2017 HICPAC-CDC GUIDELINE FOR PREVENTION OF SURGICAL SITE INFECTION: WHAT THE IP NEEDS TO KNOW

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WHY DO WE NEED NEW GUIDELINES FOR THE PREVENTION OF SURGICAL SITE INFECTIONS?

Surgical site infections (SSIs) are a frequent complication of surgical care and are associated with significant morbidity, mortality and cost. There are approximately 80 million surgeries in the U.S. each year, and roughly one and a half million of these will be complicated by an SSI, a number which is believed to be greatly underestimated due to challenges in post-discharge case finding and reporting.[1] In 2013, the Centers for Disease Control (CDC) healthcare-associated infection (HAI) prevalence survey found that there were an estimated 157,500 SSIs occurring following inpatient surgeries.[2] In this study, SSIs were the most common of all HAIs comprising roughly 30 percent.[2] The mortality associated with SSIs is substantial, with an estimated mortality rate of 3 percent.[3] Further, it is estimated that 75 percent of SSI-associated deaths are directly attributable to the infection.[3] SSIs are also extremely costly to the health system with the average cost per infection ranging from approximately $5,000-$13,000.[4]

In the last decade, national efforts to reduce SSIs have been expanded. The latest 2016 HAI Progress Report from the CDC reports that U.S. hospitals noted an overall decrease in SSIs in 2014 compared to the national baseline set in 2008 among the 10 select procedures tracked in previous reports.[5] In spite of an increasing focus on SSI reduction efforts and overall lower infection rates, the stakes remain high for all patients having surgery. Approximately 55 percent of SSI cases may be preventable with appropriate implementation of evidence-based strategies.[4]

HOW WERE THE GUIDELINES DEVELOPED?

The CDC recently published an update to their guidelines for prevention of SSIs in *JAMA Surgery*.[6] The new guidelines update SSI prevention recommendations with new evidence since the prior publication.[7] It should be noted that the updated guidelines are not comprehensive and that prevention strategies from the prior guidelines still apply. The 1999 guidelines were mostly informed by expert opinion, while the updated 2017 guidelines are evidence-based and were developed based on a systematic review of over 5,000 studies published between 1998 and 2014. To fully evaluate and interpret the new recommendations, it is critical to understand the evidence rating system used by the CDC's Healthcare Infection Control Practices Advisory Committee (HICPAC). The committee utilized the GRADE Approach (Grading of Recommendations, Assessment, Development, and Evaluation), which is composed of the categories below.[8]

Category 1A: Strong recommendation supported by high to moderate-quality evidence suggesting net clinical benefits or harms.

Category 1B: Strong recommendation supported by low-quality evidence suggesting net clinical benefits or harms or an accepted practice (e.g., aseptic technique) supported by low to very low-quality evidence.

Category 1C: Strong recommendation required by state or federal regulation.

Category II: Weak recommendation supported by any quality evidence suggesting a trade-off between clinical benefits and harms.

No recommendation/unresolved issue: An issue for which there is low to very low-quality evidence with uncertain trade-offs between the benefits and harms or no published evidence on outcomes deemed critical to weighing the risks and benefits of a given intervention.

WHAT'S NEW AND WHAT DO YOU NEED TO KNOW?

The guidelines cover 14 main domains, including a new section on prosthetic joint arthroplasty. An overview of new or changed recommendations and their corresponding levels of evidence is provided in Tables 1 and 2. Some of the key recommendations include the following:

Preoperative Prevention Practices

- For caesarean sections, administer the appropriate antimicrobial agent prior to skin incision (versus at cord clamping).

Intraoperative Prevention Practices

- Administer increased fraction of inspired oxygen (FiO_2) for intubated patients undergoing general anesthesia with normal pulmonary function. This is a new recommendation and is specific to this patient population. This does not apply to patients without endotracheal intubation or those with neuraxial anesthesia.
- Perform intraoperative skin preparation with an antiseptic agent containing alcohol unless contraindicated.

