

Optimizing the Relationship Between Perioperative Personnel and Infection Preventionists to Reduce Surgical Site Infections

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ABSTRACT

Prevention of surgical site infections (SSIs) is a critical aspect of ensuring positive patient outcomes. One of the challenges of SSI prevention is the communication barrier between perioperative staff members and infection preventionists (IPs), which may lead to frontline staff members who are primarily responsible for infection prevention being unaware of pertinent hospital SSI data. To overcome this challenge, IPs and perioperative staff members should develop a partnership that facilitates the sharing of feedback on SSI case review data and effective key performance indicators. A partnership also can help engage perioperative staff members in quality improvement efforts and increase collaboration with IPs. Perioperative leaders should identify effective methods to improve data transparency, SSI case reviews, audit and feedback programs, and education for perioperative team members. A strong perioperative–IP partnership and increased sharing of data in accessible formats may improve engagement and interest in SSI prevention.

Key words: *audit and feedback, surgical site infection (SSI), key performance indicator (KPI), infection preventionist (IP) partnership, data transparency.*

Depending on the procedure type, a surgical site infection (SSI) may occur anywhere from 30 to 90 days after an operative or other invasive procedure.¹ Surgical site infections are a substantial cause of morbidity, extended hospital stays, and death. Patients with SSIs require increased outpatient visits, emergency department visits, radiology services, antibiotics, readmissions, and home health aide services, all leading to increased medical costs.² Changes in daily activities and missed workdays can also have a negative effect on a patient's mental health.²

Surgical site infections account for approximately 20% of all health care–associated infections and can extend hospital stays by an average of 9.7 days;³ they are also associated with a 2- to 11-fold increase in the risk of mortality.^{4,5} Additionally, studies have shown that SSIs are the most costly type of health care–associated infection,

with an estimated overall annual cost of \$3.5 billion to \$10 billion,⁶ and are responsible for an estimated increase of more than \$20,000 in patient hospitalization costs per admission.⁷ A variety of factors affect the SSI occurrence rates, including patient risk factors (eg, age, glucose levels, weight), perioperative practices (eg, skin preparation, perioperative antibiotic choice and timing), OR characteristics (eg, ventilation, traffic, decontamination practices), disinfection and sterilization of surgical equipment, and provision of care that meets quality standards.⁸

As the number of surgical procedures performed in the United States increases, so too does the importance of preventing SSIs.⁹ Many states have laws requiring hospitals to report their SSI rates, which are then made publicly available online to assist patients in their decision making regarding choice of surgeons and hospitals. Mandatory

public reporting of SSI rates could negatively affect a hospital's reputation and finances. More importantly, the Centers for Medicare & Medicaid Services Hospital Inpatient Quality Reporting Program, which includes SSIs occurring after colon surgery and abdominal hysterectomies, have increased health care administrators' focus on SSIs in all states because of the financial reimbursement implications.¹⁰ Under this program, the Centers for Medicare & Medicaid Services reduces overall Medicare payments for the hospitals that rank low on measures of hospital-acquired conditions, including SSIs.¹⁰

Evidence has suggested that implementation of a bundle—"a small, straightforward set of evidence-based practices...performed collectively and reliably"¹¹—can improve patient outcomes and help prevent SSIs.¹² Health care workers across departments play a role in SSI prevention; this includes executive leaders, perioperative personnel (eg, nurses, service line leaders, sterile processing personnel, OR leaders, surgeons), supply chain personnel, biomedical service workers, facility workers, and environmental service workers. The involvement of so many different stakeholders can make communication among divisions challenging. One such barrier—between perioperative personnel and infection preventionists (IPs)—can affect SSI prevention efforts in the perioperative setting. Specific problems stemming from this barrier may include insufficient SSI case review and discussion among frontline perioperative staff members; a lack of process and metric data collection transparency; and ultimately, minimal perioperative staff member participation in performance improvement efforts in the OR.

CHALLENGES TO SSI PREVENTION

Traditionally, IPs perform surveillance for SSIs in their health care facilities and share the outcome data in a variety of ways. Sharing may involve presenting the data to the OR leaders at an infection prevention and control committee meeting and notifying the attending surgeon of specific SSI cases, typically by e-mail. Less often are the SSI data and possible causations reported to perioperative team members.¹³ A systematic scoping review on audit and feedback processes determined that the IPs provided most SSI process metrics and outcomes to the head of the surgery department or the specific surgeons, and in only 30% of the studies did the feedback cascade

down to the frontline staff members (eg, RN circulator, pharmacist, surgical technologists).¹⁴ The review authors also noted that the department heads received most of the feedback via e-mail once every few months, either collectively or individually. The lack of consistent and real-time feedback to the frontline staff members does not encourage engagement in performance improvement projects.

