



## White paper

## Postoperative prophylactic antibiotics in total joint arthroplasty

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## ABSTRACT

The Center for Disease Control and Prevention recently released their 2017 Guideline for the Prevention of Surgical Site Infection. One of their recommendations is the ordering of a single dose of preoperative prophylactic antibiotics with no subsequent postoperative dosing; this recommendation includes perioperative antibiotics for patients undergoing total joint arthroplasty. At this time, the American Association of Hip and Knee Surgeons (AAHKS) does not agree with this recommendation vis-a-vis total joint arthroplasty because it contradicts current international standards of care with limited evidence and study. AAHKS still recommends postoperative antibiotics and recommends further research. Both the Board of Counselors and Board of Specialty Societies of the American Academy of Orthopaedic Surgeons have endorsed this AAHKS recommendation through an advisory opinion; the American Academy of Orthopaedic Surgeons Board of Directors adopted that advisory opinion in June 2017. A 2017 Foundation for Arthroplasty Research and Education prospective, randomized study is being undertaken to provide level I evidence for or against single-dose vs 24-hour antibiotic prophylaxis in primary total knee arthroplasty.

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## Introduction

The efficacy of prophylactic antibiotics for joint arthroplasty has been accepted for over 40 years dating back to the early development of total hip arthroplasty (THA). An over 5% rate of infection without standardized prophylactic antibiotics was reported in that period [1]. It was reduced to closer to 1% with evidence for 1 preoperative dose followed by 2 additional postoperative doses being as effective as prolonged prophylaxis [2]. Current reported infection rates are based on a 24-hour course of antibiotics. Current infection rates are low, with 1 prospective study of over 9000 patients reporting periprosthetic infection rates as low as 0.30% for THA and 1.1% for total knee arthroplasty (TKA); in that study, antibiotics were administered preoperatively as well for 24 hours after

surgery [3]. We do not know of evidence that a 24-hour course (compared with a single preoperative dose) leads to a higher incidence of associated complications such as antibiotic-related diarrhea or antibiotic resistance.

Prosthetic joint infections, although rare, represent a serious complication as they pose potentially multiple further surgeries, possible failure to eradicate infection and life-long disability, a huge financial burden, and an indirect burden related to psychosocial impact. Treatment of prosthetic joint infections is complex and requires a combined surgical and medical approach. Patients may also be subjected to prolonged courses of antimicrobial therapy. Therefore, all efforts should be directed toward maximizing the prophylactic measures in the perioperative and postoperative phases in order to prevent the occurrence of surgical site infections. Current use of 1 dose preoperatively and 24 hours of coverage postoperatively is the most recent recommendation from the International Consensus Meeting on Periprosthetic Infections in 2013 [4].

## Problem statement

The Centers for Disease Control and Prevention (CDC) recently released their 2017 Guideline for the Prevention of Surgical Site

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Infection, which recommends against the use of postoperative prophylactic antibiotics—including patients undergoing total joint arthroplasty (TJA) [5]. The recent CDC recommendation for only 1 preoperative dose was part of a larger body of recommendations that were open to comment in draft form. At this time, the American Association of Hip and Knee Surgeons (AAHKS) does not agree with this recommendation vis-a-vis TJA in that it contradicts current international standards of care [4] with limited evidence and study.

There are several reasons for our concerns. The cited literature [6–11] is heterogeneous in terms of actual procedures, antibiotic regimens, and antibiotics used. It includes older articles and higher than expected infection rates. This is of particular concern given current ideal primary TJA infection rates that run less than 1%; the citations used appear to be underpowered to discern the true safety of withholding the postoperative antibiotics.

A recent TJA-focused meta-analysis of this specific topic could only find 4 appropriate randomized, controlled trials, 2 of which overlap with the citations given by the CDC [12]. Again, the aggregate infection rate is higher than ones reported as ideal and expected in the literature. The authors showed nonsuperiority for the postoperative antibiotics. Their conclusion, however, carried significant caveats. The available literature was considered flawed: “both reviewers rated down the quality of evidence from the 4 trials from high to very low based on (a) unclear risk of bias, (b) imprecision due to few outcome events, and (c) inconsistency due to residual unexplained heterogeneity.” The very low quality of evidence rating was based on the widely accepted Grade methodology. The authors recommended that more rigorous multicenter trials were needed.

As an organization we agree with that recommendation. The consequences of a TJA infection are devastating to the patient, hard to eradicate, and costs society hundreds of thousands of dollars per case.

### Proposed solution

It is our recommendation that implementation of this Centers for Medicare and Medicaid Services recommendation, which recommends against the use of postoperative prophylactic antibiotics, be delayed. We further recommend that the CDC join AAHKS in calling for funding to more rigorously answer this question.

Moving forward to that end, the 2017 Foundation for Arthroplasty Research and Education grant recipient, Thorsten M. Seyler, MD, PhD, of Duke University, is conducting a prospective, randomized study, “Perioperative Antibiotic Prophylaxis in Patients Undergoing Elective Total Knee Arthroplasty.” This study aims at providing level I evidence for or against single-dose vs 24-hour antibiotic prophylaxis in primary TKA and is based on the Centers for Medicare and Medicaid Services guideline for perioperative antibiotics, which is based on limited evidence.

At the 2017 American Academy of Orthopaedic Surgeons (AAOS) National Orthopaedic Leadership conference, AAHKS introduced an advisory opinion expressing the above concerns and recommendations. It was passed by both the Board of Counselors and the Board of Specialty Societies; the AAOS Board adopted the advisory opinion in June 2017.

### Future direction and long-term focus

The literature relative to this topic is sparse, of questionable strength, and based on study populations reporting higher than

contemporary rates of infection. Surrogate data do not cover the gaps. An evidence-based recommendation for duration of prophylactic antibiotics to maintain our safe and acceptable current rate of periprosthetic infection, and at the same time continuing antibiotic stewardship, is appropriate and warranted. It needs, however, to be supported with level I data with adequate power to adjudge the safety of reduced dosing, which requires thousands of patients (given the relatively low current rates of this complication).

Future studies should include such level I studies in THA and TKA. It is possible that a higher level of evidence will support the contribution of pharmacological antibiotic prophylaxis in THA and TKA with either 1 dose or up to 24 hours. It is also possible that a large enough study will allow the possibility of stratification based on relevant comorbidities. Confirmation and surveillance can be augmented over many hundreds of thousands of patients if the mode of antibiotic use becomes an ongoing data point in the American Joint Replacement Registry.

### Recommendations

At this time, the AAHKS recommends postoperative antibiotics be continued for 24 hours and supports further research to determine whether shorter duration antibiotic treatment is safe and effective. Both the Board of Counselors and Board of Specialty Societies of the AAOS have endorsed this AAHKS recommendation through an advisory opinion; the AAOS Board of Directors adopted that advisory opinion in June 2017.

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