

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

Surgical site infections (SSI) are infections directly related to a surgical procedure. It is estimated that more than 20 percent of HAI are attributed to SSI, equating to infections in approximately two percent of all surgical procedures nationally.⁵ The impact from an SSI can be devastating, often leading to a longer hospital stay, additional treatment and higher costs.⁶ The economic toll per patient occurrence is estimated to be between \$3,000 and \$25,500 depending on the procedure and pathogen(s) involved.^{1,7} Overall in the United States, SSI can cost consumers and health care payers from 3 to 10 billion dollars each year.¹

Surgical procedures required for SSI reporting are selected because they are (1) performed at a high volume, (2) performed at a variety of facilities, and (3) associated with a high risk for SSI. The surgeries monitored for SSI in Colorado include cardiac procedures, hip and knee replacements, hernia repairs, hysterectomies (abdominal and vaginal), and breast and colon procedures. The 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.² Surgeries are performed as either inpatient or outpatient procedures.

Reportable infections occur within 30 days of the procedure or within one year if an implant was placed during the procedure. 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, which involves only the top layers of the skin.
- Deep incision, which involves deeper soft tissues (e.g., fascia and muscle layers).
- Organ space, which involves any part of the body that is opened or manipulated during the surgical procedure, excluding the top layers of skin, fascia or muscle layers.

Every table presenting SSI data below lists each facility in Colorado that performed the designated procedure, its city, the number of procedures performed, number of infections, standardized infection ratio (SIR) and a comparison to national infection data. For a detailed explanation of how the SIR is calculated, see Appendix B. There are three categories that indicate how a facility's own infection rate compares to the national infection rate. These are:

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

ABDOMINAL PROCEDURES

Background

The surgeries presented in this section are hernia repairs, colon surgeries and hysterectomies (abdominal and vaginal). These surgeries can be performed as inpatient or outpatient procedures.

A hernia procedure involves the repair of a hernia or bulging of internal organs or tissues that protrude through an abnormal opening in the muscle wall. Reportable NHSN hernia procedures include inguinal, femoral, umbilical or anterior abdominal wall repairs.

In Colorado, hernia repairs were removed from mandatory reporting in acute care hospitals based on new national reporting requirements by the Centers for Medicare and Medicaid Services (CMS). To fulfill CMS reimbursement requirements, facilities nationwide began reporting certain colon procedures on Jan. 1, 2012.

Since facilities already were reporting colon surgeries to fulfill CMS requirements, Colorado removed the mandatory reporting of hernia repairs in hospitals, replacing it with colon surgeries. Hernia repair remains a reportable surgery for ASC and colon procedures only are reportable for hospitals.

Colon surgeries involve the excision of abnormal tissue in the small and large intestines. The intestines, which are muscular tubes that extend from the end of the stomach to the rectum, carry food, products of digestion and bacteria that help break down food in the digestive process. Since the intestines house bacteria, colon surgeries have a high risk for contamination and infection.

Hysterectomies are reported both by hospitals and ASC and involve the surgical removal of the uterus and occasionally, one or both fallopian tubes and/or ovaries. Indications for hysterectomy typically include benign fibroid tumors, cancerous tumors, uterine prolapse (uterus slips down into the vagina), endometriosis (cells from the uterine lining grow outside the uterus, causing pain and bleeding) and chronic pelvic pain.

Procedures counts, SSI counts and SSI rates for hernia repairs, colon surgeries and hysterectomies are presented in Tables 11-14 below.

HYSTERECTOMIES

Hysterectomies have traditionally been performed by making a large abdominal incision to access the uterus and surrounding anatomy. This traditional, open abdominal surgery often causes significant pain, threat to surrounding organs and nerves, long recovery periods and a higher risk of bleeding and infection⁴. Based on these negative outcomes, surgeons began using less invasive techniques such as vaginal hysterectomies. In traditional vaginal hysterectomies, the procedure is completed through the vagina with no abdominal incisions. Compared to traditional, open abdominal hysterectomies, vaginal hysterectomies have been shown to result in fewer surgical complications and infections⁵. This report presents SSI for both abdominal and vaginal hysterectomies.

When numbers for all facilities are combined, the state's AHYS SSI rate has been better than the national average for the last two reporting years.

Results

Tables 13 and 14 show facility specific data for SSI attributed to abdominal and vaginal hysterectomies performed from Aug. 1, 2010 through July 31, 2013.

The number of hospitals with VHYS SSI rates worse than the national average declined from five in 2010-2011 to one each year for the last two reporting years.

