AAOS Clinical Practice Guideline Summary Prevention of Total Hip and Knee Arthroplasty Periprosthetic Joint Infection in Patients Undergoing Dental Procedures

Charles P. Hannon, MD, MBA
Matthew J. Grosso, MD
Yale A. Fillingham, MD
Lauren L. Patton, DDS
Prevention of Total Hip and Knee Arthroplasty Periprosthetic Joint Infection in Patients Undergoing Dental Procedures Work Group
Non-Voting Oversight Chair
Staff of the American Academy of Orthopaedic Surgeons
Former AAOS Staff

ABSTRACT

The *Prevention of Total Hip and Knee Arthroplasty Periprosthetic Joint Infection in Patients Undergoing Dental Procedures Evidence-Based Clinical Practice Guideline* is based on a systematic review of published studies examining the influence of dental care and procedures on outcomes after total joint arthroplasty (TJA) as well as strategies to mitigate potential risks associated with dental care and procedures in patients with a TJA. The scope of this guideline includes the role of dental screening, antibiotic prophylaxis, use of antimicrobial mouth rinses, and timing of dental procedures before and after TJA. The population was limited to patients with total hip arthroplasty (THA) or total knee arthroplasty because of a paucity of data on patients with other orthopaedic implants. Based on the best current available evidence, this guideline contains five options to assist all qualified clinicians, including orthopaedic surgeons and dental providers, considering the prevention of total hip arthroplasty and total knee arthroplasty periprosthetic joint infections in patients undergoing dental procedures. It is also intended to serve as an information resource for professional healthcare practitioners and developers of practice guidelines and recommendations. In addition to providing pragmatic practice recommendations, this guideline also highlights gaps in literature and informs areas for future research and quality measure development.

Overview and Rationale

The American Academy of Orthopaedic Surgeons (AAOS) and the American Association of Hip and Knee Surgeons, with input from representatives from the Infectious Disease Society of America, the Musculoskeletal Infection Society, and the American Dental Association (ADA) recently published their clinical practice guideline (CPG), *Prevention of Total Hip and Knee Arthroplasty Periprosthetic Joint Infection in Patients Undergoing Dental*

From the Department of Orthopedic Surgery, Mayo Clinic, Rochester, MN (Hannon), the Department of Orthopedic Surgery, University of Connecticut School of Medicine, Farmington, CT and the Quality and Research, Connecticut Joint Replacement Institute at Saint Francis, Hartford, CT (Grosso), the Thomas Jefferson University and the Rothman Orthopaedic Institute, Philadelphia, PA (Fillingham), the Division of Craniofacial and Surgical Care and is the Adams School of Dentistry General Practice Residency, The University of North Carolina of Chapel Hill Adams School of Dentistry, Chapel Hill, NC (Patton).

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Procedures.[1] This CPG was approved by both the AAOS and American Association of Hip and Knee Surgeons Board of Directors in November 2024 and has been endorsed by both the ADA Infectious Disease Society of America and Musculoskeletal Infection Society.

Total hip arthroplasty (THA) and total knee arthroplasty (TKA) are among the most commonly performed surgical procedures in the United States, with their prevalence continuing to rise annually.[2] Currently, approximately 500,000 THAs are performed each year, with projections indicating a 71% increase to 635,000 procedures by 2030.[3] TKA is expected to grow even more markedly, with an estimated 85% rise to 1.26 million procedures by the same year.[3] Despite advancements in surgical techniques and perioperative management, periprosthetic joint infections (PJIs) remain one of the most severe complications after THA and TKA, affecting approximately 1% to 2% of cases.[4] PJI can arise from various sources, including direct inoculation at the time of surgery or hematogenous spread. Notably, concerns have been raised regarding the potential role of dental procedures in PJI development, as manipulation of the oral cavity can induce transient bacteremia, theoretically increasing the risk of PJI after THA and TKA.[5,6]

The consequences of PJI extend well beyond the affected joint, markedly affecting overall patient health and well-being. PJI is associated with substantial morbidity and mortality and can severely impair function and quality of life.[7,8] In addition, the psychological burden is considerable, with up to 22% of patients experiencing anxiety and depression even after successful PJI eradication.[9] The financial implications are also profound, with the cost of managing THA and TKA PJIs in the United States projected to reach $1.85 billion by 2030.[10,11] Given these notable clinical and economic burdens, the prevention of PJI remains a primary focus in the care of patients undergoing TKA and THA.

