

***Clostridium difficile* Infections (CDI) Reporting in Illinois Acute Care Hospitals, 2012 - 2015**

As of January 1, 2012, all Illinois 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 Laboratory-identified (LabID) Event module. The LabID event surveillance method enables facilities to report proxy measures for healthcare acquired infections based on data obtained from the laboratory without clinical evaluation of the patient.

Clostridium difficile Infections data are summarized using the standardized infection ratio (SIR). The SIR is a summary statistic used to measure relative difference in healthcare facility-onset (HO) CDI LABID Events during a reporting period, compared to a common referent period (national data collected during 2010-2011).¹ The standardized infection ratio adjusts for factors found to be significant in predicting HO CDI infections such as, the type of testing used at the facility, medical school affiliation, facility bed size, and the prevalence rate of Community Onset CDI using a risk model.¹ For additional information on Standardized Infection Ratios (SIRs), and confidence intervals (CIs), see the methodology section of the Illinois Hospital Report Card website.

<http://www.healthcarereportcard.illinois.gov/contents/view/methodology>

Table 1. CDI SIRs in Illinois acute care hospitals compared to the national referent period

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	4994.79	0.93	0.899	0.952	Lower
2013	183	4466	4939.25	0.90	0.878	0.931	Lower
2014	183	4640	4661.34	1.00	0.967	1.024	Similar
2015	183	4363	4542.53	0.96	0.932	0.989	Lower

* NHSN CDI data was generated on July 26, 2016.

Table 1 provides a summary of CDI in Illinois acute care hospitals from 2012 through 2015. In 2015, there were 4363 CDI reported compared to 4543 predicted, for an SIR of 0.96 (95% CI: 0.932, 0.989), which is statistically lower compared to the national referent period.

Trend analysis of CDI SIRs in Illinois Acute Care Hospitals, 2012 - 2015

Joinpoint regression version 4.1 was used to analyze trends in CDI SIR in Illinois Acute Care Hospitals over time. Joinpoint regression is a trend analysis software program developed by the US National Cancer Institute for the analysis of data from the Surveillance Epidemiology and End Results Program.²

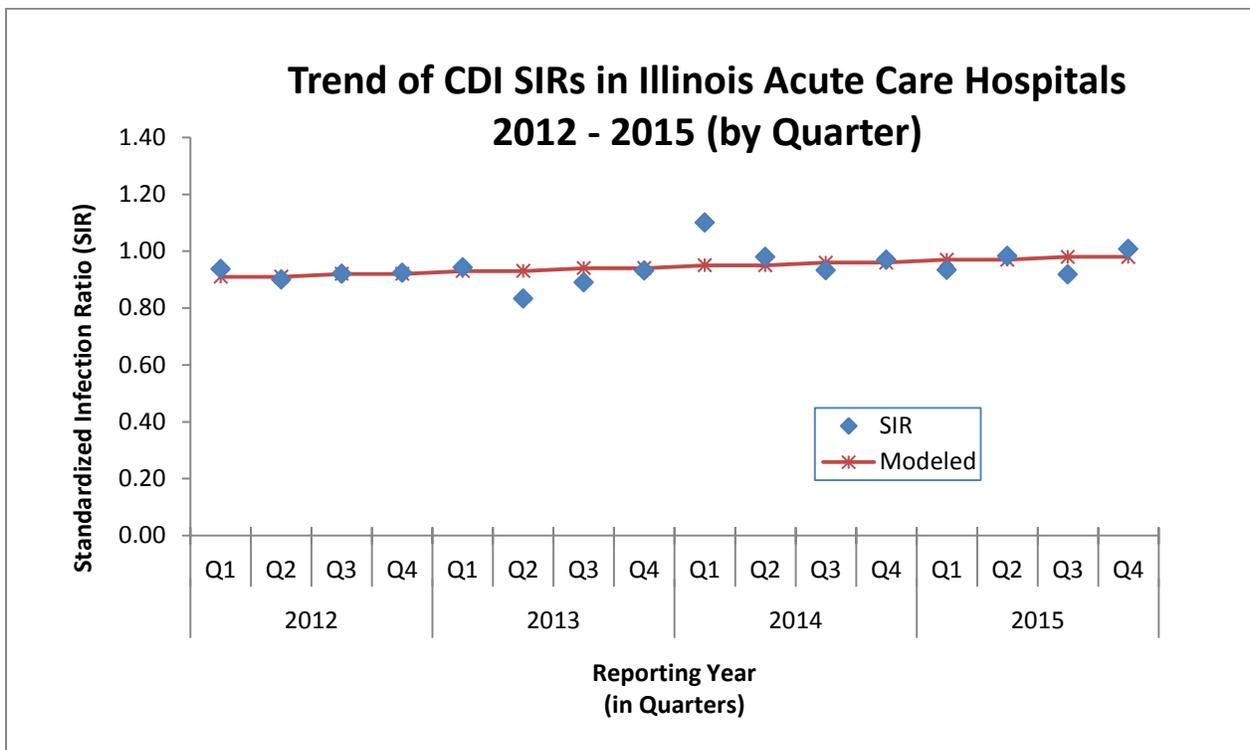
The resulting annual percent change (APC) in SIR values was estimated and reflects the magnitude of the trend during specific reporting periods. The APC is tested for statistical significance to determine whether a difference exists from the null hypothesis of no change (0%).²

