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Volume and Rates of Surgical Site Infection in
Open versus Laparoscopic Abdominal and Vaginal Hysterectomies

Introduction

The Colorado Hospital-Acquired Infections (HAI) Disclosure Act (HB 06-1045)¹ requires healthcare facilities to monitor and publicly disclose certain HAI acquired at their facilities. A common type of HAI, accounting for 31 percent of all HAI, are surgical site infections (SSI)². Since 2007, Colorado healthcare facilities have been required to report SSI associated with selected surgeries, including abdominal and vaginal hysterectomies. Surgeries are selected for required reporting based on volume and risk of infection. This bulletin compares the volume and SSI rates of abdominal and vaginal hysterectomies performed using traditional, open surgeries and laparoscopic surgeries.

Background

In the United States, hysterectomy is one of the most frequently performed surgical procedures with approximately 600,000 performed each year³. It is estimated nearly one-third of American women will have a hysterectomy by age 60². A hysterectomy involves the 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.

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. As a result, the American College of Obstetrics and Gynecology Committee on Gynecologic Practice (ACOG) recommends vaginal hysterectomy as the approach of choice for benign disease. When the vaginal route is not

indicated or feasible, such as when the uterus is enlarged or difficult to access, laparoscopic abdominal hysterectomy is recommended as an alternative^{6,7}.

The laparoscopic abdominal procedure is considered less invasive than traditional, open abdominal hysterectomies because a large abdominal incision is not required. In laparoscopies, the pelvic organs are accessed by inserting thin, lighted tubes through tiny, 1-2 cm incisions in the abdomen. The laparoscope acts as a tiny telescope with a camera that projects a magnified image onto a television screen for viewing. This enables surgeons to see abdominal and pelvic structures, find cysts, adhesions, fibroids and infections, collect tissue samples for biopsies, and remove organs. The advantages of laparoscopic abdominal over traditional, open abdominal hysterectomies include the potential for surgeons to operate with greater precision and control, reduced post-operative pain, risk of infection and bleeding associated with large incisions, shorter hospital stays⁸, quicker recovery periods and favorable clinical outcomes⁹.

Laparoscopes also are used in vaginal hysterectomies. In laparoscopy assisted vaginal hysterectomies, the laparoscope still is inserted through small abdominal incisions, but the organs and tissues are removed through the vagina. Regardless of the approach, laparoscopic surgeries have the disadvantages of the need for additional equipment, increased operator experience, and increased length of procedure¹⁰⁻¹².

The occurrence of hysterectomy related surgical site infections (SSI) appears to be dependent on the approach (abdominal or vaginal) and whether or not a laparoscope was used. Evidence has shown that SSI rates are lower in traditional vaginal hysterectomies (1.3 per 100 procedures) than in traditional, open, abdominal hysterectomies (1.4 - 5.2 per 100 procedures)¹³. There also is evidence of lower SSI rates in laparoscopic abdominal hysterectomies (1.1) versus traditional open abdominal hysterectomies (3.4)¹⁴. However, while studies have compared certain complications of laparoscopy assisted vaginal hysterectomies and other hysterectomies^{15,16}, no published study to date has compared SSI rates between traditional vaginal and laparoscopy assisted vaginal hysterectomies.

This bulletin compares the volumes and SSI rates in hysterectomies performed in Colorado from 2010 through 2012 for four types of procedures: traditional open abdominal (AH); laparoscopic abdominal (AH/Scope); traditional vaginal (VH); and laparoscopy assisted vaginal (VH/Scope).

