AAOS

AMERICAN ACADEMY OF ORTHOPAEDIC SURGEONS

# Prevention of Orthopaedic Implant Infection in Patients Undergoing Dental Procedures

## Appropriate Use Criteria

*Adapted by*:
The American Academy of Orthopaedic Surgeons Board of Directors
June 6, 2025

*Endorsed by:*

MUSCULOSKELETAL INFECTION SOCIETY

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## Disclaimer

Volunteer physicians from multiple medical specialties created and categorized these Appropriate Use Criteria. These Appropriate Use Criteria are not intended to be comprehensive or a fixed protocol, as some patients may require more or less treatment or different means of diagnosis. These Appropriate Use Criteria represent patients and situations that clinicians treating or diagnosing musculoskeletal conditions are most likely to encounter. The clinician's independent medical judgment, given the individual patient's clinical circumstances, should always determine patient care and treatment.

### Disclosure Requirement

In accordance with American Academy of Orthopaedic Surgeons (AAOS) policy, all individuals whose names appear as authors or contributors to this document filed a disclosure statement as part of the submission process. All authors provided full disclosure of potential conflicts of interest prior to participation in the development of these Appropriate Use Criteria. Disclosure information for all panel members can be found in Appendix B.

### Funding Source

The American Academy of Orthopaedic Surgeons exclusively funded development of these Appropriate Use Criteria. The American Academy of Orthopaedic Surgeons received no funding from outside commercial sources to support the development of these Appropriate Use Criteria.

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To view the clinical practice guideline for this topic, please visit
http://www.orthoguidelines.org/topic?id=1050

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# INTRODUCTION

## AUC OVERVIEW

AAOS have developed this Appropriate Use Criteria (AUC) to determine appropriateness of antibiotic prophylaxis to reduce theoretical risk of post-surgical prosthetic joint infection in patients seeking dental care.

An "appropriate" healthcare service is one for which the expected health benefits exceed the expected negative consequences by a sufficiently wide margin.[1] Evidence-based information, in conjunction with the clinical expertise of physicians from multiple medical specialties, was used to develop the criteria in order to improve patient care and obtain the best outcomes while considering the subtleties and distinctions necessary in making clinical decisions. To provide the evidence foundation for this AUC, the AAOS Department of Clinical Quality and Value provided the writing panel and rating panel with the AAOS Clinical Practice Guideline on The Prevention of Total Hip and Knee Arthroplasty Periprosthetic Joint Infection in Patients Undergoing Dental Procedures, which can be accessed via the following link: http://www.orthoguidelines.org/topic?id=1050 The purpose of this AUC is to help determine the appropriateness of clinical practice guideline recommendations for the heterogeneous patient population routinely seen in practice. The best available scientific evidence is synthesized with collective expert opinion on topics where gold standard randomized clinical trials are not available or are inadequately detailed for identifying distinct patient types. When there is evidence corroborated by consensus that expected benefits substantially outweigh potential risks, exclusive of cost, a procedure is determined to be appropriate. The AAOS uses the RAND/UCLA Appropriateness Method (RAM)[1] to assess the appropriateness of a particular treatment. This process includes reviewing the results of the evidence analysis, compiling a list of clinical vignettes, and having an expert panel comprised of representatives from multiple medical specialties to determine the appropriateness of each of the clinical indications for treatment as "Appropriate," "May be Appropriate," or "Rarely Appropriate." To access a more user-friendly version of the appropriate use criteria for this topic online, please visit our AUC web-based application at www.orthoguidelines.org/auc or download the OrthoGuidelines app from Google Play or Apple Store.

These criteria should not be construed as including all indications or excluding indications reasonably directed to obtaining the same results. The criteria intend to address the most common clinical scenarios facing qualified physicians managing patients seeking dental care post-total joint arthroplasty. The ultimate judgment regarding any specific criteria should address all circumstances presented by the patient and the needs and resources particular to the locality or institution. It is also important to state that these criteria and are not meant to supersede clinician expertise and experience or patient preference.

## INTERPRETING THE APPROPRIATENESS RATING

To prevent misuse of these criteria, it is extremely important that the user of this document understands how to interpret the appropriateness ratings. The appropriateness rating scale ranges from one to nine and there are three main range categories that determine how the median rating is defined (i.e., 1-3 = "Rarely Appropriate", 4-6 = "May Be Appropriate", and 7-9 = "Appropriate"). Before these AUCs are consulted, the user should read through and understand all contents of this document.

## DISEASE OVERVIEW

### ETIOLOGY

Periprosthetic Joint Infection (PJI) affects 1-2% of primary THA and TKA. There are several causes of PJI including hematogenous spread, contiguous spread from a local source, or surgical site infection from the index procedure.

### INCIDENCE AND PREVALENCE

TKA and THA are two of the most common surgical procedures performed worldwide. In the United States, over 1 million TKAs and THAs are performed each year. It is estimated that by 2060 the number of THA and TKA procedures performed will increase by 659% and 469%, respectively[2].

### BURDEN OF DISEASE

As the number of patients who undergo THA and TKA continues to rise, so too will the number of patients presenting for dental care and procedures with a THA and TKA.

### POTENTIAL BENEFITS, HARMS, AND CONTRAINDICATIONS

There are several benefits and harms when considering dental screening prior to surgery, timing of dental procedures prior to surgery, as well as antibiotic prophylaxis in patients who have a THA or TKA who undergo a dental procedure. The ultimate goal is to limit and prevent PJI after THA or TKA. However, interventions aimed at prevention must be weighed against potential harms including patient inconvenience, patient and societal costs, as well as other adverse clinical events such as the development of Clostridioides difficile infection or antibiotic-resistant bacteria with widespread antibiotic use. The ultimate decision on whether a patient should delay a dental procedure before or after TJA, undergo dental screening before TJA, or receive antibiotic prophylaxis should be made through a shared decision-making process understanding the unique risks and benefits for that particular patient.

# METHODS

This AUC on Dental Prophylaxis is based on a review of the available literature and a list of clinical scenarios (i.e., criteria) constructed and rated by experts in orthopaedic surgery and other relevant medical fields. This section describes the methods adapted from RAM[1]. This section also includes the activities and compositions of the various panels that developed, defined, reviewed, and rated the criteria.

