Infection control: Start with skin

With the recent national focus on patient safety, the issue of surgical site infections (SSIs) has come to the forefront of public discussion. Previously, the topic of SSIs was confined to the professional associations of surgeons, perioperative nurses, or infection control practitioners; now, there’s growing awareness of the issue throughout the healthcare industry, government agencies, and the general public.

The Joint Commission on Accreditation of Healthcare Organizations has come forth with a campaign for preventing the spread of infection,
such as hand hygiene, a core measure in the area of surgical infection prevention, and a sentinel alert concerning deaths due to nosocomial infections. Several national improvement initiatives, such as the 100,000 Lives Campaign and the Surgical Care Improvement Project, highlight the need to reduce SSI rates in the United States, leading healthcare facilities to evaluate their practices and begin investigating ways to make improvements. With this surge of energy, renewed importance is being placed on the prevention of SSIs, not simply the treatment of them once they occur.

Prophylactic antibiotics are a critical part of preventing SSIs, and many of the national improvement initiatives emphasize and monitor the proper selection and appropriate administration of these antibiotics before and after surgical procedures. Public awareness of the importance of antibiotic administration also has grown as stories of antibiotic-resistant bacteria, such as methicillin-resistant Staphylococcus aureus, grace the pages of our nation’s newspapers weekly. Hospitals strive to implement workflow systems that constrain healthcare providers to timely administer and discontinue the chosen prophylactic antibiotics. While the importance of prophylactic antibiotics is recognized, the total perioperative care of the patient should be evaluated to maximize prevention of SSIs, resisting the temptation of becoming single-focused in prevention methods.

Critical aspects of SSI prevention, which tend to receive less of the media spotlight than prophylactic antibiotic administration, are the patient’s risk factors and skin asepsis. Prior to the current trend of same-day or outpatient surgeries, all patients were admitted to the hospital the night before their surgery to address many of these aspects with presurgery preparation, including physician visits, nurse’s preoperative teaching, lab tests, and skin preparation.
asepsis plays a key role in thwarting potentially deadly infections by reducing the bacterial count of the skin. According to the National Nosocomial Infections Surveillance System (NNIS), the most frequently isolated pathogens from SSIs are *S. aureus* (20%) and coagulase-negative staphylococci (14%)—organisms which are acquired from the exogenous environment or the patient’s own skin. Because skin bacteria is the most egregious offender in SSI cases, more attention to skin prep procedures, which aid in the reduction of bacterial colonization, is needed.

**Preoperative showers**

With today’s emphasis on efficiency and the shift from inpatient to outpatient, the instruction of preoperative showers is often given in a preoperative telephone call or visit to the patient. The responsibility of acquiring the appropriate prescribed solution and performing the aseptic showers with clean towels and garments is completely left up to the patient and family. Although preoperative showers haven’t been directly linked to a reduction in SSIs, they’ve been shown in a variety of studies to dramatically reduce infection-causing bacterial colonies, creating a sound argument for renewed focus on this preoperative practice.

The Centers for Disease Control and Prevention (CDC) has published comprehensive, evidence-based recommendations for preoperative care in the Guidelines for Prevention of Surgical Site Infection (1999). These guidelines strongly

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**After hours OR team?**

An alternative to the traditional call team resulted in increased staff satisfaction and a financial savings for one organization.

*By David P. Shaffer, RN, MSN*

Traditionally, our community not-for-profit hospital had regular OR hours, with the staff remaining on call after regular hours and the end of the scheduled cases. This model was viewed by some clinicians as an inconvenience, and by others as another means of overtime and additional income.

In comments during recruitment and retention discussions, staff members would tell us that they avoided “taking the call” for the OR. They might not have looked for other positions within or outside the organization if they didn’t have to take call and the commitment and interruptions associated with this task.

