Antibiotic Stewardship in Dentistry: Opportunities and Challenges

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Each time a clinician prescribes an antibiotic, the benefits and risks of side effects and antibiotic resistance must be weighed. Antibiotic resistance is among the greatest public health threats in the world. For example, it is estimated that in the United States alone there are at least 2 million antibiotic-resistant infections, and 23,000 deaths each year.[1]

These resistant infections lead to increased morbidity and mortality resulting in excess health care costs in the range of $20 billion to $35 billion annually. In addition, a common infection related to antibiotic use is *Clostridiodes difficile* infection (*C diff*, formerly *Clostridium difficile*). *C diff* has become the most common cause of health care–associated infections in U.S. hospitals and is increasingly being reported in the community.[2] *C diff* causes debilitating and recurrent diarrhea, and approximately 7-10% of patients will die. It has been estimated that the economic burden of *C diff* in the United States may be as high as $5.4 billion annually.[3]

Antibiotic stewardship is a coordinated program that promotes the appropriate use of antimicrobials, improves patient outcomes, reduces microbial resistance, and decreases the spread of infections caused by multidrug resistant organisms. Stewardship programs help ensure that antibiotics are only prescribed when needed, help minimize misdiagnoses, and help ensure that the right drug, dose, and duration are selected when an antibiotic is needed.[4] As of January 2017, the Joint Commission requires that all hospitals implement antimicrobial stewardship programs. Effective Jan. 1, 2020, the antimicrobial stewardship requirements will also be applicable to Joint Commission-accredited ambulatory health care centers. In private practice dental settings, accreditation is voluntary, and most dental facilities are not accredited. However, as 10% of all outpatient antibiotic prescriptions in the United States are written by dentists, the implementation of antimicrobial stewardship practices in dentistry is crucial.[5]

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The advent of antibiotic stewardship practices began in acute care hospitals when clinicians ascribed to guidelines published in 2007 by the Infectious Disease Society of America.[6] In 2014 and 2015, respectively, the Centers for Disease Control and Prevention published the *Core Elements of Hospital Antibiotic Stewardship Programs* and the *Core Elements of Antibiotic Stewardship for Nursing Homes*. Recognizing that the majority of antibiotics in the United States are prescribed to outpatients, the CDC subsequently published the *Core Elements of Outpatient Antibiotic Stewardship*, which include dental facilities as a target site for implementing antimicrobial stewardship.[4,7]

According to the CDC, the four elements of outpatient antibiotic stewardship are commitment, action for policy and practice, tracking and reporting, and education and expertise (see Fig. 1). While these core elements pertain to all outpatient health care settings, there are opportunities and challenges unique to the dental profession that impact optimal prescribing practices and patient safety.

A commitment to stewardship

A leader within the facility is recommended to champion antimicrobial stewardship, yet the entire dental team may demonstrate dedication and accountability for optimizing antibiotic prescribing and patient safety. Commitment may be demonstrated by displaying provider commitment posters in operatories or reception areas (see mi-marr.org for a template), including antibiotic stewardship-related duties in job descriptions, and by encouraging consistent messaging by all team members about antibiotic use. Dental personnel may collectively and creatively develop other methods to demonstrate commitment and facilitate communication about appropriate antibiotic use.

In general, dental personnel strive for the best outcome and want to do the right thing for their patients. There are several opportunities that are unique to the dental profession to optimize antibiotic prescribing and patient safety related to antibiotics. In outpatient dental facilities, a relatively limited number of antibiotics are prescribed. Thus, the in-depth knowledge of these medications (including indications, contraindications, drug interactions, allergies, and side effects) may be more feasible than for health care personnel who prescribe a greater variety of antibiotics. In addition, most private-practice dental settings are relatively small, lack the bureaucracy of a larger health care setting, and have fewer employees. Therefore, staff training may be simplified, and it may be easier for the dental team to provide consistent messaging to patients.

A major challenge to commitment is that there are limited tools available for general and specialty dental practitioners, and clear expectations for appropriate antibiotic prescribing in the dental profession have not yet been established. Antibiotic regimens for antibiotic prophylaxis are well-defined and readily available. National evidence-based practice guidelines for the treatment of odontogenic infections are anticipated to be released by the American Dental Association in November 2019. In addition, dentists cannot reliably depend on practice management software templates to provide appropriate antibiotic prescriptions, including the right drug, right dose, and right duration. Thus, dentists may continue to prescribe based upon non-evidence-based historical practices.

How to take action

CDC recommends implementing at least one policy or practice to improve antibiotic prescribing, assess whether it is working, and modify as needed. There are several opportunities and challenges unique to dental professionals in taking action for policy and practice to improve antibiotic prescribing.