Fifty-five hospitals and one ASC reported 6,422 **abdominal hysterectomies (AHYS)** in this reporting period. Of those facilities, nine reported zero infections. Individually, all facilities had an AHYS SSI rate similar to the national average. However, when numbers for all facilities are combined (Table 5), the state's AHYS SSI rate has been better than the national average for the last two reporting years.

Fifty-five hospitals and five ASC reported 2,992 and 42 **vaginal hysterectomies (VHYS)**, respectively. SSI data for all five ASC were suppressed because they each reported performing fewer than 20 VHYS procedures per year. Of the 55 hospitals reporting VHYS, 19 reported zero VHYS SSI this past year. One hospital had a higher (worse) SSI rate than the national average and all others had rates similar to the national average. The number of hospitals with VHYS SSI rates worse than the national average declined from five in 2010-2011 to one for each of the last two reporting years.

Table 13: Abdominal Hysterectomies in Hospitals, Aug. 1, 2010 – July 31, 2013

Surgical Site Infections in Abdominal Hysterectomies in Hospitals (In- and Outpatient Combined): Aug. 1, 2010 – July 31, 2013													
Health Facility and City		August 2010- July 2011				August 2011- July 2012				August 2012- July 2013			
		Procedure Count	Infection Count	SIR	National Comparison	Procedure Count	Infection Count	SIR	National Comparison	Procedure Count	Infection Count	SIR	National Comparison
Animas Surgical Hospital	Durango	20	0	0	Same	17	***	***	***	11	***	***	***
Arkansas Valley Regional MC	La Junta	5	***	***	***	4	***	***	***	5	***	***	***
Aspen Valley Hospital	Aspen	8	***	***	***	3	***	***	***	6	***	***	***
Boulder Community Hospital	Boulder	4	***	***	***	17	***	***	***	36	1	1.6	Same
Boulder Community Hospital-Foothills	Boulder	32	1	1.7	Same	36	0	0	Same	19	***	***	***
Centura Avista Adventist Hospital	Louisville	45	1	1.2	Same	67	0	0	Same	49	3	2.8	Same
Centura Littleton Adventist Hospital	Littleton	76	0	0	Same	77	0	0	Same	153	1	0.4	Same
Centura Penrose St Francis Health	Colorado Springs	153	5	1.5	Same	189	8	2.0	Same	232	3	0.7	Same
Centura Porter Adventist Hospital	Denver	123	1	0.6	Same	165	0	0	Same	111	1	0.5	Same
Centura St Anthony Hospital	Lakewood	58	1	1.0	Same	18	***	***	***	27	0	0	Same
Centura St Anthony North Hospital	Westminster	22	0	0	Same	13	***	***	***	13	***	***	***
Centura St Francis MC	Colorado Springs	202	3	0.8	Same	224	2	0.5	Same	325	3	0.6	Same
Centura St Mary Corwin MC	Pueblo	44	0	0	Same	93	0	0	Same	145	1	0.4	Same
Centura St Thomas More Hospital	Canon City	25	0	0	Same	15	***	***	***	13	***	***	***
Colorado Plains MC	Fort Morgan	25	0	0	Same	40	0	0	Same	38	1	1.6	Same
Community Hospital	Grand Junction	7	***	***	***	17	***	***	***	13	***	***	***
Crown Point Surgery Center ASC	Parker	0	***	***	***	0	***	***	***	4	***	***	***
Delta County Memorial Hospital	Delta	22	0	0	Same	14	***	***	***	57	0	0	Same
Denver Health MC	Denver	52	0	0	Same	70	2	1.5	Same	70	1	0.6	Same
Estes Park MC	Estes Park	0	***	***	***	1	***	***	***	2	***	***	***
Exempla Good Samaritan MC	Lafayette	139	1	0.4	Same	174	2	0.8	Same	179	0	0	Same
Exempla Lutheran MC	Wheat Ridge	287	4	1.0	Same	302	7	1.6	Same	319	3	0.7	Same

Surgical Site Infections in Abdominal Hysterectomies in Hospitals (In- and Outpatient Combined): Aug. 1, 2010 – July 31, 2013

