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Considerations for responsible antibiotic use in dentistry

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OSAP, the Safest Dental Visit

Alexander Fleming's discovery of penicillin in 1928 is one of the greatest medical advancements in history.¹ The introduction of antibiotics meant that infectious diseases that were once deadly could now be cured. Since 1928, countless lives have been saved, and antibiotics have been recognized as miracle drugs. However, as antibiotic use has become more prevalent, so have antibiotic-resistant bacteria and adverse events associated with their use.^{2,3} In his 1945 Nobel Lecture, Fleming warned of the danger of over-reliance on antibiotics and the threat of bacteria developing resistance.¹

Misuse and overuse of antibiotics have contributed to selective pressure on bacteria to adapt to the antibiotics intended to kill them; antibiotic resistance is now one of our most serious global health threats.² Every year in the United States, at least 2 million people become infected with antibiotic-resistant bacteria, and approximately 23,000 people die as a direct result of these infections.² Concurrently, there has been a decrease in research and development of new antibiotics, which has compounded the antibiotic resistance crisis, making treatment of infections in some patients challenging.^{4–6}

UNINTENDED CONSEQUENCES OF ANTIBIOTIC USE

Antibiotics should be treated as a resource that is naturally limited in supply. Clinicians must consider the potential effect of their antibiotic prescribing choices on the larger community, as well as on individual patients, because there are risks to both. Each time an antibiotic is used, there is an increased risk of developing a subsequent antibiotic-resistant infection in both the patient taking the antibiotic and those in the community who come into contact with

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the patient. There are several deadly bacteria for which few antibiotics are effective, making treatment of infections associated with these pathogens more costly and less successful.² We have begun to enter a postantibiotic era in which certain infectious diseases are no longer treatable and the risk from resistant organisms precludes chemotherapeutic treatment, bone marrow and organ transplant, and many elective surgeries.

Furthermore, antibiotics are not the innocuous drugs that some clinicians and many patients perceive them to be. An estimated 1 in every 5 emergency department visits for adverse drug events in the United States is for antibiotic-related adverse events (approximately 142,000 adult visits each year).³ Antibiotics are also the main cause of health care- and community-associated *Clostridium difficile* infections, a potentially deadly form of diarrheal disease associated with considerable costs to patients and the health care system.^{7,8} Antibiotic use also disrupts the microbiome, potentially leading to other long-term consequences, such as asthma and obesity.⁹

ANTIBIOTIC PRESCRIPTIONS

Antibiotics are among the most commonly prescribed medications. However, study results indicate that 30% to 50% of prescribed antibiotics are either not necessary or not optimally prescribed.¹⁰ Dentists write approximately 10% of all outpatient antibiotic prescriptions (approximately 25.6 million) filled in the United States each year.¹¹ Although there are few studies in which the investigators evaluate the appropriateness of antibiotic prescribing in dentistry, it is likely that there are opportunities to improve prescribing practices.

Results from studies in which the investigators assess physicians' knowledge, attitudes, and behaviors regarding antibiotic use indicate that patient demands and expectations, providers' perceptions related to patient expectations, fear of litigation, and diagnostic uncertainty are important factors that lead to overprescribing.¹² We can assume that similar pressures affect prescribing in dentistry. The authors of a 2000 article published in *The Journal of the American Dental Association* surveyed all licensed dentists practicing in Canada and found that there was confusion about antibiotic prescribing recommendations and that inappropriate prescribing practices were evident, such as improper dose and duration of therapy.¹³

SURVEILLANCE EFFORTS AND NATIONAL PRESCRIBING GUIDELINES

Because most oral conditions are managed best with operative interventions and oral hygiene procedures, there are relatively few indications for the use of systemic antibiotics in dentistry.¹⁴ Unlike medical claims in the United States, private dental claims do not capture diagnostic codes accompanying procedures performed or prescriptions written; without the ability to connect the diagnosis of an oral infection to a prescription for antibiotics, it is difficult to assess appropriateness.

Guidelines have been published for antibiotic prophylaxis for prevention of infective endocarditis¹⁵ and prosthetic joint infections,¹⁶ as well as general guidance regarding the use of antibiotic therapy for dental patients.^{17,18} However, there are no national guidelines for treatment of specific dental infections, so dental care providers have to decide

independently when an antibiotic is indicated, which antibiotic to use, and what dose and duration to prescribe.

ANTIBIOTIC STEWARDSHIP

Antibiotic stewardship refers to activities that aim to promote the appropriate use of antibiotics, improve patient outcomes, lower costs, reduce antibiotic resistance, and decrease the spread of infections caused by multidrug-resistant organisms. An antibiotic stewardship program works to ensure that patients receive antibiotic therapy only when it is indicated and that the right drug is prescribed at the right dose for the right duration.

