

Illinois Hospitals Reduce Surgical Site Infections (SSI) Coronary Artery Bypass Graft Surgery (CABG)

Surgical Site Infections (SSI) Overview

Illinois hospitals have been reporting surgical site infection (SSI) data to the Illinois Department of Public Health (IDPH) using the CDC's National Healthcare Safety Network (NHSN) since April, 2010. SSIs are infections that occur in the wound created by an invasive surgical procedure and are one of the most important causes of healthcare-associated infections (HAI). The surgeries monitored for SSI in Illinois include coronary artery bypass surgery (CABG) procedures, and knee replacements (KPRO). This report and analysis reflects the July 1, 2013 to June 30, 2014 SSI data of Illinois hospitals that performs CABG.

The CDC describes three types of surgical site infections:

- **Superficial incisional SSI.** This infection occurs just in the area of the skin where the surgical incision was made.
- **Deep incisional SSI.** This infection occurs beneath the incision area in muscle tissue and in fascia, the tissue surrounding the muscles.
- **Organ or space SSI.** This type of infection can be in any area of the body other than skin, muscle, and fascia that was involved in the surgery, such as a body organ or a space between organs.

IDPH monitors inpatient procedures and Deep Incisional Primary and Organ/Space SSIs that were identified during admission or readmission to Illinois facilities as defined in the NHSN Manual.

Standardized Infection Ratio (SIR)

Facilities' surgical site infection results are compared using the standardized infection ratio (SIR). The SIR is a risk adjusted summary measure that accounts for the type of procedure and patient risk. It is the ratio of the observed to expected (or predicted) number of SSI (observed / predicted = SIR). The predicted number of infections is calculated based on national infection data and patient risk at each health facility. A hospital's SIR value is compared to the baseline U.S. experience (i.e. NHSN aggregate 2006-2008 data). If the SIR value is greater than 1.0, there are more infections than expected. If the SIR value is less than 1.0, then fewer infections occurred than expected. If the facility SIR is 1.0, then the number of observed infections is the same as or similar to the national infection rate. A statistical test (Poisson test) is used to determine if the difference is statistically significant.

The three categories summarizing how a hospital compares to the national infection data for procedures performed:

- 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.

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/methodology>

Table 1. Summary of CABG SSI Data, Year 2010 – 2013*

Reporting Year *	# Facilities Reporting	Total # of CABG Performed	Number of Infections (SSI)		Standardized Infection Ratio (SIR)	95% Confidence Interval (SIR)		p-value	Statistical Interpretation
			Observed	Predicted		Lower Bound	Upper Bound		
2010	65	7545	66	97.52	0.68	0.53	0.86	< 0.001	Lower
2011	65	7120	53	94.25	0.56	0.43	0.73	< 0.001	Lower
2012	65	6846	44	91.13	0.48	0.36	0.64	< 0.001	Lower
2013	65	7100	31	94.53	0.33	0.23	0.46	< 0.001	Lower

*NOTE: Actual Reporting Period is July 1st of the reporting year to June 30th of the following year

Table 1. provides a snapshot summary of Coronary Artery Bypass Graft (CABG) surgery SSI in Illinois hospitals from 2010 to 2013. Each year shown on the table represents a reporting period from July 1st to June 30th. For all years shown, the numbers of observed SSI compared to the predicted value have been declining, with all the SIR values being less than 1.0. All Illinois SSI SIR value are significantly lower than the national referent period noted in the SIR overview.

As shown in Table 2 and Figure 1, reductions in CABG SSIs have been observed since Illinois hospitals have started reporting SSI in 2010. The average annual percent change (AAPC) of CABG SSI from 2010 to 2013 was approximately 20%. Based on statistical evidence we conclude that the AAPC in SSI SIR is significantly different than zero at alpha equal 0.05.

