
Surgical Site
Infection
Prevention
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Surgical Site Infection Prevention
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About the Guideline
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Clinical Significance

History

- This guideline was initially published in 1999, before the era of evidence-based guidelines and therefore was based on expert opinion and informed by the best evidence available at that time.

- Basic surgical infection control practices were succinctly summarized in the original guideline. No changes have been made to these standards, and therefore they are not reevaluated in this update. A list of these surgical infection control practices is included in this summary.

Clinical Significance

- Roughly *half* of all Surgical Site Infections (SSIs) are considered preventable based on the current evidence-based strategies.
- The financial and human burdens associated with SSIs increase annually. Two factors that contribute to the increasing burden are: the rising number of procedures performed each year, and increasingly complex patients who present with numerous comorbid conditions.
- The risk of emerging antibiotic-resistant pathogens increases the complexity and the cost of dealing with SSIs, and prevention is the accepted strategy.
- The number of SSIs is likely underestimated in data capture, given that as many as 50% only become evident after discharge.
- The cost of a single SSI can exceed $90,000 when it involves the implantation of a prosthetic joint.


Objectives & Methods
• This guideline seeks to provide evidence-based strategies where the evidence is strong.
• Where evidence is inconclusive or unavailable, readers are referred to the other guidelines (linked in this summary) or an electronic supplement (eSupplement) for additional discussion on each topic. View here: https://jamanetwork.com/journals/SURG/articlepdf/2623725/ssc170001supp1_prod.pdf
• No recommendations are made if there is a questionable harm/benefit profile, or if the trade-offs of the practice are uncertain as it pertains specifically to decreasing the incidence of SSIs.
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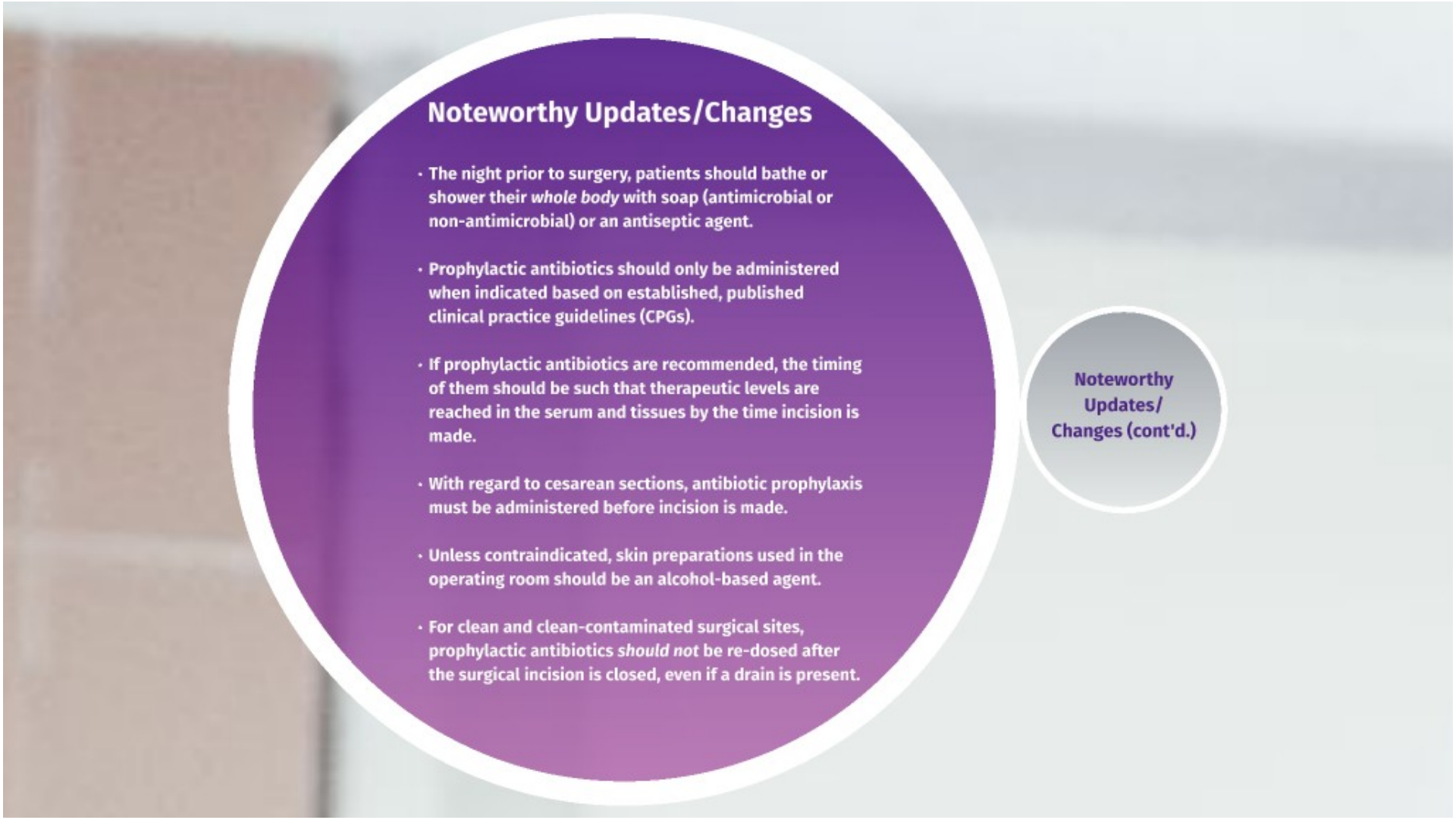
• This guideline was developed through a systematic review of relevant literature from 1998 through April 2014 and is a synthesis of 170 studies.