Two panels participated in the development of the Dental Prophylaxis AUC, a writing panel and a rating panel. Members of the writing panel developed a list of patient scenarios and relevant treatment options. Additional detail on how the writing panel developed the patient scenarios and treatments is below. The rating panel participated in two rounds of rating. During the first round, the rating panel was given approximately one month to independently rate the appropriateness of each the provided treatments for each of the relevant patient scenarios as 'Appropriate', 'May Be Appropriate', or 'Rarely Appropriate' via an electronic ballot. How the rating panel rates for appropriateness is described in more detailed below. After the first round of appropriateness ratings were submitted, AAOS staff calculated the median ratings for each patient scenario and specific treatment. A virtual rating panel meeting was held on Tuesday, April 1, 2025. During this meeting rating panel members addressed the scenarios/treatments which resulted in disagreement from round one rating. The rating panel members discussed the list of assumptions, patient indications, and treatments to identify areas that needed to be clarified/edited. After the discussion and subsequent changes, the group was asked to rerate their first-round ratings during the rating panel meeting, only if they were persuaded to do so by the discussion and available evidence. There was no attempt to obtain consensus about appropriateness.

The AAOS Committee on Evidence Based Quality and Value, the AAOS Research and Quality Council, and the AAOS Board of Directors sequentially approve all AAOS AUC.

**DEVELOPING CRITERIA**

Panel members of the Dental Prophylaxis AUC developed patient scenarios using the following guiding principles:

1. **Comprehensive** – Covers a wide range of patients.
2. **Mutually Exclusive** - There should be no overlap between patient scenarios/indications.
3. **Homogenous** –The final ratings should result in equal application within each of the patient scenarios.
4. **Manageable** – Number of total rating items (i.e., # of patient scenarios x # of treatments) should be practical for the rating panel. Target number of total rating items should be >1500. This means that not all patient indications and treatments can be assessed within one AUC.

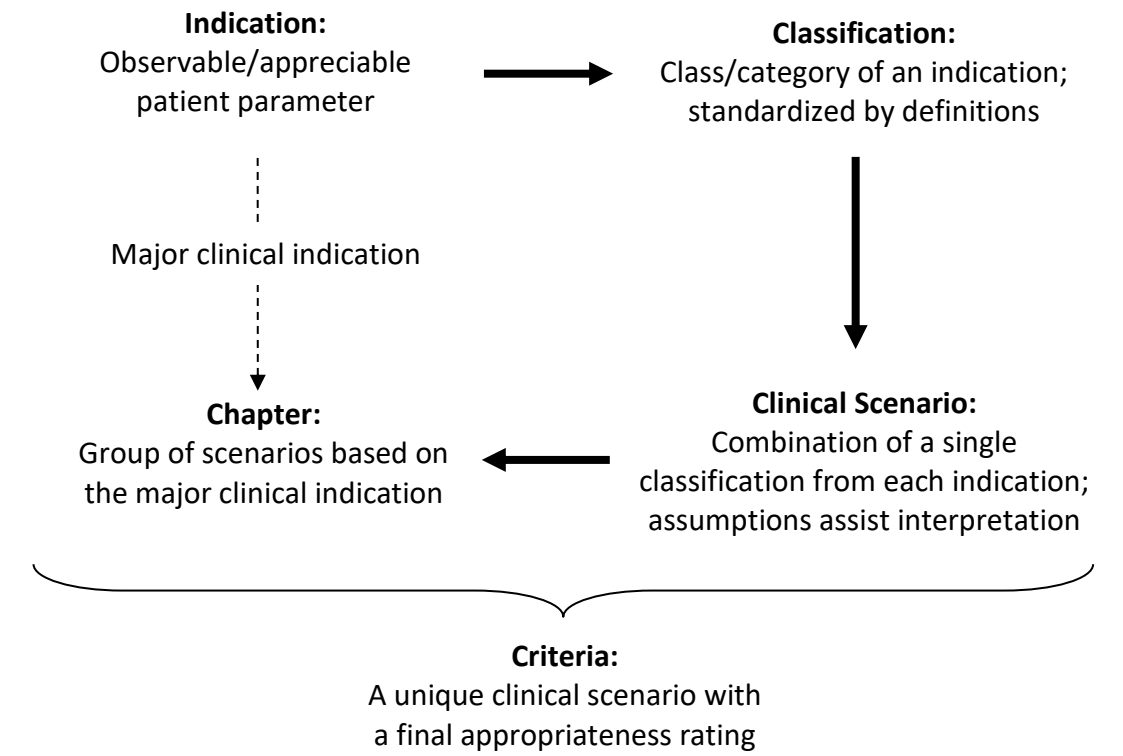
The writing panel developed the scenarios by categorizing patients in terms of indications evident during the clinical decision-making process. These scenarios relied upon definitions and general assumptions, mutually agreed upon by the writing panel during the development of the scenarios. These definitions and assumptions were necessary to provide consistency in the interpretation of the clinical scenarios among experts rating on the scenarios, and readers using the final criteria.

## FORMULATING INDICATIONS AND SCENARIOS

The AUC writing panel began the development of the scenarios by identifying clinical indications typical of patients undergoing dental procedures who have undergone total joint arthroplasty. Indications are most often parameters observable by the clinician, including symptoms or results of diagnostic tests.

Additionally, "human factor" (e.g., activity level) or demographic variables can be considered.

**FIGURE 1. DEVELOPING CRITERIA**




Indications identified in clinical trials, derived from patient selection criteria, included in AAOS Clinical Practice Guidelines (http://www.orthoguidelines.org/topic?id=1050 ) served as a starting point for the writing panel, as well as ensured that these AUCs referenced the evidence base for this topic. The writing panel considered this initial list and other indications based on their clinical expertise and selected the most clinically relevant indications.

The writing panel then defined distinct classes for each indication to stratify/categorize the indication.

