Surgical Site Infection Overview

Surgical site infections (SSI) are infections directly related to an operative procedure. Surgical procedures selected for SSI reporting are performed in a variety of facilities and tend to be associated with health facility-acquired infections. Many of the SSIs that occur in these procedures can:

- Be prevented by following established prevention techniques;
- Easily be detected and reported accurately; and
- Have a devastating impact on the patient's quality of life.

Evidence suggests that reporting of infections may lead to better adherence to preventive practices and decrease medical complications.

Surgical site infection rates are adjusted to take into account differences in patient risk factors for infection: length of the surgery, type of surgical wound and the patient's physical condition. The adjusted SSI rates (not displayed in the tables) are used to compute the Standardized Infection Ratio. The Standardized Infection Ratio (SIR) is a risk adjusted summary measure that accounts for the type of procedure and risk category. The SIR provides an overall score for a procedure at each health facility based on the expected number of infections after adjusting for the risk category. It is the ratio of the observed to expected number of SSIs. The SIR can be used as a comparison measure between facilities. However, overall crude rates for SSIs (not risk adjusted) should never be compared between facilities due to inherent differences in the patient risk distribution in each facility.

Interpretation of the SIR is straightforward: A hospital's SIR value is compared to 1.0 (observed and expected number of SSIs are the same). 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. A statistical test (Poisson test) is used to determine if the difference is statistically significant. It is important to note that it is possible for a facility's SIR to be higher or lower than 1.0, but due to statistical comparison and the total number of procedures and infections, not be significantly better or worse than the national rate. Also, it is possible for an SIR to be statistically high or low, even when a different facility has an even higher or lower (respectively) SIR that is not statistically significant. Again, this is due to the numbers of procedures, infections, and the statistical testing process. For an example of how this calculation works please refer to Appendix F.

A new analysis in this year's report is the comparison to the "historical data". For most of the data collected (excluding hysterectomy infection data), there are two to three years of data. The historical comparison calculates a Standardized Infection Ratio (or SIR) based

on a facility specific infection rate from the previous year(s). An expected number of infections can be calculated based on previous infection rates and compared to the current year's number of infections. This allows for the comparison of the current data to previous years to ascertain if a facility is doing better, worse or the same. (See Appendix F for more information concerning the calculation and interpretation of an SIR.)

Cardiac Surgeries

Background

This section focuses on SSIs in cardiac operative procedures. Heart Bypass or Coronary Artery Bypass Graft is a surgery used to bypass blocked heart arteries by creating new passages for blood to flow to the heart muscle. Arteries or veins from other parts of the body are used as grafts to create alternative blood-flow pathways. The two types are coronary artery bypass graft with **both** chest and donor site incisions (CBGB) and coronary artery bypass graft with a chest incision only (CBGC). Both types of surgery involve replacing damaged sections of one or more of the coronary arteries with undamaged arteries or veins such as the internal mammary artery (thoracic) and saphenous vein (leg) to increase cardiac blood flow. The majority of cardiac operative procedures performed in Colorado hospitals are CBGBs. Based on the small number of CBGC surgeries performed, most of the HAI data available had to be suppressed to protect confidential health information and therefore, CBGC data are not presented in this report.

Results

Table 2 below shows facility specific data for SSIs attributed to CBGB surgeries performed in hospitals from August 1, 2009 through July 31, 2010.

Each table lists all the hospitals in Colorado that performed the procedure, the city where the hospital is located, the number of procedures performed, the number of infections, the standardized infection ratio (SIR) based on the national infection rates, the comparison to the national infection rate, the SIR based on a facility specific historical infection rate, and the comparison with the historical rate. For the definition of SIR please refer back to page 1 or see Appendix F in the complete report. The three categories summarizing how a Colorado hospital compares to the national infection rate for procedure performed are:

- 1. Facilities can have a statistically lower (**better**) infection rate than the national rate;
- 2. Facilities can have an infection rate that is statistically the **same** as the national rate; or
- 3. Facilities can have a statistically higher (worse) rate than the national rate.

Table 2: Coronary Artery Bypass Grafts with Chest and Donor Site Infections (CBGB), Inpatient Procedures for Hospitals, 2009-2010

Surgical Site Infections (SSI) in Coronary Artery Bypass Grafts with Chest and Donor Site Infections (CBGB) in Hospitals, Inpatient Reporting Period: August 1, 2009-July 31, 2010.

Health Facility and Region		Procedure Count	Infection Count	Standardized Infection Ratio (SIR)-National	National Comparison	Standardized Infection Ratio (SIR)-Historic	Historical Comparison
Boulder Community Hospital	Boulder	74	3	1.1	Same	1.6	Same
Centura Penrose St. Francis Health	Colorado Springs	110	2	0.7	Same	0.8	Same
Centura Porter Adventist Hospital	Denver	84	3	1.4	Same	1.2	Same
Centura St. Anthony Central Hospital	Denver	104	1	0.3	Same	0.7	Same
Exempla Lutheran Medical Center	Wheat Ridge	87	0	0.0	Same	0.0	Same
Exempla St. Joseph Hospital	Denver	159	1	0.2	Same	1.2	Same
Longmont United Hospital	Longmont	33	0	0.0	Same	0.0	Same
Medical Center of Aurora	Aurora	80	2	0.7	Same	0.7	Same
Medical Center of the Rockies	Loveland	159	1	0.2	Better	0.5	Same
Memorial Hospital Central	Colorado Springs	247	4	0.6	Same	1.0	Same
North Colorado Medical Center	Greeley	73	0	0.0	Same	0.0	Same
Parkview Medical Center	Pueblo	105	3	1.0	Same	0.9	Same
Presbyterian St. Luke's Medical Center	Denver	24	3	4.5	Same	9.9	Worse
Rose Medical Center	Denver	14	***	***	***	***	***
Sky Ridge Medical Center	Lone Tree	31	1	1.0	Same	2.3	Same
St. Mary's Hospital	Grand Junction	122	0	0.0	Same	0.0	Same
Swedish Medical Center	Englewood	73	4	2.0	Same	8.4	Worse
University of Colorado Hospital	Aurora	59	5	2.4	Same	2.6	Same

The standardized infection ration (SIR) is the ratio of observed to expected infections, and is adjusted for procedure risk.

National comparison based on data collected and reported by NHSN-participating hospitals from 2006-2008.

See "National Healthcare Safety Network (NHSN) Report, Data Summary for 2006-2008, Issued December 2009" (Am J Infect Control 2009;37: 783-805). Historical comparison based on data collected and reported for a given facility from August 1, 2007-July 31, 2009.

Source: National Healthcare Safety Network (NHSN) Database.

Prepared By: Colorado Patient Safety Program, Colorado Department of Public Health and Environment.

^{***} Indicates value not shown due to suppression of infections data, or no National or historical rate, or an expected count of zero, to which to compare facility rate. Infections data for hospitals with fewer than 20 procedures performed in a 12-month period are suppressed to protect confidential health information. These hospitals have met the reporting requirements.