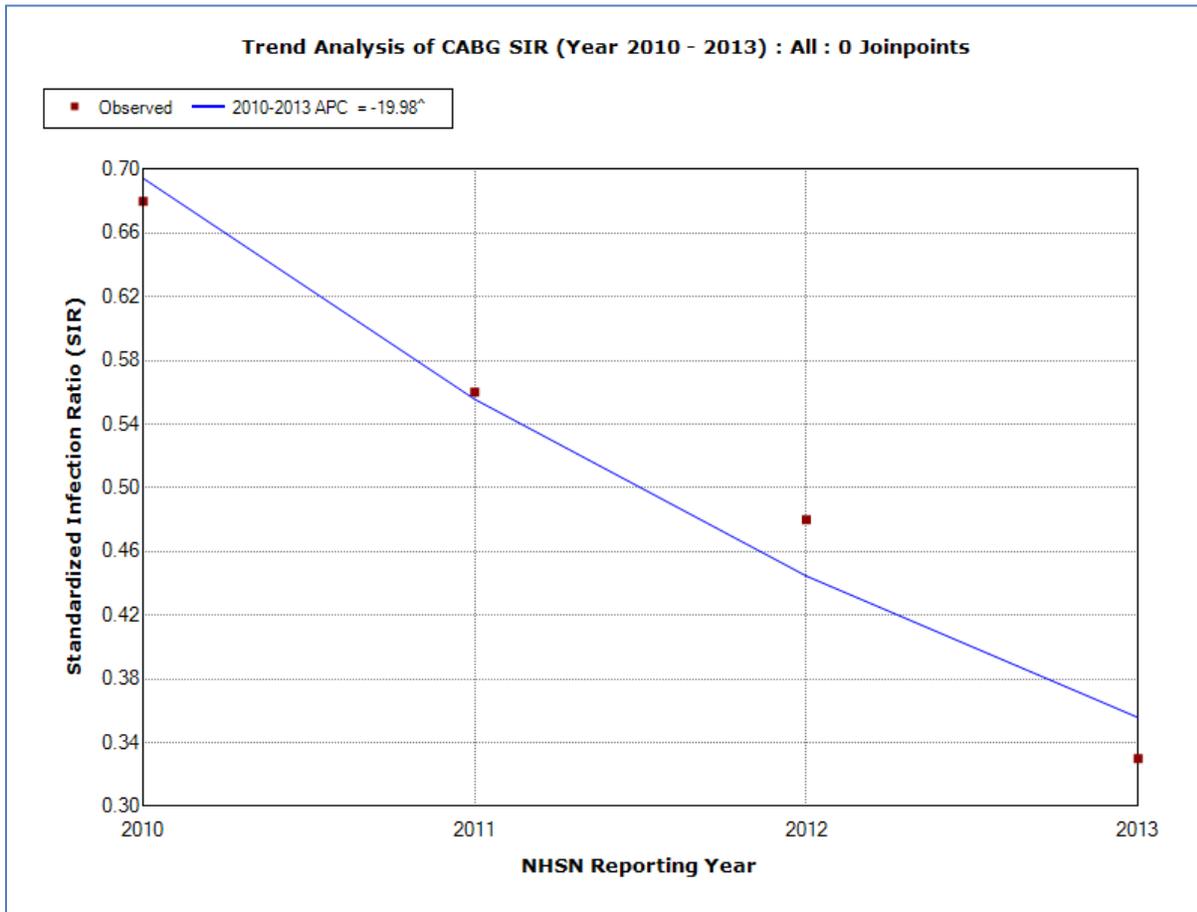
Table 2. Average Annual Percent Change (AAPC) of CABG SSI, 2010-2013

SSI Procedure Type	Year Range	Average Annual Percent Change (AAPC)	95% Confidence Interval		P-Value	Statistical Interpretation
			Lower Limit	Upper Limit		
CABG	2010 - 2013	-19.98 [^]	-30.3	-8.2	0.0200	Significant Decrease

[^] The Average Annual Percent Change (AAPC) is significantly different from zero at alpha = 0.05

The Illinois SIR values for CABG SSIs are trended over time in Figures 1 below.

Figure 1. Trend of CABG SSI (SIR) in Illinois Hospitals from 2010 - 2013



Summary

CABG SSI trend analysis indicates consistent decreases in the number of CABG SSIs reported in all Illinois hospitals between 2010 and 2013, as reflected in the decreased SIR. This overall average annual percent change of 20% in CABG SSI SIR since 2010 is statistically significant. Furthermore, when compared to the national CABG SSI baseline for each individual year as outlined in Table 1, the SIR for Illinois hospitals are significantly lower for every year reported.