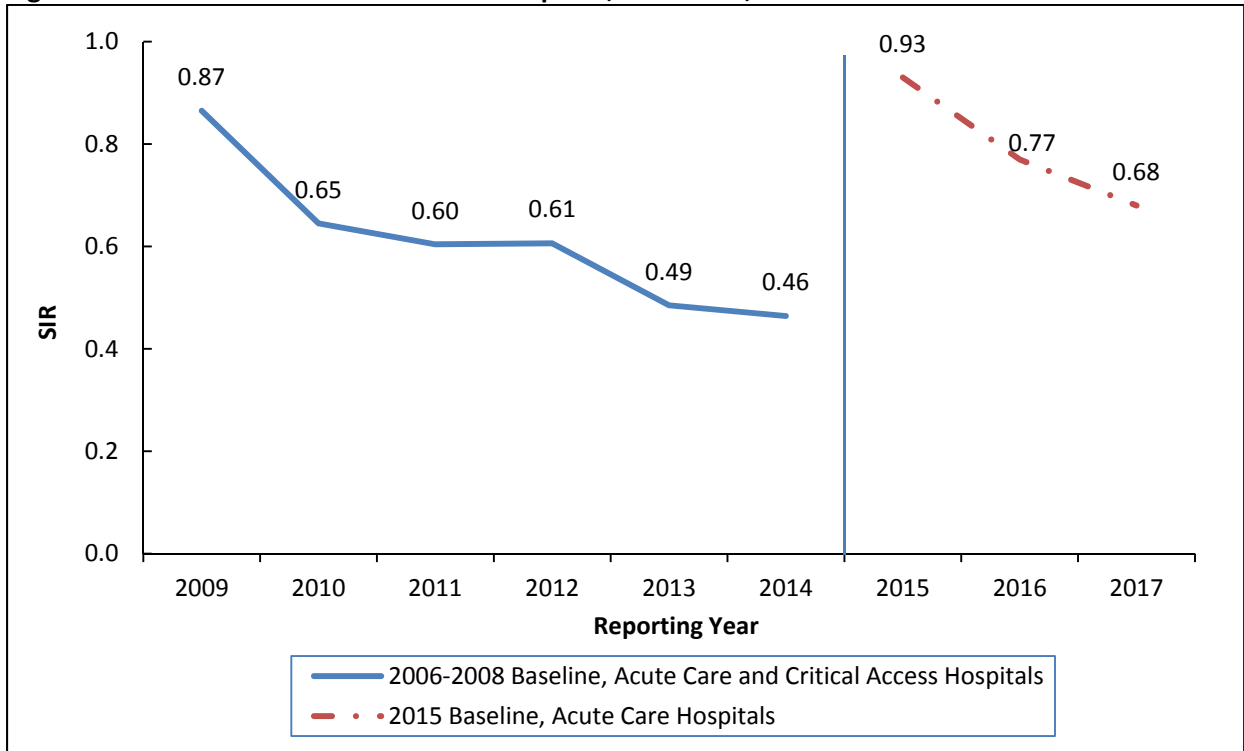


Figure 2. Trend of CLABSI SIRs in Illinois acute care hospitals, neonatal ICUs, 2009 – 2017

