



# Cost-effectiveness of antibiotic prophylaxis for dental patients with prosthetic joints

## Comparisons of antibiotic regimens for patients with total hip arthroplasty

Daniel D. Skaar, DDS, MS, MBA;  
Taehwan Park, PhD; Marc F. Swiontkowski, MD;  
Karen M. Kuntz, ScD

Substantial annual increases in the number of primary and revision total joint arthroplasties have been projected in the United States.<sup>1</sup> Given an aging US population, the demand for total joint arthroplasties, primarily knee and hip, is expected to rise from approximately 1 million to 4 million yearly by 2030.<sup>1</sup> Annual primary total hip arthroplasty (THA) and hip revision cases are expected to approach 600,000 and 100,000, respectively, by 2030. Prosthetic joint infection (PJI) is a common cause of revision hip arthroplasty.<sup>2</sup> Medical costs for revisions have been estimated to be 4.8 times higher than primary joint arthroplasties.<sup>3</sup> The total annual hospital costs for PJIs are expected to exceed \$1.6 billion by 2020, with average hospital costs for hip PJIs estimated to exceed knee PJIs.<sup>4</sup> Given the projections for primary and revision joint arthroplasties, the clinical and economic burden of PJIs will continue to be a major health care issue.

Consensus concerning the need for antibiotic prophylaxis for dental patients with prosthetic joints to prevent PJI remains elusive.<sup>5</sup> The American Academy of Orthopaedic Surgeons (AAOS) and the American Dental Association (ADA) continue to address the issue. In 1997, AAOS and ADA published an advisory statement concluding that antibiotic prophylaxis was not indicated routinely for most dental patients with total joint replacements. However, antibiotic regimens were suggested for patients with certain medical conditions who presumably had an increased risk of experiencing hematogenous total joint infection and who were undergoing dental procedures with a higher possible incidence of bacteremia.<sup>6</sup>

The AAOS and ADA published an updated advisory statement with minor modifications in 2003.<sup>7</sup> These

### ABSTRACT

**Background.** Clinician uncertainty concerning the need for antibiotic prophylaxis to prevent prosthetic joint infection (PJI) after undergoing dental procedures persists. Improved understanding of the potential clinical and economic risks and benefits of antibiotic prophylaxis will help inform the debate and facilitate the continuing evolution of clinical management guidelines for dental patients with prosthetic joints.

**Methods.** The authors developed a Markov decision model to compare the lifetime cost-effectiveness of alternative antibiotic prophylaxis strategies for dental patients aged 65 years who had undergone total hip arthroplasty (THA). On the basis of the authors' interpretation of previous recommendations from the American Dental Association and American Academy of Orthopaedic Surgeons, they compared the following strategies: no prophylaxis, prophylaxis for the first 2 years after arthroplasty, and lifetime prophylaxis.

**Results.** A strategy of foregoing antibiotic prophylaxis before dental visits was cost-effective and resulted in lower lifetime accumulated costs (\$11,909) and higher accumulated quality-adjusted life years (QALYs) (12.375) when compared with alternative prophylaxis strategies.

**Conclusions.** The results of Markov decision modeling indicated that a no-antibiotic prophylaxis strategy was cost-effective for dental patients who had undergone THA. These results support the findings of case-control studies and the conclusions of an American Dental Association Council on Scientific Affairs report that questioned general recommendations for antibiotic prophylaxis before dental procedures.

**Practical Implications.** The results of cost-effectiveness decision modeling support the contention that routine antibiotic prophylaxis for dental patients with total joint arthroplasty should be reconsidered.

**Key Words.** Total hip arthroplasty; prosthetic joint infection; antibiotic prophylaxis; dental procedures.

JADA 2015;146(11):830-839

<http://dx.doi.org/10.1016/j.adaj.2015.05.014>

guidelines were intended to supplement practitioners' clinical judgment and continued to advise antibiotic prophylaxis for a limited number of patients, including those who had undergone a total joint arthroplasty within 2 years, those with a previous PJI, and those who had undergone a total joint arthroplasty more than 2 years previously and had certain medical conditions such as immunosuppression. The guidelines suggested using antibiotic regimens and stratified dental procedures on the basis of patients' presumed risk of experiencing bacteremia. For the first time, the lack of cost-effectiveness data justifying routine antibiotic prophylaxis was mentioned.

