IDPH
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Trends in Central Line-associated Bloodstream Infection (CLABSI) Reporting in Illinois Acute Care and Critical Access Hospitals, 2009 - 2016

Illinois hospitals have been reporting CLABSI data from adult intensive care units (ICU) to the Illinois Department of Public Health (IDPH) using the CDC's National Healthcare Safety Network (NHSN) since October, 2008. Reporting of CLABSI data from both pediatric ICUs (PICU) and neonatal ICUs (NICU) commenced in October, 2009. This report focuses on trends in NHSN CLABSI aggregate data from acute care and critical access hospitals from 2009 – 2016.

Standardized Infection Ratio (SIR)

The standardized infection ratio (SIR) is a measure that compares a facility's burden of CLABSI events to a predicted number based on a national referent population. It is a risk-adjusted summary statistic used to measure the relative difference in healthcare-associated infections (HAI) during a given reporting period compared to that of a national referent population. The SIR adjusts for risk factors found to be significant predictors of CLABSI incidence in a facility.

The SIR is the ratio of the actual number of HAIs reported to what would be predicted, given the standard population.

- If the SIR value is greater than 1.0, there are more infections than predicted.
- If the SIR value is less than 1.0, then fewer infections occurred than predicted.
- If the facility SIR is 1.0, then the number of observed infections is the same as or similar to the predicted number.

The three categories summarizing how a hospital compares to the national infection data are highlighted below:

- Statistically fewer (Lower) infections than predicted based on national infection data;
- Statistically similar (Similar) infections as predicted based on the national infection data; or
- Statistically more (Higher) infections than predicted based on national infection data.

NHSN 2015 Baseline

Prior to 2015, the CLABSI predicted number was calculated using the NHSN published device-associated national pooled means (2006-2008 baseline time period) for each individual location. In 2015, the CDC modified the risk adjustment factors that are used to calculate the predicted number of infections in the SIR and updated the national referent population (see CLABSI Risk Adjustment Factors below). Under the 2015 baseline, 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. In addition to the change to risk adjustment factors, SIRs under the new 2015 baseline are calculated using the national data collected during 2015.

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. Starting with 2015 data, SIRs under the new 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

The predicted number of infections is calculated based on 2015 national HAI aggregate data and patient risk at each health facility type. Negative binomial regression models are used to calculate the number of predicted events under the 2015 baseline. For acute care hospitals, the number of predicted events calculated under the 2015 baseline for CLABSI is risk adjusted based on the following factors found to be statistically significant predictors of CLABSI incidence: the CDC location, medical school affiliation, facility bed size, and facility type. For NICU, birthweight was the statistically significant predictor. None of the risk factors were significant predictors of CLABSI in the critical assess settings, therefore, the predicted events are 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 provides a summary of central line-associated bloodstream infections in Illinois hospitals during 2016. Figures 1-3 shows the trend of CLABSI SIRs for reporting years 2009 through 2016. Reporting years 2009-2014 are based on the 2006-2008 national experience, whereas 2015 and 2016 are based on the 2015 national experience.

In 2016, there were a total of 317 CLABSIs reported compared to 421 CLABSIs predicted, for an SIR of 0.75 (95% CI: 0. 673, 0. 839). This translates to 25% less infections compared to the national referent period noted above. This statistically significant reduction in CLABSIs was observed in the adult (AICU) and neonatal (NICU) intensive care settings. The reduction in the pediatric ICUs (PICU) was not statistically different than the national referent period. The reduction of CLABSIs was 21% in adult ICUs, 41% in NICUs, and 19% in PICUs, respectively.

Table 1. CLABSIs by Type of Intensive Care Unit (ICU), 2016

ICU Type	Number of Units Reporting	Number of CLABSI Infections		Standardized Infection Ratio (SIR)	95% Confidence Interval (SIR)		Statistical Interpretation
		Observed	Predicted		Lower	Upper	
All ICU Combined	263	317	420.99	0.75	0.673	0.839	Lower
Adult ICU	199	234	297.44	0.79	0.691	0.892	Lower
Neonatal ICU (NICU)	43	47	79.22	0.59	0.441	0.782	Lower
Pediatric ICU (PICU)	21	36	44.33	0.81	0.577	1.112	Similar

