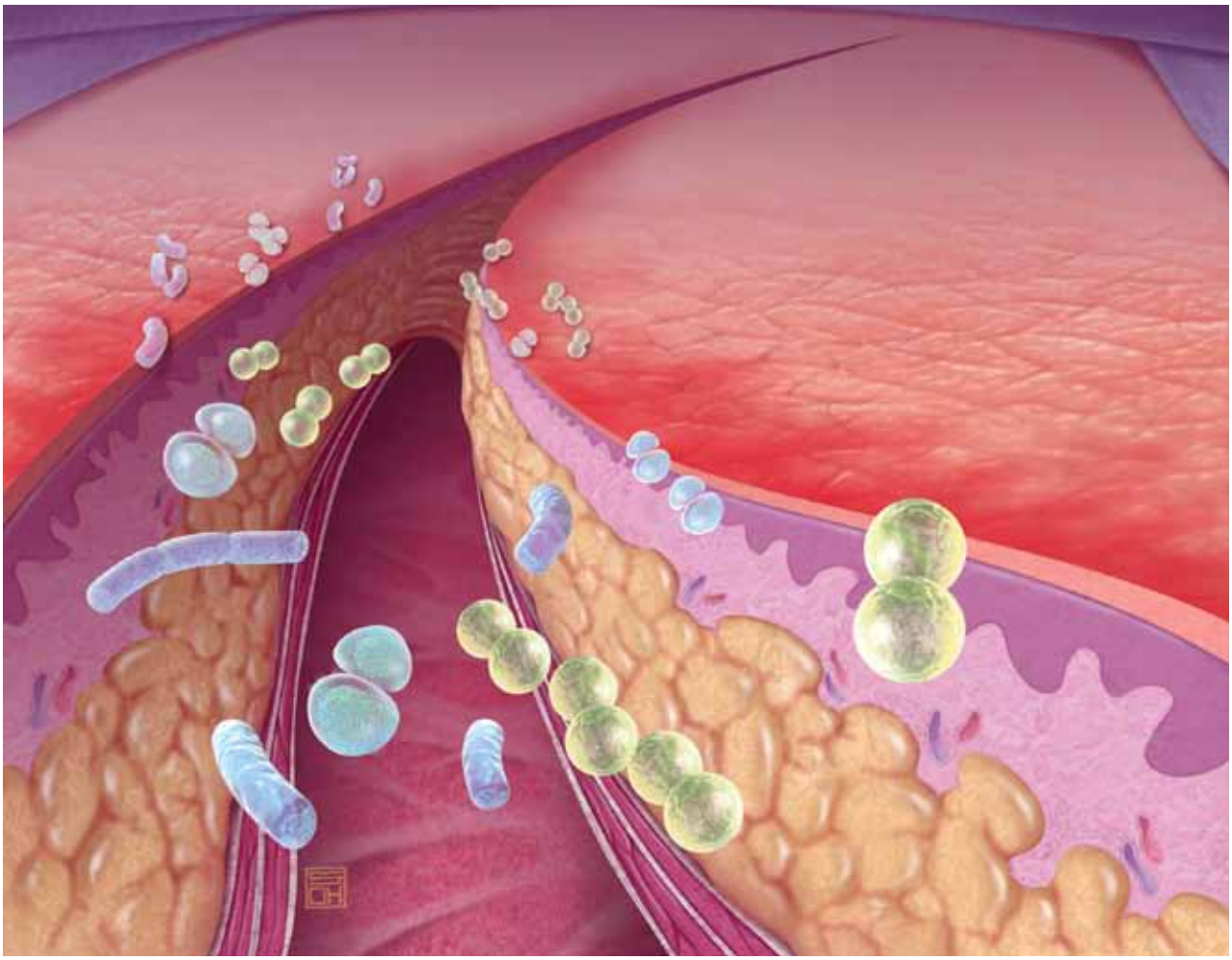

Gynecologic Surgical Site Infections: Simple Strategies for Prevention

Christa Lewis, DO
Patrick Culligan, MD, FACOG, FACS

With recent emphasis on all aspects of patient safety, it is good to be reminded of the basic protocols of surgical site infection prevention.

