

# Quality Improvement: Single-Field Sterile Scrub, Prep, and Dwell for Laparoscopic Hysterectomy

KATHERINE A. O'HANLAN, MD; STACEY PARIS McCUTCHEON, BA; JOHN G. McCUTCHEON, MBA; BETH E. CHARVONIA, BSN, RN

## ABSTRACT

The vulva and vaginal interior are considered a contaminated surgical area, and current OR guidelines require surgeons who are gloved and gowned at the abdominal field to avoid contact with the urethral catheter, the uterine manipulator, and the introitus or to change their gloves and even regown if contact occurs. It is our belief that the perception of the vaginal field as contaminated reflects a lack of specific standards for the preoperative cleansing of the deeper vagina and a lack of preoperative prep instructions for the combined fields. We developed a comprehensive single-field prep technique designed to improve surgical efficiency and prevent contamination of the sterile field. Combining a methodical scrub, prep, and dwell, this technique allows the entire abdomino-perineovaginal field to be treated as a single sterile field for laparoscopic procedures. Our surgical site infection rate of 1.8% when using this single-field prep technique and the subsequent surgical treatment of the abdominal, vaginal, and perineal fields as a single sterile field is well within reported norms. *AORN J* 97 (May 2013) 539-546. © AORN, Inc, 2013. <http://dx.doi.org/10.1016/j.aorn.2013.03.003>

**Key Words:** *surgical prep, sterile prep, vaginal antisepsis, gynecologic surgery, clean-contaminated surgery, chlorhexidine gluconate, povidone-iodine, total laparoscopic hysterectomy, surgical site infection.*

**T**raditionally, the vagina has been categorized as a contaminated surgical area. To preserve the sterility of the abdominal field, surgeons performing laparoscopic pelvic surgery have been required to avoid touching the perineum or perineal instruments or to reglove and even regown if such contact occurs, even though most gynecologic laparoscopic procedures require the surgeon to move back and forth between the abdominal and perineovaginal fields.

The guidelines for the surgical preparation of areas classified as contaminated do not cover specifics of establishing cervical antisepsis.<sup>1</sup> In addition, the issue of moving between the perineovaginal and abdominal fields during laparoscopic surgery has not been addressed in any publication.<sup>2</sup>

In the belief that a more thorough cervical and perineovaginal prep would allow the abdominal and perineal skin to be treated as a single, sterile

field, we reviewed existing guidelines and revised our OR prep standards to include the following:

- a meticulous scrub and prep of every aspect of the surface of the abdomen, upper thighs, vulva, vaginal interior, cervix, and anus<sup>1</sup>;
- specific training about the prep of the cervix and upper vagina; and
- a practice of instilling 50 mL of povidone-iodine solution into the vagina after the prep as the “dwell.”

During the laparoscopic procedures performed after this prep, the surgeon contacted tissues and used instruments in both fields, moving freely from abdomen to perineum and back without changing gloves or regowning. This retrospective descriptive article illustrates our quality improvement (QI) technique and reports on surgical site infections (SSIs) from a series of patients undergoing consecutive total laparoscopic hysterectomy (TLH), as recently reviewed in the *Journal of Minimally Invasive Gynecology*.<sup>3</sup>

### DESCRIPTION OF THE PROBLEM

Because TLH is considered a clean-contaminated procedure, current OR standards require surgeons to treat the abdominal and perineovaginal fields as separate and to consider the perineovaginal field as contaminated even after a surgical prep.<sup>1</sup> This requirement is cumbersome, time-consuming, and costly when the surgeons must repeatedly contact tissue and instruments in both fields during the course of a TLH procedure. It is our belief that the perception of the perineovaginal field as contaminated stems from inadequate prep standards. Neither Surgical Care Improvement Project (SCIP) guidelines<sup>4</sup> nor AORN recommendations<sup>1</sup> provide comprehensive details for the internal vaginal sterile scrub and preparation or for the use of two surgical fields simultaneously. Further proof of often-inadequate prep standards comes from feedback from physicians attending laparoscopic surgical courses. When queried, a majority of these physicians report having diverse or no institutional

standards for managing the two surgical fields, as well as having frequently observed undisturbed white vaginal fluid surrounding the cervix after preoperative sterile preps were performed on their own patients (K. A. O'Hanlan, personal conversations).

