

Recommendations for Antibiotics in Patients with Joint Prosthesis Are Irresponsible and Indefensible

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New quality and safety agendas have emerged in health care at the beginning of the 21st century. Although the goals of these agendas are lofty and broad, they include providing safe, cost-effective care, eliminating waste and providing treatments that prolong and improve quality of life. Our job, as stewards of antimicrobials, is closely intertwined with these agendas. Antibiotics are life saving and cost effective in a variety of settings, but are often wasted, used for non-infectious diseases or given to patients for an ill-defined benefit without due consideration of risks. Thus, we are keenly interested in guidelines and statements on the use of antibiotics and the clinical evidence on which they are based.

The American Academy of Orthopaedic Surgeons (AAOS) recently issued an “information statement” on antibiotic prophylaxis for patients with joint prostheses, which was prepared by its Guidelines and Technology Oversight Committee.¹ Bacteremia-induced prosthetic joint infections are extremely rare events (if they occur at all), and it is, therefore, implausible that any intervention to reduce bacteremia will be shown to be effective (let alone cost effective or safe). In this article, we point out why the AAOS statement is both irresponsible and indefensible, that it was developed in direct contravention of the AAOS’s own guiding principles and how it will do little to help the individual patient.

Resistance to Antibiotics

The health care community is currently experiencing an unprecedented threat from antimicrobial-resistant organisms for which treatment options are limited. In the 1990s, we were introduced to health care-acquired methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *Enterococcus* and drug-resistant *Pseudomonas aeruginosa* in hospitals and a global threat of penicillin-resistant *Streptococcus pneumoniae*. We are now seeing additional drug-resistant organisms circulating outside health care institutions, such as community-acquired MRSA (a dramatically virulent organism), coliforms producing extended-spectrum β -lactamases (enzymes that render them resistant to all penicillins and cephalosporins) and a new aggressive strain of *Clostridium difficile*. In light of this threat coupled with a drying antibiotic pipeline, infectious disease experts have started a new campaign—“bad bugs, no drugs”—in this war against disease-causing antibiotic-resistant bacteria.²

Resistance develops as an evolutionary response to the presence of antibiotics. Darwinian principles argue (and epidemiologic evidence has repeatedly shown) that increasing use of antibiotics is associated with the emergence and spread of antimicrobial-resistant organisms in the environment and in patients. The selection pressure of an additional million patients (the annual increase in the number

of joint-replacement patients in the United States) unnecessarily consuming 2 g of amoxicillin twice a year—that is 4 tonnes annually—is unneeded. Although appropriate use of antibiotics (i.e., use that unequivocally helps people live longer or better) also contributes to the development of resistance, the war against antimicrobial resistance is fought on the antibiotic overuse and misuse fronts.

The AAOS information statement fails to provide the surgeon or dentist with the information required to make a decision regarding antibiotic prophylaxis and also makes claims that are in direct conflict with available scientific evidence, are misleading or both.

Bacteremia from Hematogenous Seeding

The AAOS statement points out that a variety of sources can cause hematogenous seeding of bacteria into joint implants and references a paper over 30 years old that reported 3 cases of prosthetic joint infection (PJI) following dental manipulation, only 1 of which was even plausibly related to a dental procedure given our current understanding of oral microbiology.³ Indeed, the organisms that are most responsible for both early and late PJI are *Staphylococcus aureus* and coagulase-negative staphylococci, both uncommonly found in the oral cavity or outside their usual skin habitat.

The mythology surrounding the utility of antibiotic prophylaxis before dental procedures undoubtedly combines the aura surrounding the purported benefit of antibiotics preventing infective endocarditis with the recognition that surgical prophylaxis before joint surgery reduced the incidence of early PJI.⁴ However, a recent review of all large series of late PJI found that only 0.05%–0.2% of late PJIs are associated with antecedent dental procedures.⁵ The AAOS statement makes no mention of procedure-induced bacteremia from non-dental procedures because the evidence supporting that notion is even more tenuous.