Gynecologic surgical site infections (SSIs) most commonly arise when bacteria that naturally occur on the skin or vagina contaminate an incision site. Other potential sources of bacteria are skin-to-skin contact with health care workers, as well as contaminated medical equipment. Despite widespread use of prophylactic antibiotics, SSIs remain a major issue facing the health care system today. Patients who experience SSIs utilize more health care resources, such as intravenous antibiotics and clinician care, and are at greater risk for readmission

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and death.[1] Should you suspect that a patient has an SSI, early identification and treatment are critical.

Beyond patient care, SSIs are a key consideration for an institution's bottom line, given the new mandatory reporting requirement for hospitals. They affect up to 500,000 patients per year and result in an annual cost to hospitals of $7.4 billion.[2,3] As of October 2008, the Centers for Medicare and Medicaid Services (CMS) stopped reimbursing for treatment of certain health care–associated conditions, including SSIs that have evidence-based prevention guidelines. Also, beginning in 2012, CMS is requiring hospitals to use the CDC's National Healthcare Safety Network to report incidences of SSIs in order to receive a full Medicare reimbursement for payments in 2014. These reported infections will become public information, providing a forum in which our institutions can be evaluated by prospective patients and professionals.

Many ObGyn professionals perceive cesarean delivery as the surgery most likely to result in an SSI, yet SSI incidence following gynecologic surgeries is approximately 2%.[4] Still, SSI rates are not high enough to place the issue at the top of the gynecologic surgeon's mind. In fact, SSI prevention techniques tend to become rote—and can then be taken for granted. This article focuses on a "best practices" approach to reducing the risk of SSIs associated with gynecologic surgery.

ANTIBIOTIC PROPHYLAXIS

Antibiotic prophylaxis is utilized so that the drugs can augment natural immune function at the skin level—killing bacteria that are inoculated into the surgical field. Therefore, a narrow window of timing exists in which to complete the antibiotic infusion. For best results, prophylactic antibiotics should be fully infused no longer than 2 hours before and no sooner than 30 minutes before the incision time.[5]

Due to their broad-spectrum activity and low incidence to produce allergic reactions, cephalosporins are the standard first-line choice for prophylaxis. Most commonly, cefazolin (1 g) is used because of its 1.8-hour half-life and low cost. For patients who are morbidly obese (BMI >35), the antibiotic dose should be increased to 2 g.[6] Repeat dosing of prophylactic antibiotics should be given at 1 or 2 times the estimated drug half-life. In the case of cefazolin, the second dose should be given at 3 hours.[7] Repeat dosing should also be given in situations involving blood loss greater than 1,500 mL.[7]

In May 2009, ACOG issued a practice bulletin for antibiotic prophylaxis for gynecologic procedures, which replaced the previous guidelines developed in 2006.[6] The highlights from this publication are presented in Tables 1 and 2.

FOCUSPOINT

Antibiotic prophylaxis is utilized so that the drugs can augment natural immune function at the skin level.

SKIN PREPARATION

Gynecologic infections are commonly caused when the flora of the patient's vagina gains exposure to the surgical incision site in the peritoneal cavity. This can happen even when performing total laparoscopic and supracervical hysterectomy procedures. For this reason, it is important to prepare the patient with a vaginal scrub as well as skin antisepsis at the point of incision, in order to reduce the amount of naturally occurring bacteria on the skin.

Abdominal Incisions

When possible, the skin should be prepared with a 2% chlorhexidine gluconate (CHG)/70% isopropyl alcohol solution (such as ChloraPrep®, CareFusion, Leawood, KS) for abdominal access points. This formulation, which is recommended for skin preparation, works by rapidly killing microorganisms and providing persistent antimicrobial activity for up to 48 hours.

