Preventing SSI: It Starts In The Prep

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Surgical site infections (SSIs), and the human and monetary costs associated with these events, is a top concern for facilities across the country. While it’s important that a facility follows best practice approaches to infection prevention throughout the perioperative process, ensuring all efforts are made in the preoperative preparation period to prevent infection can help start every surgical case off on the right foot.

Most facilities have standardized processes in place for this step in the patient’s care. However, new infection prevention products and protocols require facilities to constantly review and update their protocols to ensure they do everything they can to prevent surgical site infections from occurring.

According to Linda R. Greene, RN, MPS, CIC, member of the APIC Board of Directors and director of infection prevention and control at Rochester General Health System, many surgical site infections are caused endogenously from microorganisms that live on patients’ skin. These microorganisms do not cause problems on the skin, but do cause problems if they get into a sterile site.

“When one creates an incision, it gives the microorganisms a portal of entry into a sterile environment where they don’t live and they don’t belong,” Greene says. “That can predispose to a surgical site infection.”

Surgical site infections can also be caused exogenously—or from contamination from an external source—perhaps due to breaks in technique or a compromise of the sterile field, Greene says. The issue is complicated by other external factors such as personnel, instrumentation, if the patient has diabetes or smokes, and operative events such as how long the wound is open.

Still, the fact that the root cause of many surgical site infections is the patient’s skin itself makes the preoperative preparation process absolutely crucial in assuring best-

practice infection control is achieved.

Prep Before The Prep

According to Greene, patient prep can be viewed from two perspectives. The first involves what a surgical staff instructs the patient to do before they arrive at the hospital for their procedure. For example, many facilities ask patients to take a pre-op shower—or to bathe with a pre-op skin cleanser. This lessens the burden of bacteria on the skin.

“We can’t sterilize our skin, but what we can do, through the pre-op shower or a wipe with chlorhexidine gluconate (CHG), is lessen the colony count,” Greene explains. “It lessens the microorganisms on the skin.”

As Beth Beck, director of infection prevention and control/employee health at Springhill Medical Center in Mobile, AL, explains, her facility follows specific steps in the prep process to help reduce infection risk.

“We ask the surgeons to have the patients bathe with chlorhexidine the night before,” she says. “Then, once they arrive to the hospital, we wipe them down with a CHG-impregnated cloth and we instruct patients to brush their teeth twice. We have them rinse with a CHG oral rinse. Then, we give them skin and nasal antiseptic.”

This skin and nasal antiseptic product, marketed by 3M, is applied to the patient’s nares one to two hours before surgery in an attempt to reduce Staphylococcus aureus (Staph aureus) colonization—the leading cause of SSI. As Joe Gillis, marketing manager for the skin and nasal antiseptic product at 3M, explains, applying a skin and nasal antiseptic to help prevent surgical infection is a relatively new concept. Currently, the product is mainly used in high-risk procedures—orthopedics and cardiothoracic namely—but it’s a technology that could gain in popularity once more data proving its efficacy is established.

According to Gillis, approximately thirty percent of surgical patients today are colonized with Staph aureus in the nares. In turn, a study published in *The Lancet* in 2004 revealed that eighty percent of Staph aureus infections are caused by the patient’s own nasal flora. Additionally, one percent of the surgical population carries methicillan-resistant Staphylococcus aureus (MRSA).

For Beck, her facility is in the trial phase of using the skin and nasal antiseptic product on orthopedic patients who are undergoing an operation involving implants, due to the increased risk of infection. After seeing an increase in surgical site infections in orthopedic patients, the facility decided to give the product a try.

Trying new products to prevent infection may not only make sense from a patient safety perspective, but also from the perspective of the monetary cost associated with infections occurring in a hospital. In October 2008, the Centers for Medicare and Medicaid stopped reimbursing facilities for “never events” or hospital-acquired conditions it considered preventable through safe practices. This includes hospital-acquired infections (HAIs) and SSIs.

This means that when these events occur, it can be extremely costly for a hospital. According to Gillis, a Staph aureus infection has been reported to cost a facility anywhere from $10,000 to $25,000 per case. A study published in December 2009 from Duke University shows the cost of a MRSA infection can reach $60,000. While MRSA is less frequent, Gillis says, it's a larger issue in terms of cost, morbidity and mortality.

Skin Prep: Last Line Of Defense

Once in the OR, but before the first incision, applying a preoperative patient skin is an important practice to reducing the potentially infectious microorganisms on the patient's skin. This, Greene says, is the second perspective from which patient prep can be viewed.

"The skin is actually the best defense the patient has in fighting off infection, but it can also be the worst enemy because of all the microorganisms that normally generate from the skin," says DeAnn Hammer, infection prevention marketing manager at 3M. "The patient skin prep is there to try and lower that microbial count before the surgery starts so you have fewer organisms that find their way into the incision area."

Greene adds, "The goal of the pre-op skin prep is to reduce the risk of SSI by removing surface contaminants and reducing the number of colonies of microorganisms, so that when you make the incision, it's as close to a sterile incision as possible."

The prep is to be applied in the OR once the patient has been put under anesthesia, before the draping. According to Hammer, the most commonly used preps in the United States have two active ingredients. Usually, the base ingredient is alcohol. This will start killing microbes immediately. The second active ingredient such as CHG—used in the common commercial product ChloraPrep—or iodophor povacrylex—used in 3M's DuraPrep product—will work to kill microbes throughout the procedure. Preps are also available with one active ingredient, such as povodine iodine, which is often used when an alcohol-based product cannot be used due to patient or procedure variables.

"There are a lot of different options because you really can't standardize on patient prep due to patient variability," Hammer says. "You may have a patient with sensitive skin, and if you do, you may not choose a CHG-based product because it can tend to irritate skin. On the other hand, if you have a patient who is allergic to iodine, you will probably choose a CHG-based product."

With all of these options, it's important to note that successful skin prep is dependent upon the surgical staff's ability to use the product correctly and to adhere to the manufacturer's specifications. The efficacy claims made by the manufacturer about the product are based on the instructions for use. And, every product is different. Some products require a back and forth scrubbing motion, while another might require a circular motion to applying the prep. Some preps require a single coated paint. There may be a time consideration for how long the

prep should be scrubbed on the patient.

Further, Greene says, the prep must be allowed to dry completely before the incision is made in order to achieve maximum efficacy. Especially when using alcohol-based preps, it's important to let the prep thoroughly dry to prevent fire hazards. All of these factors will affect how well the product works in helping to prevent infection.

Choosing The Right Interventions

With many infection control product and technology options just in the preparation portion of the perioperative process, it can be difficult to identify which solutions are right for your facility. Patient, procedure, surgeon preference and budgetary constraints are all factors in the decision-making process.

"You can see that clinicians really, truly believe that every intervention that they can have, the outcome should be better," Hammer says. "It would be great in the future if there was a study that linked all these together to show there is a greater benefit to having multiple interventions."

Greene recommends looking at the literature. How does a product act? What has the experience been? Have there been peer review studies on it? Then, she says, do a facility risk assessment. Ask: What are my issues? Where am I in terms of surgical site infections? Where do I want to be? Are there any new products out there that may get me to where I want to be?

"What you really want to do is follow a logical, science-based approach in choosing products and looking at your facility's needs," Greene says.

Overall, Beck says it's important for facilities to constantly be updating their protocols and trying out new infection control solutions, even for small facilities like the one in which she works.

"Even if a facility has a low rate of SSI, they are not zero," she says. "We want zero."

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