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Trends in *Clostridioides difficile* Infection (CDI) Reporting in Illinois Acute Care and Critical Access Hospitals, 2012 – 2017

On January 1, 2012, all Illinois acute care and critical access hospitals began mandated reporting of cultures positive for *Clostridioides difficile* Infections (CDI) using the Centers 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 based on data obtained from the laboratory without clinical evaluation of the patient. This report focuses on trends in NHSN hospital-onset CDI aggregate data from Illinois acute care and critical access hospitals from 2012 – 2017.

Standardized Infection Ratio (SIR)

NHSN uses risk models that determine the predicted number of CDIs at a facility based on the national baseline data, adjusting for statistically significant risk factors. The CDI standardized infection ratio (SIR) is a measure that compares a facility's burden of CDI 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 CDI SIR was calculated using a single statistical model for all facility types (acute care and critical access) and national data collected during 2010-2011. Starting with 2015 data, the CDC modified the NHSN risk models and updated the national referent population (referred to as the "2015 baseline"). **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. 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:
http://www.healthcarereportcard.illinois.gov/contents/view/State_Reports_of_Current_Interest

CDI Risk Adjustment Factors

Under the 2015 baseline, the CDI risk model for acute care hospitals is adjusted for: 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 risk model is adjusted for inpatient community-onset prevalence rate. Because acute care and critical access facilities now have different risk models, data from 2015 and beyond are shown by facility type.

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 summarizes CDIs in Illinois acute care and critical access hospitals from 2012 through 2014 under the 2010 – 2011 baseline. In 2017, acute care hospitals reported 4147 CDI compared to 4257 predicted, for an SIR of 0.97 (95% CI: 0.945, 1.004), which is statistically similar to the 2015 national referent population (Table 2). Critical access hospitals reported 33 CDI compared to 40 predicted, for an SIR of 0.83 (95% CI: 0.577, 1.145), which is statistically similar to the national referent population (Table 3).

The 2012 – 2017 SIRs are graphically displayed in Figure 1. Because SIRs calculated under the old baseline are not comparable to those under the new baseline, a blue 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 compared to 2010 – 2011 national baseline, 2012 – 2014

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

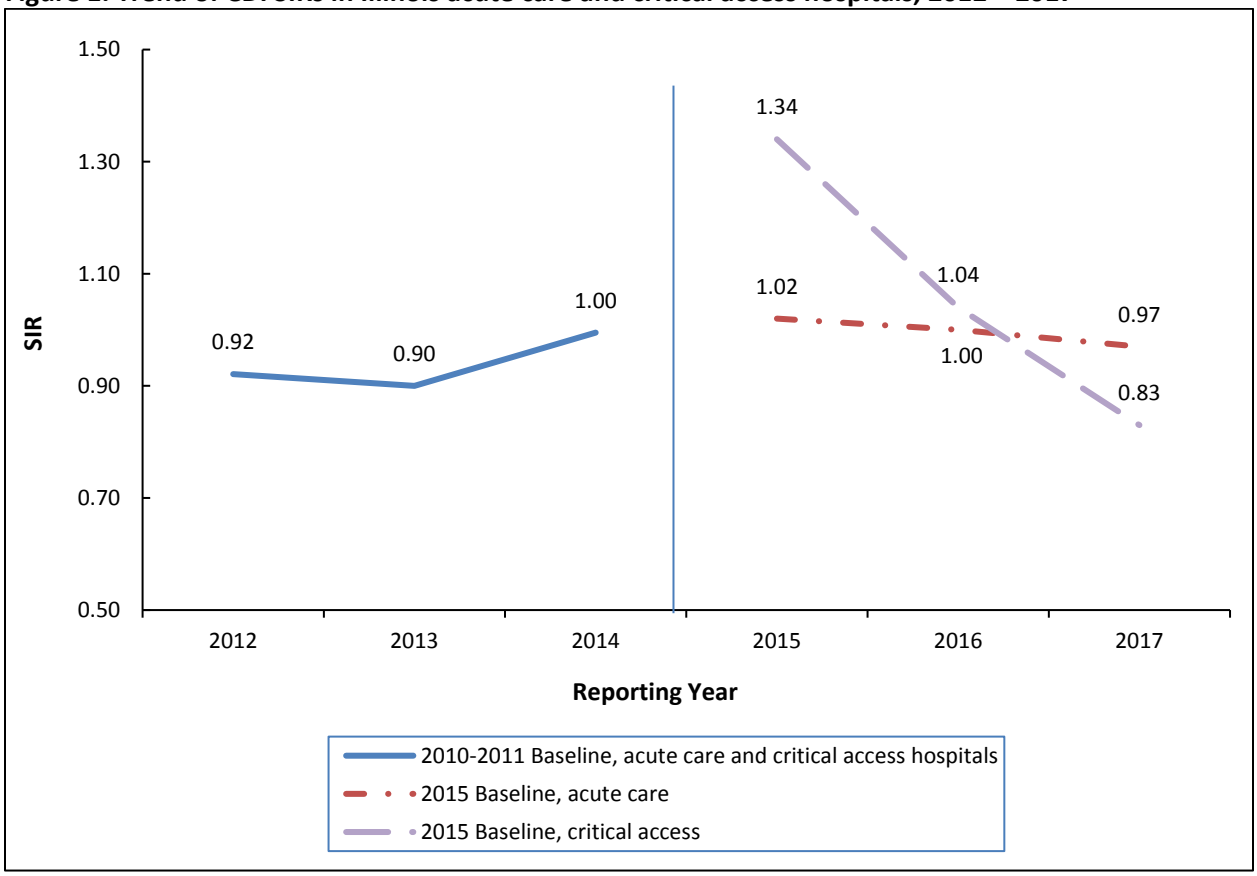
Table 2. CDI SIRs in Illinois acute care hospitals compared to 2015 national baseline, 2015 – 2017