Despite evidence that 2% CHG/70% isopropyl alcohol is superior, many surgeons are still using povidone-iodine for abdominal skin preparation. A drawback of using povidone-iodine for skin preparation is that iodine can be neutralized by blood and other organic matter, reducing the effectiveness and persistence. In addition, povidone-iodine is not completely effective until thor-

Christa Lewis, DO, is a fellow in Urogynecology and Reconstructive Pelvic Surgery, Atlantic Health, Morristown and Summit, NJ. **Patrick Culligan, MD, FACOG, FACS**, is Director of Urogynecology and Reconstructive Pelvic Surgery, Atlantic Health, Morristown and Summit, NJ; and Professor of Obstetrics, Gynecology and Reproductive Science, Mount Sinai School of Medicine, New York, NY.

TABLE 1. ACOG Antimicrobial Prophylactic Regimens by Procedure[6a]

Procedure	Antibiotic	Dose (Single Dose)
Hysterectomy	Cefazolin[b]	1 or 2 g[c] IV
Urogynecology procedures, including those involving mesh	Clindamycin[d] plus	600 mg IV
	gentamicin or	1.5 mg/kg IV
	quinolone[e] or	400 mg IV
	aztreonam	1 g IV
	Metronidazole[d] plus	500 mg IV
	gentamicin or	1.5 mg/kg IV
	quinolone[e]	400 mg IV
Laparoscopy	None	
Diagnostic		
Operative		
Tubal sterilization		
Laparotomy	None	
Hysteroscopy	None	
Diagnostic		
Operative		
Endometrial ablation		
Essure		
Hysterosalpingogram or chromotubation	Doxycycline[f]	100 mg orally, twice daily for 5 days
IUD insertion	None	
Endometrial biopsy	None	
Induced abortion/dilation and evacuation	Doxycycline	100 mg orally 1 hour before procedure and 200 mg orally after procedure
	Metronidazole	500 mg orally twice daily for 5 days
Urodynamics	None	

Abbreviations: IV, intravenously; IUD, intrauterine device.

[a] A convenient time to administer antibiotic prophylaxis is just before induction of anesthesia.

[b] Acceptable alternatives include cefotetan, cefoxitin, cefuroxime, or ampicillin-sulbactam.

[c] A 2-g dose is recommended in women with a BMI >35 or weight >100 kg or >220 lb.

[d] Antimicrobial agents of choice in women with a history of immediate hypersensitivity to penicillin.

[e] Ciprofloxacin or levofloxacin or moxifloxacin.

[f] If patient has a history of pelvic inflammatory disease or procedure demonstrates dilated fallopian tubes. Nonprophylaxis is indicated for a patient without dilated tubes.

oughly dried on the skin. Furthermore, a recent study published in the *New England Journal of Medicine* demonstrated that preoperative use of 2% CHG/70% isopropyl alcohol reduced total SSIs by 41% compared to use of povidone-iodine solution.[8]

Vaginal Incisions

Povidone-iodine surgical preparation is the most commonly employed method in surgical procedures that require a vaginal scrub. Alternatively, there has been some indication that a 4% aqueous CHG solution may

also be appropriate. One randomized trial demonstrated that 4% aqueous CHG is more effective than povidone-iodine in decreasing the bacterial colony counts that were found in the operative field for vaginal hysterectomy.[9] Physicians and other operating room personnel are often reluctant to use CHG inside the vagina, due to the fact that CHG is not appropriate for mucosal surfaces. However, despite common use of the term "vaginal mucosa," the vagina is lined by an epithelial surface. As such, prepping this surface with CHG is appropriate.

Hand Hygiene

Since microorganisms can be transferred from the hands of a health care worker to a patient, proper hand hygiene is a critical measure to prevent pathogen transmission. Glove use alone does not suffice and does not replace washing with soap and water or hand-rubbing with an alcohol-based solution.

Obviously, sterile technique dictates that hand hygiene should be performed before touching a patient or a device that will be used for patient care. It should also be performed after contact with bodily fluids or inanimate surfaces and objects and after removing gloves.