### DESCRIPTION OF THE SETTING

After we obtained institutional review board approval from Sequoia Hospital in Redwood City, California, we abstracted data from hospital and office files for all patients undergoing TLH and concomitant procedures from September 1996 to March 2011. Every surgery was performed by the main investigator at one of four San Francisco Bay Area hospitals. She was assisted by a categorical obstetrics and gynecology resident (ie, a resident completing his or her residency in obstetrics and gynecology), a gynecologist, or a general surgeon. Initially, the surgeon performed the preoperative prep and, subsequently, a team of nurses who had been specifically trained performed the prep. The prep standard includes a sequential scrub, prep, and dwell technique and covers the vaginal apex and cervix. The surgeons then used the surgical instruments on both the abdominal and perineal/vaginal tissues, which was treated as one sterile field.

### GOALS AND INTENDED OUTCOMES

Our goal was to develop an antiseptic procedure for the abdomino-perineovaginal fields that was thorough enough to allow the vaginal field to be treated as sterile during TLH. This would improve surgical efficiency, prevent unnecessary glove and gown changes, and maintain a low SSI rate.

### BRIEF REVIEW OF RELEVANT EVIDENCE

For total abdominal hysterectomy or vaginal hysterectomy, the SCIP and AORN standards have defined the sterile prep for the one surgical field. However, the AORN recommended practices do not provide specific standards for the order of prep, for upper vaginal and cervical cleansing for

laparoscopic hysterectomy, or for treatment of both the perineovaginal and abdominal fields as one.<sup>1</sup> Specifically, the AORN “Recommended practices for preoperative patient skin antisepsis” states that if a highly contaminated area is part of the procedure, the area with the lower bacterial count should be prepped first, followed by the area of higher contamination.<sup>1</sup> AORN also recommends the single use of each prep sponge in contaminated areas and that care be taken to prevent any prep solution from splashing from contaminated areas onto any previously prepped areas.<sup>1</sup>

A review of the published literature also reveals a general lack of specific details for perineovaginal and cervical cleansing.<sup>3</sup> Darouiche et al<sup>5</sup> compared chlorhexidine-alcohol versus povidone-iodine for surgical site antisepsis and reported on the results in gynecologic and other types of surgery, but they did not specify a technique for sterile preparation of the vagina. Levin et al<sup>6</sup> compared the same two bactericides specifically in gynecologic surgery but also did not describe a technique. Culligan et al<sup>7</sup>

compared antiseptics for vaginal hysterectomy and provided details of the physical cleansing process only in a subsequent letter. Our QI project sought to resolve the ambiguity with regard to the specific process of vaginal and cervical antisepsis by obtaining SSI data.

## PROJECT METHODS

All patients undergoing only total or radical laparoscopic hysterectomy and concomitant procedures from September 1996 to March 2011 were included in the project. After the scrub and paint technique was performed (Table 1), the entire abdomino-perineovaginal field was treated as one sterile field during all surgeries, with no changes of gloves or gowns after surgeon contact with the manipulator, catheter, vulva, or vaginal interior.

In accordance with institutional review board standards, data collected included demographic variables, indications for surgery, surgical duration, estimated blood loss, and duration of hospital stay. Surgical site infections, including superficial

**TABLE 1. Steps for Combined Abdomino-Perineovaginal Prep**

1. Open the prep kit.
2. Don sterile gloves.
3. Place a moisture-proof pad under the patient’s buttocks and between her tucked arms and abdomen.
4. Cleanse the umbilicus with cotton-tipped applicators; remove detritus before applying the antiseptic prep agent.
5. Scrub the abdomen by starting at the incision site, usually the central lower abdomen, and moving outward toward the periphery:
  - upward to the xiphoid and costal margins;
  - laterally to the mid-axillary line;
  - inferiorly to the mons pubis;
  - downward to the anterior upper and inner third of the thighs;
  - downward to the vulva and perineum, scrubbing all the vulvar folds;
  - into the vagina, scrubbing all the walls up to the apex around the cervix; and
  - ending in the anal area.

