

Surgical Site Infection: AAOS Systematic Literature Review on the Management of Surgical Site Infections (2018)

About the Guideline

- The guideline was created after an extensive literature search through Embase, PubMed, and Cochrane Central Register of Controlled Trials from 1966 through March 2017.
- The literature search was performed after formulating PICO (population, intervention, comparison, and outcome) questions to guide the scope of the review.
- Physician experts formed the American Academy of Orthopaedic Surgeons (AAOS) Management of Surgical Site Infections group, along with the AAOS Quality and Value Unit in the Department of Research and methodologists from the Quality and Scientific Affairs group.
- The majority of the literature that was reviewed and the data that were collected involved hip and knee arthroplasty.

Key Clinical Considerations

Become familiar with the recommendations and best-practice statements provided in this guideline, especially if you work in an acute care setting.

Background

- Surgical site infections (SSIs) occur in approximately 1% of orthopedic patients.
- The infection may be superficial, involving bacteria or fungi entering through the surgical wound and only affecting the skin around the incision, or it may be more serious, affecting the deep tissue, organs, or implanted materials.
- Currently the Centers for Disease Control and Prevention (CDC) considers an infection to be an SSI when it occurs within 30 days from the day of surgery (Day 1).

Medical Imaging

- There is limited evidence to support the use of medical imaging to diagnose infection in patients with a suspected organ/space (e.g., bone, joint, and implant) SSI.
- *Radiography* may be considered for initial imaging to assess the site and describe the features of the infection, and it may be used to rule out other conditions causing the patient's symptoms.
- *Radiolabeled leukocyte imaging* may be used in conjunction with other diagnostic tools, either to rule in or rule out a prosthetic joint infection (PJI), but it should not be used as the lone study. Specificity is increased when it's used with bone marrow scintigraphy.
- *Tc-99m diphosphonate skeletal scintigraphy* (a "bone scan") is a useful diagnostic tool to rule out PJIs that might occur a year after surgery when radiolabeled leukocyte imaging is not available. By itself, a bone scan is of limited use in diagnosing such an infection.
- *Positron emission tomography (PET)* is not typically used to rule in or rule out SSIs because of its expense and the limited reimbursement and availability, although in some circumstances PET may be considered a useful diagnostic test in conjunction with other studies.
- *Cross-sectional imaging* (magnetic resonance imaging, computed tomography, ultrasonography) may be useful in diagnosing infections in which soft tissue fluid collection occurs and therapeutic or diagnostic aspirations or biopsies may be needed; these imaging modalities are used for guidance in aspiration.

Cultures

- Synovial fluid and tissue cultures are strong rule-in tests for the diagnosis of infection with strong supporting evidence; however, infections cannot be ruled out by negative synovial fluid and tissue cultures.
- *Synovial fluid cultures*: Obtaining a synovial culture may subject the patient to an increased risk of infection. Wound swabbing has the potential to provide a false-positive result.
- *Intraoperative tissue cultures*: Tissue cultures are preferred over swab cultures.
- *Number of intraoperative cultures*: If there is strong evidence of periprosthetic infection (yielding the same organism), two cultures are required, as a single culture provides limited value.
- *Duration of culture incubation*: Incubation for 14 days in aerobic and anaerobic environments has provided the best results.
- *Prior antibiotic exposure*: Antibiotic treatment started within 14 days of the specimen collection resulted in a lower culture yield.

C-reactive Protein

- C-reactive protein (CRP) testing is a strong rule-in and rule-out laboratory study for patients with suspected SSI.
- Confirmation of a periprosthetic infection is solidified with a positive CRP value, and infection is ruled out with a negative value. The CRP test was found to be both sensitive and specific in such infections.
- In patients with neoplasms, metabolic syndrome, and chronic inflammatory conditions, CRP levels can be elevated and may confuse a final diagnosis; therefore, such patients should be followed and evaluated to determine the cause of the elevated CRP levels.