The writing panel organized these indications into a matrix of clinical scenarios that addressed all combinations of the classifications. The writing panel was given the opportunity to remove any scenarios that rarely occur in clinical practice but agreed that all scenarios

were clinically relevant. The major clinical decision-making indications chosen by the writing panel divided the matrix of clinical scenarios into chapters, as follows: Level of Invasiveness of Dental Procedure, and Systemic Host Status.

## CREATING DEFINITIONS AND ASSUMPTIONS

The Dental Prophylaxis AUC writing panel constructed concise and explicit definitions for the indications and classifications. This standardization helps ensure that the way the writing panel defined the patient indications is consistent among those reading the clinical scenario matrix or the final criteria. Definitions create explicit boundaries when possible and are based on standard medical practice or existing literature.

Additionally, the writing panel formulated a list of general assumptions in order to provide more consistent interpretations of a scenario. These assumptions differed from definitions in that they identified circumstances that exist outside of the control of the clinical decision-making process. Assumptions also address the use of existing published literature regarding the effectiveness of treatment and/or the procedural skill level of physicians. Assumptions also highlight intrinsic methods described in this document such as the role of cost considerations in rating appropriateness, or the validity of the definition of appropriateness. The main goal of assumptions is to focus scenarios so that they apply to the average patient presenting to an average physician at an average facility.

The definitions and assumptions should provide all readers with a common starting point in interpreting the clinical scenarios. The list of definitions and assumptions accompanied the matrix of clinical scenarios in all stages of AUC development and appears in the Writing Panel section of this document.

## LITERATURE REVIEW

The Clinical Practice Guideline on the Prevention of Total Hip and Knee Arthroplasty Periprosthetic Joint Infection in Patients Undergoing Dental Procedures, was used as the evidence base for this AUC[3] (see here: http://www.orthoguidelines.org/topic?id=1050) . This guideline helped to inform the decisions of the writing panel and rating panel where available and necessary.

## RATING PANEL MODIFICATIONS TO WRITING PANEL DOCUMENT

At the start of the rating panel meeting, the rating panel was reminded that they could amend the original writing panel materials if the amendments resulted in more clinically relevant and practical criteria. To amend the original materials, a rating panel member must make a motion to amend and another member must "second" that motion, after which a vote is conducted. If the majority of rating panel members voted "yes" to amend the original materials, the amendments were accepted.

## DETERMINING APPROPRIATENESS

### RATING PANEL

As mentioned above, a multidisciplinary panel of clinicians was assembled to determine the appropriateness of treatments for the Dental Prophylaxis AUC. A non-rating moderator, who is an orthopaedic surgeon, moderated the rating panel. The moderator was familiar with the methods and procedures of AAOS Appropriate Use Criteria and led the panel (as a non-rater) in discussions. Additionally, no member of the rating panel was involved in the development, i.e., writing panel, of the scenarios.

The rating panel used a modified Delphi procedure to determine appropriateness ratings. The rating panel participated in two rounds of rating while considering evidence-

based information provided in the literature review.

**RATING APPROPRIATENESS**

When rating the appropriateness of a scenario, the rating panel considered the following definition:

"An appropriate procedural step for a patient seeking care is one for which the procedure **is** generally acceptable, **is** a reasonable approach for the indication, and **is** likely to improve the patient's health outcomes or survival."

The rating panel rated each scenario using their best clinical judgment, taking into consideration the available evidence, for an average patient presenting to an average physician at an average facility as follows:

**FIGURE 2. INTERPRETING THE 9-POINT APPROPRIATENESS SCALE**

| Rating | Explanation |
|---|---|
| 7-9 | **Appropriate**: Appropriate for the indication provided, meaning treatment **is** generally acceptable and **is** a reasonable approach for the indication and **is** likely to improve the patient's health outcomes or survival. |
| 4-6 | **May Be Appropriate**: Uncertain for the indication provided, meaning treatment **may** be acceptable and **may** be a reasonable approach for the indication, but with uncertainty implying that more research and/or patient information is needed to further classify the indication. |
| 1-3 | **Rarely Appropriate**: **Rarely** an appropriate option for management of patients in this population due to the lack of a clear benefit/risk advantage; **rarely** an effective option for individual care plans; exceptions should have documentation of the clinical reasons for proceeding with this care option (i.e., procedure is not generally acceptable and is not generally reasonable for the indication). |

**ROUND ONE RATING**

The first round of rating occurred after approval of the final indications, scenarios, and assumptions by the writing panel. The rating panel rated the scenarios electronically using the AAOS AUC Electronic Ballot Tool, a personalized ballot created by AAOS staff. There was no interaction between rating panel members while completing the first round of rating. Panelists considered the following materials:

- The instructions for rating appropriateness
- The completed literature review, that is appropriately referenced when evidence is available for a scenario
- The list of indications, definitions, and assumptions, to ensure consistency in the interpretation of the clinical scenarios

**ROUND TWO RATING**

The second round of rating occurred after the virtual rating panel meeting on April 1, 2025. Prior to the meeting, each rating panelist received a personalized document that included his/her first-round ratings along

with summarized results of the first-round ratings that resulted in disagreement. These results indicated the frequency of ratings for a scenario for all panelists. The document contained no identifying information for other panelists' ratings. The moderator also used a document that summarized the results of the panelists' first round rating. These personalized documents served as the basis for discussions of scenarios which resulted in disagreement.

During the discussion, the rating panel members were allowed to add or edit the assumptions list, patient indications, and/or treatments if clarification was needed. Rating panel members were also able to record a new rating for any scenarios/treatments, if they were persuaded to do so by the discussion and/or the evidence. There was no attempt to obtain consensus among the panel members. After the final ratings were submitted, AAOS staff used the AAOS AUC Electronic Ballot Tool to export the median values and level of agreement for all rating items.