Choice of Antimicrobials for Prophylaxis

On initial review, the AAOS statement's recommendations for antibiotic regimens seem thoughtful, being appropriated from *The Medical Letter*, a respected source of unbiased medical information. However, *The Medical Letter* recommendations are merely routine recommendations for surgical prophylaxis that all surgeons and interventionalists should incorporate. Their purpose is to prevent a "surgical site infection," *not infection at another location*. The only recommendation that the AAOS statement makes above and beyond what should be "routine" surgical management is antibiotic prophylaxis before dental procedures.

Safety of Antimicrobial Prophylaxis

From the AAOS statement and a subsequent interview with one of the authors, it is clear that the authors' estimation of risk of dental procedures exceeds that of antibiotic prophylaxis. The scientific literature does not support this contention. A decision analysis, considering the balance of costs of treatment and of PJI, concluded that penicillin prophylaxis was not only more costly than no prophylaxis but also more dangerous.⁶ An updated analysis, including risks of *C. difficile* and antimicrobial resistance would undoubtedly reach the same conclusion.

Overuse of Antimicrobials

If we use the data available, there are—at most—approximately 30 late PJIs following every million dental visits. As identified above, it is unclear whether any of these infections is *caused* by the dental visit, and evidence that prophylaxis might prevent these infections is even less clear. Nevertheless, the question begging to be asked is: is it appropriate to recommend up to 2 tonnes of antibiotics every 6–12 months for an unproved benefit? As "stewards" of antibiotics—whose job it is to ensure that patients get the right antibiotics when they need them—we would answer "no" unequivocally.

Surely, dentists should expect more direction than an "opinion" that ignores current scientific evidence, and we call on dental associations to make a clear, unambiguous statement that antibiotic prophylaxis for prosthetic joints is a dangerous practice. Dentists will continue to prescribe or recommend antibiotics before dental procedures in patients with a prosthetic despite (or because of) the AAOS information statement. But they should do so with the understanding that they may be conferring more harm than benefit to their patients. ♦

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References

1. American Academy of Orthopaedic Surgeons. *Information statement: antibiotic prophylaxis for bacteremia in patients with joint replacements*. February 2009. Available: www.aaos.org/about/papers/advismt/1033.asp (accessed 2009 July 14).
2. Infectious Diseases Society of America. *Bad bugs, no drugs: as antibiotic discovery stagnates... a public health crisis brews*. 2004. Available: www.idsociety.org/badbugsnodrugs.html (accessed 2009 July 14).

3. Rubin R, Salvati EA, Lewis R. Infected total hip replacement after dental procedures. *Oral Surg Oral Med Oral Pathol.* 1976;41(1):18-23.
4. Seymour RA, Whitworth JM, Martin M. Antibiotic prophylaxis for patients with joint prostheses—still a dilemma for dental practitioners. *Br Dent J.* 2003;194(12):649-53.
5. Uckay I, Pittet D, Bernard L, Lew D, Perrier A, Peter R. Antibiotic prophylaxis before invasive dental procedures in patients with arthroplasties of the hip and knee. *J Bone Joint Surg Br.* 2008;90(7):833-8.
6. Jacobson JJ, Schweitzer SO, Kowalski CJ. Chemoprophylaxis of prosthetic joint patients during dental treatment: a decision-utility analysis. *Oral Surg Oral Med Oral Pathol.* 1991;72(2):167-77.

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Glick M. Clinical guidelines: to follow or folly? You decide. *J Am Dent Assoc.* 2009;140(7):824-6. Available: <http://jada.ada.org/cgi/content/full/140/7/824>.

Napeñas JJ, Lockhart PB, Epstein JB. Comment on the 2009 American Academy of Orthopaedic Surgeons' information statement on antibiotic prophylaxis for bacteremia in patients with joint replacements. *J Can Dent Assoc.* 2009; 75(6):447-9. Available: www.cda-adc.ca/jcda/vol-75/issue-6/447.html.