Then discard the sponge. Repeat this five times.
6. Dry the external prepped area with a sterile towel.
7. Apply the prep agent to the abdomen, upper thighs, labia, vagina, cervix, and anus with sponges on disposable sponge sticks or with soaked-sponge forceps. Use a generous amount of prep agent in the vagina because the vaginal epithelium has many folds and crevices that are not easily prepped. Repeat this two times.
8. Fill the bulb syringe with 50 mL of povidone-iodine solution. With the table adjusted to mild Trendelenburg, inject the solution into the patient’s vagina.
9. Remove the moisture-proof pads.
10. Dispose of the prep kit, remove gloves, and wash hands. (The surgeon drapes the patient and inserts the catheter on the field.)

incisional, deep facial incisional, and organ space infections were recorded for the first 90 days in accordance with Centers for Disease Control and Prevention guidelines.<sup>8</sup>

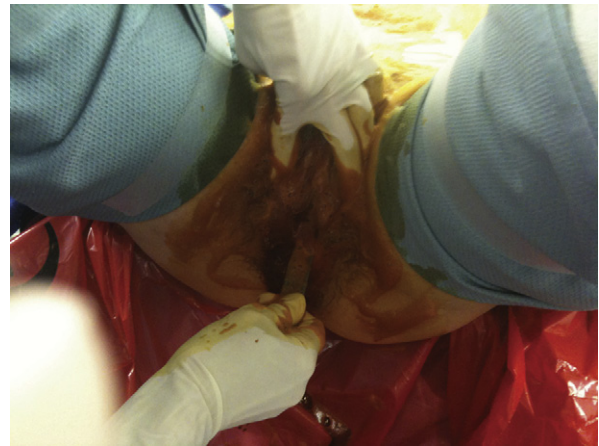
## IMPLEMENTATION

Our “single field” prep is performed using a prep kit that contains two cotton tip applicators, six foam sponges, three foam sponge sticks, a 3-oz bottle of povidone-iodine scrub, and a 90-mL bottle of povidone-iodine solution. An additional 50 mL of povidone-iodine solution is added to the prep set along with a 50-mL bulb-tip irrigating syringe.

First, it is confirmed that the patient is not allergic to external iodine preparations. For patients who are allergic, diluted 4% chlorhexidine gluconate is used.<sup>9</sup> The staff member performing the prep uses cotton tip applicators with iodine paint to clean the umbilicus of detritus (ie, debris). Next, each foam sponge is dipped in the scrub solution to vigorously scrub, in sequence, the abdomen, top third of the thighs, perineum, and vulva, and then the vaginal interior up to and around the cervix; the sponge is discarded after the anus is swabbed (Figure 1). Staff members were taught to carefully scrub the apical vagina and cervix as deeply as the anatomy would allow (Figure 2). This scrub is repeated with



**Figure 1.** The combined abdomino-perineovaginal prep starts with the abdominal field and then continues with each sponge to include the perineum, vagina, cervix, and anus before the sponge is discarded.



**Figure 2.** The deepest apex of the vagina and cervical region are meticulously scrubbed to remove all vaginal fluid.

five more of the foam sponges. The external prepped area is then dried with a sterile towel.

Then three sponge sticks are soaked in iodine solution and used to paint, in sequence, the abdomen, perineum, top third of the thighs, vulva, and vaginal interior up to the cervix and posteriorly to the anus, and then they are discarded. Lastly, with the patient in a slight Trendelenburg position, 50 mL of povidone-iodine solution is injected into the vaginal cavity with the bulb syringe.<sup>10</sup> The surgeon then drapes the patient, using no under-buttock sheet and no coverage of the anus. The surgeon inserts the urethral catheter (Figure 3) and the uterine manipulator. The surgeon may subsequently manipulate the urethral catheter<sup>11</sup> or uterine manipulator or perform a vaginal morcellation with no change of glove or gown.

