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.)

Orthopedic Surgeries

Background

This section focuses on surgical site infections in orthopedic operative procedures. The orthopedic procedures monitored are hip replacements (total or partial) and knee replacements (total or partial).

A total or partial hip replacement is a surgery for people with severe hip damage or pain related to chronic osteoarthritis, rheumatoid arthritis or other degenerative processes involving the hip joint. The surgical procedure for a hip replacement involves removing the damaged cartilage and bone from the hip joint and replacing them with an artificial device. The procedure consists of a cup, which is typically plastic, ceramic or metal that will replace the hip socket, a metal or ceramic ball that replaces the head of the thighbone and finally a metal stem that attaches to the bone.

A total or partial knee replacement is a surgery (arthroplasty) that is considered an elective procedure for people with severe knee damage and pain related to osteoarthritis, rheumatoid arthritis, or traumatic arthritis. A total knee replacement involves removing the damaged cartilage and bone from the surface of the knee joint and replacing them with an artificial device. In this procedure, the patella (kneecap) is removed, the femur (thigh bone) and tibia (shin bone) are cut down, and a metal, ceramic or plastic prosthesis is put in place.

Results

Tables 5 and 6 below show facility specific data for SSIs attributed to the two different procedures performed in hospitals and ambulatory surgical centers, as described above. The tables present data from surgeries performed from August 1, 2009 through July 31, 2010.

Each table lists all the healthcare facilities in Colorado that performed the procedure, the city where the facility 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 5: Knee Replacement (total or partial) (KPRO), Inpatient Procedures for Hospitals, 2009-2010

Surgical Site Infections (SSI) in
Knee Replacement Procedures (total or partial) 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
Animas Surgical Hospital	Durango	75	0	0.0	Same	***	***
Aspen Valley Hospital	Aspen	22	1	6.4	Same	***	***
Boulder Community Hospital	Boulder	239	1	0.5	Same	0.6	Same
Centura Avista Adventist Hospital	Louisville	180	2	1.3	Same	0.5	Same
Centura Littleton Adventist Hospital	Littleton	129	0	0.0	Same	0.0	Same
Centura Penrose St. Francis Health	Colorado Springs	442	7	1.8	Same	2.1	Same
Centura Porter Adventist Hospital	Denver	1,009	11	1.4	Same	1.1	Same
Centura St. Anthony Central Hospital	Denver	515	1	0.2	Same	0.1	Better
Centura St. Anthony North Hospital	Westminster	73	3	4.1	Same	***	***
Centura St. Francis Medical Center	Colorado Springs	311	5	1.8	Same	2.4	Same
Centura St. Mary Corwin Medical Center	Pueblo	214	2	0.9	Same	0.3	Same
Centura St. Thomas More Hospital	Canon City	93	0	0.0	Same	***	***
Colorado Plains Medical Center	Fort Morgan	38	1	2.6	Same	1.5	Same
Community Hospital	Grand Junction	124	1	0.8	Same	1.2	Same
Delta County Memorial Hospital	Delta	129	0	0.0	Same	0.0	Same
Denver Health Medical Center	Denver	99	3	3.1	Same	1.4	Same
East Morgan County Hospital	Brush	16	***	***	***	***	***
Exempla Good Samaritan Medical Center	Lafayette	512	1	0.2	Same	0.8	Same
Exempla Lutheran Medical Center	Wheat Ridge	547	5	1.3	Same	1.0	Same
Exempla St. Joseph Hospital	Denver	651	2	0.4	Same	1.2	Same
Grand River Medical Center	Rifle	7	***	***	***	***	***