In reality, there are limited clinical circumstances that warrant antibiotic prescriptions. Recent data suggests that more than 80% of antibiotics prescribed for prophylaxis before dental visits are unnecessary or inappropriate.[8] Ensuring that all dental staff understand and abide by guidelines for antibiotic prophylaxis can be a good first step in reducing unnecessary antibiotic use.

Typically, in regards to odontogenic infections, therapeutic management (endodontics, incision and drain, pulpotomy, etc.) may be sufficient to control a localized oral bacterial infection. The proposed ADA evidence-based clinical practice guidelines will provide guidance for the emergency management of symptomatic irreversible pulpitis, symptomatic apical periodontitis, and localized acute apical abscess, and for emergency management of dental pain and swelling in immunocompe-

(Continued on Page 42)

Figure 1 — Core Elements for Implementing Antimicrobial Stewardship

tent adults. By encouraging dental providers to record the rationale for or against prescribing antibiotics in patient records, and having a similar conversation with patients, unnecessary antibiotic use may be curtailed. The practice of "delayed" prescribing, providing a patient with a postdated prescription and instructing the patient to fill the prescription after a predetermined period only if their symptoms worsen, may be another approach to limiting antibiotic usage.

However, a challenge may exist when either the patient, the patient's physician, or other dental care providers have differing expectations about antibiotic use and stewardship practices. For instance, when collaborating in dental care a dentist may consider an antibiotic inappropriate, yet a colleague may "override" the decision and provide a prescription. Thus, it is prudent to discuss prescribing practices and protocols with specialists prior to and during collaborative care.

When a decision is made to provide a patient with an antibiotic prescription, there are opportunities for dentists to positively impact drug selection and duration of therapy and thereby limit potential harm — especially *C diff*. Although *C diff* may be associated with any antibiotic, clindamycin has the highest relative risk.[9] By implementing a policy requiring collection of full details of patients' allergic reaction to penicillin, it may be determined that the patient does not have a "true" penicillin allergy. By correctly identifying patients who are not truly penicillin-allergic, a decrease in use of broad-spectrum antibiotics may be seen.[10] Duration of antibiotic therapy may be reduced by altering dental prescribing software (typically preprogrammed for 10 days of therapy) and/or encouraging patients to call the facility when their symptoms have resolved to discuss potential early discontinuation.

Tracking and reporting

The CDC encourages all out-patient health care settings to monitor antibiotic prescribing and to provide regular feedback to clinicians. Alternatively, clinicians may assess their own antibiotic prescribing practices. In smaller dental practice settings, dentists may self-evaluate their practices, audit their own patient records to assess the appropriateness of antibiotic prescriptions, implement a tracking system and a quality improvement program. If assessment is performed by a peer, feedback may be provided to the dentist, and stewardship interventions may help guide modifications to improve antibiotic prescribing practices.

In dental settings, there are challenges for these tracking and reporting quality improvement measures. First and foremost, prescriptions written in private practice dental settings typically do not require a diagnostic code or indication for antibiotic use. Thus, the logistics of data extraction make the tracking of antibiotic appropriate use difficult at best. In dental settings, individual patient records must be reviewed to determine if an antibiotic was indicated, and whether the proper drug, right dose, and duration was selected.

It goes without saying that the success of antibiotic surveillance efforts will depend completely on the knowledge base and competence of the examiner. For example, if the individual performing tracking is unaware of up-to-date guidelines, prescribing protocols, and stewardship principles, the surveillance efforts will be compromised, and of limited use.

Education and expertise

Education and training of dental personnel and patients may also improve appropriate antibiotic prescribing and use. Education of dental personnel may include antimicrobial resistance and stewardship in formal dental education and CE programs, as well as a review of the clinician's own behavioral tendencies. Dentists may coordinate and collaborate with other dental and medical specialties to implement shared decision-making to achieve better outcomes. And, communication with patients may include management of their perceptions, concerns, beliefs, and expectations regarding antibiotic prescriptions.

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In the dental setting there are many opportunities for patient education and to provide appropriate and consistent messaging. Patients and family members should be educated to take antibiotics exactly as prescribed, and not to save unused medication for future illnesses. Explanations may be provided to patients that antibiotics are not always needed for dental infections and are not indicated for viral, fungal, or other oral conditions. Other information that should be reviewed with the patient includes the potential risks of antibiotic treatment (side effects, *C diff* infection, allergic reactions) and appropriate pain management strategies that do not include use of antibiotics.

Scheduled time in the dental operatory may present a challenge to patient education. For example, a patient may have expectations that an antibiotic will be prescribed at his or her appointment and have minimal

(Continued on Page 44)

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