

**TITLE: Antibiotic Prophylaxis in Patients with Orthopedic Implants Undergoing Dental Procedures: A Review of Clinical Effectiveness, Safety, and Guidelines**

**DATE:** 17 February 2016

**CONTEXT AND POLICY ISSUES**

Oral antibiotics are often used prophylactically in patients undergoing invasive dental procedures, with the aim of preventing oral bacteria from entering the bloodstream, and causing serious complications due to infection among susceptible patients.<sup>1,2</sup>

Patients with prosthetic joints have historically been prescribed antibiotics prior to dental procedures.<sup>3</sup> A 2014 survey found that 71% of Canadian dentists and 77% of orthopedic surgeons routinely prescribed prophylactic antibiotics for patients with total joint arthroplasty prior to dental procedures.<sup>3</sup> While this practice has been commonplace, it has been carried out with little supporting clinical evidence.<sup>1,2,4</sup> Individuals who have undergone total joint replacement are considered to be at a generally higher risk of developing infection.<sup>1</sup> Given the frequency with which dental procedures are performed, the potential for antimicrobial resistance, and potential cost, clinical effectiveness should be demonstrated.<sup>1</sup>

The present review was conducted as an update to a 2013 CADTH Rapid Response report<sup>4</sup> on the same topic. The 2013 report identified one guideline that recommended practitioners could consider ceasing the routine use of antibiotics prior to dental procedures for patients with prosthetic joints. This review will seek to identify any recently published clinical evidence for the prophylactic use of oral antibiotics during dental procedures in patients with orthopedic implants and to review current evidence-based guideline recommendations for this patient group.

**RESEARCH QUESTIONS**

1. What is the clinical effectiveness and safety of antibiotic prophylaxis in patients with orthopedic implants undergoing dental procedures?
2. What are the evidence-based guidelines associated with the use of antibiotic prophylaxis in patients with orthopedic implants undergoing dental procedures?

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## KEY FINDINGS

The results of this and the previous CADTH review have found the evidence for antibiotic prophylaxis during dental procedures for patients with orthopedic prostheses to be limited. The identified guideline recommends against the routine use of prophylactic antibiotics during dental procedures for patients with orthopedic prostheses.

## METHODS

### Literature Search Methods

A limited literature search was conducted on key resources including PubMed, The Cochrane Library, University of York Centre for Reviews and Dissemination (CRD) databases, ECRI, Canadian and major international health technology agencies, as well as a focused Internet search. No filters were applied to limit the retrieval by study type. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2013 and January 20, 2016.

Rapid Response reports are organized so that the evidence for each research question is presented separately.

### Selection Criteria and Methods

One reviewer screened citations and selected studies. In the first level of screening, titles and abstracts were reviewed and potentially relevant articles were retrieved and assessed for inclusion. The final selection of full-text articles was based on the inclusion criteria presented in Table 1.

<b>Population</b>	Adult patients with orthopedic implants undergoing dental procedures
<b>Intervention</b>	Antibiotic prophylaxis
<b>Comparator</b>	No antibiotic prophylaxis
<b>Outcomes</b>	Clinical effectiveness Safety (e.g., patient benefits and harms, antibiotic resistance) Guidelines
<b>Study Designs</b>	Health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, evidence-based guidelines

### Exclusion Criteria

Articles were excluded if they did not meet the selection criteria outlined in Table 1, they were duplicate publications, or were published prior to 2013.

### Critical Appraisal of Individual Studies

Guidelines were assessed with the AGREE II instrument.<sup>5</sup> Summary scores were not calculated for the included studies; rather, a review of the strengths and limitations of each included study were described narratively.

## SUMMARY OF EVIDENCE

### Quantity of Research Available

A total of 79 citations were identified in the literature search. Following screening of titles and abstracts, 68 citations were excluded and 11 potentially relevant reports from the electronic search were retrieved for full-text review. Six potentially relevant publications were retrieved from the grey literature search. Of these potentially relevant articles, 16 publications were excluded for various reasons, while one publication met the inclusion criteria and was included in this report. Appendix 1 describes the PRISMA flowchart of the study selection.

