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Going Forward: Preventing Surgical Site Infections in 2015

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In the previous three reports, several sentinel issues have been discussed that have a significant effect on how to improve surgical patient outcomes by reducing the risk of surgical site infections (SSIs); how the role of the OR environment affects acquisition of SSIs; and why complete, timely, and thorough endoscope reprocessing is important, without which the margin of safety in endoscope reprocessing is so small. Figure 1 is a fishbone diagram that identifies the many factors that influence development of health care–associated infections (HAIs), including the importance of the preoperative assessment and preparation of the patient and the effect of the perioperative environment, surgeon, and care delivery factors on SSI prevention, as well as management concerns.

Health care professionals recognize that HAIs have a tremendous fiscal and emotional toll on patients and their family members. When looking at infection prevention beyond 2014, in addition to the recommendations given in the preceding reports, health care professionals should consider racial and ethnic disparities in health care, implement surgical care bundles, and use adenosine triphosphate (ATP) bioluminescence assays to assess the effectiveness of the terminal cleaning process.

RACIAL AND ETHNIC DISPARITIES IN HEALTH CARE

The disproportional effect of HAIs on certain racial and ethnic populations in the United States is not often discussed. Although racial and ethnic disparities have been acknowledged in both medical treatments and outcomes, there are little data on racial and ethnic disparities in patient safety.[1-4] A recent analysis of more than 79,000 patients admitted to acute care facilities for treatment of acute cardiovascular disease, pneumonia, or major surgery provided several examples of racial or ethnic disparities in infection rates.[3] Hispanic and Asian patients had higher risk-adjusted rates of HAIs compared with non-Hispanic white patients, and Asian patients had higher rates of *Clostridium difficile* infections, central line–associated bloodstream infections, and catheter-associated urinary tract infections than white patients.

Factors that contribute to disparities in health care include language barriers, unconscious bias, income level, education, and a tendency of minorities to use lower-quality health care facilities.[3] In the analysis by Bakullari et al,[3] the investigators indicated that it was unlikely that either income level or educational level was the primary driver of poor outcomes for Asian and Hispanic populations. Rather, they noted, it is much more likely that language barrier was the primary factor in creating an environment in which disparities were observed in outcomes and processes of care.

It is almost counterintuitive that ineffectual communication between patients and health care providers in 2014 could lead to an increased rate of HAIs among certain racial or ethnic populations in the United States. However, poor English proficiency

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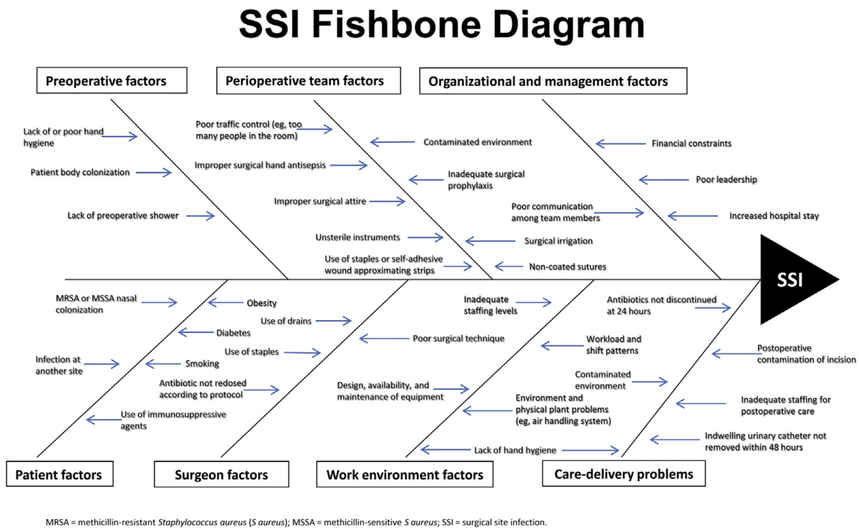

Figure 1. Diagram showing how myriad factors affect the risk of developing a surgical site infection. *Illustration courtesy of Maureen Spencer*.

has been noted as a contributing risk factor for adverse events in hospitalized patient populations.[4-7] For example, Asian and Hispanic patients are at higher risk for postoperative sepsis, and African American patients have two times the risk of developing hospital-acquired methicillin-resistant *Staphylococcus aureus* infection compared with white patients. In the current political and economic environment, as more non–English-speaking immigrant patients seek health care, and in some cases surgical care, clinicians need to be more attuned to the racial and ethnic disparities that exist in today's health care environment and to seek effective and innovative strategies to minimize these disparities and improve patient outcomes.