An incidental appendectomy was performed in 653 of these cases, with the appendix being removed through the vagina. In cases of pelvic mass, a nylon bag was folded, placed in a glove, and passed up the vagina with the open end of the glove, allowing the bag to be pulled into the abdomen for extraction of the pelvic mass in the bag. The suture used for closing the vagina was also passed up through the vagina on ring forceps. As a true test of theory, the surgeon also used the abdominal 5-mm laparoscope to perform a cystoscopy per urethra using lidocaine jelly and subsequently reused the same



**Figure 3.** After the drape is applied, a urethral catheter is inserted and affixed to the drapes. Surgeons and nurses do not need to change gloves or gowns unless the anus is contacted or other contamination occurs.

5-mm laparoscope through the abdominal trocar, again with no instrument change.

**RESULTS**

Of the 1,337 patients who underwent the described single-field prep technique before a simple or radical laparoscopic hysterectomy, 24 patients (1.8%) experienced SSIs, all in the deep organ

space (Table 2).<sup>3</sup> There were no superficial or deeper incisional infections as defined by Centers for Disease Control and Prevention guidelines.<sup>8</sup> Five of these 24 patients (0.4%) required reoperation. There were 14 cases of pelvic cellulitis, defined clinically as an inflammation of the soft or connective tissue. Cultures and blood counts were not performed. Patients’ symptoms all resolved with prescribed oral empiric antibiotics. Seven patients had abscesses: three that resolved with antibiotics and four that required reoperation. Two patients experienced fluid collection that required computed tomography-guided drainage, both of which were culture negative. One patient had persistent pain but no radiological findings and underwent a laparoscopic resection of a culture-negative granuloma.

Patients with and without SSI showed no differences in baseline age, parity, body mass index, estimated blood loss, hospital stay, or final pathological diagnosis. There was no increase in risk of pelvic infection associated with performance of appendectomy and extraction of the appendix through the vagina. However, women who experienced an SSI were younger (46 years versus 50 years of age, *P* = .047) and had longer durations of surgery than those without SSI (115 minutes versus 152 minutes, *P* = .013).<sup>3</sup>

**DISCUSSION**

In a TLH, the surgeon must repeatedly contact both the perineovaginal and abdominal fields.

**TABLE 2. Surgical Site Infections Among 1,337 Patients<sup>1</sup>**

	Nonreoperative surgical site infection		Reoperative surgical site infection		Total	
	Number	%	Number	%	Number	%
Pelvic cellulitis	14	1.05%			14	1.05%
Fluid collection, granuloma	2	0.15%	1	0.07%	3	0.22%
Pelvic abscess	3	0.22%	4	0.30%	7	0.52%
<b>Total</b>	<b>19</b>	<b>1.42%</b>	<b>5</b>	<b>0.37%</b>	<b>24</b>	<b>1.79%</b>

1. O’Hanlan KA, McCutcheon SP, Charvonia BE. Instruments & techniques: single-field sterile-scrub, preparation and dwell for laparoscopic hysterectomy. *J Minim Invasive Gynecol.* 2012;19(2):220-224.

The surgeon typically inserts the urethral catheter after draping and then inserts a uterine manipulator and maneuvers it during the course of the surgery. The surgeon may need to morcellate a large uterus through the vagina<sup>12</sup> and/or perform cystosufflation<sup>11</sup> or laparoscopic cystoscopy,<sup>13</sup> both of which require manipulation of the urethral catheter, and then suture the vagina laparoscopically. Under the assumption that the vulvar and vaginal fields are nonsterile, surgeons have traditionally assiduously avoided contact or changed their gloves or instruments and even regowned after every contact.<sup>1</sup>

In a 1997 meta-analysis of vaginal antiseptics for hysterectomy, Eason wrote, "Infectious complications of hysterectomy remain common despite the use of prophylactic antibiotics. Most are caused by contamination of the surgical site by vaginal bacteria, which are not controlled by current methods of pre-operative antiseptics."<sup>14(p53)</sup> The AORN "Recommended practices for preoperative patient skin antiseptics" does not provide standards for preoperative sterile vaginal and cervical cleansing for laparoscopic hysterectomy specifically with respect to contacting both the abdominal and perineovaginal fields.<sup>1</sup>