Additional references of potential interest are provided in Appendix 4.

### Summary of Study Characteristics

One evidence-based guideline, prepared by the American Dental Association (ADA), was identified.<sup>2</sup> The guideline is intended to guide the use of prophylactic antibiotics prior to dental procedures for patients with prosthetic joints. The current ADA guideline is an update to the 2012 joint guidelines produced by the ADA and the American Association of Orthopedic Surgeons. The 2012 guideline was reviewed in the previously published CADTH report.<sup>4</sup>

### Summary of Critical Appraisal

The guideline development group used the same search strategy that was developed for the 2012 guideline which involved searching multiple databases as well as manually screening bibliographies for additional relevant articles. The systematic literature search was updated and the new results were screened in duplicate. Additionally, the group reviewed the excluded studies from the original guideline development process. A list of excluded studies, and the reason for exclusion, was provided; however, the full inclusion and exclusion criteria that were used by the guideline panel were not clearly outlined in the guideline document. The case-control studies that were identified through the updated literature search were critically appraised using the Critical Appraisal Skills Programme case-control critical appraisal tool. A full description of the appraisal was provided in an appendix. The authors clearly outlined the level of certainty categories and methods used to determine the strength of the clinical recommendation. It did not appear that patients were consulted regarding their input or preferences.

The guideline panel determined that the newly identified case-control studies provided sufficient evidence, for their purposes, to change the wording of the original guideline recommendation. The guideline group's critical appraisal of the included studies indicated they had confidence in the results of two of the four studies but also indicated that the results of these studies fit with evidence identified as part of the 2012 guideline development process suggesting that there is no association between dental procedures and prosthetic joint infection.

### Summary of Findings

*What is the clinical effectiveness and safety of antibiotic prophylaxis in patients with orthopedic implants undergoing dental procedures?*

No relevant literature was identified regarding the clinical effectiveness and safety of antibiotic prophylaxis in patients with orthopedic implants undergoing dental procedures.

*What are the evidence-based guidelines associated with the use of antibiotic prophylaxis in patients with orthopedic implants undergoing dental procedures?*

The identified guideline made one recommendation regarding antibiotic prophylaxis prior to dental procedures for patients with prosthetic joints.<sup>2</sup> Unlike the 2012 guideline which recommended that “practitioners might consider discontinuing the practice of routinely prescribing prophylactic antibiotics for patients with hip and knee prosthetic joint implants undergoing dental procedures”,<sup>4</sup> the 2014 guideline states that “In general, for patients with prosthetic joint implants, prophylactic antibiotics are not recommended prior to dental procedures to prevent prosthetic joint infection.” (page 15)<sup>2</sup> The guideline group indicated that the current recommendation was made based on moderate evidence against the standard practice of antibiotic prophylaxis suggesting dental procedures are not linked to infections in prosthetic joints and the potential benefit of prophylactic antibiotics for these patients may not outweigh the potential harms. The guideline group suggests that individual patients’ preferences and clinical circumstances should also be taken into consideration when deciding whether to provide a patient with prophylactic antibiotics.

### **Limitations**

No new literature was identified regarding the clinical effectiveness and safety of antibiotic prophylaxis in patients with orthopedic implants undergoing dental procedures. One newly published guideline was identified and the recommendation differed slightly from those published previously, in part, by the same group. While the previous guideline indicated practitioners could consider ceasing antibiotic prophylaxis prior to dental procedures, the current guideline states that prophylactic antibiotics are not recommended. No evidence-based Canadian guidelines were identified; however, a number of Canadian clinical practice guidelines and position statements have been provided in Appendix 4.