**FINAL RATINGS**

Using the median value of the second-round ratings, AAOS staff determined the final levels of appropriateness. Disagreement among raters can affect the final rating. Agreement and disagreement were determined using the BIOMED definitions of Agreement and Disagreement, as reported in the RAND/UCLA Appropriate Method User's Manual[1], for a panel of 8-10 rating members (Figure 3). The 8-10 panel member disagreement cutoff was used for this rating panel. For this panel size, disagreement is defined as when ≥ 3 members' appropriateness ratings fell within the appropriate (7-9) and rarely appropriate (1-3) ranges for any scenario (i.e., ≥ 3 members' ratings fell between 1-3 and ≥ 3 members' ratings fell between 7-9 on any given scenario and its treatment). Agreement is defined as ≤ 2 panelists rating outside of the 3-point range containing the median. If there is disagreement in the rating panel ratings after the last round of rating, that rating item is labeled as "5" regardless of median score. The classifications presented in figure 4 determined final levels of appropriateness.

**FIGURE 3. DEFINING AGREEMENT AND DISAGREEMENT FOR APPROPRIATENESS RATINGS**

| | **Disagreement** | **Agreement** |
|---|---|---|
| Panel Size | Number of panelists rating in each extreme (1-3 and 7-9) | Number of panelists rating outside the 3-point region containing the median (1-3, 4-6, 7-9) |
| 8,9,10 | *≥ 3* | *≤ 2* |
| 11,12,13 | ≥ 4 | ≤ 3 |
| 14,15,16 | ≥ 5 | ≤ 4 |
| 17,18,19 | ≥ 6 | ≤ 5 |

*Adapted from RAND/UCLA Appropriate Method User's Manual[1]*

**FIGURE 4. INTERPRETING FINAL RATINGS OF CRITERIA**

| Level of Appropriateness | Description |
|---|---|
| Appropriate | • Median panel rating between 7-9 and no disagreement |
| May Be Appropriate | • Median panel rating between 4-6 or<br>• Median panel rating 1-9 with disagreement |
| Rarely Appropriate | • Median panel rating between 1-3 and no disagreement |

## REVISION PLANS

These criteria represent a cross-sectional view of current methods of care for patients seeking dental care post total joint arthroplasty  and may become outdated as new evidence becomes available or clinical decision-making indicators are improved. In accordance with guideline and appropriate use criteria standards, AAOS will update or withdraw these criteria in five years. AAOS will issue updates in accordance with new evidence, changing practice, rapidly emerging treatment options, and new technology.

## DISSEMINATING APPROPRIATE USE CRITERIA


All AAOS AUCs can be accessed via a user-friendly app that is available via the OrthoGuidelines website (www.orthoguidelines.org/auc) or as a native app via the Apple and Google Play stores.

Publication of the AUC document is on the AAOS website at [https://www.aaos.org/quality/quality-programs/. This document provides interested readers with full documentation about the development of Appropriate Use Criteria and further details of the criteria ratings.

AUCs are first announced by an Academy press release and then published on the AAOS website. AUC summaries are published in *AAOS Now* and the Journal of the American Academy of Orthopaedic Surgeons (JAAOS). AUCs may also be promoted via JAAOS' Unplugged podcast. In addition, most appropriate use criteria are promoted at the AAOS Annual Meeting in the Resource Center.

The dissemination efforts of AUCs may include the AAOS Learning Management Systems (LMS), AAOS' Education by Specialty Area pages, webinars, and media briefings. In addition, AUCs are also promoted in relevant Continuing Medical Education (CME) courses. Specialty Societies that participated in the development of the AUC are invited to endorse the AUC and share the links to the online tool and full AUC pdf to their membership via their websites.

Other dissemination efforts outside of the AAOS include submitting AUCs to the Guidelines International Network and to other medical specialty societies' meetings.

# ASSUMPTIONS, PATIENT INDICATIONS AND TREATMENTS

## ASSUMPTIONS LIST AND DISCLAIMER

### Scope

The scope of this AUC is intended to cover the majority of patients, who are "average" or "lower" risk patients as there is no data to guide decisions on the small population of higher risk patients such as patients with revision implants, mega-prostheses, poor soft tissue envelopes, prior prosthetic joint infection.

With this AUC, we have attempted to define clinical situations in which antibiotic prophylaxis prior to dental procedures in average risk patients could reduce a theoretical risk of post-surgical prosthetic joint infection.

When an orthopedic surgeon discusses the role of antibiotic prophylaxis with a patient before a dental procedure, it is also important to encourage routine, proper dental care and hygiene as an equal or more important infection prevention measure. Appropriate dental care is always recommended.

It is assumed that antibiotics, if prescribed, will take into account any patient allergies or drug – drug interactions; This is what is meant by "patient-appropriate" antibiotics in the tool.

### Planned Dental Procedures

- The chance of oral bacteremia being related to joint infections is extremely low, with no evidence for an association.
- Oral bacteremia frequently occurs secondary to activities of daily living such as tooth brushing and eating.
- Virtually all dental office procedures have the potential to create bacteremia.

### Definitions:

#### A. Level of Invasiveness

Non-Invasive

- Dental examination without probing dental radiograph or cone beam CT imaging, denture adjustment procedures, clear orthodontic aligner (invisible braces) adjustment procedures, occlusal guard or bite splint adjustment
- Oral hygiene procedures including dental cleaning, dental prophylaxis using a rubber cup and handpiece [without scaling] or periodontal probing (without SRP)
- Orthodontic procedures including banding or debanding orthodontic fixes or removable appliances, archwire adjustment, orthodontic mini-implant removal, orthodontic separate placement

- Other non-invasive procedures including suture removal, anesthetic injection, crown and bridge placement, dental restorative procedures, rubber dam clamp or matrix band wedge between teeth, impression taking, endodontic treatment (root canal therapy).

Invasive

- Scaling and/or root planing (SRP) with manual (hand instruments) or ultrasonic scaler
- Dental Extractions including single, multiple, impacted third molar
- Oral Surgery (including dental implant surgery, periodontal surgery, cleft palate surgery, piezoelectric surgery, osteosynthesis plate removal)
- Treatment of Active Dental Infection

**B. Immunocompromised**

For a comprehensive list of conditions that are defined by CDC guidelines as severely immunocompromised, please see the following citations linked here. ‡

## Disclaimer

Volunteer physicians and dentists from multiple medical and dental specialties created and categorized these Appropriate Use Criteria. These Appropriate Use Criteria are not intended to be comprehensive or a fixed protocol, as some patients may require more or less treatment or different means of diagnosis. These Appropriate Use Criteria represent patients and situations that clinicians treating or diagnosing musculoskeletal conditions are most likely to encounter. The clinician's independent medical judgment, given the individual patient's clinical circumstances, should always determine patient care and treatment.