Perioperative Management Strategies

- Implement glycemic control (blood glucose levels ≤200mg/dL) for both diabetic and non-diabetic patients. This updated recommendation now includes both diabetic and non-diabetic patients and provides a specific blood glucose target level.
- Maintain normothermia. Other guidelines recommend a minimum temperature of 95.9°F (35.5°C).[9] While attaining normothermia is a strong recommendation, there is no recommendation for the most effective strategies to reach this goal.
- Discontinue antimicrobial prophylaxis after the incision is closed in clean and clean-contaminated procedures. This also applies to patients undergoing prosthetic joint arthroplasty, even in the presence of a drain. This recommendation updates the 1999 guideline recommendation that allowed administration of antibiotics for up to 24 hours post-incision.

It should also be noted that 25 of the 42 statements assessed were classified as "No recommendation/unresolved issue," suggesting that more high quality research in this area is necessary. No recommendation/unresolved issue does not necessarily mean that a recommendation from the prior guideline has no merit or should be discontinued.

TABLE 1. SUMMARY OF UPDATED, KEY RECOMMENDATIONS FROM THE CENTERS FOR DISEASE CONTROL AND PREVENTION GUIDELINE FOR THE PREVENTION OF SURGICAL SITE INFECTION, 2017

Recommendation	Strength of Evidence
PARENTERAL ANTIMICROBIAL PROPHYLAXIS	
Administer antimicrobials only when indicated based on published guidelines. Time administration such that bactericidal concentration is established in serum and tissues at initial incision.	Category IB
For caesarean sections, administer the appropriate agent prior to skin incision (versus at cord clamping).	Category IA
NONPARENTERAL ANTIMICROBIAL PROPHYLAXIS	
Consider use of triclosan-coated sutures.	Category II
GLYCEMIC CONTROL	
Implement perioperative glycemic control using blood glucose target levels ≤ 200 mg/dL in both diabetic and non-diabetic patients.	Category IA
NORMOTHERMIA	
Maintain perioperative normothermia.	Category IA
OXYGENATION	
Administer increased fraction of inspired oxygen intraoperatively and in the immediate post-operative period following extubation for all patients with normal pulmonary function undergoing general anesthesia with endotracheal intubation.	Category IA
ANTISEPTIC PROPHYLAXIS	
Instruct patients to perform full body shower or bath the night before surgery (with either soap or an antiseptic agent).	Category IB
Intraoperative skin preparation should be performed with an antiseptic agent containing alcohol unless contraindicated.	Category 1A
Consider intraoperative irrigation of deep or subcutaneous tissues with aqueous iodophor solution.	Category II

TABLE 2. STRATEGIES DETERMINED TO BE UNNECESSARY IN THE PREVENTION OF SURGICAL SITE INFECTIONS

Strategy	Strength of Evidence
Antimicrobial prophylaxis after surgical closure (clean and clean-contaminated procedures)	Category IA
Topical antimicrobial agents applied to the surgical incision	Category IB
Autologous, platelet-rich plasma	Category II
Antimicrobial sealant following intraoperative skin preparation	Category II
Plastic adhesive drapes for antisepsis	Category II
Withholding transfusion of necessary blood products (question posed for patients undergoing prosthetic joint arthroplasty)	Category IB

WHAT CAN YOU DO AS AN INFECTION PREVENTIONIST TO IMPLEMENT THE GUIDELINES AND PREVENT SSI?

The infection preventionist (IP) has an important role in SSI prevention beyond SSI surveillance. First, the IP must have knowledge and understanding of the new CDC guidelines, along with other existing and future prevention guidelines, which help guide best practices. The IP must continue to stay up-to-date with new guidelines, including state-issued guidelines, as they are available.[10] It is important to also anticipate potential barriers and facilitators to implementation of new recommendations. Furthermore, the IP should be familiar with the Association of periOperative Registered Nurses (AORN) standards and guidelines, as they serve as the backbone for perioperative practices.[11] IPs can and should evaluate practice within perioperative departments, assessing for both strengths in practice and gaps in infection prevention.