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Because of the extended postoperative window within which SSIs can occur, it may be challenging for IPs to provide real-time feedback and a case review to the surgeon and perioperative staff members involved in the procedure that resulted in the SSI. Additionally, because these infections are identified weeks to months after the surgery, the case review may be an afterthought or a low priority for both the IP and the perioperative staff members. The absence of a structured protocol for feedback between infection prevention and perioperative staff members makes it difficult for the IP to engage them in prevention efforts without the data to support changes in practice.¹³

The IP in the Perioperative Setting

Infection preventionists may consider the OR to be a daunting environment. The aura of the OR—with large, complicated machines and with sterile areas that cannot be touched; staffed with busy professionals; and with a history of deference to the surgeon as the core of the health care team—lends itself to intimidation. There is a plethora of information that an IP must learn to be proficient in the OR, particularly if their previous training and work experience took place outside the perioperative domain. Any IP who enters the OR environment should become familiar with the processes and procedures of the perioperative setting (eg, surgical hand antisepsis, surgical site preparation, decreasing bioburden on sterile instruments, instrument reprocessing, between-procedure and terminal cleaning, surgical attire, personal protective

equipment, anesthesiology practices, bloodstream infections, pneumonia, innovative surgical techniques) to ultimately become a subject matter expert on infection prevention in the OR.¹⁵ Infection preventionists should be continually aware of the evolving literature and the evidence regarding best practices; understand multiple surgical procedures and innovative technologies; and work to determine root causes and risk factors for SSIs as well as develop strategies to prevent them.¹⁵

As novice IPs are learning infection prevention in the perioperative setting, they also need to develop collaborative relationships with surgeons, anesthesia professionals, perioperative nurses, and ancillary staff members through knowledge sharing. Novice IPs may be hesitant to enter an OR and may find providing feedback to perioperative personnel and surgeons challenging. Perioperative areas of a hospital are therefore typically reserved for experienced IPs; however, as with several other job categories in health care, the number of experienced IPs is dwindling.¹⁶

A primary reason that frontline perioperative personnel often are unaware of infection trends is because IPs are unsure of the most effective way to partner with perioperative staff members.¹⁵ In some instances, quick conversations and mini education sessions are effective, but it is important to understand when perioperative colleagues would be most amenable to these interventions. At other times, more in-depth education and explanations are required to change practices and behaviors, thereby requiring extended time. It is important that perioperative partners understand the hesitancy of many IPs to partner with perioperative staff members and work in such a complex environment.

SOLUTIONS

Some approaches that may help perioperative staff members overcome the barriers to effective engagement with infection prevention efforts include

- framing the collaboration between IPs and perioperative staff members in a positive light,
- formalizing the submission of SSI case data feedback to include perioperative staff members, and
- providing effective process data in formats that are easy to understand and lead to improvement.

Collaboration Is Key

Surgical site infection prevention and data transparency begin with a strong partnership built on trust and collaboration between perioperative staff members and hospital IPs. Perioperative staff members or leaders can strengthen this relationship by proactively inviting IPs to observe procedures. While observing, the IP should be actively engaged and interact with the perioperative team. During these observations, perioperative leaders should encourage all perioperative staff members to be curious about the IP's expertise regarding evidence-based practice for infection prevention, thoughts on product selection, and ideas for specific interventional strategies.¹⁵ Perioperative staff members may be resistant to the IP's presence in the OR because they may perceive them as judgmental. To ease any tension, perioperative leaders should encourage staff members to view the IP as a resource and subject matter expert on infection prevention, rather than as an auditor critiquing their technique.

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Perioperative personnel have the power to engage with the IP and help lower the intimidation factor of the OR, foster interprofessional relationships, collaborate on performance improvement projects, and discuss any concerns about infection prevention. Collaboration with the IP to develop an OR observation checklist supports the goals of both teams.¹⁵ The list can include items that benefit both perioperative and infection prevention initiatives as well as forge a partnership between the two teams.¹⁵ Checklists can include information on the following:

- surgical hand antisepsis (eg, surgical attire and mask worn during hand scrub, hand scrub used according to the manufacturer's instructions for use [IFU], hands and arms held up and allowed to dry before the donning of gown and gloves),