Methods

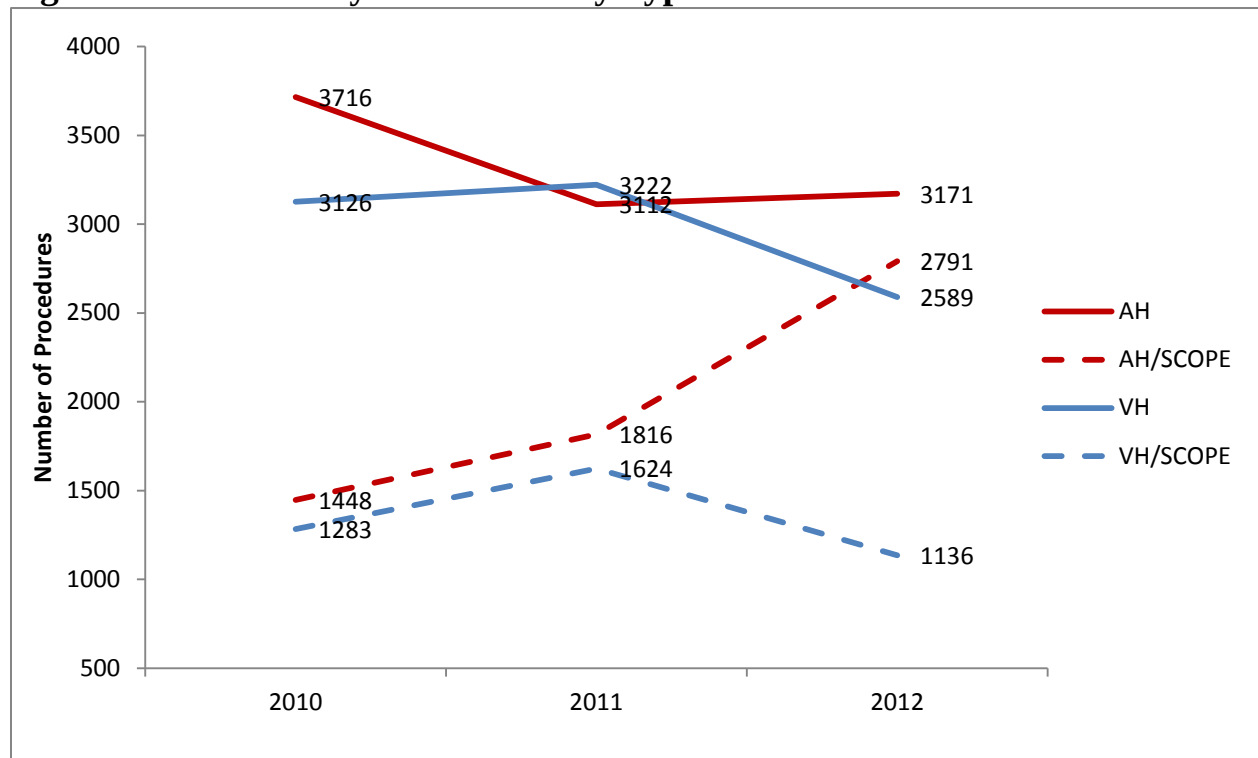
Colorado health facilities report hysterectomies and associated SSI into a national electronic data base called the National Healthcare Safety Network (NHSN). In NHSN, facilities identify whether a hysterectomy was abdominal or vaginal and whether or not a laparoscope was used. Procedures counts and SSI counts for hysterectomies performed in Colorado (2010-2012) were obtained from NHSN. SSI rates were calculated by dividing the number of infections per reporting year by the total number of procedures multiplied by 100. Statistical analysis using the Mann-Whitney test was conducted to test differences in SSI rates between the four types of procedures.

Results

Procedure Counts. Figure 1 shows that during the three year period from 2010 through 2012, abdominal hysterectomies were performed more frequently than vaginal hysterectomies (16,054 versus 12,980 respectively). However, since 2010, the number of traditional, open abdominal hysterectomies (AH) declined while the number of laparoscopic abdominal hysterectomies (AH/Scope) nearly doubled; the proportion of AH/Scope increased from 28 percent in 2010 to 47 percent in 2012.

In vaginal hysterectomies, the volume of both VH and VH/Scope increased slightly from 2010 to 2011, and then declined in 2012. From 2011 to 2012, the proportion of VH/Scope also declined from 33 percent to 30 percent.