Noteworthy Updates/Changes
• The night prior to surgery, patients should bathe or shower their *whole body* with soap (antimicrobial or non-antimicrobial) or an antiseptic agent.
• Prophylactic antibiotics should only be administered when indicated based on established, published clinical practice guidelines (CPGs).
• If prophylactic antibiotics are recommended, the timing of them should be such that therapeutic levels are reached in the serum and tissues by the time incision is made.
• With regard to cesarean sections, antibiotic prophylaxis must be administered before incision is made.
• Unless contraindicated, skin preparations used in the operating room should be an alcohol-based agent.
• For clean and clean-contaminated surgical sites, prophylactic antibiotics *should not* be re-dosed after the surgical incision is closed, even if a drain is present.
Noteworthy Updates/ Changes (cont'd.)

Noteworthy Updates/ Changes (cont'd.)

- There is no evidence to support the use of topical antimicrobial agents, and they should not be applied to surgical incisions at closure.
- Glycemic control should be maintained during surgery, to keep the target blood glucose level below 200mg/dL.
- All patients should be maintained at normal body temperature throughout surgery.
- For patients with normal pulmonary function and undergoing general anesthesia with endotracheal intubation, an increased inspired fraction of oxygen should be administered during surgery, after extubation, and into the recovery phase of surgery.
- Blood transfusions should not be withheld from patients as a means to reduce the incidence of SSIs.


Core Recommendations
Summarized from the 1999 Guideline
• Patient preparation:
• Prior to surgery, whenever possible, identify and treat infections, postponing elective procedures until remote site infections are resolved.
• Only hair at or around the intended incision site should be removed.
• When necessary to remove hair, remove it immediately prior to the operation, using clippers.
• Advise patients to stop using tobacco for a minimum of 30 days prior to elective surgery.
• Skin at or near the incision site should be free of gross contamination prior to applying antiseptic skin preparations.
• Surgical team antisepsis:
• Antisepsis of hands and forearms should be performed immediately prior to procedure, in accordance with manufacturer's recommendation for the specific product in use.
• Adhere to 2002 Guidelines for Hand Hygiene in Healthcare Settings (Boyce & Pittet, 2002).
• Operating Room Environmental Standards:
• Refer to guideline (https://www.cdc.gov/infectioncontrol/pdf/guidelines/environmental-guidelines.pdf) for specifics of environmental and physical plant practices related to the operating room (CDC HICPAC, 2003).
Core Recommendations (cont'd.)

Core Recommendations (cont'd.) Summarized from the 1999 Guideline:

- Reprocessing of surgical instruments:
  - Sterilization of instruments should be done in accordance with published guidelines and manufacturer's recommendations.
  - Flashing, or immediate-use steam should be reserved only for patient care items that will be used immediately in emergency situations when no other options are available. For further detail see the Guideline for Disinfection and Sterilization in Healthcare Facilities at https://www.cdc.gov/infectioncontrol/pdf/guidelines/disinfection-guidelines.pdf (Rutala & Weber, 2008).

- Surgical team attire:
  - In the operating room, at any time when sterile instruments are exposed, when surgery is about to begin or in progress, and for the duration of the procedure, all those present must wear a surgical mask that fully covers the mouth and nose.
  - When entering the operating room, ensure that all hair on the head is covered with a new, disposable or hospital laundered head covering for each case.
  - Facial hair not covered by the surgical mask must also be covered.
  - Sterile gloves should be worn by every single member of the scrubbed surgical team and should be donned after the sterile gown is in place.
  - Use only surgical gowns and drapes of a type that form an effective barrier when wet.
  - Scrub suits must be changed if they become visibly soiled, contaminated, or are penetrated by blood or other infectious materials.