SURGICAL CARE BUNDLES

Surgical care bundles are an effective strategy for reducing the risk of SSIs.[8,9] In patients undergoing colorectal surgery specifically, two recent reports present a cogent argument for embracing a bundled interventional strategy to reduce the risk of SSIs.[10,11] The authors of both reports documented a significant reduction (three- to four-fold) in the rate of SSIs over a 30-day observational period. There were some differences in the bundles selected in the two studies, which indicates that one size does not fit all. In fact, myriad effective evidence-based strategies are warranted to address the diversity of surgical interventions and patient populations.[8,12]

As public reporting of postoperative complications, including SSIs, evolves, health care professionals will address this transparent environment by embracing evidence-based interventions that limit patient risk and improve patient outcomes. The Surgical Care Improvement Project (SCIP) has been highly effective at elevating the national dialogue for reducing the risk of SSIs[8]; mechanistically, however, this process initiative has resulted in limited success. The SCIP should not be viewed as a failure but rather as an evolutionary first step. Several recent studies have clearly documented the clinical value of supplementing SCIP core measures with adjunctive evidence-based interventions.[9-14] As health care professionals become more knowledgeable about specific risk factors and mechanisms associated with postoperative SSIs, they should expect the process to undergo a continued evolution in the effort to further drive down institutional standardized infection ratios.

ATP BIOLUMINESCENCE ASSAYS AND THE TERMINAL CLEANING PROCESS

A final consideration for reducing the risk of infection in surgical patients involves the evolving approach to the terminal cleaning process in the OR. The increased size and complexity of integrative, hybrid ORs creates a challenge for perioperative and environmental services personnel and those who monitor the terminal cleaning process. The real question is this: "how clean is clean?"[15,16] According to Cloutman-Green et al,[15] British investigators determined that a significant proportion of sites screened for bacterial contamination after disinfection would fail (ie, would be considered contaminated beyond what would reasonably be expected) using standard microbiological criteria (ie, aerobic colony counts). However, the use of an ATP bioluminescence assay is a potential alternative for assessing the effectiveness of the terminal cleaning process and would allow health care personnel to determine what surfaces are harboring significant bioburden and therefore are likely to be contaminated.

In essence, the ATP bioluminescence assay can monitor the levels of viable and nonviable bioburden contamination after terminal cleaning, providing immediate and direct feedback to personnel.[17-19] The process involves measuring residual DNA on a surface after cleaning. It requires the purchase of a luminometer and ATP-free swabs that can come premoistened or be moistened by the user with an ATP-free buffer, water, or extractant. The residual ATP is measured in the luminometer, and results usually are expressed as relative light units. Unfortunately, there is no standardization of the relative light units denoting clean or dirty surfaces across the myriad of commercially available luminometers; each device has its own cutoff point. However, the major advantage of this technology is that the process is quick and virtually anyone can be trained both to use the technology and interpret the results. The immediate feedback serves to reinforce the environmental services and perioperative personnel of the team's effectiveness or deficiencies in cleaning OR surfaces. Although the role of patient risk factors in the acquisition of an HAI is debated in great detail, health care professionals often forget that the environment of care extends into the OR, and inadequate terminal cleaning cannot be dismissed as an insignificant factor in the etiology of a postoperative SSI.

FUTURE CONSIDERATIONS FOR A RISK-AVERSE WORLD

The present discussion has characterized the challenges that health care professionals currently face in delivering high-quality care to surgical patient populations. Moving forward, these challenges are likely to continue in part because of increased patient morbidity, high demand on institutional resources, and, ironically, emerging surgical technologies, which often require a steep learning curve for effective use. It is safe to say that the importance of infection prevention in perioperative services likely will increase. Meeting this challenge will require collegiality; a continued focus on evidence-based research; and an institutional commitment to invest in innovative, safe, and effective patient care practices. AORN

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