With regard to the antiseptic agent used for the preoperative surgical preparation, the effectiveness of an iodophor soap and solution has been confirmed for laparotomy and vaginal surgery since 1977.<sup>15,16</sup> We used povidone-iodine in the 5-year duration of this QI project, but both povidone-iodine and chlorhexidine kill 99% of bacteria in the vagina.<sup>16</sup> Although, historically, there has been some reluctance to use chlorhexidine in the genital area,<sup>7</sup> chlorhexidine cleansing of the internal vagina appears safe<sup>7</sup> with an allergic reaction of less than 1%.<sup>5</sup>

A review of the literature on the topic of chlorhexidine versus povidone-iodine for surgical site antiseptics suggests that while chlorhexidine-alcohol may be more protective than povidone-iodine for superficial and deep incisional infections,<sup>5</sup> the two agents are similarly effective with regard to SSIs in the deep organ space. It is this measure that is most

relevant to TLH, because TLH involves only four half-inch incisions, and virtually all postoperative SSIs occur in the deep pelvic organ space. Culligan et al<sup>7</sup> found that alcohol-based chlorhexidine 2% is more effective than aqueous povidone-iodine 10% in decreasing early (ie, 30-minute) but not later bacterial colony counts in the surgical field for vaginal hysterectomy. Levin et al,<sup>6</sup> in a retrospective review of 256 patients undergoing gynecologic surgery, reported that alcohol-based chlorhexidine 2% appeared to reduce the incidence of SSI from 15% to 5% compared to aqueous povidone-iodine 10% scrub and paint. Darouiche et al<sup>5</sup> compared the use of chlorhexidine 2%/alcohol 70% applicators versus povidone-iodine 10% scrub and paint and reported SSIs with follow-up over 30 days. Among the 82 patients undergoing gynecologic surgery, the researchers found no difference in infection rates (one in 42 compared with zero in 40). Among all 849 patients undergoing any type of surgery in the report by Darouiche et al, there was no difference in deep organ space infections (4.4%) between these two preps.<sup>5</sup> However, neither alcohol-based (70%) chlorhexidine nor alcohol-based (74%) povidone should be used on the internal vaginal epithelium. Unfortunately, neither Levin et al nor Darouiche et al specified their method of vaginal prep.

It may be that friction from actual scrubbing during the vaginal cleansing process with antimicrobial agents is more important in removing bacterial organisms than the specific agent used.<sup>15,17</sup> To prevent the frequent, post-prep observation of undisturbed white vaginal fluid at the vaginal apex that so many gynecologists report, our single-field prep standards included ensuring that the apical vagina and cervix were repeatedly scrubbed and that 50 mL of paint was instilled with the patient in the Trendelenburg position. The nursing teams performing the preps were trained to become comfortable and confident in contacting the cervix and scrubbing the vaginal apex. Culligan employed a similar cleansing process with each of the antibacterial agents by using a "vigorous 2-minute scrub in and around the vagina using disposable

sponges,<sup>18(p625)</sup> followed by a paint application of either povidone-iodine or chlorhexidine, depending on which agent the patient was randomly assigned to receive.<sup>18</sup>

We have not observed any toxicity from the use of the povidone-iodine dwell. Of note, all the paint has typically spilled out onto the perineum from manipulation of the uterus during the procedure such that there has never been a pool of povidone observed when the vaginotomy is performed. There are no studies of serum absorption or toxicity from one-time vaginal scrub with or without instillation of povidone-iodine paint into the vagina. Use of external single-use povidone-iodine on neonates has been shown to elevate excretion of iodine in the urine but not influence thyroid function.<sup>19</sup> High serum levels of iodine were documented up to an hour after instillation of a single povidone-iodine intrarectal irrigation for patients with a sigmoid carcinoma, but no organ toxicity was observed. One patient was reported to have experienced allergic anaphylaxis after vaginal cleansing with povidone-iodine, worsened by use of epidural lidocaine.<sup>20</sup> In this patient, histamine levels were abnormally elevated, and iodine levels were increased but not toxic.