Health Facility and City		August 2010- July 2011				August 2011- July 2012				August 2012- July 2013			
		Procedure Count	Infection Count	SIR	National Comparison	Procedure Count	Infection Count	SIR	National Comparison	Procedure Count	Infection Count	SIR	National Comparison
Exempla St Joseph Hospital	Denver	234	5	1.1	Same	279	5	0.9	Same	453	10	1.0	Same
Grand River MC	Rifle	7	***	***	***	10	***	***	***	6	***	***	***
Gunnison Valley Hospital	Gunnison	16	***	***	***	15	***	***	***	5	***	***	***
Heart of the Rockies Regional MC	Salida	7	***	***	***	11	***	***	***	1	***	***	***
Longmont United Hospital	Longmont	59	1	1.1	Same	29	0	0	Same	149	2	0.8	Same
McKee MC	Loveland	47	1	1.4	Same	162	0	0	Same	233	0	0	Same
MC of Aurora	Aurora	82	1	0.7	Same	109	0	0	Same	96	1	0.7	Same
MC of the Rockies	Loveland	73	1	0.9	Same	61	0	0	Same	45	0	0	Same
Melissa Memorial	Holyoke	0	***	***	***	0	***	***	***	1	***	***	***
Memorial Hospital Central	Colorado Springs	220	10	3.2	Worse	162	3	1.2	Same	272	4	0.9	Same
Memorial Hospital North	Colorado Springs	216	1	0.4	Same	138	4	2.2	Same	131	0	0	Same
Mercy Regional MC	Durango	104	1	0.9	Same	103	0	0	Same	106	1	0.8	Same
Montrose Memorial Hospital	Montrose	69	0	0	Same	119	0	0	Same	120	2	1.3	Same
Mt San Rafael Hospital	Trinidad	3	***	***	***	1	***	***	***	6	***	***	***
North Colorado MC	Greeley	120	1	0.5	Same	167	2	0.9	Same	218	1	0.3	Same
North Suburban MC	Thornton	121	1	0.5	Same	154	2	0.8	Same	147	0	0	Same
Parker Adventist Hospital	Parker	92	3	1.8	Same	122	1	0.5	Same	130	1	0.5	Same
Parkview MC	Pueblo	116	3	1.8	Same	120	1	0.7	Same	125	0	0	Same
Pikes Peak Regional Hospital	Woodland Park	1	***	***	***	1	***	***	***	0	***	***	***
Platte Valley MC	Brighton	26	2	5.2	Same	22	1	3.2	Same	23	1	2.6	Same
Poudre Valley Hospital	Ft Collins	267	3	0.8	Same	252	2	0.5	Same	261	1	0.3	Same
Presbyterian St Luke's MC	Denver	50	0	0	Same	59	1	0.8	Same	64	2	1.6	Same
Prowers MC	Lamar	20	0	0	Same	31	0	0	Same	12	***	***	***
Rose MC	Denver	409	1	0.1	Better	392	6	1.0	Same	488	5	0.7	Same
San Luis Valley Regional MC	Alamosa	12	***	***	***	7	***	***	***	11	***	***	***
Sky Ridge MC	Lone Tree	193	2	0.6	Same	216	5	1.2	Same	406	6	0.8	Same
Southwest Memorial	Cortez	2	***	***	***	1	***	***	***	15	***	***	***
St Anthony Summit MC	Frisco	36	0	0	Same	24	0	0	Same	16	***	***	***
St Mary's Hospital	Grand Junction	174	1	0.3	Same	265	1	0.2	Same	298	1	0.2	Same

Surgical Site Infections in Abdominal Hysterectomies in Hospitals (In- and Outpatient Combined): Aug. 1, 2010 – July 31, 2013

Health Facility and City		August 2010- July 2011				August 2011- July 2012				August 2012- July 2013			
		Procedure Count	Infection Count	SIR	National Comparison	Procedure Count	Infection Count	SIR	National Comparison	Procedure Count	Infection Count	SIR	National Comparison
Sterling Regional MC	Sterling	6	***	***	***	5	***	***	***	1	***	***	***
Swedish MC	Englewood	460	6	0.8	Same	448	4	0.5	Same	537	7	0.8	Same
The Memorial Hospital	Craig	0	***	***	***	3	***	***	***	0	***	***	***
University of Colorado Hospital	Aurora	152	3	0.6	Same	197	0	0	Better	225	3	0.3	Same
Vail Valley MC	Vail	12	***	***	***	13	***	***	***	10	***	***	***
Valley View Hospital	Glenwood Springs	30	1	2.0	Same	14	***	***	***	13	***	***	***
Yampa Valley MC	Steamboat Springs	17	***	***	***	11	***	***	***	24	0	0	Same

Note: MC=Medical Center; SIR=Standardized Infection Ratio, the ratio of observed to expected infections adjusted for procedure risk factors.

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

*** Indicates value not shown due to suppression of infection data, no national or historical rate available, or an expected infection count of zero.

Infections for facilities performing less than 20 procedures per year are suppressed to protect confidential health information. These facilities fulfilled reporting requirements.

Source: National Health Care Safety Network (NHSN) Database.