- sterile technique (eg, sterile field is prepared close to the time of surgery, sterile items are presented to scrubbed personnel or placed securely on a sterile field, instrument tray filters or wraps as well as sterilization indicators are checked before placing instruments on the sterile field, surgical drapes are placed without contamination, the number of times the door is opened after the sterile instruments are opened),
- surgical skin preparation (eg, patient completed preoperative bathing according to preoperative patient instructions, surgical skin preparation applied according to the manufacturer's IFU, skin preparation area allowed to dry before draping),
- intraoperative practices (eg, sterility maintained throughout surgery, minimal staff members present during the procedure, surgical attire policy followed),
- medication administration (eg, antibiotic administered within an hour of the incision, appropriate antibiotic administered according to protocol and dosage, single medications prepared according to manufacturer's IFU, infusion supplies are single-patient use), and
- end-of-procedure practices (eg, surgical instruments are sprayed with enzymatic cleanser according to protocol; all horizontal surfaces, medical equipment, and positioning devices are cleaned after the procedure; scrubbed staff members performed hand hygiene after removing gloves).

Additionally, IPs can perform focused bundle-implementation audits based on surgery type. For example, during colon procedures, they can audit for the use of a wound protector, for a change of gloves and gowns, and for the use of a separate instrument tray for closure; during joint replacement surgery, they can audit for wound irrigation and the use of antimicrobial suture for wound closure. These audit findings can help perioperative leaders and IPs prioritize future improvement projects based on any identified gaps with other quality metrics and patient safety opportunities.¹⁷

Formalizing Feedback

Although the IP may identify infections based on the Centers for Disease Control and Prevention's SSI surveillance definitions; aggregate the data monthly; and present it during regularly scheduled infection prevention and control, perioperative, or quality department meetings; a key stakeholder may be missing.¹⁵ Perioperative leaders may

or may not have the opportunity to see these data. Immediately after identifying an SSI, the IP and perioperative staff members should clinically review the procedure to identify opportunities for preventing SSIs and help facilitate a relationship between the IP and the perioperative staff members.¹⁵ It also may be useful for the IP to share with perioperative staff members the consequences of SSIs for patients (eg, additional surgeries, extended lengths of stay, overall effects on quality of life) to help them understand the "why" behind the prevention tactics. These in-depth SSI case reviews should include an *apparent cause analysis* (ie, a limited investigation of an event that will identify actions to address the problem and will collect information that can help to identify trends)¹⁸ to identify possible opportunities to improve patient safety; procedures that result in SSIs may have products or perioperative staff members in common, potentially signaling that these factors contributed to the infections.¹⁵ Rather than simply being shown outcome graphs of aggregated data, frontline OR staff members involved with procedures that result in SSIs should be given the opportunity to participate in the review of these cases to provide meaning and personalization to the infections. A final step to cement the relationship would be for perioperative leaders to invite the IPs to attend perioperative staff meetings to discuss infection-related topics as well as present the process data on performance projects.

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A perioperative-infection prevention partnership exemplar

Every month, the hospital's IPs meet with the perioperative leadership team (ie, OR nurse director, service line leaders, charge nurse) to review a comprehensive list of the identified SSIs. The list includes the following variables for each SSI:

- procedural information (eg, type of procedure, duration, wound classification);

- perioperative antibiotics and timing before the procedure;
- skin preparation;
- perioperative staff members present during the procedure;
- patient glucose level, history (eg, comorbidities, previous surgeries), risk factors (eg, age, body mass index, diabetic status), and intraoperative temperature; and
- any other pertinent procedure information (eg, colon SSI prevention–bundle components).

During these monthly reviews, the perioperative leaders engage the perioperative staff members to review the lists to identify trends across the procedures. During one of these reviews, a surgeon notices an increase in SSIs for a specific surgeon and surgery type. As they continue to review, they find that SSIs are occurring after every procedure during which a new piece of equipment is used. As a result, the surgeon has this piece of equipment removed from the OR and the infections ceased for this surgeon using this equipment.