As long as they are used properly, alcohol-based solutions can provide hand preparation on par with traditional surgical scrubbing. According to the World Health Organization Guidelines on Hand Hygiene in Health Care,[10] the following technique should be followed:

- Apply a palmful of alcohol-based handrub and cover all surfaces of the hands. Rub hands until dry.
- When washing hands with soap and water, wet hands with water and apply the amount of product necessary to cover all surfaces. Rinse hands with water and dry thoroughly with a single-use towel. Use clean, running water whenever possible. Avoid using hot water, as repeated exposure to hot water may increase the risk of dermatitis. Use towel to turn off tap/faucet. Dry hands thoroughly using a method that does not recontaminate hands. Make sure towels are not used multiple times or by multiple people.
- Liquid, bar, leaf, or powdered forms of soap are acceptable. When bar soap is used, small bars of soap in racks that facilitate drainage should be used to allow the bars to dry.

Studies demonstrate that scrubbing for 5 minutes will reduce bacterial count just as effectively as the previous practice of scrubbing for 10 minutes.[11] Furthermore, alcohol-based waterless hand hygiene products are being formulated to be gentler on the skin and provide for easier glove application by not leaving a residue on the skin. When reviewing data comparing waterless alcohol scrub to conventional presurgical brush hand scrub, the risk of SSIs is comparable when either method is used correctly.[12]

All ObGyns are familiar with the traditional hand scrub technique; however, the technique employed for waterless hand scrub has many misconceptions.

Proper technique for application of waterless hand scrub is outlined below:

- One pump placed onto the palm of hand. Opposite hand used to dip fingertips into hand prep and work under fingernails. Then spread remaining prep over hand and just above elbow. Second pump used to repeat with other hand.
- Third pump placed into either hand and reapplied to all aspects of both hands, up to the wrists. Allow to dry without the use of towels.
- Can be used as first scrub of the day.
- If fingernails or hands are visibly soiled, first wash with soap and water prior to application.

FOCUSPOINT

Proper hand hygiene is a critical measure to prevent pathogen transmission.

TABLE 2. ACOG Recommendations and Conclusions for Gynecologic Antibiotic Prophylaxis[6]

- Patients undergoing hysterectomy should receive single-dose antimicrobial prophylaxis preoperatively.
- Pelvic inflammatory disease occurs uncommonly with or without the use of antibiotic prophylaxis, and so prophylaxis is not indicated at the time of IUD insertion.
- Antibiotic prophylaxis is indicated for elective suction curettage abortion.
- Antibiotic prophylaxis is not recommended in patients undergoing diagnostic laparoscopy.

FIGURE. SensiClip. Used with permission of CareFusion, San Diego, CA.

FOCUSPOINT

SSIs are serious, but they are also preventable.

Hair Removal

For gynecologic procedures, hair removal is typically not needed, as incisions are rarely made in the hairline. However, when preoperative hair removal is necessary, guidelines recommend using a surgical clipper rather than a razor. These recommendations are based on data that have shown a traditional razor can cause microabrasions to the skin, which can increase the risk of infection.

With a surgical clipper, the risk of trauma to the skin is significantly reduced. Disposable, single-use blades help prevent cross-contamination. Some clippers are designed specifically for the rather sensitive areas encountered during gynecologic surgeries. One such product (Figure) is specifically shaped for ease of use on the groin and perineum and is designed to be fully submersible in disinfectants, which can make the cleaning easier and faster.

CONCLUSION

In recent years, we have made great progress in reducing SSI incidence rates for gynecologic procedures. However, we must not become complacent because of these successes. We must do everything in our power to reduce the risk of infections for each patient we see.

SSIs are serious, but they are also preventable. Proper infection prevention protocols go beyond ensuring a clean operating room and sterile equipment. They start with remembering the basics, refusing to take shortcuts, and always having the best interest of the patient at the forefront.

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