In particular, concerns regarding transient bacteremia and its potential association with an increased risk of PJI have prompted an increased focus on preventive strategies related to dental procedures. These considerations include the optimal timing of dental procedures before and after total joint arthroplasty (TJA), the role of dental screening before TJA, the use of antibiotic prophylaxis in patients with a TJA undergoing dental procedures, and the application of antiseptics or antimicrobials during such procedures. However, these approaches remain controversial, with varying recommendations across organizations, healthcare providers, and health systems. In 2012, the AAOS, in collaboration with the ADA, published a CPG addressing this topic. This guideline has been one of the most viewed guidelines published by AAOS, demonstrating the interest and importance of this topic. Over the past decade, renewed interest in this topic has emerged, driven by the morbidity associated with PJI, ongoing debate regarding the efficacy of antibiotic prophylaxis, concerns over antibiotic stewardship, and the potential adverse effects of routine antibiotic use.

Therefore, the AAOS updated this CPG to aid clinicians managing patients who are scheduled to undergo TJA and those who have a TJA and are seeking dental care. The scope of this guideline limited the population to patients with THA or TKA implants because of a paucity of data on patients with other orthopaedic implants. Furthermore, the CPG represents a resource demonstrating areas that need additional investigation to

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This clinical practice guideline was approved by the American Academy of Orthopaedic Surgeons Board of Directors on November 18, 2024, and the American Association of Hip and Knee Surgeons on November 7, 2024.

The complete document, *Prevention of Total Hip and Knee Arthroplasty Periprosthetic Joint Infection in Patients Undergoing Dental Procedures,* includes all tables, and figures, and is available at www.aaos.org/dentalppxcpg.

provide improved evidence-based guidelines for the prevention of THA and TKA PJI in patients undergoing dental procedures.

In summary, the *Prevention of Total Hip and Knee Arthroplasty Periprosthetic Joint Infection in Patients Undergoing Dental Procedures* CPG involved reviewing 1,251 abstracts and 203 full-text articles to develop five options supported by eight research articles meeting stringent inclusion criteria. Each option is based on a systematic review of the research-related topic, which resulted in two options classified as limited and three options classified as consensus for patients scheduled to undergo TJA and those who have a TJA and are seeking dental care. The strength of an option also takes into account the quality, quantity, and trade-offs between benefits and harms of a treatment, magnitude of treatment effect, and whether there are data on critical outcomes. The strength as shown in Table 1 is assigned based on the quality of the supporting evidence. An option is defined as limited strength if there are only low-quality studies or a single moderate-quality study. An option is defined as consensus when there is no evidence or only conflicting evidence. The strength can also change with statements resulting in a limited or consensus strength following Evidence to Decision Framework upgrading and/or downgrading (ie, a moderate strength recommendation downgraded to limited strength). This led to the creation of two limited strength options: (1) routine antibiotic prophylaxis before dental procedures may not lower the risk of PJI in patients with THAs or TKAs and (2) dental screening before THA or TKA may not lower the risk of PJI after surgery. Consensus strength options were formulated on the use of oral topical antiseptic wash, on the decision to delay a THA or TKA after a dental procedure and to delay a dental procedure after THA or TKA.