Laparoscopic approaches have been shown to result in lower rates of SSI than open abdominal hysterectomies.<sup>21</sup> Chang et al<sup>22</sup> reported on SSIs in a series of 310 patients undergoing laparoscopic-assisted vaginal hysterectomy to be 2.7%. Donnez et al<sup>23</sup> reported an admirable 0.76% of infectious complications from their series of 1,577 laparoscopic-assisted vaginal or total laparoscopic hysterectomies; however, their prep standards were not discussed. Recognizing the vast number of variables that may contribute to SSIs, it is gratifying to confirm that our SSI rate of 1.8% following the single-field prep technique and subsequent surgical treatment of the abdominal, vaginal, and perineal fields as a single sterile field remains well within reported norms.

The 2013 AORN recommended practices do not provide specifics for scrubbing the vagina and do

not cover the new scenario presented in gynecologic laparoscopy of combined surgical fields.<sup>1</sup> Informal discussions with many perioperative nurses revealed that the traditional view of the vagina as contaminated reduces their commitment to more optimal preps in the vaginal apex. Scrub personnel may also report being fearful of perforating the vaginal apex and thus may not use the sponges well in the cervical region. An educational strategy to disseminate information about the effectiveness of both povidone-iodine and chlorhexidine vaginal preps, with focus on reaching the vaginal apex and cervix, may be beneficial.

We followed strict standards of surgical antisepsis for each of the two separate surgical fields in sequence but trained personnel to extend the thorough scrub, prep, and dwell to the vagina and cervix, which allowed surgeons and nurses to treat the two sterilized fields as one. We offer evidence from this single-institution QI project and suggest that other institutions consider a similarly meticulous prep standard and collect their own SSI data to evaluate such an approach.

Preoperative prep for laparoscopic hysterectomy can be improved by establishing a new standard that involves a more detailed and thorough scrub, prep, and dwell and includes the vaginal apex. This prep will allow the abdominal, vulvar, and vaginal fields to be safely treated as a single sterile field during a TLH procedure while maintaining low postoperative infection rates. AORN may find these data useful in preparing guidelines for a single, combined-field surgical prep for gynecologic laparoscopy procedures. [AORN](#)

## References

1. Recommended practices for preoperative patient skin antisepsis. In: *Perioperative Standards and Recommended Practices*. Denver, CO: AORN, Inc; 2013:75-89.
2. Burlingame B. Abdomino-perineal surgical preps [Clinical Issues]. *AORN J*. 2011;94(1):97-100.
3. O'Hanlan KA, McCutcheon SP, Charvonia BE. Instruments & techniques: single-field sterile-scrub, preparation and dwell for laparoscopic hysterectomy. *J Minim Invasive Gynecol*. 2012;19(2):220-224.
4. Dellinger EP. Adherence to Surgical Care Improvement Project measures: the whole is greater than the parts. *Future Microbiol*. 2010;5(12):1781-1785.