Joinpoint analysis of quarterly NHSN CDI SIR Data is summarized in Tables 2 and 3 and Figure 1. Refer to Table 2 and Figure 1 for the observed and modeled CDI SIRs by quarter.

Table 2. Trend of CDI SIRs in Illinois acute care hospitals, 2012 – 2015 (by quarter)

CDI	2012				2013				2014				2015			
	Q1	Q2	Q3	Q4												
SIR	0.94	0.90	0.92	0.92	0.94	0.83	0.89	0.93	1.10	0.98	0.93	0.97	0.93	0.98	0.92	1.01
Modeled	0.91	0.91	0.92	0.92	0.93	0.93	0.94	0.94	0.95	0.95	0.96	0.96	0.97	0.97	0.98	0.98

Figure 1. Trend of CDI SIRs in Illinois acute care hospitals, 2012 – 2015 (by quarter)



As summarized in Table 3 below, there is a 0.50% increase in CDI SIRs per quarter for the reporting period from 2012 through 2015. This percent increase is not statistically significant.

Table 3. Percent Change in CDI SIRs

Reporting Years	APC	p-value (95% CI)	Statistical Interpretation
2012 - 2015	0.50%	0.1174 (-0.1834, 1.1862)	The average quarterly percent increase of 0.5% is not statistically significant

In addition, comparison of standardized infection ratios by year was performed to assess significant differences between reporting years. The percent change in SIR, 95% confidence interval, and p-value were calculated for each time period. Refer to Figure 2 and Table 4 for the comparative analysis of CDI SIR by year.

Figure 2. Trend of CDI SIRs in Illinois acute care hospitals, 2012 – 2015 (by year)