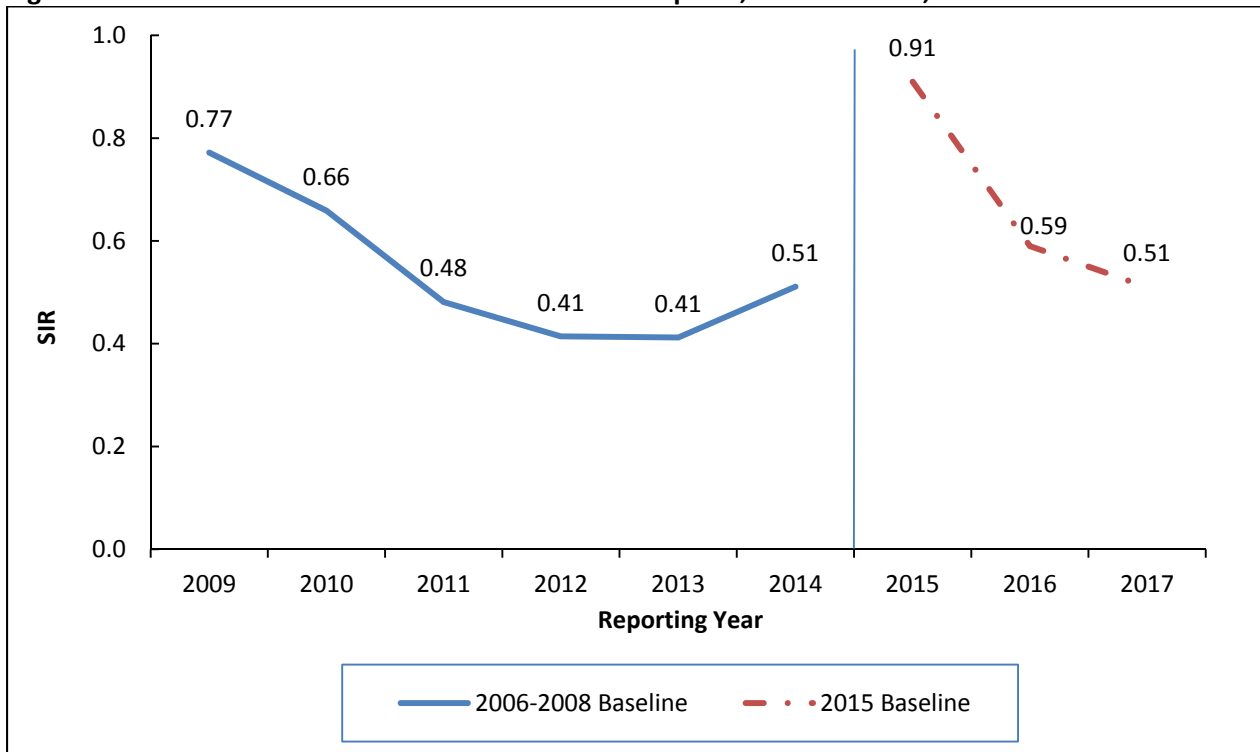
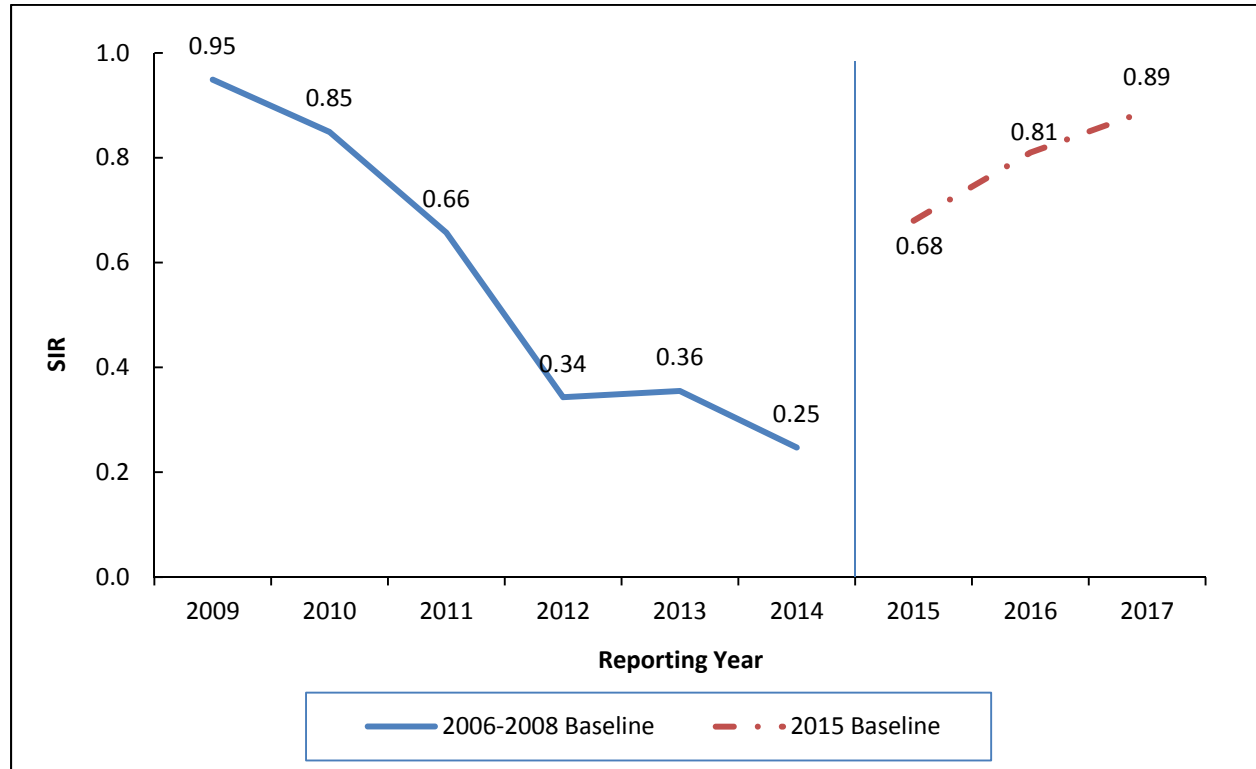


Figure 3. Trend of CLABSI SIRs in Illinois acute care hospitals, pediatric ICUs, 2009 – 2017



Summary

Since 2009, the CLABSI SIRs in Illinois acute care hospitals have been lower than or similar to those of the national referent population. This trend continues in 2017, in which the SIRs for adult ICUs (0.68) and NICUs (0.51) were statistically significantly lower than the 2015 baseline. Comparative analysis of Illinois CLABSI SIRs between 2016 and 2017 showed a decrease of 11.6% in adult ICUs and 13.5% in NICUs. However, neither year-to-year comparison was statistically significant. Overall, Illinois acute care hospitals have made measurable progress toward decreasing CLABSI events in their adult and neonatal ICUs over the past 8 years.

The Illinois PICU SIR in 2017 was similar to that of the national referent population. Comparative analysis of 2016 vs. 2017 PICU SIRs showed a non-significant increase of 9.2%. Due to the smaller number of central line days among PICUs, the SIRs may be unstable from year to year. Small absolute changes in the number of observed infections could have a large effect on the SIR. For example, there appears to be a jump in SIR from 2015 – 2017, but this was due to an absolute increase of 13 cases.

Due to the small number of central line days in critical access hospitals, these settings may not see SIRs calculated for their adult ICUs. However, in 2017, they successfully achieved zero CLABSIs, and they should strive to maintain this level of prevention.