‡ *Section linked as stated above:*

Severely immunocompromised patients include:

a. Patient with Stage 3 AIDS as defined by the Centers for Disease Control and Prevention (CDC) Guidelines when the immune system becomes severely compromised due to reduced CD4 T lymphocyte counts (<200) or opportunistic infection as defined by CDC[1] see list of diseases below.
b. Cancer patient undergoing immunosuppressive chemotherapy with febrile (Celsius 39) neutropenia (ANC <2000) OR severe neutropenia irrespective of fever (ANC <500)
c. Rheumatoid arthritis with use of biologic disease modifying agents including tumor necrosis factor alpha or prednisone >10 mg per day. Methotrexate, Plaquenil not considered immunocompromising agents.
d. Solid organ transplant on immunosuppressants
e. Inherited diseases of immunodeficiency (e.g., congenital agammaglobulinemia, congenital IgA deficiency)
f. Bone marrow transplant recipient in one of the following phases of treatment:
    i. Pretransplantation period
    ii. Preengraftment period (approximately 0-30 d posttransplantation)
    iii. Postengraftment period (approximately 30-100 d posttransplantation)
    iv. Late posttransplantation period (≥100 d posttransplantation) while still on immunosuppressive medications to prevent GVHD (typically 36 months post transplantation) (see Table reference below)

*Opportunistic illness in AIDS: (as per CDC[2])

1. Bacterial infections, multiple or recurrent*
2. Candidiasis of bronchi, trachea, or lungs
3. Candidiasis of esophagus
4. Cervical cancer, invasive†
5. Coccidioidomycosis, disseminated or extrapulmonary
6. Cryptococcosis, extrapulmonary
7. Cryptosporidiosis, chronic intestinal (>1 month's duration)
8. Cytomegalovirus disease (other than liver, spleen, or nodes), onset at age >1 month
9. Cytomegalovirus retinitis (with loss of vision)
10. Encephalopathy attributed to HIV§
11. Herpes simplex: chronic ulcers (>1 month's duration) or bronchitis, pneumonitis, or esophagitis (onset at age >1 month)
12. Histoplasmosis, disseminated or extrapulmonary
13. Isosporiasis, chronic intestinal (>1 month's duration)
14. Kaposi sarcoma
15. Lymphoma, Burkitt (or equivalent term)
16. Lymphoma, immunoblastic (or equivalent term)

17. Lymphoma, primary, of brain
18. Mycobacterium avium complex or Mycobacterium kansasii, disseminated or extrapulmonary
19. Mycobacterium tuberculosis of any site, pulmonary†, disseminated, or extrapulmonary
20. Mycobacterium, other species or unidentified species, disseminated or extrapulmonary
21. Pneumocystis jirovecii (previously known as "Pneumocystis carinii") pneumonia
22. Pneumonia, recurrent†
23. Progressive multifocal leukoencephalopathy
24. Salmonella septicemia, recurrent
25. Toxoplasmosis of brain, onset at age >1 month
26. Wasting syndrome attributed to HIV[§]

** Only among children aged <6 years.*

*† Only among adults, adolescents, and children aged ≥6 years.*

*§ Suggested diagnostic criteria for these illnesses, which might be particularly important for HIV encephalopathy and HIV wasting syndrome[1,3]*

**Citations:**


1. Centers for Disease Control and Prevention (CDC). 1993 Revised classification system for HIV infection and expanded surveillance case definition for AIDS among adolescents and adults. MMWR 1992;41(No. RR-17).
2. Centers for Disease Control and Prevention (CDC) Revised surveillance case definition for HIV infection—United States, 2014. *MMWR. Recommendations and Reports*. 2014;63(3):1–10.

Centers for Disease Control and Prevention (CDC). 1994 Revised classification system for human immunodeficiency virus infection in children less than 13 years of age. MMWR 1994;43(No. RR-12).

## INDICATIONS

### PATIENT INDICATIONS AND CLASSIFICATIONS

**Level of Invasiveness of Dental Procedure**

a) Non-Invasive - Dental procedures that do not result in the manipulation of gingival or periapical tissues, or perforation of the oral mucosa
b) Invasive - Dental procedures that involve manipulation of gingival tissue or the periapical region of teeth or perforation of the oral mucosa