Table 1. **Strength of Recommendations Descriptions**

Strength of Recommendation	Evidence of Quality	Statement Description	Strength Visual
Strong	High	Evidence from two or more "high" quality studies with consistent findings for recommending for or against the intervention. Or Rec is upgraded using the EtD framework	
Moderate	Moderate	Evidence from two or more "moderate" quality studies with consistent findings, or evidence from a single "high" quality study for recommending for or against the intervention. Or Rec is upgraded or downgraded from Limited or Strong using the EtD framework	
Limited	Low	Evidence from two or more "low" quality studies with consistent findings or evidence from a single "moderate" quality study recommending for or against the intervention. Or Rec is downgraded from Strong or Moderate using the EtD Framework	
Consensus	Very Low or Consensus	Evidence from one "low" quality study, no supporting evidence, or Rec is downgraded using the EtD framework. In the absence of sufficient evidence, the guideline work group is making a statement based on their clinical opinion	

Guideline Summary

The developed options are meant to assist treatment providers not only in making shared clinical decisions with their patients but also in describing to patients and their loved ones why a selected intervention represents the best course of treatment.

This CPG was a notable update to the previously published 2012 CPG, which had three recommendations, one which was limited supported by low-quality evidence and one that was inconclusive and one that was consensus. This updated 2024 CPG consisted of five options: two were limited options supported by low quality evidence and three were consensus statements.

Antibiotic prophylaxis in patients with a TKA or THA before a dental procedure is common practice in some settings. However, the routine use of a systemic prophylactic antibiotic before a dental procedure in patients with a THA or TKA was not recommended because it may not reduce the risk of subsequent PJIs. There were four low-quality studies, and all did not demonstrate a benefit to prophylactic antibiotic use. This is similar to the recommendation made in the 2012 CPG that stated that the practitioner might consider discontinuing the practice of routinely prescribing prophylactic antibiotics for patients with a THA or TKA. An important limitation of the evidence included in the 2024 CPG is that all four studies predominantly looked at primary TJA patients and not revision TJA patients. In addition, they did not stratify high-risk populations, such as those that are immunocompromised or with a history of a PJI in another joint. Therefore, antibiotic prophylaxis may still be beneficial in certain subsets of high-risk TJA patients. Future research is warranted on these populations who either have a revision or megaprostheses as well as patients with medical comorbidities that already place them at a heightened risk of PJI.

Many institutions and providers require dental screening before TKA or THA; however, this practice was not supported by the CPG. Based on four low-quality studies, a limited option was made that performing dental screenings in patients before THA or TKA may not reduce the subsequent risk of PJI. All four studies found that a preoperative dental evaluation was not associated with a change in the risk of PJI after THA or TKA. Although dental evaluation before THA or TKA may not be beneficial in reducing risk of PJI, it is important to encourage patients to maintain dental health before surgery. A formal preoperative evaluation by a dental provider may be beneficial in select cases such as if a patient discloses a history of poor dental hygiene, active dental pain or infection, medical comorbidities such as malnutrition, smoking, or immunosuppression that impose a risk of dental pathology, and when both the cost and feasibility of a dental evaluation are appropriate for that patient.

To prevent PJI in patients with a TKA or THA undergoing a dental procedure, oral topical antiseptic washes are occasionally used. However, there were no studies that specifically evaluated their effectiveness in THA or TKA patients. Indirect evidence suggests that chlorhexidine oral wash prophylaxis does not markedly reduce bacteremia levels after dental procedures, which is the proposed mechanism leading to PJI. Based on this indirect evidence, the workgroup reached a consensus recommendation that the routine use of an oral topical antiseptic wash before dental procedures is not necessary for patients with THA or TKA. There were no studies that specifically evaluated this population.

One of the most common questions from patients undergoing THA or TKA concerns the appropriate timing of dental procedures before and after surgery. However, no direct evidence currently addresses this issue. Consequently, the multidisciplinary workgroup developed two consensus recommendations regarding the optimal timing of dental procedures in relation to primary TKA and THA. These recommendations were formulated based on expert opinion from specialists in orthopaedic surgery, infectious disease, and dentistry. The workgroup concluded that the minimum interval before or after TKA or THA should depend on the type of dental procedure and its associated risk of transient bacteremia. Table 2 summarizes various dental procedures and the recommended minimum waiting periods before and after primary THA and TKA. In general, the workgroup recommends waiting at least 3 weeks after a surgical dental procedure before undergoing primary THA or TKA to minimize risk. However, minimally invasive visits, such as dental examinations, oral hygiene procedures, and many orthodontic procedures require waiting just 24 hours before undergoing TJA. In addition, a minimum waiting period of 3 months after primary THA or TKA is advised before undergoing most dental procedures.