Erythrocyte Sedimentation Rate (ESR)

- Limited evidence exists to support the use of ESR, by itself, to rule in or rule out an SSI.
- In combination with other diagnostic tools, ESR may be used to diagnose infection, but alone the results are too inconsistent when surgery, inflammation, and other factors are involved.

Clinical Exam for the Diagnosis of SSIs

- The clinical exam may reveal fever, pain, and drainage.
- A clinical exam should be included along with the history and diagnostic studies.
- The absence of pain does not necessarily coincide with the absence of infection.

Strong Evidence of Factors Associated with an Increased Risk of SSI

The below factors are associated with an increased risk of SSI with strong supporting evidence:

- Anemia
- Duration of hospital stay
 - Both lengthy pre- and postoperative hospital stays are associated with an increased risk of SSI.
 - Early discharge to avoid infections should not take place until any unstable medical conditions are assessed and identified.
 - Discharge pathways should be utilized.
- Immunosuppressive medications

- Careful consideration should be given to patients on immunosuppressive medications, as there is a strong correlation with the risk of SSI.
- Stopping immunosuppressive medications may cause a flare-up of an inflammatory disease, and is therefore not recommended.
- History of alcohol abuse
 - There is strong evidence of SSI occurring in alcoholics, as reviewed in the literature.
 - Of note is the risk of alcohol withdrawal in these patients as well.
- Obesity
 - Obesity is a risk for many systemic complications, including SSI.
- Depression
 - The correlation between depression and SSI is unknown, but four high-quality studies identified the relationship, and therefore the correlation is considered strong evidence.
- History of congestive heart failure (CHF)
 - CHF is associated with various vascular complications along with SSI.
- Dementia
 - Dementia is an independent risk factor for SSI.
- Human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS)
 - Prior to orthopedic surgery, control of opportunistic infections should be attained.

Moderate Evidence of Increased Associated Risk of SSI

Patients meeting any of the following criteria are at an increased risk of SSI after hip and knee arthroplasty:

- Chronic kidney disease
 - A definitive correlation exists between severity of kidney disease and the risk of SSI.
- Diabetes
 - Conflicting evidence exists for a specific correlation between diabetes and SSI in the studies that were reviewed.
 - The risk of over- or under-controlling blood sugar levels, both preoperatively and postoperatively, may increase the risk of SSI in diabetic patients.
- Tobacco use/smoking
 - An exact correlation between smoking and SSI was not identified; however, smoking cessation counseling is of benefit to decrease various other risks to the surgical patient.
- Malnutrition
 - Increased risk of hypoalbuminemia and SSI was identified in patients who were malnourished.
 - Malnutrition is a known surgical risk, regardless of the risk for SSI.

Limited Evidence of Increased Associated Risk of SSI

Patients meeting one or more of the following criteria may be at an increased risk of infection after hip and knee arthroplasty, although evidence is limited:

- Cancer
- Hypertension
- Liver disease

Antibiotic Duration for Management of SSIs

- For retained total joint arthroplasty, moderate supporting evidence indicates that antibiotic protocols of 8 weeks' duration do not result in significantly different outcomes than therapy of 3 to 6 months' duration.

Rifampin Use for Management of SSIs

- Rifampin as a second antibiotic in therapy improves the treatment results for staphylococcal infections with retained orthopedic implants, according to moderate supporting evidence.
- Rifampin should not be used as monotherapy, and its use should be monitored by infectious disease experts because of the risk of adverse interactions.

Reference

McLaren, A. C., & Lundy, D. W. (2019). AAOS Systematic Literature Review: Summary on the Management of Surgical Site Infections. *The Journal of the American Academy of Orthopaedic Surgeons*, 27(16), e717–e720. <https://doi.org/10.5435/JAAOS-D-18-00653>. Accessed March 2019 via the Web at https://www.aaos.org/uploadedFiles/PreProduction/Quality/Guidelines_and_Reviews/ssi-sr-09132018.pdf