**Systemic Host Status**

a) Immunocompetent
b) Immunocompromised

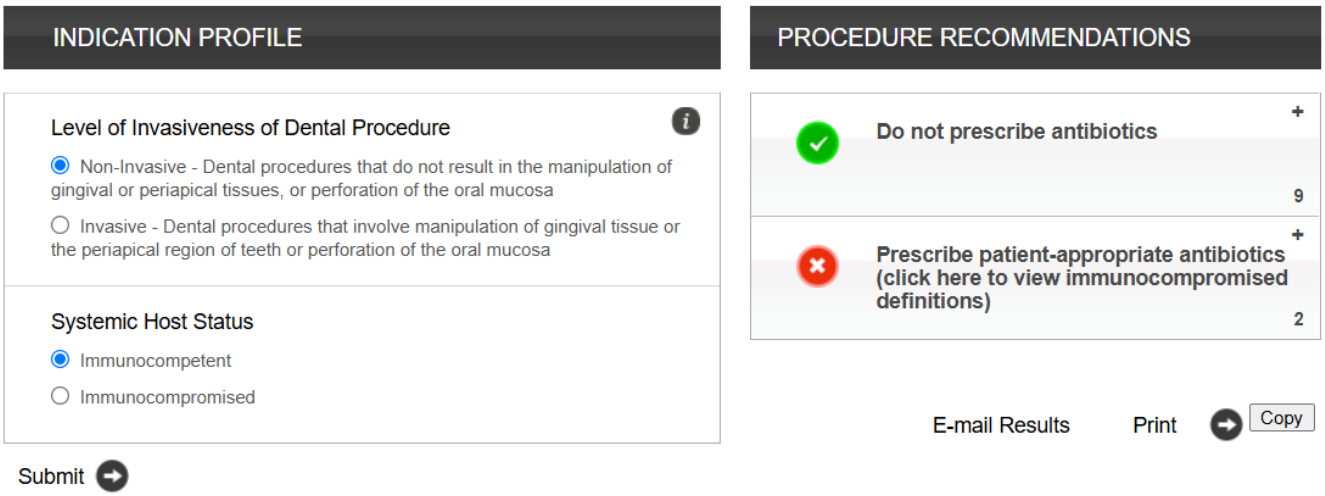
## TREATMENTS

1. Prescribe patient-appropriate antibiotics
2. Do not prescribe antibiotics

# FINAL APPROPRIATENESS RATINGS

For a user-friendly version of these appropriate use criteria, please access our AUC web-based application at www.orthoguidelines.org/auc. The OrthoGuidelines native app can also be downloaded via the Apple or Google Play stores.

**Web-Based AUC Application Screenshot**



## RESULTS

The following Appropriate Use Criteria tables contain the final appropriateness ratings assigned by the members of the rating panel. Patient characteristics are found under the column titled “Patient Indications”. The Appropriate Use Criteria for each patient scenario can be found within each of the treatment rows. These criteria are formatted by appropriateness, median rating, and + or - indicating agreement or disagreement amongst the rating panel, respectively.

Out of eight total rating items, 3 (37.5%) rating items were rated as “Appropriate”, 2 (25%) rating items were rated as “May Be Appropriate”, and 3 (37.5%) rating items were rated as “Rarely Appropriate” (Figure 5). Additionally, the rating panel members were in statistical agreement on 5 (62.5%) rating items and statistical disagreement on 0 (0%) rating items (Figure 6). Three (37.5%) items did not reach agreement nor disagreement. The distribution of appropriateness ratings on the 9-point scale can be seen in Figure 7.

**FIGURE 5. BREAKDOWN OF APPROPRIATENESS RATINGS**

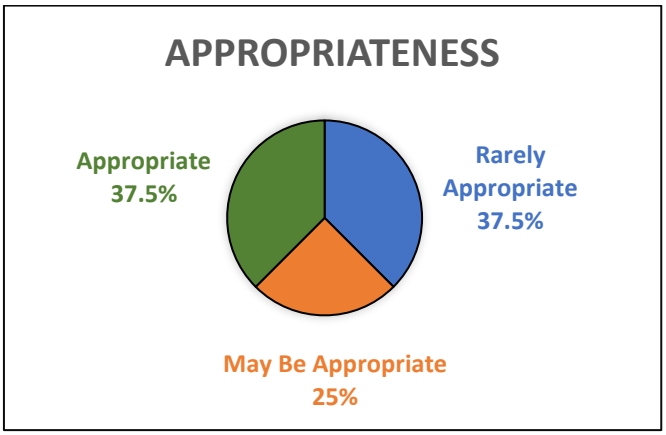



**FIGURE 6. BREAKDOWN OF AGREEMENT AMONGST RATING PANEL**

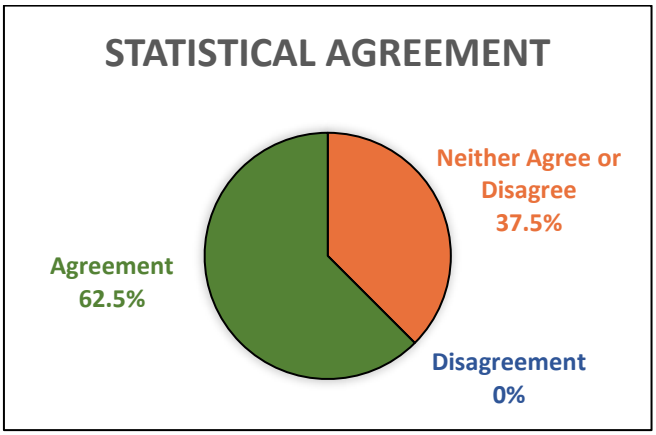
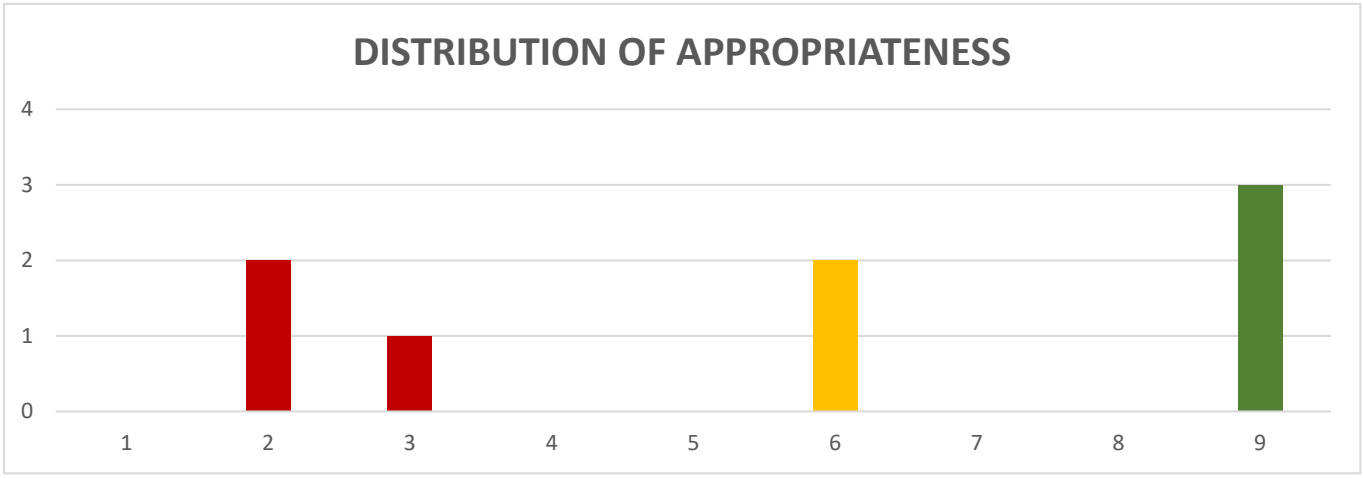