In summary, this guideline summarizes the best recommendations and options regarding the prevention of THA and TKA PJI in patients undergoing dental procedures based on available evidence. These are simply options and should not be viewed as prescriptive for all patients. It is important that these options are

Table 2. Suggested Time Intervals Needed Between Dental Procedures and Total Joint Arthroplasty Surgery

Dental Procedure Group[a]	Considerations	Minimum Time before TJA[b]	Minimum Time after TJA[c]
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	Not considered invasive dental procedures No possibility of manipulation of gingiva	Same day	Same day
Oral hygiene procedures including dental cleaning, dental prophylaxis using a rubber cup and handpiece [without scaling] or periodontal probing (without SRP)	—	1 day	3 months
Orthodontic procedures including banding or debanding orthodontic fixes or removable appliances, archwire adjustment, orthodontic mini-implant removal, orthodontic separate placement	—	1 day	3 months
Other noninvasive 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)	Impressions may be taken digitally (no risk) or with intraoral impression material use in a tray (minimal risk)	1 day	3 months
Scaling and/or root planing (SRP) with manual (hand instruments) or ultrasonic scaler	—	1 week	3 months
Dental extractions including single, multiple, affected third molar	With or without bone graft or platelet-rich fibrin material for socket augmentation	3 weeks	3 months
Oral surgery (including dental implant surgery, periodontal surgery, cleft palate surgery, piezoelectric surgery, osteosynthesis plate removal)	—	3 weeks	3 months
Treatment of active dental infection	Antibiotics and oral surgery (eg, extraction) or endodontic treatment (eg, root canal therapy)	3 weeks after resolution of active infection	Same day

[a](Martins, 2024).
[b]Minimum time before TJA is based on dental procedure–induced bacteremia and related procedure healing time. Most transient bacteremia in healthy mouth resolves in several hours but studies indicate longest times for extractions and scaling procedures and 2 hours is the farthest time point assessed in most studies (Martins, 2023).
[c]Minimum time after TJA is based on joint healing required for stability before dental procedure–induced bacteremia.

considered in the context of the individual patient including the patient's demographics, medical comorbidities, social situation, and preferences. Many options were limited because of a lack of evidence, highlighting the importance of future research in many of these areas.

Recommendations

This Summary of Recommendations of the AAOS *Prevention of Total Hip and Knee Arthroplasty Periprosthetic Joint Infection in Patients Undergoing Dental Procedures Evidence-Based CPG* contains a list of evidence-based prognostic and treatment recommendations and options. Discussions of how each option was developed and the complete evidence report are contained in the full guideline at www.aaos.org/dentalppxcpg. Readers are urged to consult the full guideline for the comprehensive evaluation of available scientific studies. The options were established using methods of evidence-based medicine that rigorously control for bias, enhance transparency, and promote reproducibility. An exhaustive literature search was conducted resulting initially in over 203 papers for full review. The papers were then graded for quality and aligned with the work group's patients, interventions, and outcomes of concern. For CPG population, intervention, comparison, and outcome questions that returned no evidence from the systematic literature review, the work group used the established AAOS CPG methodology to generate three companion consensus options: (1) in patients with a THA or TKA, the use of an oral topical antiseptic wash is not necessary before a dental procedure; (2) the decision to delay a THA or TKA after a dental procedure is based on the risk of transient bacteremia, the occurrence of an invasive surgical procedure, or treatment of an active dental infection; and (3) the decision to delay dental procedures after THA or TKA is based on the risk of transient bacteremia, the occurrence of an invasive surgical procedure, or treatment of an active dental infection.

