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ILLINOIS DEPARTMENT OF PUBLIC HEALTH
122 S. Michigan Ave., Suite 700 • Chicago, IL 60603-6119 • www.dph.illinois.gov

Methicillin-Resistant *Staphylococcus aureus* (MRSA) Infections Reporting in Illinois Acute Care Hospitals, 2012 - 2015

As of January 1, 2012, all Illinois hospitals began mandated reporting of blood cultures positive for MRSA using the Center for Disease Control and Prevention's National Healthcare Safety Network (NHSN) Multidrug-Resistant Organizm 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.

MRSA bacteremia 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) MRSA 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 MRSA infections such as, medical school affiliation, facility bed size, and the prevalence rate of Community Onset MRSA 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. MRSA SIRs in Illinois acute care hospitals compared to the national referent period

Reporting Year	# of Facilities Reported	Number of MRSA Bloodstream Infections		Standardized Infection Ratio (SIR)	95% Confidence Interval (SIR)		Statistical Interpretation
		Observed	Predicted		Lower	Upper	
2012	179	358	419.8	0.853	0.768	0.945	Lower
2013	183	293	408.56	0.715	0.636	0.800	Lower
2014	183	296	418.98	0.706	0.629	0.790	Lower
2015	183	265	348.07	0.761	0.674	0.857	Lower

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

Table 1 provides a snapshot summary of MRSA bloodstream infections in Illinois acute care hospitals from 2012 through 2015. In 2015, there were 265 MRSA bloodstream infections reported compared to 348 predicted, for an SIR of 0.761 (95% CI: 0. 674, 0. 857). This translates to 24% less MRSA bloodstream infections compared to the national referent period.

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

Joinpoint regression version 4.1 was used to analyze trends in MRSA bloodstream 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

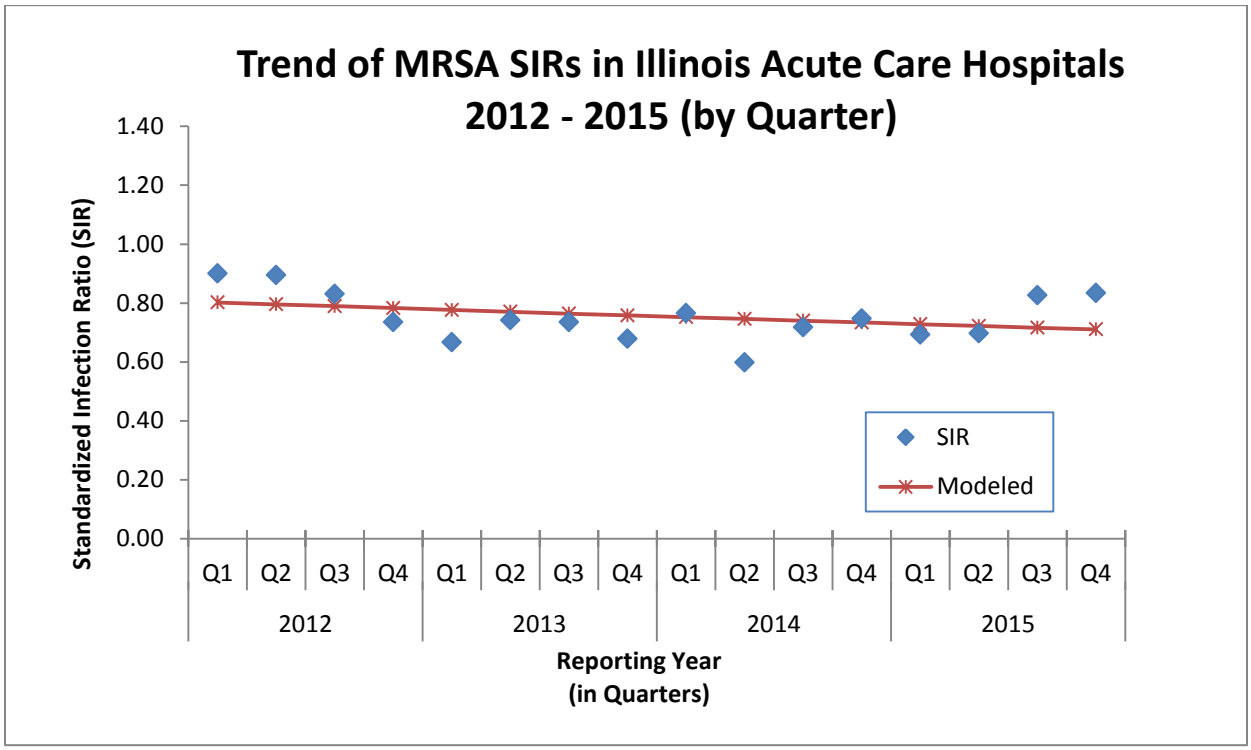
Program.[2] The resulting annual percent change (APC) in SIR values was estimated and reflects the magnitude of the trend during specific reporting periods. The APC is tested for statistical significance to determine whether a difference exists from the null hypothesis of no change (0%).[2]

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

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

MRSA	2012				2013				2014				2015			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
SIR	0.90	0.90	0.83	0.74	0.67	0.74	0.74	0.68	0.77	0.60	0.72	0.75	0.69	0.70	0.83	0.83
Modeled	0.80	0.80	0.79	0.78	0.78	0.77	0.76	0.76	0.75	0.75	0.74	0.73	0.73	0.72	0.72	0.71

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



As summarized in Table 3 below, there is a 0.81% decrease in MRSA SIRs per quarter for the reporting period from 2012 through 2015. This percent decrease is not statistically significant.