**FIGURE 7. DISTRIBUTION OF APPROPRIATENESS ON 9-POINT RATING SCALE**



## APPROPRIATENESS RATINGS BY PATIENT SCENARIO

**Interpreting the AUC tables**:

- Each treatment contains the appropriateness (i.e., appropriate, may be appropriate, or rarely appropriate) for each patient scenario, followed by the median panel rating, and the panel's agreement in parentheses.

| Patient Indications | Treatment | Appropriateness Rating |
|---|---|---|
| **Scenario 1:** Non-Invasive - Dental procedures that do not result in the manipulation of gingival or periapical tissues, or perforation of the oral mucosa, Immunocompetent | Prescribe patient-appropriate antibiotics (click here to view immunocompromised definitions) | Rarely Appropriate, 2 (+) |
| | Do not prescribe antibiotics | Appropriate, 9 (+) |
| **Patient Indications** | **Treatment** | **Appropriateness Rating** |
| **Scenario 2:** Non-Invasive - Dental procedures that do not result in the manipulation of gingival or periapical tissues, or perforation of the oral mucosa, Immunocompromised | Prescribe patient-appropriate antibiotics (click here to view immunocompromised definitions) | Rarely Appropriate, 2 (+) |
| | Do not prescribe antibiotics | Appropriate, 9 (+) |
| **Patient Indications** | **Treatment** | **Appropriateness Rating** |
| **Scenario 3:** Invasive - Dental procedures that involve manipulation of gingival tissue or the periapical region of teeth or perforation of the oral mucosa, Immunocompetent | Prescribe patient-appropriate antibiotics (click here to view immunocompromised definitions) | Rarely Appropriate, 3 |
| | Do not prescribe antibiotics | Appropriate, 9 (+) |
| **Patient Indications** | **Treatment** | **Appropriateness Rating** |
| **Scenario 4:** Invasive - Dental procedures that involve manipulation of gingival tissue or the periapical region of teeth or perforation of the oral mucosa, Immunocompromised | Prescribe patient-appropriate antibiotics (click here to view immunocompromised definitions) | May Be Appropriate, 6 |
| | Do not prescribe antibiotics | May Be Appropriate, 6 |

# APPENDICES

## APPENDIX A. DOCUMENTATION OF APPROVAL

**AAOS BODIES THAT APPROVED THIS APPROPRIATE USE CRITERIA:**

**Evidence-Based Quality and Value Committee: Approved on 05/05/2025**
The AAOS Committee on Evidence Based Quality and Value consists of 16 AAOS members. The overall purpose of this committee is to plan, organize, direct, and evaluate initiatives related to Clinical Practice Guidelines, Appropriate Use Criteria, and Quality Measures.

**Research and Quality Council: Approved on 05/12/2025**
To enhance the mission of the AAOS, the Research and Quality Council promotes the most ethically and scientifically sound basic, clinical, and translational research possible to ensure the future care for patients with musculoskeletal disorders. The Council also serves as the primary resource to educate its members, the public, and public policy makers regarding evidenced-based medical practice, orthopaedic devices and biologics regulatory pathways and standards development, patient safety, and other related areas of importance.

**Board of Directors: Approved on 06/06/2025**
The 17 member AAOS Board of Directors manages the affairs of the AAOS, sets policy, and determines and continually reassesses the Strategic Plan.

## APPENDIX B. DISCLOSURE INFORMATION

### WRITING PANEL MEMBER DISCLOSURES

**Tara Aghaloo, DDS, MD, PhD**
Submitted on: 03/05/2023
Journal of Oral and Maxillofacial Surgery: Editorial or governing board ($25,000) N/A(Self)
Osteoscience Foundation: Board or committee member ($2,000) N/A(Self)
Radius Health: Research support ($65,000) N/A(Self)
Strasbourg Osteosynthesis Research Group (SORG): Board or committee member ($2,000) N/A(Self)
Straumann Group: Paid presenter or speaker ($3,000) Number of Presentations: 2 N/A(Self)
Straumann Group: Research support ($70,000) N/A(Self)

**Elie Berbari, MD**
Submitted on: 07/23/2024
This individual reported nothing to disclose.

**Gregory Della Rocca, MD, PhD, MBA, FAAOS, FACS**
Submitted on: 07/20/2024
Journal of Bone and Joint Infection: Editorial or governing board ($0) N/A(Self)
Sonoran Biosciences: Stock or stock options, Number of Shares: 5,197 Preclinical; FMV $0.61(Self)
Wolters Kluwer Health - Lippincott Williams & Wilkins: Publishing royalties, financial or material support ($13,242)
UpToDate author and section editor (Self)

**Carlos Higuera, MD,**
Submitted on: 10/03/2024
AAOS: Board or committee member
American Association of Hip and Knee Surgeons: Board or committee member
Journal of Arthroplasty: Editorial or governing board
Journal of Bone and Joint infection: Editorial or governing board
Journal of Hip Surgery: Editorial or governing board
OREF: Research support
Osteal Therapeutics: Research support
PSI: Stock or stock options
CLEU: Stock or stock options
Solenic: Stock or stock options
SICOT: Board or committee member
Solventum a 3M Company: Paid consultant; Paid presenter or speaker
Stryker: Paid consultant; Research support
Zimmer: Research support
BD: Paid presenter or speaker

**Jessica Hooper, MD, FAAOS**
Submitted on: 06/18/2024
American Association of Hip and Knee Surgeons: Board or committee member ($0)
Evidence Based Medicine Committee (Self)
Smith & Nephew: Paid consultant ($41,700) N/A(Self)

**Purnima Kumar, DDS, PhD**
Submitted on: 09/14/2024
GlaxoSmithKline: Paid presenter or speaker
Johnson & Johnson: Paid presenter or speaker
Procter & Gamble: Paid presenter or speaker