The summary of options is not intended to stand alone. Medical care should be based on evidence, a physician's expert judgment, and the patient's circumstances, values, preferences, and rights. A patient-centered discussion understanding an individual patient's values and preferences can inform appropriate decision making. Treatment decisions should be made after comprehensive individualized shared decision making discussion between the patient and physician.

A "Limited" option means that there is a lack of compelling evidence that has resulted in an unclear balance between benefits and potential harm. A "Consensus" option means that expert opinion supports the guideline recommendation although there is no available evidence that meets the inclusion criteria of the guideline's systematic review. Table 3 illustrates how to interpret the strength of these options within the context of shared decision making.

Options

Low-quality evidence, no evidence, or conflicting support evidence have resulted in the following statements for patient interventions to be listed as options for the specified condition. Future research may eventually cause these statements to be upgraded to strong or moderate recommendations for treatment.

Prophylactic Systemic Antibiotic Use Before Dental Procedure (Hip/Knee Patients)

Routine use of a systemic prophylactic antibiotic before a dental procedure in patients with a hip or knee arthroplasty may not reduce the risk of a subsequent periprosthetic joint infection.

Strength of recommendation: Limited.

Implication: Practitioners should feel little constraint in following a recommendation labeled as Limited, exercise clinical judgment, and be alert for emerging evidence that clarifies or helps to determine the balance between benefits and potential harm. Patient preference should have a substantial influencing role.

Table 3. Interpreting the Strength of a Recommendation or Option

Strength of Statement	Patient Counseling (Time)	Decision Aids	Impact of Future Research
Strong	Least	Least important, unless the evidence supports no difference between two alternative interventions	Not likely to change
Moderate	Less	Less important	Less likely to change
Limited	More	Important	Change possible/anticipated
Consensus	Most	Most important	Impact unknown

Dental Screening Before Hip or Knee Arthroplasty

Implementation of a dental screening in patients before a hip or knee arthroplasty may not reduce the risk of subsequent periprosthetic joint infection.

Strength of recommendation: Limited.

Implication: Practitioners should feel little constraint in following a recommendation labeled as Limited, exercise clinical judgment, and be alert for emerging evidence that clarifies or helps to determine the balance between benefits and potential harm. Patient preference should have a substantial influencing role.

Antiseptic/Antimicrobial Treatment

In the absence of reliable evidence, it is the opinion of the workgroup that the use of an oral topical antiseptic wash is not necessary before a dental procedure in patients with a hip or knee arthroplasty.

Strength of recommendation Consensus:

Implication: In the absence of reliable evidence, practitioners should remain alert to new information as emerging studies may change this recommendation. Practitioners should weigh this recommendation with their clinical expertise and be sensitive to patient preferences.

Delay Versus No Delay of Arthroplasty After a Dental Procedure

In the absence of reliable evidence, it is the opinion of the workgroup that the decision to delay a hip or knee arthroplasty surgery is based on the risk of transient bacteremia, the occurrence of an invasive surgical procedure, or treatment of an active dental infection.

Strength of recommendation Consensus:

Implication: In the absence of reliable evidence, practitioners should remain alert to new information as emerging studies may change this recommendation. Practitioners should weigh this recommendation with their clinical expertise and be sensitive to patient preferences.

Delay Versus No Delay of Dental Procedure After a Hip/Knee Arthroplasty

In the absence of reliable evidence, it is the opinion of the workgroup that the decision to delay a dental procedure after hip or knee arthroplasty surgery is based on the risk of transient bacteremia, the occurrence of an invasive surgical procedure, or treatment of an active dental infection.

Strength of recommendation Consensus:

Implication: In the absence of reliable evidence, practitioners should remain alert to new information as emerging studies may change this recommendation. Practitioners should weigh this recommendation with their clinical expertise and be sensitive to patient preferences (Supplemental Digital File, http://links.lww.com/JAAOS/B373).

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