

The use and misuse of antibiotics in dentistry

A scoping review

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Supplemental material
is available online.

ABSTRACT

Background. To describe antibiotic prescribing behaviors in dentistry, including clinical and nonclinical indications for their use, the type and regimen of antibiotics prescribed, and factors influencing their prescription, the authors conducted a scoping review.

Types of Studies Reviewed. The authors conducted a scoping review of published literature by searching multiple databases. Key search terms included *dentist*, *antibiotic*, *antimicrobial*, *antibacterial*, *prophylaxis*, *prescription*, *pattern*, *habit*, *knowledge*, and *practice*. Two authors independently reviewed titles and abstracts by using detailed eligibility criteria. The authors placed no restrictions on study design or publication year. The authors qualitatively assessed studies by using a modified version of the Center for Evidence-Based Management's critical appraisal of a survey checklist.

Results. The authors identified 1,912 studies but considered only 118 studies eligible for review. Most included studies were either cross-sectional surveys (81 studies) or prescription audits (25 studies) from various geographic locations. Publication dates ranged from 1982 through 2017. The authors examined prophylactic and therapeutic antibiotic use in 48 and 29 studies, respectively. Another 29 studies examined the use of both prophylactic and therapeutic antibiotics in dentistry. Overall, dentists prescribed a wide variety of antibiotic regimens for various clinical and nonclinical indications. Dentists have acquired their prescribing knowledge from a variety of sources and have changed their antibiotic prescribing practices throughout their careers for various reasons.

Conclusions and Practical Implications. Considering the seriousness of antibiotic resistance, the authors highlight trends in antibiotic prescribing practices, characterize factors contributing to the use and misuse of antibiotics in dentistry, provide insight into the importance of antibiotic stewardship in the oral health setting, and encourage dentists to reflect on their antibiotic prescription practices.

Key Words. Antibiotics; antimicrobials; dentistry; stewardship; survey; audit antibiotic resistance; prescription.

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The use of antibiotics has revolutionized health care by saving lives and preventing serious health complications, yet their overuse has serious adverse effects on the health of people and communities.¹ Antibiotics produce adverse drug reactions ranging from minor and reversible to severely debilitating or fatal.² Antibiotics can disrupt a person's healthy flora, resulting in opportunistic bacterial infections such as *Clostridium difficile*, which can be life-threatening.³⁻⁵ Of greatest concern are antibiotic-resistant bacteria because patients with such infections are at an increased risk of experiencing worse clinical outcomes and death.⁶ Owing to the overuse of antibiotics, resistant microbes have entered the public's radar as posing a serious health threat to the population.⁷ Consequently, in May 2015, the World Health Organization endorsed a global action plan to combat this issue, with a specific emphasis on antibiotic resistance.⁶

Although dentistry's role in this dynamic is mostly unknown, results of research in British Columbia, Canada, suggest that antibiotic prescriptions by dentists are increasing at an alarming rate.⁸ From 1996 through 2013, antibiotic prescriptions by physicians in British Columbia decreased

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by 18.2%, whereas that of dentists in British Columbia increased by 62.2%.⁸ Among the antibiotics prescribed by dentists, broad-spectrum amoxicillin was the most common, whereas the use of narrow-spectrum agents such as penicillin V potassium (VK) decreased.⁸ This finding is worrisome because narrow-spectrum agents are less likely to lead to resistant bacteria.^{8,9}

In dentistry, antibiotic prescriptions are prophylactic or therapeutic.¹⁰ Dentists prescribe prophylactic antibiotics to prevent infection, and these can be classified as either primary or secondary.¹¹ Primary prophylaxis is the prevention of an initial infection, such as antibiotics administered to prevent surgical site infections, whereas secondary prophylaxis is used to prevent an infection at a distant site; for example, antibiotics administered to patients with a high-risk cardiac condition to prevent infective endocarditis (IE).¹¹ Therapeutic antibiotics are used in oral health practice to treat odontogenic and nonodontogenic infections and can be classified as either primary or adjunctive.¹² Primary therapy is described as first-line treatment for an infection and is used rarely in dentistry.¹² An example of its use in dentistry would be if definitive care is not possible because of case complexity or medical conditions negating effective local treatment at the time the patient seeks care.¹² More often, dentists use adjunctive antibiotics, such as those administered in conjunction with a surgical intervention, together with oral health treatment.¹²

To understand dentistry's role in this global health issue fully, we must recognize the reasons for the prophylactic and therapeutic use of antibiotics in dentistry. Thus, we conducted a scoping review of published literature to answer the following research question: Why are systemic antibiotics being prescribed in dentistry? Specifically, the review objectives were to

- describe the clinical and nonclinical indications for prescribing prophylactic and therapeutic antibiotics in dentistry;
- describe the type and regimen of prophylactic and therapeutic antibiotics prescribed by dentists;
- describe factors influencing the antibiotic prescription patterns of dentists.

METHODS

We conducted a scoping review from July 2016 through August 2017. We chose this research design because of the broad nature of the research question. We adopted Levac and colleagues'¹³ methodology for scoping reviews and included a quality assessment.

Eligibility criteria

We placed no restrictions on the study design, year of publication, or study location. We limited studies to those in the English language and those available electronically or accessible in the Harry R. Abbott Dentistry Library at the Faculty of Dentistry, University of Toronto, Toronto, Canada. Publications in which the authors focused on the prescription of prophylactic or therapeutic systemic antibiotics by general oral health care practitioners or specialists were eligible for inclusion. This included studies in which the authors explored clinical and nonclinical indications for antibiotic use; the type and regimen of antibiotics prescribed; and factors influencing the antibiotic prescription patterns of dentists, including common sources of antibiotic prescription knowledge, reasons for changing prescribing practices, and differences in these practices among dentists.

Search strategy

In July 2016, we searched 5 electronic databases, Embase, PubMed, Ovid MEDLINE, Scopus, and Google Scholar, by using key terms. We updated the search in August 2017 to include any new publications. [eTable 1](#) (available online at the end of this article) shows a sample search strategy we used in PubMed, including the key search terms and results. Key search terms included dentist, antibiotic, antimicrobial, antibacterial, prophylaxis, prescription, pattern, habit, knowledge, and practice. We adapted this search strategy for use in the other 4 electronic databases. We also reviewed reference lists of relevant studies. Because of time and resource constraints, we did not consult gray literature, including organizational and nonorganizational reports, in this review.

Study screening and selection

[eFigure 1](#) (available online at the end of this article) summarizes the screening and selection process as a Preferred Reporting Items in Systematic Reviews and Meta-Analyses flowchart.¹⁴ After

ABBREVIATION KEY

AHA:	American Heart Association.
bid:	Twice per day.
IE:	Infective endocarditis.
IM:	Intramuscularly.
IV:	Intravenously.
Preop:	Preoperatively.
qid:	4 times per day.
tid:	3 times per day.
TJR:	Total joint replacement.
VK:	V potassium.

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