Table 14: Vaginal Hysterectomies in Hospitals and Ambulatory Surgery Centers (ASC), Aug. 1, 2010 – July 31, 2013

Surgical Site Infections in Vaginal Hysterectomies in Hospitals and Ambulatory Surgery Centers (ASC), (In- and Outpatient Combined): Aug. 1, 2010 – July 31, 2013													
Health Facility and City		August 2010- July 2011				August 2011- July 2012				August 2012- July 2013			
		Procedure Count	Infection Count	SIR	National Comparison	Procedure Count	Infection Count	SIR	National Comparison	Procedure Count	Infection Count	SIR	National Comparison
Animas Surgical Hospital	Durango	49	0	0	Same	27	0	0	Same	29	0	0	Same
Aspen Valley Hospital	Aspen	18	***	***	***	18	***	***	***	13	***	***	***
Audubon Ambulatory Surgery Center ASC	Colorado Springs	0	***	***	***	1	***	***	***	1	***	***	***
Boulder Community Hospital	Boulder	63	1	2.8	Same	35	1	4.7	Same	1	***	***	***
Boulder Community Hospital-Foothills	Boulder	13	***	***	***	13	***	***	***	16	***	***	***
Centura Avista Adventist Hospital	Louisville	43	3	10.8	Worse	34	1	4.7	Same	37	0	0	Same
Centura Littleton Adventist Hospital	Littleton	181	2	2.0	Same	150	0	0	Same	80	0	0	Same
Centura Penrose St Francis Health	Colorado Springs	58	1	3.7	Same	78	2	5.2	Same	30	0	0	Same
Centura Porter Adventist Hospital	Denver	131	0	0	Same	121	2	3.0	Same	75	1	2.4	Same
Centura St Anthony Hospital	Lakewood	12	***	***	***	0	***	***	***	3	***	***	***
Centura St Anthony North Hospital	Westminster	79	0	0	Same	62	0	0	Same	29	0	0	Same
Centura St Francis MC	Colorado Springs	183	5	5.5	Worse	303	3	1.8	Same	138	1	1.4	Same
Centura St Mary Corwin MC	Pueblo	57	0	0	Same	62	0	0	Same	23	0	0	Same
Centura St Thomas More Hospital	Canon City	22	1	7.5	Same	13	***	***	***	34	0	0	Same
Colorado Plains MC	Fort Morgan	13	***	***	***	22	0	0	Same	19	***	***	***
Colorado Springs Surgery Center ASC	Colorado Springs	10	***	***	***	0	***	***	***	0	***	***	***
Community Hospital	Grand Junction	82	2	5.4	Same	80	1	2.5	Same	58	0	0	Same
Crown Point Surgery Center ASC	Parker	5	***	***	***	0	***	***	***	0	***	***	***
Delta County Memorial Hospital	Delta	29	1	6.7	Same	22	0	0	Same	7	***	***	***
Denver Health MC	Denver	60	0	0	Same	59	3	3.9	Same	65	1	1.0	Same
Estes Park MC	Estes Park	0	***	***	***	7	***	***	***	10	***	***	***
Exempla Good Sam	Lafayette	131	1	1.6	Same	138	2	2.7	Same	115	1	1.6	Same
Exempla Lutheran MC	Wheat Ridge	173	0	0	Same	188	3	2.9	Same	164	0	0	Same

Surgical Site Infections in Vaginal Hysterectomies in Hospitals and Ambulatory Surgery Centers (ASC), (In- and Outpatient Combined): Aug. 1, 2010 – July 31, 2013