Table 3. Percent Change in MRSA SIRs

Reporting Years	Quarterly % Change (APC)	p-value (95% CI)	Statistical Interpretation
2012 - 2015	-0.81%	0.1637 (-2.034, 0.438)	The average quarterly percent decrease of 0.81% 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 MRSA SIRs by year.

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

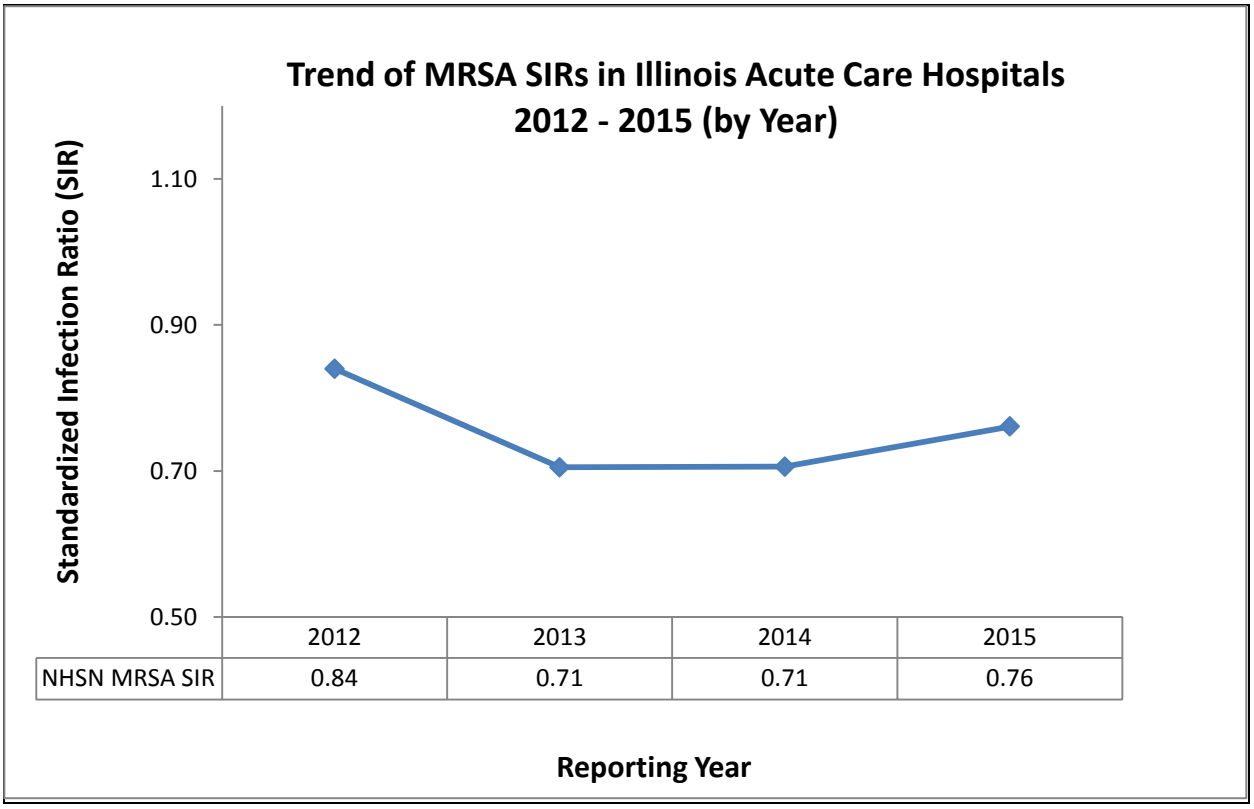


Table 4. Percent Change in MRSA SIRs, 2012 - 2015 (by year)

Reporting Period	% change in SIR (95% CI)	p-value (SIR)
2012 vs. 2013	-15.9% (0.72, 0.981)	0.0277 ^
2013 vs. 2014	-1.5% (0.838, 1.158)	0.8556
2014 vs. 2015	7.8% (0.913, 1.272)	0.3767
Overall change: 2012 vs. 2015	-10.8% (0.761, 1.046)	0.1613

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

Summary

Since 2012, the MRSA bloodstream SIR in Illinois acute care hospitals have been consistently lower compared to the national referent SIR. This trend continues in 2015, where there were 265 MRSA bloodstream infections reported compared to 348 predicted. The resulting SIR of 0.761 (95% CI: 0. 674, 0. 857) is statistically lower compared to the national referent period. Refer to Table 1 for the NHSN MRSA summary table.

Trend analysis by year and by quarter of MRSA SIR in Illinois Acute Care Hospitals from 2012 – 2015 were performed to assess percent change over time. Data analysis by quarter using Joinpoint analysis indicates that Illinois SIRs for MRSA bloodstream infections have been steadily decreasing on average of 0.81% per quarter for the 4-year period of 2012 through 2015 (Table 3). This quarterly percent decrease of MRSA SIR is not statistically significant (p-value = 0.1637).

Comparative analysis of MRSA SIRs were analyzed by year and summarized in Table 4. From 2012 to 2013, there was a significant decrease of 15.9%, followed by another decrease of 1.5% from 2013 to 2014. However, an increase of 7.8% was observed from 2014 to 2015. Overall, Illinois acute hospitals have seen a steady decrease of 10.8% in MRSA SIR since 2012. This percent decrease is not statistically significant (p-value = 0.1613).

References:

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