Reporting Year	# of Facilities Reported	Number of CDIs		Standardized Infection Ratio (SIR)	95% Confidence Interval (SIR)		Statistical Interpretation
		Observed	Predicted		Lower	Upper	
2015	132	4192	4126	1.02	0.986	1.047	Similar
2016	130	4346	4333	1.00	0.974	1.033	Similar
2017	132	4147	4257	0.97	0.945	1.004	Similar

Table 3. CDI SIRs in Illinois critical access hospitals compared to 2015 national baseline, 2015 – 2017

Reporting Year	# of Facilities Reported	Number of CDIs		Standardized Infection Ratio (SIR)	95% Confidence Interval (SIR)		Statistical Interpretation
		Observed	Predicted		Lower	Upper	
2015	50	51	38	1.34	1.010	1.751	Higher
2016	51	51	49	1.04	0.783	1.358	Similar
2017	51	33	40	0.83	0.577	1.145	Similar

Figure 1. Trend of CDI SIRs in Illinois acute care and critical access hospitals, 2012 – 2017



Summary

Since 2012, the CDI SIRs in Illinois acute care hospitals have been similar or lower compared to the national referent population. This trend continues in 2017, in which the SIR of 0.97 was similar to the 2015 baseline. Although there was a 2.9% decrease in CDI SIRs between 2016 and 2017, this was not a statistically significant decrease (p-value = 0.18).

The CDI SIRs for critical access hospitals have also decreased since 2015, when the SIR of 1.34 was significantly higher, or worse, than the 2015 baseline. Between 2016 and 2017, there was a large (20.7%), but non-significant decrease in CDI SIRs (p-value = 0.30). It is important to note that due to the relatively small number of predicted infections in critical access hospitals, a small change in the number of observed infections can have a large effect on the SIR. For example, there appears to be a remarkable decline in CDI SIRs in Illinois critical access hospitals from 2015 – 2017 (Figure 1). However, the absolute number of hospital-onset CDI cases went from 51 in 2015 to 33 in 2017, a decrease of 18 cases (Table 3). We continue to explore additional approaches for presenting critical access data in a way that meaningfully guides improvement efforts.

Overall, the burden of CDI in Illinois hospitals has not changed significantly. More efforts are needed to prevent avoidable healthcare-associated CDI events.