Health Facility and City		August 2010- July 2011				August 2011- July 2012				August 2012- July 2013			
		Procedure Count	Infection Count	SIR	National Comparison	Procedure Count	Infection Count	SIR	National Comparison	Procedure Count	Infection Count	SIR	National Comparison
Exempla St Joseph Hospital	Denver	327	0	0	Better	311	1	0.2	Same	216	3	0.9	Same
Grand River MC	Rifle	17	***	***	***	11	***	***	***	31	0	0	Same
Gunnison Valley Hospital	Gunnison	0	***	***	***	0	***	***	***	5	***	***	***
Heart of the Rockies Regional MC	Salida	0	***	***	***	2	***	***	***	3	***	***	***
Longmont United Hospital	Longmont	87	1	2.2	Same	82	1	2.1	Same	33	1	4.7	Same
McKee MC	Loveland	238	3	2.0	Same	119	1	1.4	Same	2	***	***	***
MC of Aurora	Aurora	116	1	1.5	Same	88	0	0	Same	49	2	6.9	Same
MC of the Rockies	Loveland	16	***	***	***	11	***	***	***	9	***	***	***
Memorial Hospital Central	Colorado Springs	340	6	3.3	Worse	205	1	0.9	Same	176	0	0	Same
Memorial Hospital North	Colorado Springs	209	5	4.1	Worse	195	2	2.0	Same	188	1	1.0	Same
Mercy Regional MC	Durango	22	0	0	Same	27	0	0	Same	16	***	***	***
Montrose Memorial Hospital	Montrose	44	1	4.1	Same	34	0	0	Same	24	0	0	Same
Mt San Rafael Hospital	Trinidad	1	***	***	***	9	***	***	***	10	***	***	***
North Colorado MC	Greeley	178	0	0	Same	154	1	1.2	Same	66	0	0	Same
North Suburban MC	Thornton	46	0	0	Same	69	0	0	Same	25	0	0	Same
Pagosa Springs MC	Pagosa Springs	0	***	***	***	0	***	***	***	1	***	***	***
Parker Adventist	Parker	59	0	0	Same	67	4	10.1	Worse	102	1	1.5	Same
Parkview MC	Pueblo	202	1	0.4	Same	200	0	0	Same	200	0	0	Same
Peak One Surgery Center ASC	Frisco	0	***	***	***	13	***	***	***	14	***	***	***
Pikes Peak Regional Hospital	Woodland Park	6	***	***	***	6	***	***	***	1	***	***	***
Platte Valley MC	Brighton	18	***	***	***	31	0	0	Same	33	3	17.8	Worse
Poudre Valley Hospital	Ft Collins	139	1	0.6	Same	141	5	2.7	Same	92	1	0.8	Same
Presbyterian St Luke's MC	Denver	26	0	0	Same	37	1	2.1	Same	57	0	0	Same
Prowers MC	Lamar	0	***	***	***	1	***	***	***	5	***	***	***
Pueblo Surgery Center ASC	Pueblo	2	***	***	***	0	***	***	***	4	***	***	***
Rose MC	Denver	183	0	0	Same	173	1	0.4	Same	99	0	0	Same
San Luis Valley Regional MC	Alamosa	31	0	0	Same	34	0	0	Same	18	***	***	***

Surgical Site Infections in Vaginal Hysterectomies in Hospitals and Ambulatory Surgery Centers (ASC), (In- and Outpatient Combined): Aug. 1, 2010 – July 31, 2013													
Health Facility and City		August 2010- July 2011				August 2011- July 2012				August 2012- July 2013			
		Procedure Count	Infection Count	SIR	National Comparison	Procedure Count	Infection Count	SIR	National Comparison	Procedure Count	Infection Count	SIR	National Comparison
Sky Ridge MC	Lone Tree	292	2	1.2	Same	320	4	2.1	Same	161	2	2.2	Same
Southwest Memorial Hospital	Cortez	4	***	***	***	1	***	***	***	12	***	***	***
St Anthony Summit MC	Frisco	2	***	***	***	5	***	***	***	8	***	***	***
St Mary's Hospital	Grand Junction	215	4	1.4	Same	130	0	0	Same	124	2	1.2	Same
Sterling Regional MC	Sterling	11	***	***	***	9	***	***	***	6	***	***	***
Surgery Center At Lutheran ASC	Wheat Ridge	0	***	***	***	2	***	***	***	8	***	***	***
Surgery Center At Printers Park ASC	Colorado Springs	2	***	***	***	4	***	***	***	0	***	***	***
Surgery Center Of Ft Collins ASC	Ft Collins	15	***	***	***	16	***	***	***	15	***	***	***
Swedish MC	Englewood	224	0	0	Same	210	0	0	Same	166	2	2.3	Same
The Memorial Hospital	Craig	0	***	***	***	4	***	***	***	0	***	***	***
University of Colorado Hospital	Aurora	130	3	1.5	Same	140	2	0.9	Same	113	0	0	Same
Vail Valley MC	Vail	31	0	0	Same	17	***	***	***	16	***	***	***
Valley View Hospital	Glenwood Springs	38	2	8.6	Worse	56	1	2.9	Same	33	1	4.5	Same
Wray Community Hospital	Wray	0	***	***	***	1	***	***	***	0	***	***	***
Yampa Valley MC	Steamboat Springs	32	0	0	Same	31	0	0	Same	34	0	0	Same

Note: MC=Medical Center; SIR=Standardized Infection Ratio, the ratio of observed to expected infections adjusted for procedure risk factors.

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

*** Indicates value not shown due to suppression of infection data, no national or historical rate available, or an expected infection count of zero.

Infections for facilities performing less than 20 procedures per year are suppressed to protect confidential health information. These facilities fulfilled reporting requirements.

Source: National Health Care Safety Network (NHSN) Database.