In 2009, AAOS independently promulgated an information statement that was to serve as an educational tool for practitioners.<sup>8</sup> It was a significant departure from the previous collaborative statements. On the basis of the morbidity rates and the cost of treating PJIs, the statement recommended that clinicians consider prescribing antibiotic prophylaxis for all patients who had a total joint arthroplasty and who would be undergoing any invasive procedure that potentially could cause bacteremia, regardless of the time since the patient's joint implantation. This AAOS statement did not explicitly identify for dentistry the procedures requiring prophylaxis and associated antibiotic regimens. The opinion statement created uncertainty for oral health care providers as it could be interpreted to suggest for the first time the need for lifetime antibiotic prophylaxis for all dental patients with total joint arthroplasties undergoing any invasive procedure.<sup>9,10</sup>

The confusion resulting from the 2009 information statement<sup>8</sup> was an impetus for a collaborative, multidisciplinary effort to develop a new clinical practice guideline for dental patients with orthopedic implants.<sup>9</sup> The guideline, released in 2012, again was codeveloped by AAOS and ADA using a formal, evidence-based process.<sup>11</sup> AAOS and ADA intended this guideline to be an educational tool that would provide support for practitioners' clinical judgment. The systematic review process limited the number of published studies considered and restricted the scope and strength of the committee recommendations. For example, the first recommendation was a limited recommendation that practitioners might consider discontinuing the practice of routinely prescribing prophylactic antibiotics for patients with hip and knee prosthetic joint implants who would be undergoing dental procedures. Given the quality of the supporting evidence for this recommendation, the guideline's authors suggested that practitioners should be cautious in deciding whether to follow it, exercise clinical judgment, and consider patient preferences. The guideline's authors did not address important issues for clinicians such as providing treatment protocols, distinguishing patients with different levels of risk of experiencing PJI, or specifically addressing the issue

of prescribing antibiotics and the risks associated with them. Furthermore, the guideline's authors did not address the costs and clinical outcomes of different antibiotic prophylaxis strategies.

In response to continuing uncertainty about prescribing antibiotic prophylaxis, the ADA Council on Scientific Affairs published an evidence-based clinical practice guideline in 2015.<sup>12</sup> The expert panel updated the literature review from the 2012 guideline<sup>11</sup> and used ADA methods for clinical recommendations to provide more clear guidance related to prescribing antibiotic prophylaxis. The panel found that the evidence did not demonstrate an association between dental procedures and PJI or any effectiveness for routine antibiotic prophylaxis. In the absence of significant medical risks, antibiotic prophylaxis to prevent PJI was not generally recommended by the panel.<sup>12</sup>

Oral health care providers recognize that the traditional practice of prescribing antibiotic prophylaxis for patients with joint replacements is undergoing reevaluation. Improved understanding of the potential clinical and economic risks and benefits of antibiotic prophylaxis to prevent PJI will facilitate the continuing evolution of clinical management guidelines for dental patients with joint prostheses. Given the substantial morbidity and high estimated costs of treating PJI in patients with hip replacements, we focused on using the methods of decision analysis to better inform the debate concerning the need for and the cost-effectiveness of antibiotic prophylaxis before dental visits for patients with THA.<sup>4</sup> In addition, we aimed to identify the ranges of assumptions (for example, risk of experiencing PJI associated with dental visits and the effectiveness of prophylaxis at reducing the PJI risk) that may favor one prophylaxis strategy over another.

## METHODS

**Model design.** We used cost-effectiveness decision modeling to evaluate antibiotic prophylaxis strategies for preventing PJI after dental visits.<sup>13</sup> We compared expenditures and costs and related health outcomes (associated with PJIs) for alternative antibiotic prophylaxis strategies. We developed a Markov decision model to project lifetime harms, benefits, and economic outcomes for a hypothetical cohort of 65-year-old patients

---

**ABBREVIATION KEY.** AAOS: American Academy of Orthopaedic Surgeons. ADA: American Dental Association. AE: Adverse event. CDI: *Clostridium difficile* infection. DRG: Diagnosis-related group. HCPCS: Healthcare Common Procedure Code System. HCUP: Healthcare Cost and Utilization Project. ICER: Incremental cost-effectiveness ratio. MEPS: Medical Expenditure Panel Survey. NA: Not applicable. NIS: National Inpatient Sample. PJI: Prosthetic joint infection. QALY: Quality-adjusted life years. THA: Total hip arthroplasty.

Download English Version:

<https://daneshyari.com/en/article/3136485>

Download Persian Version:

<https://daneshyari.com/article/3136485>

[Daneshyari.com](https://daneshyari.com)