Staff interviewing for open positions within the OR said this was a definite negative aspect of the position and often cited it as the reason for not pursuing OR nursing. Morale seemed to be affected by the expectation of working beyond the traditional daily OR schedule.

During an overtime reduction effort, we continually found that the OR on call headed the list of expenses. Again, we brainstormed on how to reduce this cost, yet provide the service. The OR manager offered a well-thought-out plan that was reinforced by staff interviews and interest: Develop teams of after-hours OR staff consisting of an RN and a scrub technician who wouldn’t work during the day but would cover all cases from 3 p.m. until 7 a.m. Two teams were proposed to allow a rotation.

Some staff members were delighted at the thought of no longer taking call. Others worried that their income would be drastically reduced without the traditional call time they usually received. To move the proposed change forward, we had to address fears and misconceptions. Human resources (HR) helped managers determine which staff members would work best together. HR was highly involved in setting salaries that would be fair and acceptable, yet provide a guaranteed savings for the organization.

After the initial trial, participants voiced overwhelming approval, and our organization experienced a positive financial effect. The change proved to be a win/win situation for all involved: Currently, there are no open nursing positions in the OR.

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recommend preoperative antiseptic showering (Category IB) using products containing chlorhexidine gluconate (CHG). Chlorhexidine has been shown to reduce bacterial colony counts ninefold, while povidone-iodine and triclocarban-mediated soap reduced colony counts by 1.3- and 1.9-fold, respectively. Implementing methods for patients to acquire appropriate preoperative solutions at times of clinic or preoperative visits would increase the chances of compliance. Patients may not understand the importance of this preventive measure or have the means to obtain it. At one time, this expense was rolled into the cost of the hospitalization; now, if prescribed, it becomes an outpatient pharmacy cost often paid for out of the patient’s pocket.

**Hair removal technique**
Historically, operating room (OR) nurses have shaved surgical sites in preparation for surgery. Razors were a standard part of any preoperative kit because the presence of hair was believed to heighten the risk of infection and impede the surgeon’s ability to perform. We now know better.

In recent years, myriad studies have been published directly linking alcohol’s limited persistence has precluded its stand-alone use in the OR.
preoperative shaving with an increased risk of SSIs when compared to the use of depilatory agents or no hair removal. The heightened incidence of SSIs in patients who were shaved is attributed to resulting microabrasions on the skin that can harbor and facilitate the growth of infection-causing bacteria. As a result of these studies, which demonstrate the potential risks associated with razor shaving, the CDC guidelines strongly recommend that hair not be removed unless it will interfere with the procedure, and if removal is necessary, the hair should be clipped immediately before the operation (Category IA). Because depilatory agents can produce hypersensitivity reactions, the CDC’s 1985 recommendation to use them was updated in the 1999 version to exclude this particular method.

Although sufficient clinical evidence exists to support ubiquitous implementation of these recommendations, anecdotal evidence suggests that adoption of these practices is less than pervasive. Concerted efforts must be made to inform our healthcare colleagues about this evidence-based practice, provide appropriate equipment, and reinforce continued best practice with comparison of outcomes.

**Alcohol-based preps**

Proper selection and application of preoperative prep solutions is crucial to the success of any multifaceted approach to preoperative skin preparation. The U.S. Food and Drug Administration (FDA) has long recognized alcohol as being the most effective and rapid-acting skin antiseptic. However, alcohol’s limited persistence has precluded its stand-alone use in the OR. To be a truly effective preoperative prep, alcohol must be mixed with other active ingredients, such as iodophors, CHG, or other compounds, to increase the persistent and cumulative bactericidal effects. The FDA regulates and establishes efficacy criteria for over-the-counter products to be marketed with the indication of “patient preoperative skin preparation” through published guidelines entitled “Tentative Final Monograph (TFM) for Healthcare Antiseptic Drug Products; Proposed Rule, June 17, 1994.”