NHSN CLABSI data was generated on November 28, 2017

Figure 1. Trend of CLABSI SIRs in Adult ICUs from 2009 – 2016

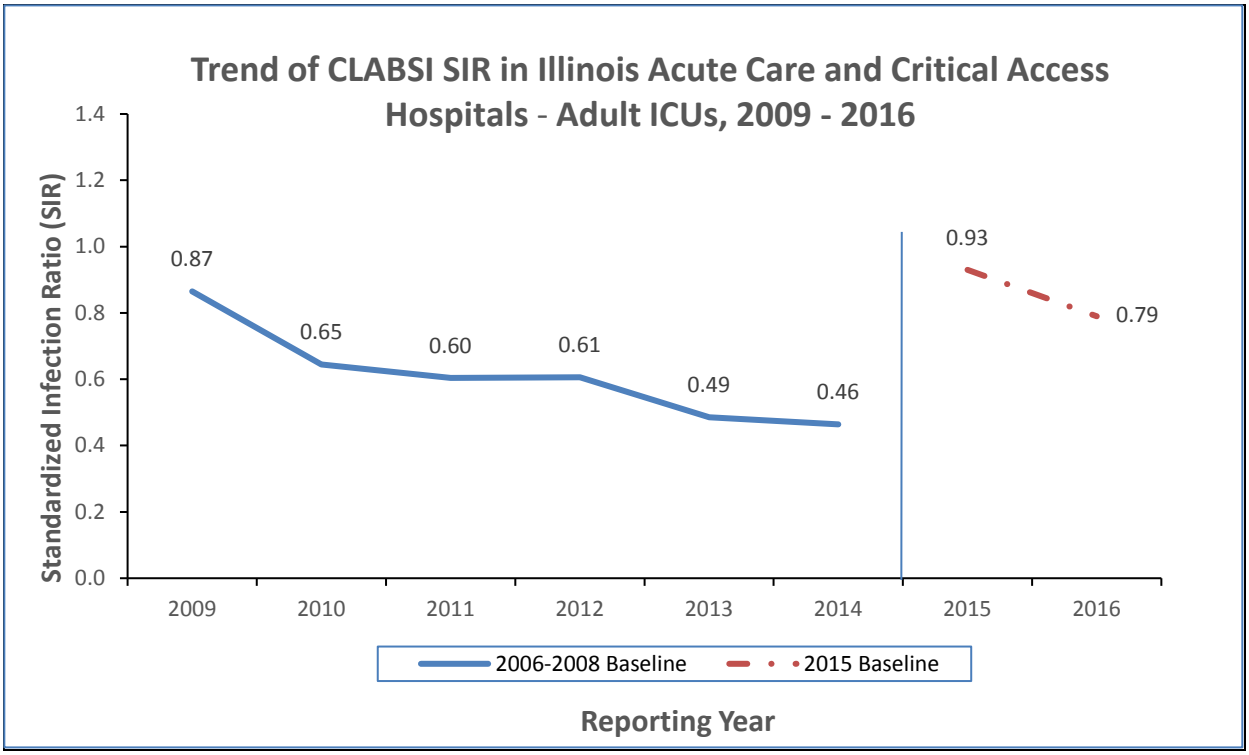


Figure 2. Trend of CLABSI SIRs in Neonatal ICUs from 2009 – 2016

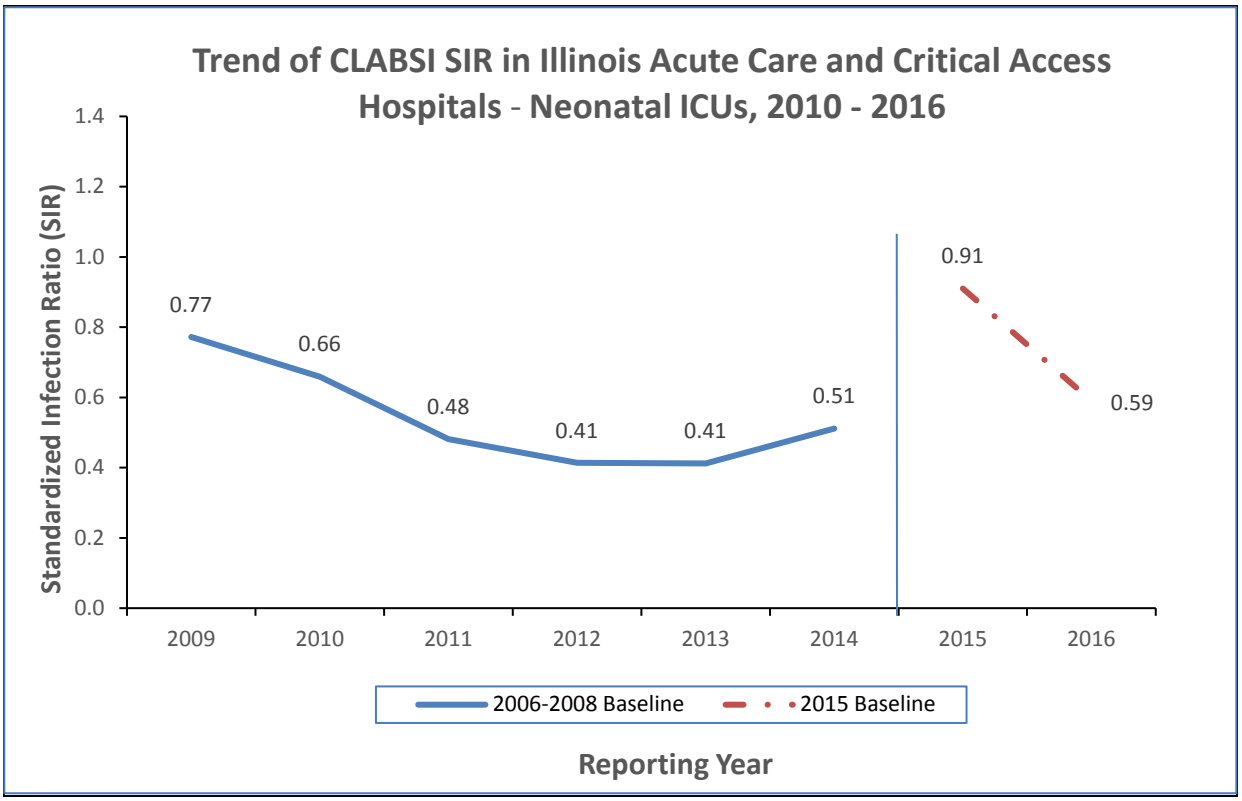
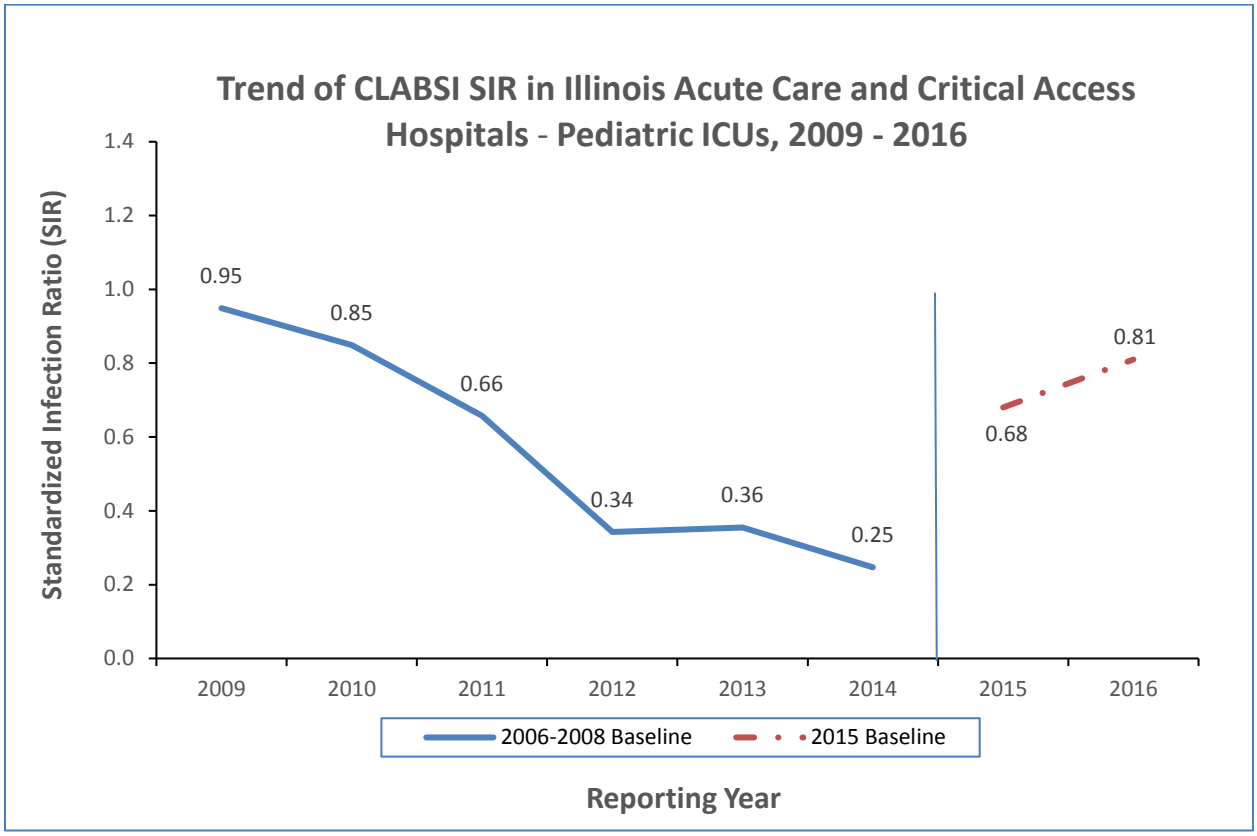


Figure 3. Trend of CLABSI SIRs in Pediatric ICUs from 2009 – 2016



Summary

Since 2009, the CLABSI SIR in Illinois acute care hospitals have been lower compared to the national referent SIR. For adult ICU and NICU, this trend continues in reporting year 2016. Statistically significant reduction in CLABSIs was observed in the AICU and NICU settings. The reduction in the PICUs was not statistically different than the national referent period. The reduction of CLABSIs was 21% in adult ICUs, 41% in NICUs, and 19% in PICUs, respectively. Refer to Table 1.

The trends of CLABSI SIRs of Illinois acute care and critical access hospitals from 2009-2014 and 2015-2016 are shown in Figures 1-3. SIRs from reporting years 2009-2014 are based on the 2006-2008 national experience, whereas 2015 and 2016 are based on the 2015 national experience. Comparative analysis of CLABSI SIRs between 2015 and 2016 shows a decrease of 15.7% in adult ICUs and an increase of 19.2% in PICU; neither were statistically significant. The 34.5% decrease in CLABSI SIRs between 2015 and 2016 in NICUs was statistically significant (CI: 0.451, 0.945 and p-value = 0.02).