Providing Useful and Accessible Data

Although presenting SSI data in a graphical format can make it easier for users to understand the information, this does not directly translate to decreasing rates of infection. Outcome data need to be paired with an effective feedback mechanism to change behavior;¹⁹ these data are best gathered through audit and feedback. When gathering data, perioperative leaders should focus on the elements of practice for which frontline nurses are responsible and can be held accountable.²⁰ Effective audit and feedback focuses on process indicators that are actionable and proximal to nursing care activities. In a systematic review of the use of feedback data to reduce SSIs and enhance perioperative administration of antibiotics, the authors determined that effective implementation of audit and feedback encompassed several components, including

- applying repetitive and evaluative strategies,
- providing interactive assistance,
- adapting interventions to apply to local settings, and
- developing relationships with stakeholders and providing them with education and training.¹⁴

Audit and feedback will improve perioperative staff members' performance if frontline personnel perceive it as a quality improvement opportunity or determine there will be improved efficiency in the workflow.²¹ Audit and feedback is particularly effective when applied to SSI prevention bundles. In a study on the implementation of a colon surgery SSI-prevention bundle, the audit and feedback portion involved the use of patient tracking sheets to document each component of the bundle throughout the preoperative, intraoperative, and postoperative periods.²² Infection preventionists compiled the tracking sheets and reported data to the preoperative nurses, RN circulators, surgeons, and postoperative nurses weekly regarding adherence to the bundle components. Interestingly, adherence to the bundle improved for the nursing components through the audit and feedback of the process metrics; however, a specific surgeon's practice only changed when elevated SSI rates coincided with lack of bundle adherence. This project showed the benefits of audit and feedback and highlighted how different approaches may be necessary for different health care workers.²²

Audit and feedback is particularly effective when applied to SSI prevention bundles.

The biggest challenge is determining which audit and feedback programs will be most effective and how to optimize the transparency of the feedback when presenting it to the frontline staff members. With the increased use of electronic medical records comes increased access to large volumes of data. When audit and feedback programs are used correctly, IPs or clinical performance improvement specialists can develop dashboards that provide a concise overview of these data.²³ Dashboards can provide the perioperative staff members visual cues for process measures—also known as *key performance indicators* (KPIs)—associated with performance improvement projects.²⁴ An example of a KPI for infection prevention is the daily percentage of patients who received a chlorhexidine gluconate bath before surgery.

Dashboards can use color-coded graphical displays to facilitate rapid interpretation of performance status. They can provide performance benchmarks, notifications, and

Key Takeaways

- ◆ Surgical site infections (SSIs) are detrimental to patients. They are a substantial cause of morbidity, extended hospital stays, and death. Patients with SSIs require increased outpatient visits, emergency department visits, radiology services, antibiotics, readmissions, and home health aide services, all leading to increased medical costs.
- ◆ Because SSIs may not be identified until 72 days after the procedure, it may be challenging for infection prevention personnel to provide real-time feedback and a case review to the surgeon and the perioperative staff members involved in a procedure that resulted in an SSI.
- ◆ Communication barriers between infection preventionists and OR team members may be overcome by framing the collaboration between infection preventionists and perioperative staff members in a positive light, formalizing the submission of SSI case data to include receptive perioperative staff members, and providing effective process data in formats that are easy to understand and lead to improvement.
- ◆ Audit and feedback will improve perioperative staff members' performance if frontline personnel perceive it as a quality improvement opportunity or determine there will be improved efficiency in the workflow. Audit and feedback is particularly effective when applied to SSI prevention bundles.

warnings to predict performance and guide managerial decision making, and summarize and analyze data to provide performance feedback and guide clinical decision making.²¹ The benefits of process dashboards include easy-to-interpret visual notifications when metrics deviate from acceptable levels as well as decision-making support to improve efficiency, quality, and data-driven decisions. Perioperative staff members, OR leaders, surgeons, and IPs should partner to determine effective KPIs for their performance improvement projects and create effective ways to display the data using dashboards to increase transparency.

CONSIDERATIONS

Although there are noteworthy benefits to a perioperative-infection prevention partnership for data transparency and use, there are many considerations to keep in mind. The OR is a high-stress setting, and perioperative staff members are extremely focused and involved with their patients and the multidisciplinary team. However, this focus on the best possible outcome for their patient can lead to noticeable levels of burnout.²⁵ There is an association between providing feedback to nurses and negative outcomes such as burnout and poor quality of care; it is important to associate the feedback with internal improvements

(eg, better patient outcomes) rather than external regulation (eg, accreditation).^{21,25}

CONCLUSION

The overall goal of a perioperative-infection prevention partnership is to overcome any barriers between infection prevention and perioperative staff members that may hinder efforts to prevent SSIs. Perioperative leaders should collaborate with IPs to make SSI data more transparent and accessible to perioperative staff members; they should also invite IPs into the OR to collect data and share their expertise. Infection prevention personnel and perioperative leaders and staff members should collaborate to determine effective methods to enhance data transparency, SSI case reviews, and audit and feedback programs for surgeons and perioperative personnel to improve engagement and interest in SSI prevention. A strong, mutually respectful partnership between perioperative staff members and IPs can help set the stage for success in SSI prevention.

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