### **CONCLUSIONS AND IMPLICATIONS FOR DECISION OR POLICY MAKING**

Infections of orthopedic prostheses are rare events and, as such, it is difficult to determine if dental procedures are associated with their incidence. The results of this and the previous CADTH review<sup>4</sup> have found the evidence for antibiotic prophylaxis during dental procedures for patients with orthopedic prostheses to be limited. The identified guideline<sup>2</sup> recommends against the routine prophylactic use of antibiotics prior to dental procedures for patients with prosthetic joints.

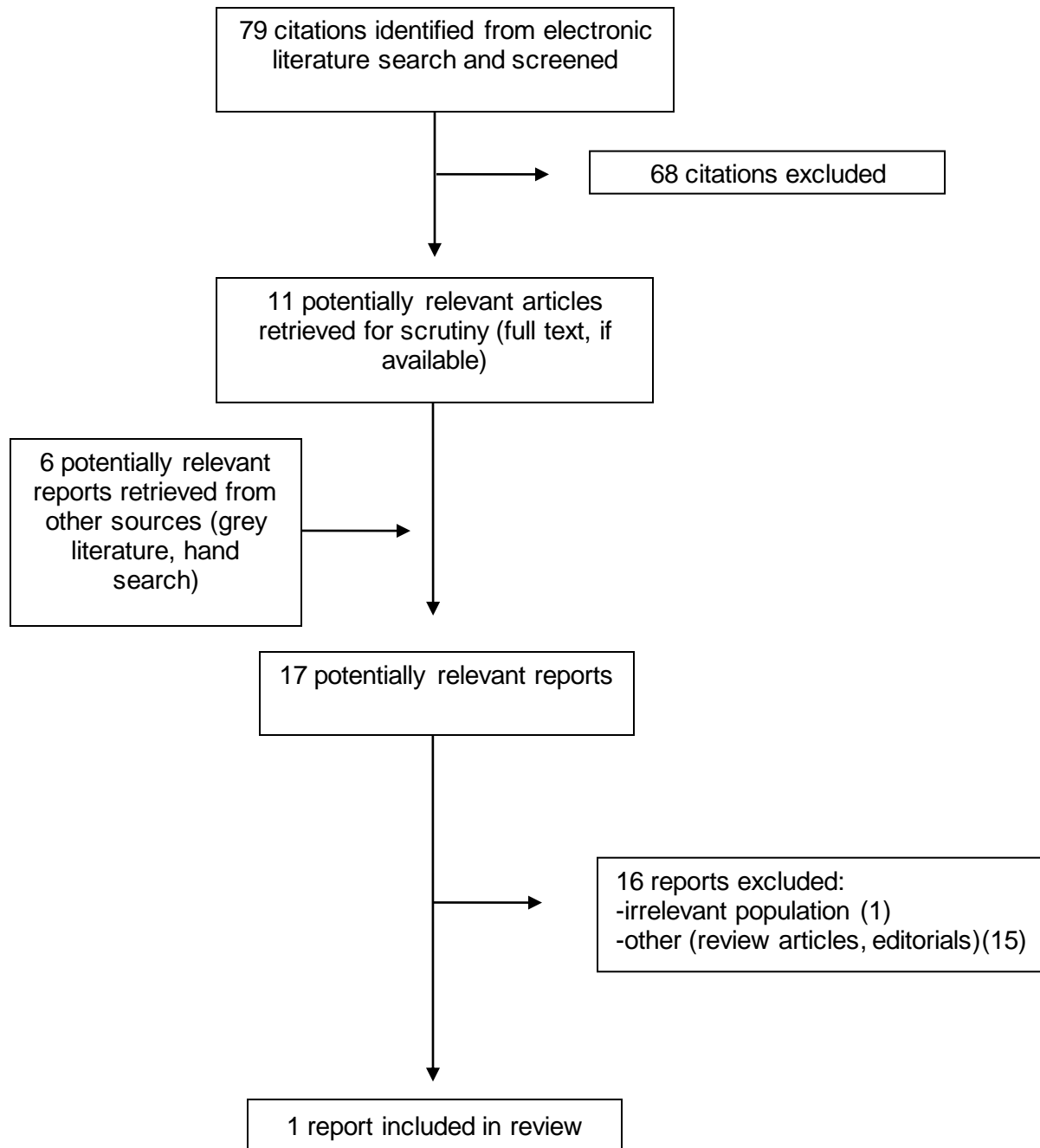
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## REFERENCES