Health Facility and Region		Procedure Count	Infection Count	Standardized Infection Ratio (SIR)-National	National Comparison	Standardized Infection Ratio (SIR)-Historic	Historical Comparison
Gunnison Valley Hospital	Gunnison	8	***	***	***	***	***
Heart of the Rockies Regional Medical Center	Salida	15	***	***	***	***	***
Kremmling Memorial Hospital	Kremmling	1	***	***	***	***	***
Longmont United Hospital	Longmont	207	0	0.0	Same	0.0	Same
Loveland Surgery Center	Loveland	3	***	***	***	***	***
McKee Medical Center	Loveland	230	0	0.0	Same	0.0	Same
Medical Center of Aurora	Aurora	374	6	2.0	Same	0.9	Same
Medical Center of the Rockies	Loveland	63	2	2.8	Same	6.3	Same
Memorial Hospital Central	Colorado Springs	539	3	0.6	Same	0.5	Same
Memorial Hospital North	Colorado Springs	244	0	0.0	Same	0.0	Same
Mercy Regional Medical Center	Durango	128	1	0.9	Same	***	***
Montrose Memorial Hospital	Montrose	168	1	0.6	Same	0.3	Same
North Colorado Medical Center	Greeley	223	2	1.0	Same	0.8	Same
North Suburban Medical Center	Thornton	108	1	1.1	Same	0.9	Same
Parker Adventist Hospital	Parker	75	0	0.0	Same	***	***
Parkview Medical Center	Pueblo	325	9	3.2	Worse	2.4	Worse
Pikes Peak Regional Hospital	Woodland Park	12	***	***	***	***	***
Platte Valley Medical Center	Brighton	97	2	2.6	Same	0.3	Same
Poudre Valley Hospital	Fort Collins	1,014	5	0.6	Same	0.8	Same
Presbyterian St. Luke's Medical Center	Denver	360	3	1.0	Same	2.3	Same
Rose Medical Center	Denver	587	0	0.0	Better	0.0	Same
San Luis Valley Regional Medical Center	Alamosa	49	0	0.0	Same	0.0	Same
Sky Ridge Medical Center	Lone Tree	603	9	1.8	Same	1.3	Same
Skyline Surgery Center	Loveland	5	***	***	***	***	***
Southwest Memorial Hospital	Cortez	44	1	2.1	Same	1.6	Same
St. Anthony Summit Medical Center	Frisco	25	0	0.0	Same	***	***
St Mary's Hospital	Grand Junction	332	1	0.4	Same	0.4	Same
Sterling Regional Medical Center	Sterling	34	0	0.0	Same	0.0	Same
Surgical Center At Premier	Colorado Springs	9	***	***	***	***	***
Swedish Medical Center	Englewood	272	1	0.5	Same	0.2	Better
The Children's Hospital	Aurora	2	***	***	***	***	***
The Memorial Hospital	Craig	6	***	***	***	***	***
University of Colorado Hospital	Aurora	316	4	1.4	Same	1.0	Same

Health Facility and Region		Procedure Count	Infection Count	Standardized Infection Ratio (SIR)-National	National Comparison	Standardized Infection Ratio (SIR)-Historic	Historical Comparison
Vail Valley Medical Center	**Vail**	199	2	1.3	Same	***	***
Valley View Hospital	**Glenwood Springs**	131	0	0.0	Same	***	***
Wray Community Hospital	**Wray**	12	***	***	***	***	***
Yampa Valley Medical Center	**Steamboat Springs**	79	0	0.0	Same	0.0	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.
*** 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.
Source: National Healthcare Safety Network (NHSN) Database.
Prepared By: Colorado Patient Safety Program, Colorado Department of Public Health and Environment.

Table 6: Knee Replacement (total or partial) (KPRO), Outpatient Procedures for Ambulatory Surgical Centers, 2009-2010

Surgical Site Infections (SSI) in

Knee Replacement Procedures (total or partial) in Ambulatory Surgical Centers

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
Orthopaedic Center of the Rockies	**Fort Collins**	280	0	0.0	Same	***	***
Rocky Mountain Surgery Center	**Englewood**	3	***	***	***	***	***

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.
*** 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 ASCs with fewer than 20 procedures performed in a 12-month period are suppressed to protect confidential health information. These ASCs have met the reporting requirements.
Source: National Healthcare Safety Network (NHSN) Database.
Prepared By: Colorado Patient Safety Program, Colorado Department of Public Health and Environment.