5. Darouiche RO, Wall MJ Jr, Itani KM, et al. Chlorhexidine-alcohol versus povidone-iodine for surgical-site antisepsis. *N Engl J Med*. 2010;362(1):18-26.
6. Levin I, Amer-Alshiek J, Avni A, Lessing JB, Satel A, Almog B. Chlorhexidine and alcohol versus povidone-iodine for antisepsis in gynecological surgery. *J Womens Health (Larchmt)*. 2011;20(3):321-324.
7. Culligan PJ, Kubik K, Murphy M, Blackwell L, Snyder J. A randomized trial that compared povidone iodine and chlorhexidine as antiseptics for vaginal hysterectomy. *Am J Obstet Gynecol*. 2005;192(2):422-425.
8. Mangram AJ. A brief overview of the 1999 CDC Guideline for the Prevention of Surgical Site Infection. Centers for Disease Control and Prevention. *J Chemother*. 2001;13 Spec No 1(1):35-39.
9. Pereira L, Chipato T, Mashu A, et al. Randomized study of vaginal and neonatal cleansing with 1% chlorhexidine. *Int J Gynaecol Obstet*. 2011;112(3):234-238.
10. Eason E, Wells G, Garber G, et al. Antisepsis for abdominal hysterectomy: a randomised controlled trial of povidone-iodine gel. *BJOG*. 2004;111(7):695-699.
11. O'Hanlan KA. Cystosufflation to prevent bladder injury. *J Minim Invasive Gynecol*. 2009;16(2):195-197.
12. O'Hanlan KA, McCutcheon SP, McCutcheon JG. Laparoscopic hysterectomy: impact of uterine size. *J Minim Invasive Gynecol*. 2011;18(1):85-91.
13. O'Hanlan KA. Cystoscopy with a 5-mm laparoscope and suction irrigator. *J Minim Invasive Gynecol*. 2007;14(2):260-263.
14. Eason EL. Vaginal antisepsis for hysterectomy: a review of the literature. *Dermatology*. 1997;195(Suppl 2):53-56.
15. Osborne NG, Wright RC. Effect of preoperative scrub on the bacterial flora of the endocervix and vagina. *Obstet Gynecol*. 1977;50(2):148-151.
16. Vorherr H, Vorherr UF, Mehta P, Ulrich JA, Messer RH. Antimicrobial effect of chlorhexidine and povidone-iodine on vaginal bacteria. *J Infect*. 1984;8(3):195-199.
17. Owens CD, Stoessel K. Surgical site infections: epidemiology, microbiology and prevention. *J Hosp Infect*. 2008;70(Suppl 2):3-10.
18. Culligan PJ. Preoperative vaginal preps with chlorhexidine gluconate solution [Letter to the Editor]. *Am J Obstet Gynecol*. 2006;195(2):625.
19. Yilmaz D, Teziç HT, Zorlu P, Firat S, Bilaloğlu E, Kutlu AO. Single dose povidone-iodine on thyroid functions and urinary iodine excretion. *Indian J Pediatr*. 2003;70(8):675-677.
20. Ono T, Kushikata T, Tsubo T, Ishihara H, Hirota K. [A case of asystole following povidone iodine administration]. *Masui*. 2011;60(4):499-501.
21. Brill A, Ghosh K, Gunnarsson C, et al. The effects of laparoscopic cholecystectomy, hysterectomy, and appendectomy on nosocomial infection risks. *Surg Endosc*. 2008;22(4):1112-1118.
22. Chang WC, Lee MC, Yeh LS, Hung YC, Lin CC, Lin LY. Quality-initiated prophylactic antibiotic use in laparoscopic-assisted vaginal hysterectomy. *Aust N Z J Obstet Gynaecol*. 2008;48(6):592-595.
23. Donnez O, Jadoul P, Squifflet J, Donnez J. A series of 3190 laparoscopic hysterectomies for benign disease from 1990 to 2006: evaluation of complications compared with vaginal and abdominal procedures. *Br J Obstet Gynaecol*. 2009;116(4):492-500.

**Katherine A. O'Hanlan, MD**, is a gynecologic oncologist and medical director of the Laparoscopic Institute for Gynecologic Oncology, Portola Valley, CA. *As a consultant and speaker for Baxter, Covidien, CareFusion, and LSI Solutions, Dr O'Hanlan has declared affiliations that could be perceived as posing a potential conflict of interest in the publication of this article.*

**Stacey Paris McCutcheon, BA**, is a self-employed health writer, Menlo Park, CA. *Ms McCutcheon has no declared affiliation that could be perceived as posing a potential conflict of interest in the publication of this article.*

**John G. McCutcheon, MBA**, is a self-employed statistician, Menlo Park, CA. *Mr McCutcheon has no declared affiliation that could be perceived as posing a potential conflict of interest in the publication of this article.*

**Beth E. Charvonja, BSN, RN**, is the director of gynecologic surgery services at the Sequoia Hospital, Redwood City, CA. *Ms Charvonja has no declared affiliation that could be perceived as posing a potential conflict of interest in the publication of this article.*