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APPENDIX 1: Selection of Included Studies



APPENDIX 2: Characteristics of Included Publications

<b>Table A1: Characteristics of Included Guideline</b>					
<b>Objectives</b>			<b>Methodology</b>		
<b>Intended users/ Target population</b>	<b>Intervention and Practice Considered</b>	<b>Major Outcomes Considered</b>	<b>Evidence collection, Selection and Synthesis</b>	<b>Evidence Quality and Strength</b>	<b>Recommendations development and Evaluation</b>
Sollecito, 2015 <sup>2</sup> – American Dental Association Council on Scientific Affairs					
Dentists treating patients with prosthetic joints	Antibiotic prophylaxis	Infection rates	Update to a 2012 systematic review, qualitative synthesis of newly identified information	Case-control studies	Recommendations were developed using pre-defined criteria provided within the guideline document



**APPENDIX 3: Critical Appraisal of Included Publications**

<b>Table A2: Strengths and Limitations of Guideline using AGREE II<sup>o</sup></b>	
<b>Strengths</b>	<b>Limitations</b>
<b>Sollecito, 2015<sup>2</sup></b>	
<ul style="list-style-type: none"> <li>• Overall objective, questions, and population of interest of the guideline are clearly described</li> <li>• Target users of the guideline are clearly defined</li> <li>• Inclusion and exclusion criteria were clearly defined</li> <li>• Clearly outline their level of certainty categories and methods of clinical recommendation strength</li> <li>• Included a list of excluded studies and reason for exclusion</li> <li>• Full description of the critical appraisal of the newly identified case-control studies using the critical appraisal skills programme case-control critical appraisal tool.</li> <li>• Used the same search strategy from the 2012 guideline and re-reviewed the excluded studies from the original guideline development process</li> <li>• Guideline was externally reviewed</li> <li>• Potential resource implications have been briefly discussed</li> <li>• No competing interests were declared by the panel members</li> </ul>	<ul style="list-style-type: none"> <li>• did not consult patients or discuss implementation issues.</li> <li>• The guideline panel was made up only of dental professionals</li> <li>• Unclear whether patient preferences/views were taken into consideration</li> <li>• A procedure for updating the guideline was not outlined</li> </ul>



**APPENDIX 4: Additional References of Potential Interest****Clinical Practice Guidelines and Position Statements – Methodology Not Specified**

1. Guideline on antibiotic prophylaxis for dental patients at risk for infection [Internet]. Chicago: American Academy of Pediatric Dentistry; 2014 [cited 2016 Feb 16]. Available from: [http://www.aapd.org/media/Policies\\_Guidelines/G\\_AntibioticProphylaxis.pdf](http://www.aapd.org/media/Policies_Guidelines/G_AntibioticProphylaxis.pdf)
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*See: 3.3 Procedures in Patients with Previous Total Joint Replacement, page 36*
3. South Australian expert Advisory Group on Antibiotic Resistance. Clinical guideline: surgical antibiotic prophylaxis guideline – prevention of endocarditis or infection of prosthetic implants or grafts [Internet]. Adelaide: Government of South Australia, Department for Health and Ageing; 2014 Aug 12 [cited 2016 Feb 16]. Available from: [https://www.sahealth.sa.gov.au/wps/wcm/connect/979fad804f9172cd9127dbc4163822ed/Prevention+of+Endocarditis\\_Oct2014.pdf?MOD=AJPERES&CACHEID=979fad804f9172cd9127dbc4163822ed](https://www.sahealth.sa.gov.au/wps/wcm/connect/979fad804f9172cd9127dbc4163822ed/Prevention+of+Endocarditis_Oct2014.pdf?MOD=AJPERES&CACHEID=979fad804f9172cd9127dbc4163822ed)
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