Although alcohol has an established ability to effectively and immediately kill bacteria, many facilities have, unfortunately, restricted its use in the OR because of flammability issues. OR fire prevention is an important topic which demands the attention of every member of the surgical team, but statistically speaking, SSIs pose a much greater threat to the health of patients than surgical fires. When compared to the 27 million surgical procedures performed each year, the FDA and ECRI’s (formerly the Emergency Care Research Institute, now designated by the U.S. Agency for Healthcare Research and Quality as an evidence-based practice center) estimation of 100 OR fires, 20 resulting injuries, and one to two resulting deaths per year is minute. Certainly, one preventable death is one too many, but with thousands of deaths per year attributable to SSIs, the importance of various risks that patients face should be kept in perspective.

In light of these statistics, the National Fire Protection Association (NFPA), which sets national fire safety standards, agreed in August 2005 to lift its restrictions on the use of alcohol-based surgical prep solutions in ORs, as advocated by the American Hospital Association’s American Society for Healthcare Engineering. While the NFPA remains focused on preventing OR fires, the organization recognizes these critical infection control products play an important role in reducing the risk of SSIs. Alcohol-based antiseptics are a safe and efficacious way to help prevent SSIs when used as directed, allowing proper drying time and preventing pooling of alcohol.

Few healthcare professionals would dismiss the proven efficacy of alcohol; however, the debate continues about the superiority of surgical preps containing CHG and alcohol versus surgical preps containing iodine and alcohol. In a recent study, the authors compared the efficacy of three different surgical skin preps. The solutions consisted of: a) 0.7% iodine/74% iso-
propyl alcohol, b) 2% CHG/70% isopropyl alcohol, and c) 3% chloroxylenol. The researchers randomized the presurgical prep solution used on 125 consecutive patients undergoing surgery of the foot and ankle. Their results showed a significantly lower positive culture rate for the solution of CHG/alcohol when compared to the solution of iodine/alcohol in the cultures taken from the web spaces between the toes and the hallux. In the cultures taken from the anterior tibia—the designated control site—the positive rates weren’t significantly different between the CHG/alcohol and iodine/alcohol groups. The CHG/alcohol solution was related to significantly fewer bacterial colonies than the iodine/alcohol solution, which was in turn significantly lower than the chloroxylenol solution. However, patient outcomes weren’t significantly different between the three groups, possibly due to the small sample size—the chloroxylenol group developed two postoperative infections out of 40 patients, the CHG/alcohol group had one infection out of 40 patients, and the iodine/alcohol group had no infections. Results could vary for a variety of reasons, such as differences of application method and patient risk factors. Clearly, the combination solutions with alcohol were most effective in reducing bacterial counts. Further studies measuring clinical outcomes, as well as colonization rates, are needed in large diverse patient populations.

**Back to the basics**

The quest for today’s healthcare leaders is to provide safe and affordable care. Every facet of the healthcare industry is experiencing increased pressure to be more efficient than ever before. Healthcare administrators struggle to analyze the true cost-benefit of the prevention of SSIs since so many factors contribute to this complication. The use of evidence-based practice to produce better outcomes must be
quantified and measured to assure administrations that quality makes a positive financial difference as well. While simple practices, such as preoperative CHG showers, avoiding hair removal at the surgical site, and effectively applying alcohol-based skin preps, can have a dramatic impact on SSI rates, consistency and measurement of these practices make success difficult to measure and realize.

Healthcare practices vary tremendously, and the culture in place often is difficult to change. Perioperative nurses must assume a leadership role in educating other healthcare providers and their patients on the latest advancements in skin antisepsis and implementing evidence-based standards of practice in their facilities. The challenge for all nurse leaders is to develop a collaborative patient care system that ensures the continuum of care through the complex systems of today’s healthcare. Obviously, many nursing research opportunities are needed in this area to establish evidence-based practice. Although measuring preventive outcomes is difficult, it’s imperative to recognize and celebrate the impact of multifaceted prevention programs.

REFERENCES

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