Second, the IP should identify and make plans to collaborate with key stakeholders and partners in SSI prevention to ensure that their facility's policies, procedures, and practices are aligned with new recommendations in the updated guidelines. Hospital and surgical leadership should play an integral role in setting goals for prevention. Key stakeholders may vary by institution and, at a minimum, should include surgical service team members such as perioperative and central sterile processing staff, anesthesiologists, and surgeons. However, other stakeholders may be important in the implementation of best practices and should be included in prevention efforts (e.g., infectious disease, microbiology, endocrinology, pharmacy, information technology, environmental services, etc.). Collaborations with key stakeholders require regular and open communication, and are essential to making practice improvements, reducing SSI, and preventing patient harm.

The IP, along with perioperative and surgical colleagues, should be a leader in prevention efforts. The leadership team, along with other stakeholders, should focus on identifying gaps in practice and potential for improvement. Among these, institutional priorities should be determined, followed by a full analysis of current practice including possible facilitators and barriers to best practice. Stakeholder teams should also set goals and benchmarks, as well as a timeline for reaching those goals. IPs can assist with the assessment and implementation of new prevention strategies aimed at closing identified gaps. Furthermore, the IP can aide in the development and collection of process measures unique to their own institutional goals to ensure adequate improvement in processes. It is important that the IP continue to collect SSI outcome data to provide feedback to teams working on improvement strategies.

Finally, the IP should be a well-informed and integral part of the surgical team. This requires knowledge and understanding of practice at their facility. Consider incorporating the following into your regular practice:

- Round regularly in the operating room. Observation provides an excellent opportunity for assessing staff adherence to best practice.
- Plan what you want to accomplish before you start; round with a purpose and define your goals in advance. Will you be looking at hand hygiene compliance or observing skin preparation? Is skin preparation being applied according to the manufacturer's recommendations? Is there compliance with surgical attire?
- Provide regular and constructive feedback on your observations. Share this information with perioperative and surgical leaders and encourage them to join you in any future rounds.
- Use rounds as an opportunity to collaborate and educate. Reinforce best practices, whether these are the updated recommendations or those that have not changed.
- Where there are those who do not feel that the evidence is sufficient or where there are "nonbelievers," arrange smaller meetings to review the evidence and attempt to find common ground.
- Be aware of guidelines from other societies (e.g., surgical specialty guidelines) and how they may support or be different from infection prevention guidelines.

Antimicrobial surgical prophylaxis will be used as an illustrative example. The current CDC guideline states that antimicrobial prophylaxis should not be continued after the incision is closed for clean and clean-contaminated procedures. This recommendation represents a deviation from past guidelines, which allowed continuation of surgical prophylaxis for up to 24 hours after the incision, and thus will be a change in practice. An important potential barrier to this change is that other surgical guidelines still allow for prolonged prophylaxis after the incision is closed. For example, the recommendation from the Society for Thoracic Surgeons allows for up to 48 hours of antimicrobial prophylaxis post-cardiothoracic procedures.[12] To ensure implementation of

best practices, the appropriate stakeholders need to be included in discussions. In this case, consider surgical leadership (including representation from cardiothoracic surgery), infectious diseases, antimicrobial stewardship, anesthesiology, pharmacy, nursing, and information technology. If stakeholders determine this to be an institutional priority, consider possible facilitators and barriers to achieving best practice. Although specific goals will vary by facility, one goal may be to achieve 90 percent compliance with discontinuing antimicrobial prophylaxis after incision or documenting the need to continue in the patient's chart. Possible strategies may include education, protocol development, or creation of clinical pathways and order sets to facilitate compliance.

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