**Young-Min Kwon, MD, PhD, FAAOS**
Submitted on: 05/23/2024
Biomet: Research support ($0)
DePuy, A Johnson & Johnson Company: Research support ($0)
Smith & Nephew: Research support ($0)
Stryker: Research support ($0)
Zimmer: Research support ($0)

**Brett Levine, MD, MS, FAAOS**
Submitted on: 2/4/2025
Link: Type: Other Professional Activities
Enovis: Type: Other Professional Activities
Zimmer Biomet Holdings, Inc.: Type: Other Professional Activities
OLC, AAHKS, MAOA, AAOS: Type: Board of Directors or committee member Self
AT, JOA, Orthopedics: Type: Editorial or governing board Self

**Andy Miller, MD,**
Submitted on: 05/23/2024
Lilly: Stock or stock Options Number of Shares: 48 N/A(Family)
Musculoskeletal Infection Society: Board or committee member ($0)

**Sandra Nelson, MD**
Submitted on: 07/23/2024
Journal of Bone and Joint Infection: Editorial or governing board ($0) N/A(Self)
Sonoran Biosciences: Stock or stock Options Number of Shares: 5,197 Preclinical; FMV $0.61(Self)
Wolters Kluwer Health - Lippincott Williams & Wilkins: Publishing royalties, financial or material support ($13,242)
UpToDate author and section editor (Self)

## RATING PANEL MEMBER DISCLOSURES

**Alberto Carli, MD**
Submitted on: 05/03/2024
Heraeus Medical: Paid consultant ($0)

**Laura Certain, MD, PhD**
Submitted on 04/10/2024
Foot and Ankle International: Editorial or governing board ($0)
Musculoskeletal Infection Society: Board or committee member ($0)
Osteal Therapeutics: Unpaid consultant
Zimmer Biomet: Paid consultant ($0)

**Matthew Grosso, MD, FAAOS**
Submitted on: 05/21/2024
AAOS: Board or committee member ($0) EBQV CPG/AUC Section Leader (Self)
American Association of Hip and Knee Surgeons: Board or committee member ($0) EBM Committee Member (Self)
Stryker: Paid consultant ($10,000) N/A(Self)

**Ryland Kagan, MD, FAAOS**
Submitted on: 05/22/2024
AAOS: Board or committee member ($0)
American Association of Hip and Knee Surgeons: Board or committee member ($0)
DJ Orthopaedics: Paid consultant ($0)
KCI: Research support ($0)

**Erinne Kennedy, DMD, MPH, MMSc**
Submitted on: 09/16/2024
This individual reported nothing to disclose.

**Paul Manner, MD, FAAOS**
Submitted on: 03/28/2024
Clinical Orthopaedics and Related Research: Editorial or governing board ($60,000) Senior Editor (Self)

**Lauren Patton, DDS**
Submitted on: 09/13/2024
This individual reported nothing to disclose.

**Jessica Seidelman, MD,**
Submitted on: 05/28/2024
3M: Employee ($30,000) Legal Consultant (Self)
Infectious Disease Society of America: Board or committee member ($0) n/a(Self)
Society of Healthcare and Epidemiology of America: Board or committee member ($0) n/a(Self)
Wolters Kluwer Health - Lippincott Williams & Wilkins: Publishing royalties, financial or material support ($1,500)
UptoDate(Self)

**Mark Spangehl, MD, FAAOS**
Submitted on: 05/23/2024
Arthroplasty Today: Editorial or governing board ($0)
DePuy, A Johnson & Johnson Company: Research support ($0) No personal support. Receive institutional research support (Self)
Journal of Arthroplasty: Editorial or governing board ($0)
Sonoran Biosciences: Stock or stock Options Number of Shares: 0
Stryker: Research support ($0) No personal support. Recieve institutional research support.

**Kenneth Urish, MD, PhD, FAAOS**
Submitted on: 04/30/2024
AAOS: Board or committee member ($0)
Adaptive Phage Therapeutics: Paid consultant ($0)
ASTM: Board or committee member ($0)
BiomX: Paid consultant ($0)
MSIS: Board or committee member ($0)
Osteal: Stock or stock Options Number of Shares: 0
Peptilogics: IP royalties ($0)
Peptilogics: Paid consultant ($0)
Peptilogics: Stock or stock Options Number of Shares: 0
Peptilogics: Research support ($0)
Smith & Nephew: Paid consultant ($0)
Smith & Nephew: Research support ($0)

## APPENDIX C. REFERENCES


1. Fitch K, Bernstein SJ, Aguilar MD et al. The RAND/UCLA Appropriateness Method User's Manual. Santa Monica, CA: RAND Corporation; 2001.
2. Shichman, I, Roof, M, Askew, N, Nherera, L, Rozell, JC, Seyler, TM, Schwarzkopf, R. Projections and Epidemiology of Primary Hip and Knee Arthroplasty in Medicare Patients to 2040-2060. JBJS Open Access. 2023;8:e22.00112. doi: 10.2106/JBJS.OA.22.00112
3. American Academy of Orthopaedic Surgeons/American Association of Hip and Knee Surgeons Prevention of Orthopaedic Implant Infection in Patients Undergoing Dental Procedures Evidence-Based Clinical Practice Guidelines. www.aaos.org/dentalppxcpg Published 11/18/2024 - Approved by the American Association of Hip and Knee Surgeons on 11/07/2024

## ENDORSEMENTS

MUSCULOSKELETAL INFECTION SOCIETY

June 27, 2025

Kaitlyn S. Sevarino, MBA, CAE
Director
Department of Clinical Quality and Value
American Academy of Orthopaedic Surgeons
9400 West Higgins Road Rosemont, IL 60018

Dear Ms. Sevarino,

The Musculoskeletal Infection Society has voted to endorse the AAOS Appropriate Use Criteria for the Prevention of Orthopaedic Implant Infection in Patients Undergoing Dental Procedures. This endorsement implies permission for the AAOS to officially list our organization as an endorser of this clinical practice guideline and reprint our logo in the introductory section of the clinical practice guideline review document.

Sincerely,

Andy Miller, MD
2025 President