COLORADO FACILITY SPECIFIC HEALTH CARE ACQUIRED INFECTION DATA - SURGICAL SITE INFECTION OVERVIEW

Surgical site infections (SSI) are infections directly related to an operative procedure. Surgical procedures selected for SSI reporting are (1) performed at a high volume, (2) performed at a variety of facilities, and (3) associated with a high risk for health facility-acquired infections. The surgeries monitored for SSI in Colorado include cardiac procedures, hip and knee replacements, hernia repairs, hysterectomies (abdominal and vaginal), breast and colon procedures. The National Healthcare Safety Network (NHSN) manual defines reportable procedures for surveillance as those that occur in a single trip to an operating room where the incision is closed following the procedure. Surgeries are performed as either in- or outpatient procedures. An NHSN inpatient is one whose date of admission to the health care facility and date of discharge are different calendar days. An NHSN outpatient is one whose date of admission and date of discharge are the same calendar day.

Surveillance for reportable infections is now determined by the type of procedure and could be within 30 days or 90 days per NHSN criteria. Common signs of infection include fever, pain or tenderness, drainage from the incision site, redness, or presence of an abscess. In NHSN, SSI are classified into three different categories based on the location of the infection.

- Superficial incision infection– the infection involves only the top layers of the skin
- Deep incision– the infection involves deeper soft tissues (e.g., fascia and muscle layers) of the incision.
- Organ space– the infection involves any part of the body that is opened or manipulated during the operative procedure, excluding the skin incision, fascia or muscle layers.

It is estimated that approximately 17 percent of HAI are SSI, equating to infections in approximately 2 percent of all surgical procedures nationally. The impact from an SSI can be devastating often leading to longer hospital stays, additional treatment and higher costs. The economic toll per patient occurrence is estimated between $10,000 to $25,500 in 2002 dollars depending on the surgical procedure and pathogen(s) involved. Overall, in the United States, SSI cost consumers and health care payers $3.45-$10 billion dollars each year.

Please see the Health Facilities Acquired Infections Reporting Initiative Reports, 2013 Annual Report, located in the HAI and Surveillance Data and Reports section for more detailed information about all HAI reportable to NHSN and the state health department.

STANDARDIZED INFECTION RATIO OVERVIEW

The Standardized Infection Ratio (SIR) is a risk adjusted summary measure used for surgical site infection (SSI). The SIR describes a facility's performance, taking into account individual facility's patient population risk. The SIR is the number of infections reported by the facility divided by the expected number of infections. The expected number of infections is determined by historical data collected by the NHSN as well as an individual facility's patient population.

Interpretation of the SIR is done by comparing a facility's value to 1.0 (observed and expected number of SSI are the same). In other words, the number of infections is what was expected based on the national average. If the SIR value is greater than 1.0, there are more infections than expected, and if the SIR value is less than 1.0, there are fewer infections than expected.

The statistical significance of is the observed SSI compared to its expected SSI based on the national average is tested using a Poisson test. A p-value is computed from the test and helps to determine if the difference in the HAI rate is due to chance alone. If the p-value is greater than or equal to 0.05, then there is no significant difference (**SAME**) between the facilty's HAI count and the expected count based on the national rate.

If the p-value is less than 0.05, then the difference is statistically significant, and the value of the SIR determines whether the facility is better than or worse than the national average. If the SIR is greater than 1, then the facility has significantly more SSI than were expected based on the national average (**WORSE**). The converse also applies where if the SIR is less than 1, the facility has significantly fewer SSI than were expected (**BETTER**).

CARDIAC PROCEDURES

A heart bypass, also known as a 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 such as the internal mammary artery (thoracic) or saphenous vein (leg) are used as grafts to create alternative blood-flow pathways. There are two types of coronary artery bypass graft surgeries; one that has both chest and donor site incisions (CBGB) and one that uses a chest incision only (CBGC). Both types involve replacing damaged sections of one or more coronary arteries with undamaged arteries or veins to increase cardiac blood flow. The majority of cardiac operative procedures performed in Colorado hospitals are CBGB. Based on the small number of CBGC surgeries performed, most SSI data associated with CBGC had to be suppressed to protect confidential health information. Based on this, CBGC data are not presented in this report.