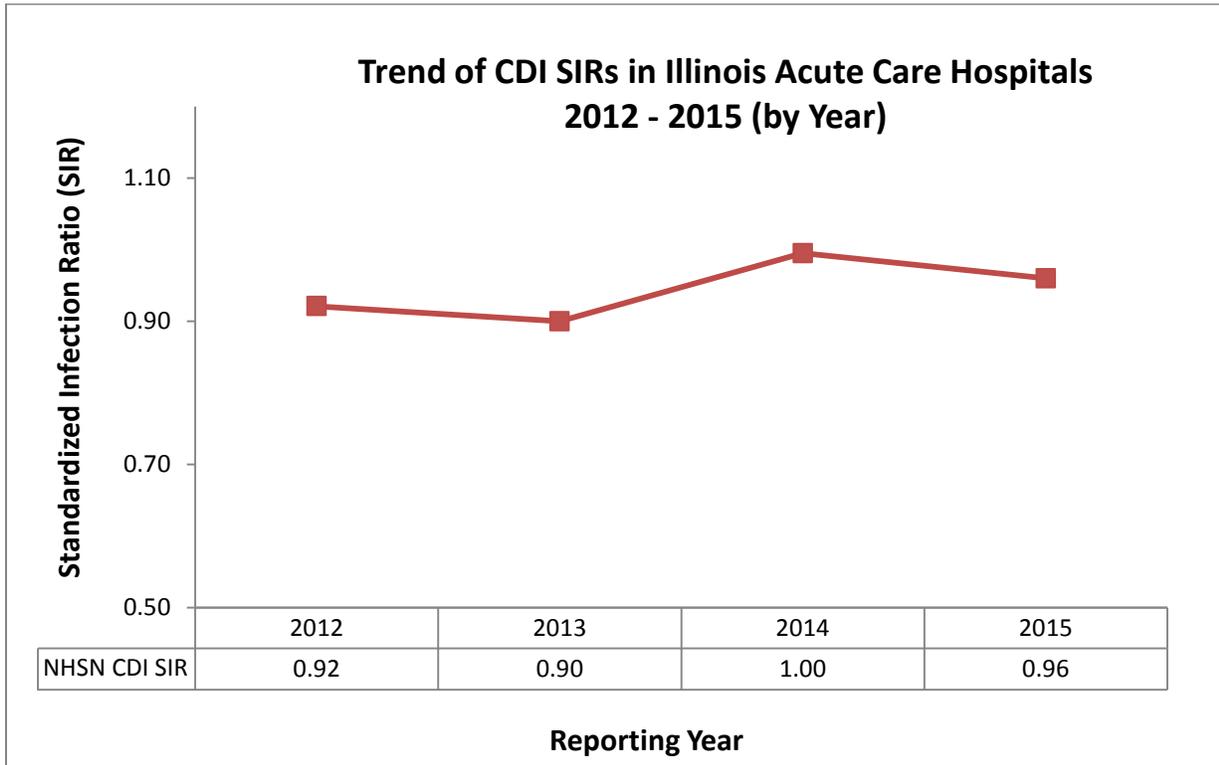


Table 4. Percent Change in CDI SIRs, 2012 - 2015 (by year and by quarter)

Reporting Period	% change in SIR (95% CI)	p-value (SIR)
2012 vs. 2013	-2.3% (0.938, 1.019)	0.279
2013 vs. 2014	10.1% (1.057, 1.147)	0.0001 ^
2014 vs. 2015	-3.5% (0.926, 1.006)	0.0901
Overall change: 2012 vs. 2015	3.8% (0.996, 1.082)	0.0744

^ The percent change is significantly different from zero at alpha = 0.05

Summary

Since 2012, the CDI SIR in Illinois acute care hospitals have been similar or lower compared to the national referent SIR. This trend continues in 2015, where there were 4363 CDI reported to NHSN compared to 4543 predicted. The resulting SIR of 0.96 (95% CI: 0.932, 0.989) is statistically lower compared to the national referent period. Refer to Table 1 for the NHSN CDI summary table.

Trend analysis by year and by quarter of CDI SIR in Illinois Acute Care Hospitals from 2012 – 2015 were performed to assess percent change over time. Data analysis by quarter using Joinpoint regression indicates that Illinois SIRs for CDI have been steadily increasing on average of 0.5% per quarter for the 4-year period of 2012 through 2015 (Table 3). This quarterly percent increase in CDI SIR is not statistically significant (p-value = 0.1174).

Comparative analysis of CDI SIRs were analyzed by year and summarized in Table 4. From 2012 to 2013, there was a decrease of 2.3%, followed by a significant increase of 10.1% from 2013 to 2014, and then a decrease of 3.5% from 2014 to 2015. Overall, Illinois acute hospitals have seen an increase of 3.8% in CDI SIR since 2012. This percent increase is not statistically significant (p-value = 0.0744).

References:

¹ Dudeck MA, Weiner LM, Malpiedi PJ, et al. Risk Adjustment for Healthcare Facility-Onset *C. difficile* and CDI Bacteremia Laboratory-identified Event Reporting in NHSN. Published March 12, 2013. Available at: <http://www.cdc.gov/nhsn/pdfs/CDI-cdi/RiskAdjustment-CDI-CDI.pdf>

² Kim HJ, Fay MP, Feuer EJ, Midthune DN. Permutation tests for joinpoint regression with applications to cancer rates. *Stat Med* 2000;19:335–5