- Sterile and surgical technique:
  - Strict adherence to principles of sterile technique is required for all invasive surgical procedures.
  - If a drain is required, a separate incision (remote from the surgical site) should be used to place a closed-suction drain. This drain should be removed as soon as possible.

- Care of incisions:
  - Primary incisions should be protected with a sterile dressing for 24-48 hours postoperatively.


Key Features, Discussion, & Recommendations
• Antimicrobial Prophylaxis
• Parenteral Antimicrobial Prophylaxis:
• The preoperative administration of antimicrobial agents should be limited to cases that fit criteria established by published clinical practice guidelines.
• At this time, there is insufficient published evidence to establish criteria for intraoperative re-dosing of antibiotics, and weight-based adjustments of parenteral doses of antimicrobial agents.
• There is strong evidence to avoid administering additional prophylactic antimicrobial agents after the closure of incisions, (clean and clean-contaminated) even when a drain is present. This standard applies to all patients, even prosthetic joint arthroplasty patients receiving immunosuppressive therapy or systemic steroids.
Key Features, Discussion, & Recommendations (cont'd.)
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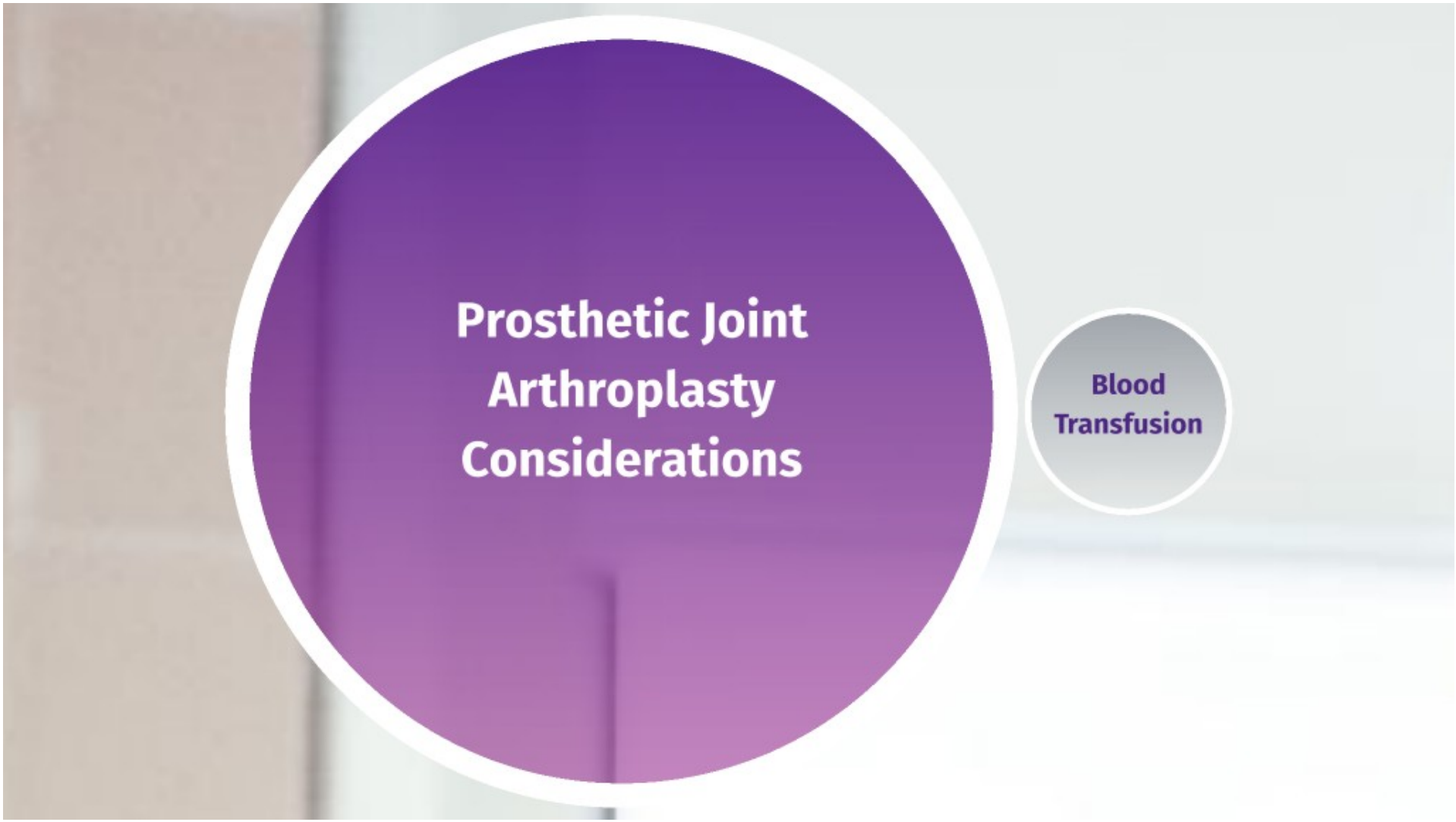
Key Features, Discussion, & Recommendations (cont'd.)

