

Trends in *Clostridium difficile* Infection (CDI) Reporting in Illinois Acute Care and Critical Access Hospitals, 2012 - 2016

On January 1, 2012, all Illinois acute care and critical access hospitals began mandated reporting of cultures positive for *Clostridium difficile* Infections (CDI) using the Center for Disease Control and Prevention's National Healthcare Safety Network (NHSN) Multidrug-Resistant Organism (MDRO) Laboratory-identified (LabID) Event module. The LabID event surveillance method enables facilities to report proxy measures for healthcare-associated infections (HAIs) based on data obtained from the laboratory without clinical evaluation of the patient. This report focuses on trends in NHSN CDI aggregate data from acute care and critical access hospitals from 2012 – 2016.

Standardized Infection Ratio (SIR)

The CDI standardized infection ratio (SIR) is a measure that compares a facility's burden of CDI 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 facility-onset (HO) CDI LabID events 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 CDI 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 national infection rate.

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 SIR was calculated using a single statistical model for all facility types (acute care and critical access) and national data collected during 2010-2011. 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 CDI 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 2012 – 2014 are not directly comparable to those from 2015 and beyond. The 2012-2014 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

CDI 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. For acute care hospitals, the number of predicted CDI events calculated under the 2015 baseline is risk adjusted based on the following factors found to be statistically significant predictors of CDI incidence: CDI test type, medical school affiliation, facility bed size, facility type, CDI outpatient reporting, and the prevalence rate of inpatient community-onset CDI. For critical access hospitals, the inpatient community-onset prevalence rate is used to calculate the predicted events.¹

Additional information regarding these CDI 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 CDI in Illinois hospitals from 2012 through 2016. Reporting years 2012-2014 are based on the 2010-2011 national experience, whereas 2015 and 2016 are based on the 2015 national experience.

In 2016, there were 4397 CDI reported compared to 4382 predicted, for an SIR of 1.00 (95% CI: 0.974, 1.034), which is statistically similar to the national referent population. The SIRs are graphically displayed in Figure 1. Because SIRs calculated under the old baseline are not comparable to those under the new baseline, a vertical line in the figure denotes a break between when the old versus new baselines were used.

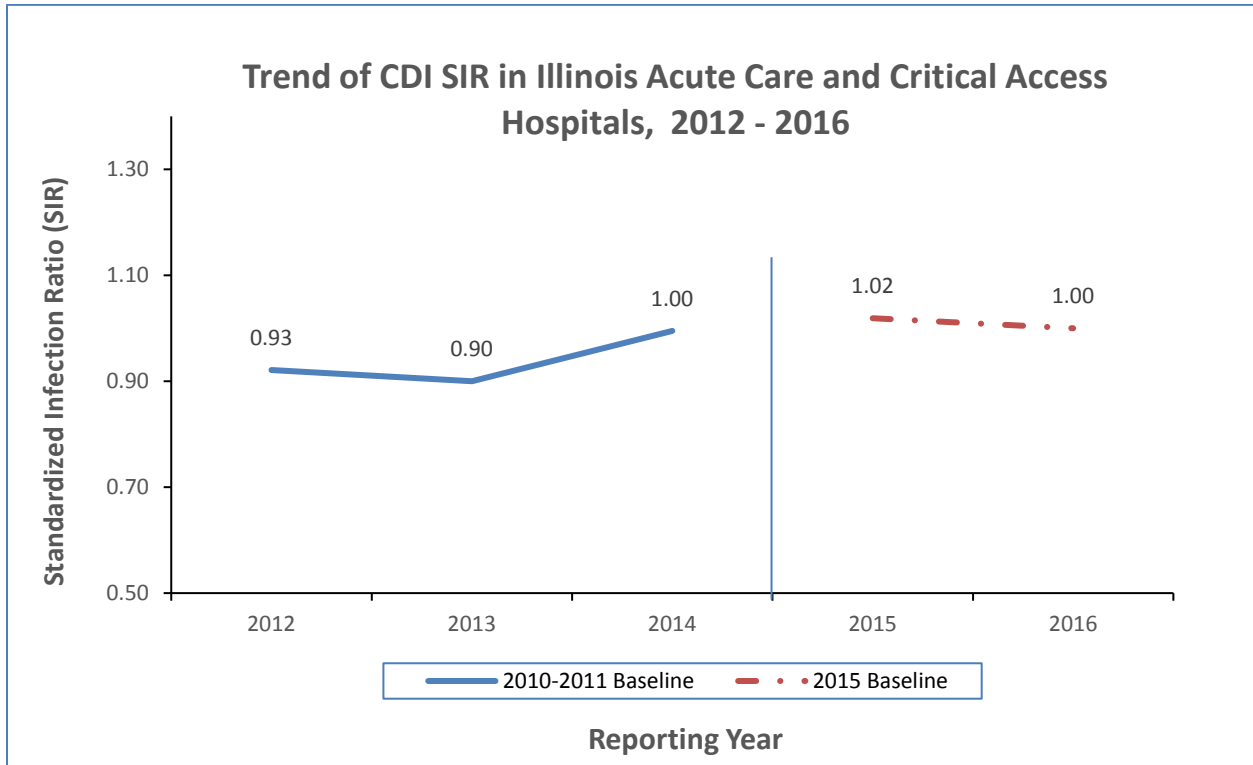
Table 1. CDI SIRs in Illinois acute care and critical access hospitals, 2012 - 2016

Reporting Year	# of Facilities Reported	Number of CDIs		Standardized Infection Ratio (SIR)	95% Confidence Interval (SIR)		Statistical Interpretation
		Observed	Predicted		Lower	Upper	
2012 †	179	4620	4995	0.93	0.899	0.952	Lower
2013 †	183	4466	4939	0.90	0.878	0.931	Lower
2014 †	183	4640	4661	1.00	0.967	1.024	Similar
2015 *	183	4243	4164	1.02	0.989	1.050	Similar
2016 *	181	4397	4382	1.00	0.974	1.034	Similar

† NHSN CDI data compared to 2010 – 2011 baseline.

* NHSN CDI data compared to 2015 baseline.

Figure 1. Trend of CDI SIRs in Illinois acute care and critical access hospitals, 2012 – 2016



Summary

Since 2012, the CDI SIRs in Illinois acute care and critical access hospitals have been similar or lower compared to the national referent SIR. This trend continues in 2016, where there were 4397 CDI reported to NHSN compared to 4382 predicted. The resulting SIR of 1.00 (95% CI: 0.974, 1.034) is statistically similar to the national referent population. Refer to Table 1 for the NHSN CDI summary table.

The trends of CDI SIRs of Illinois acute care and critical access hospitals from 2012-2014 and 2015-2016 are shown in Figure 1. SIRs from reporting years 2012-2014 are based on the 2010-2011 national experience, whereas 2015 and 2016 are based on the 2015 national experience. Comparative analysis of CDI SIRs between 2015 and 2016 shows a decrease of 1.6%. This decrease is not statistically significant (95% CI: 0.944, 1.027 and p-value = 0.48).

References

1. THE NHSN STANDARDIZED INFECTION RATIO (SIR); A Guide to the SIR. Centers for Disease Control and Prevention. Updated July 2017. <https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sir-guide.pdf>