RESULTS

Table 7 shows facility specific data for SSI attributed to CBGB surgeries performed in hospitals from August 1, 2010 through July 31, 2011 and August 1, 2011 through July 31, 2012.

Each table lists all Colorado hospitals that performed CBGB, their cities, numbers of procedures performed, infection counts, standardized infection ratios (SIR) based on the national infection data, and comparisons to the national infection data. The three categories summarizing how a Colorado hospital compares to the national infection data for the procedure performed are:

1. Statistically fewer (**better**) infections than expected based on national infection data;
2. Statistically similar (**same)** infections as expected based on the national infection data; or
3. Statistically more (**worse**) infections than expected based on national infection data.

The specific patient risk factors used to calculate the expected number of infections include:

- Patient age
- Patient gender
- American Society of Anesthesiologists (ASA) Score (given by the anesthesiologist, as an indicator of patient health and risk for surgical complications)
- Facility bed size

TABLE 7: CORONARY ARTERY BYPASS GRAFTS WITH CHEST AND DONOR SITE INCISIONS, INPATIENT PROCEDURES FOR HOSPITALS, AUGUST 2010 – JULY 2012

Surgical Site Infections (SSI) in Cardiac Procedures in Hospitals (Inpatient). Reporting Period: August 2010 – July 2012									
Health Facility and Region		2010-2011				2011-2012			
		Procedure Count	Infection Count	Standardized Infection Ratio (SIR)	National Comparison	Procedure Count	Infection Count	Standardized Infection Ratio (SIR)	National Comparison
Boulder Community Hospital	Boulder	51	0	0	Same	65	1	0.8	Same
Centura Penrose St Francis Health	Colorado Springs	186	7	2.2	Same	219	4	1.1	Same
Centura Porter Adventist Hospital	Denver	94	6	3.7	Worse	110	4	2.4	Same
Centura St Anthony Central Hospital	Denver	66	0	0	Same	70	0	0	Same
Exempla Lutheran Medical Center	Wheat Ridge	64	1	0.8	Same	89	0	0	Same
Exempla St Joseph Hospital	Denver	135	1	0.4	Same	152	1	0.4	Same
Longmont United Hospital	Longmont	31	1	1.2	Same	15	***	***	***
Medical Center of Aurora	Aurora	85	1	0.6	Same	65	0	0	Same
Medical Center of the Rockies	Loveland	151	3	0.8	Same	150	4	1.1	Same
Memorial Hospital Central	Colorado Springs	262	6	1.5	Same	151	0	0	Same
North Colorado Medical Center	Greeley	76	2	1.4	Same	67	3	2.4	Same
Parkview Medical Center	Pueblo	54	1	1	Same	60	3	2.6	Same
Presbyterian St Lukes Medical Center	Denver	23	0	0	Same	13	***	***	***
Sky Ridge Medical Center	Lone Tree	36	2	2.7	Same	16	***	***	***
St Marys Hospital	Grand Junction	135	1	0.5	Same	123	1	0.5	Same
Swedish Medical Center	Englewood	75	3	2.6	Same	54	2	2.4	Same
University of Colorado Hospital	Aurora	60	3	2.7	Same	78	1	0.6	Same

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

National comparison is based on the indirect adjustment of modeled risk factors for each procedure type.

See "Improving Risk-Adjusted Measures of Surgical Site Infection for the National Health care Safety Network" (Inf Control and Hosp Epi, October 2011, Vol 32, No 10, pp. 970-986).

Facilities performing fewer than 20 procedures during both reporting periods are excluded from this table: Rose Medical Center.

*** 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.

Source: National Health care Safety Network. Prepared By: Colorado Health & Safety Data Services Program, Colorado Department of Public Health and Environment.