Figure 1: Colorado Hysterectomies by Type: 2010-2012

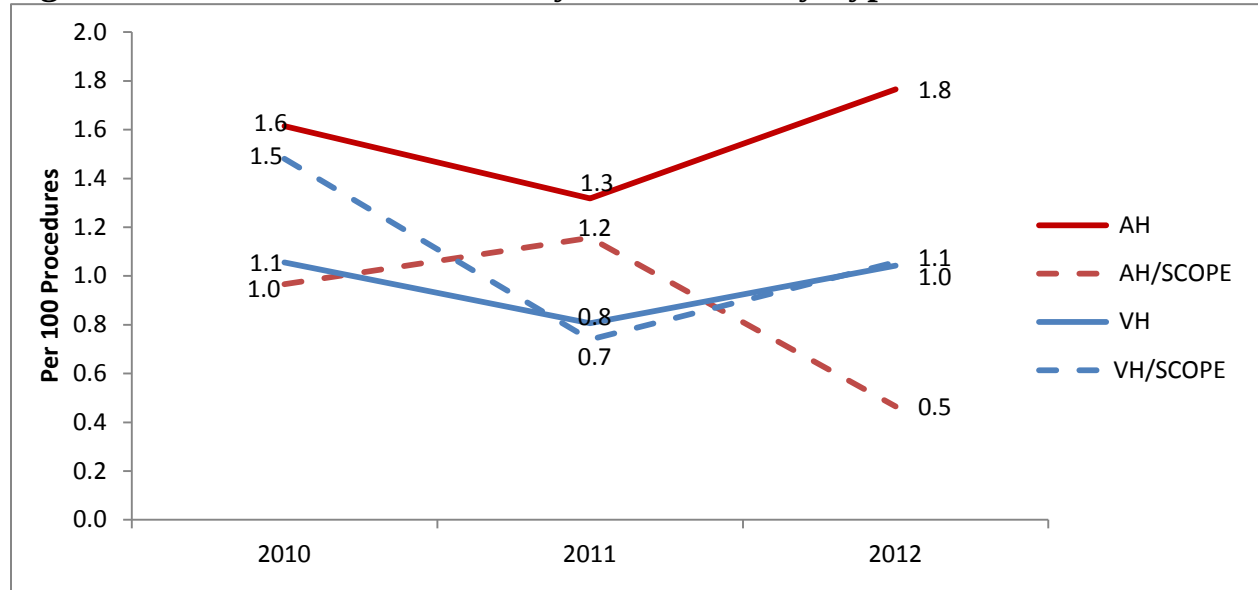


SSI Rates. As shown in Figure 2, traditional, open abdominal hysterectomies (AH) had the highest rate of SSI (1.55 per 100 procedures) among the four types of hysterectomy performed in Colorado from 2010-2012. Additionally, while the AH SSI rate declined from 1.6 in 2010 to 1.3 in 2011, it increased to 1.8 in 2012.

Laparoscopic abdominal hysterectomies (AH/Scope) had the lowest rate of SSI (0.78 per 100 procedures). Moreover, while the SSI rate for AH increased from 2011 to 2012, the AH/Scope SSI rate declined from 1.2 to 0.5 in that same period. Statistical analysis showed a statistically significant difference in 2012 SSI rates for AH and AH/Scope ($p < 0.01$).

SSI rates for all vaginal hysterectomies declined from 2010 to 2011 and showed a slight increase in 2012. The SSI rates for both VH and VH/Scope were similar in 2012 (1.0 and 1.1 respectively), yet both rates were higher than the SSI rate for AH/Scope.

Figure 2: SSI Rates in Colorado Hysterectomies by Type: 2010-2012



Summary and Recommendations

Despite known advantages of minimally invasive techniques, traditional, open abdominal hysterectomies remain the most frequently used approach in the U.S. and worldwide¹⁷. This trend also was noted in Colorado where from 2010 through 2012, traditional abdominal hysterectomies were the most frequently performed of the four types of procedures examined. Findings also highlighted an increase in the use of laparoscopic techniques, particularly in abdominal hysterectomies, which also mirrors national trends.

SSI rates were highest for traditional abdominal hysterectomies, lowest for laparoscopic abdominal hysterectomies, and roughly equivalent for traditional vaginal and laparoscopy assisted vaginal procedures. These findings support previous research that documents the advantages of traditional vaginal hysterectomies and laparoscopic abdominal procedures over traditional open abdominal hysterectomies⁶. However this study showed lower SSI rates for AH/Scope than for VH or VH/Scope. With these positive outcomes, the practice of AH/Scope will likely continue to rise.

It is noteworthy that for vaginal hysterectomies, the use of laparoscopy did not improve SSI rates. The small incisions required for laparoscopy and additional procedure duration may be factors contributing to this finding. Those factors, coupled with evidence of greater incidence of bladder injury¹⁶, the need for additional surgeon training and experience, and the need for certain hospital technologies and devices can lessen the advantage of laparoscopy in vaginal hysterectomies.

These findings indicated that certain laparoscopic hysterectomies are on the rise in Colorado and were validated by a recent survey of Colorado Acute Care Hospitals and Ambulatory Surgery Centers. Over 90 percent of the facilities surveyed reported performing laparoscopic hysterectomies. Results of this survey also suggested that more facilities are using robot-assisted hysterectomy (23 percent reported current use and several others reported plans for doing so). National trends have shown that the proportion of robot-assisted hysterectomies rose from 0.5 percent to 10 percent in the last three years¹⁸. Experience with robot-assisted hysterectomy is still limited and more data are needed to determine its role in the performance of hysterectomy^{2,6}. It is noteworthy that currently, facilities reporting hysterectomies into NHSN have no way to identify robot-assisted techniques. With the increase in robotic procedures, it may behoove NHSN to capture this information and assess the impact on SSI.

To further reduce the rate of hysterectomy associated SSI, health care personnel are encouraged to adhere to the following guidelines:

1. Advocate for non-surgical alternatives such as uterine artery embolization for treatment of benign gynecological problems.
2. If surgery is deemed necessary, educate surgeons to choose vaginal or laparoscopic-abdominal hysterectomies when feasible.
3. Implement AORN's recommended guidelines and practices for minimally invasive surgery.
4. Implement the latest evidence based guidelines for peri-operative prophylaxis for hysterectomy procedures.
5. Follow CDC guidelines for the prevention of SSI¹⁹.

This bulletin should be used as one of many healthcare quality evaluation tools and cannot, on its own, provide a complete picture of healthcare in Colorado. Readers should not base conclusions about healthcare quality on a single source, but should consider information from multiple sources including their personal physicians and other data sources (e.g., CMS Hospital Compare website, Colorado Hospital Report Card website). For more information about HAI in Colorado, please visit the HAI webpage at WWW.HEALTHFACILITIES.INFO and click on the Healthcare-Associated Infections (HAI) tab.

Health & Safety Data Services, Health Facilities & Emergency Medical Services Division
Colorado Department of Public Health and Environment
4300 Cherry Creek Drive South
Denver, CO 80246-1530 Phone: 303-692-2930 Email: tamara.hoxworth@state.co.us

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