During a White House Forum on Antibiotic Stewardship in June 2015, more than 100 organizations made commitments to improve antibiotic prescribing over the next 5 years.¹⁹ These planned activities were submitted to the Centers for Disease Control and Prevention.²⁰ The American Dental Association (ADA) pledged to provide appropriate scientific and clinical expertise to assess fully and respond to antibiotic health care issues, offer continuing education courses at professional meetings, and provide systematic reviews and up-to-date scientific information on the proper use of antibiotics in online resources.

The following are suggested initial steps to take to understand, develop, and support antibiotic stewardship better in dentistry:

- identify data sources that can be used to understand better and characterize antibiotic prescribing by dentists;
- develop and update national prescribing recommendations for the treatment of dental infections;
- develop educational tools, resources, and messages for dentists and patients about the importance of antibiotic stewardship in dentistry;
- foster collaboration among the ADA, dental specialty organizations, and other relevant stakeholders to provide consistent messaging regarding antibiotic use in dentistry;
- encourage ADA and dental specialty organizations to work together to develop and adopt antibiotic stewardship policies that are relevant to dentistry;
- incorporate national prescribing recommendations within dental software management prescription templates.

Until national prescribing guidelines are endorsed by the ADA and dental specialty organizations, dentists must continue to use their judgment to optimize antibiotic prescribing and should consider the clinical tips and resources outlined in Boxes 1 and 2.

CONCLUSIONS

Antibiotic resistance has become a serious and growing global public health threat. Although new bacterial resistance patterns continue to be identified, the pipeline for the development for antibiotics has dwindled. Dentists prescribe approximately 10% of

antibiotic prescriptions in the United States, and it will be important to identify opportunities to improve antibiotic use in dentistry. Dentists play an integral role in the appropriate use of antibiotics, which is critical for delivering high-quality patient care, minimizing the risk for adverse events, and slowing the spread of antibiotic-resistant bacteria. ■

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BOX 1**Clinical tips for antibiotic prescribing by dentists.****PRETREATMENT CONSIDERATIONS**

- Make the correct diagnosis of an oral bacterial infection.
- Recognize that antibiotics are rarely helpful for effective control of a localized oral infection.
- Therapeutic management interventions, such as incision and drainage, extraction, or endodontic therapy, are appropriate first steps in treating most oral bacterial infections. Weigh the potential benefits and risks of antibiotics before prescribing. Toxicity, allergy, adverse effects, and *Clostridium difficile* infection can occur even with a single dose.²¹
- Prescribe antibiotics (and all other prescriptions) only for patients of record.
- Prescribe antibiotics only for bacterial infections you have been trained to treat.
- Do not prescribe antibiotics for oral viral infections, fungal infections, or oral ulcerations related to trauma or aphthae.
- Understand and implement national recommendations for antibiotic prophylaxis for the medical concerns for which guidelines exist (for example, cardiac defects).
- Review the patient's medical history to
 - assess medication allergies, drug-drug interactions, and the potential for other adverse drug events;
 - review pregnancy status and medical conditions that would affect antibiotic selection.

CHAIRSIDE PRESCRIBING

- Ensure that antibiotic expertise or references are available and can be accessed during patient visits.
- Avoid prescribing based on
 - nonevidence-based historical practices;
 - patient demand or expectations;
 - convenience of clinician or patient;
 - pressure from other health care professionals.
- Make and document the diagnosis, treatment steps, and, if prescribed, the rationale for antibiotic use in the patient chart.

- ▣ Prescribe only when clinical signs and symptoms of a bacterial infection suggest systemic spread, such as fever or malaise along with localized oral swelling.
- ▣ Use the most targeted (narrow-spectrum) antibiotic for the shortest duration possible (2-3 days after the clinical signs and symptoms subside) for otherwise healthy patients.
- ▣ For empirical treatment, revise antibiotic regimens on the basis of patient progress and, if needed, culture results.
- ▣ Consider a conversation about antibiotic use with referring specialists about their own antibiotic prescribing protocols.

ENGAGING THE PATIENT

- ▣ Educate your patients about
 - taking the antibiotic exactly as prescribed;
 - taking only antibiotics prescribed for themselves;
 - not saving antibiotics for future illness.

MAINTAINING OPTIMAL PRESCRIBING PRACTICES

- ▣ Provide training to staff members to improve the probability of patient adherence to the antibiotic prescription.
- ▣ Ensure you are up to date on appropriate management of oral bacterial infections by attending continuing education courses or conferences on the topic or accessing dental journals or pharmacology texts on the topic.

BOX 2**Resource list for antibiotic resistance in dentistry.**

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