- Nonparenteral Antimicrobial Prophylaxis:
  - The following measures *do not* have strong evidence to support their use to prevent SSIs:
    - Antimicrobial irrigation solutions
    - Soaking prosthetic devices in antimicrobial solutions prior to implantation
    - Application of ointment, solutions, or powders to cover incisions
    - Use of autologous platelet-rich plasma (prp)
    - The use of antimicrobial dressings after primary surgical site closure
  - Triclosan-coated sutures *should be considered* as a means of SSI prevention.

- Glycemic Control:
  - In patients with and without a diagnosis of diabetes mellitus, there is strong evidence to support the use of glycemic control intraoperatively with a target glucose level less than 200mg/dL.
  - There is no strong evidence in publication at this time to support:
    - a lower blood glucose target,
    - a narrower target range, or
    - a time-frame for optimal perioperative blood glucose management.
  - At this time, there is no established optimal hemoglobin A1C target for patients with and without diabetes mellitus, for prevention of SSIs.

Key Features, Discussion, & Recommendations (cont'd.)

- Normothermia:
  - Strong evidence exists to support maintaining normothermia intraoperatively.
  - The research, however, does not establish any specific strategy as superior or support specific standards for timing or duration of perioperative temperature management, nor is there any established criteria quantifying the lower limit of normothermia.
- Oxygenation:
  - Strong evidence supports optimizing oxygen delivery to the tissues as a means of preventing SSIs.
  - For perioperative patients, optimal delivery of oxygen to the tissues is supported by maintaining normothermia, maintaining adequate tissue perfusion, and maintaining adequate intravascular fluid volume replacement.
  - For patients with normal pulmonary function and undergoing general anesthesia with endotracheal intubation, an increased inspired fraction of oxygen should be administered during surgery, after extubation, and into the recovery phase of surgery
  - For patients receiving regional or neuraxial anesthesia, the SSI prevention benefits of supplemental oxygen have not been established in the literature.
  - At this time, there are no RCTs that evaluate the optimal duration, delivery method, or target level of supplemental oxygen administration as a means to prevent SSI.
- Antiseptic Prophylaxis:
  - As noted earlier, all patients should be advised to shower or bathe their *full body* with soap (antimicrobial or non-antimicrobial) or an antiseptic agent on the night before surgery.
  - Available RCTs are inconclusive as to the optimal timing of bath/shower, the number of soap/antiseptic agents to apply, or the use of chlorhexidine gluconate washcloths as single or combined means to prevent SSIs.
  - It is not necessary to use plastic adhesive drapes (with or without antimicrobial properties) to prevent SSI.
  - Aqueous iodophor solution *can be considered* for intraoperative irrigation of deep or subcutaneous tissues for prevention of SSI.
  - Aqueous iodophor solution is not required for intraperitoneal lavage in contaminated or dirty abdominal wounds for prevention of SSI.
  - Available evidence is inconclusive regarding the repeat application of antiseptic agents to the surgical site prior to closure.


Prosthetic Joint Arthroplasty Considerations
Blood Transfusion

Blood Transfusion

- Maintaining tissue perfusion and oxygenation is a known means of preventing SSI.
- When patient conditions warrant, blood transfusions should not be withheld from patients as a means to reduce the incidence of SSIs.

Intra-articular Corticosteroid Injection

- Available evidence is inconclusive as to the use and timing of intra-articular corticosteroid injections as a means of reducing SSIs.

Anticoagulation

- Regarding the use of venous thromboembolism prophylaxis in prosthetic joint arthroplasty and the prevention of SSI, available evidence suggests uncertain trade-offs, and no recommendation is made in this guideline.

- Other organizations have made recommendations and they can be found here https://jamanetwork.com/journals/SURG/articlepdf/2623725/ssc170001supp1_prod.pdf (Berrios-Torres et al., 2017).

Orthopedic Surgical Space Suit

- Research does not clearly establish the benefit/harm profile of using orthopedic surgical space suits, nor does it establish which healthcare personnel should wear them as a means to prevent SSI in prosthetic joint arthroplasty.

Biofilm

- There are no clear recommendations at this time regarding the use of the following as strategies to prevent biofilm and reduce SSIs:
  - antimicrobial/modified joint cement
  - modified prosthetic joints
  - vaccinations

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