Guest Editorial

Protecting patients beyond the chair

Antibiotic stewardship in dentistry

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As I begin my role as President of the American Dental Association (ADA) this month, I am reminded of what drew me to become a dentist: the blending of art and science and the role oral health plays in overall health. My desire to understand the disease process and how to manage it led to a degree in microbiology. Understanding the immune system, infection, and antibiotics spurred a lifelong passion related to antibiotic stewardship.

The Latin phrase *Primum non nocere* translates to "first, do no harm." This is a fundamental principle of bioethics in health care and part of the ADA Code of Ethics and Professional Conduct, highlighting the concept of nonmaleficence.[1] As dentists, we have a duty to consider the potential harm of any intervention we undertake. Yet do we consider the risks of writing a prescription for antibiotics each time we use them? Probably not. Many of us were taught that antibiotics only help patients, and the harm, if any, is less than the potential benefit.

The immediate harms of antibiotic use are well known: allergy, gastrointestinal distress, and anaphylaxis, which are rarely life threatening. However, the delayed and long-term harms from antibiotic use are typically not considered when using antibiotics in dentistry. Most antibiotics used in dentistry are used to prevent a distant-site infection or complications from extractions, root canals, and implant placement. This just in case prescribing seems innocuous but carries serious risk. Antibiotic-associated *Clostridioides difficile* infections (CDIs) and antibiotic-resistant superbug infections kill an estimated 64,000 people every year in the United States.[2-4]

Dentists prescribe 10% of all antibiotics in health care, totaling nearly 27 million prescriptions per year.[5] This means that dentists may be associated with up to 6,400 deaths annually due to antibiotic use, and, ironically, often in an attempt to prevent an adverse outcome. That is 17 to 18 deaths daily, and yet most dentists are unaware of these tragic outcomes. CDIs can occur up to 90 days after a single dose of an antibiotic, and antibiotic resistance–related superbug infections can take months or years to develop, so dentists may never be aware that these life-threatening conditions occurred.

Any antibiotic and each use can put patients at risk of developing antibiotic resistance and CDIs; however, clindamycin has been shown to have the highest risk for antibiotic-associated CDIs. It has a nearly 9-fold greater risk of causing CDIs than all other antibiotics[6] and has a black box warning for the risk of severe and potentially fatal colitis caused by *Clostridioides difficile*.[7] Although clindamycin is the antibiotic associated with the highest risk of CDIs, amoxicillin and cephalexin are considered medium risk, and azithromycin and clarithromycin are considered the lowest risk.[6]

Antibiotics revolutionized medicine and save lives. Antibiotic use made fatal bacterial infections such as pneumonia and tuberculosis treatable and allows high-risk surgeries such as joint replacements and organ transplants to be done safely. Antibiotics prevent infections, reduce complications, decrease mortality, and lead to longer life expectancy. That is today.

We have already entered into a postantibiotic era with untreatable infections. The US Centers for Disease Control and Prevention continues to identify numerous antibiotic-resistant bacteria and fungi as urgent or serious public health threats.[4] Resistant infections already affect millions of Americans annually, with CDIs alone resulting in hundreds of thousands of infections and tens of thousands of deaths. At the same time, development of new antibiotics has slowed dramatically, with relatively few truly novel agents reaching the market.

It is estimated that by 2050, antibiotic-resistant infections could be involved in as many as 8 to 10 million deaths per year worldwide.[8] Antimicrobial resistance develops through selective

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pressure. Each exposure to an antibiotic eliminates susceptible bacteria, while allowing resistant organisms to survive and multiply. Inappropriate prescribing, patients not using antibiotics as prescribed, unnecessary agricultural use, inadequate infection control, and limited culture- and sensitivity-directed therapy all contribute to this growing problem. Although resistance cannot be eliminated, it can be slowed through responsible prescribing.

The consequences extend beyond public health statistics. Studies have shown that patients who receive antibiotics are more likely to harbor resistant organisms for many months afterward, and repeated antibiotic exposure substantially increases that risk.[9,10] Those at highest risk of developing resistance are disproportionately represented among our most vulnerable patients: young children, older adults, patients with compromised immune systems, patients receiving chemotherapy, those recently hospitalized, and those with repeated antibiotic exposure.

Equally important is recognizing patients at increased risk of developing CDIs. Advanced age, recent antibiotic use or hospitalization, inflammatory bowel disease, colorectal cancer, immunosuppression, gastrointestinal surgery, previous CDI, chemotherapy, and proton pump inhibitor therapy all increase susceptibility.[11] These factors reinforce the importance of obtaining thorough and regularly updated medical histories before prescribing antibiotics.

Being labeled penicillin allergic, reported at 10% to 11% of the population, also affects risk of developing CDI and antibiotic resistance. It is caused by the use of alternative antibiotics, typically broader spectrum and less effective. This leads to increased rates of sepsis and antibiotic-resistant infections and increased risk of developing surgical site infections. It is estimated that from 90% to 99% of patients who report penicillin allergies are not truly allergic. Dentistry must do a better job in helping delabel patients who claim penicillin allergies by referring them for testing.[12]

The American Dental Association has provided the scientific evidence, the clinical guidelines, and the leadership necessary to improve antibiotic stewardship.

Antibiotic stewardship may not increase practice revenue, but it can save lives. There is no investment to implement an antibiotic stewardship program beyond the time it takes to ensure that you and your team members are up to date with the latest evidence and clinical practice guidelines.

That is where the ADA comes in. The ADA Council on Scientific Affairs is dedicated to leading the development of clinical practice guidelines on behalf of the profession. This is shown by the article "Shared Decision Making in Oral Health Care for Patients With Prosthetic Joint Replacements: American Dental Association Council on Scientific Affairs Position Statement."[13] This statement reaffirms the 2015 Clinical Practice Guideline, which states that "In general, for patients with prosthetic joint implants, prophylactic antibiotics are not recommended before dental procedures to prevent prosthetic joint infection."[14] The 2024 American Academy of Orthopaedic Surgeons/American Association of Hip and Knee Surgeons Clinical Practice Guideline recommendation states that "routine use of a systemic prophylactic antibiotic prior to a dental procedure in patients with a hip or knee replacement may not reduce the risk of a subsequent [periprosthetic joint infection]."[15] There is now consensus between the dental and orthopedic communities that antibiotic prophylaxis before invasive dental procedures for patients with prosthetic joints is ineffective and unnecessary.

However, although there is agreement at the scientific and professional association level, adoption at the practice level for both orthopedic surgeons and dentists is slow. Studies show that more than 80% of all antibiotic use for prophylaxis before dental procedures does not align with recommendations.[16] Long-standing habits, patient expectations, medico-legal concerns, and the challenge of staying current with changes in the literature contribute to this gap. Continuing outdated practices exposes patients to unnecessary risk without providing measurable benefit.

It is not just how we use antibiotics for prevention. Therapeutic antibiotic use for pulpal and periapical infections by many dentists is not concordant with ADA guidelines issued in 2019.[17] Antibiotic use for pulpal-related disease should be adjunctive only, as definitive treatment,

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including incision and drainage, pulpotomy, pulpectomy, or extraction, is the only way to control or eliminate an infection. Antibiotics are recommended for use when there are systemic symptoms, which include cellulitis, lymphadenopathy, fever, and malaise. When used, they should be taken for the shortest duration possible. In addition, the use of antibiotics is not necessary before treating an odontogenic infection or periapical abscess. Immediate treatment is always best when possible. Antibiotics will not reduce or prevent pain and should not be used for a toothache without systemic symptoms.

Now, through the ADA Living Guideline Program in collaboration with the University of Pennsylvania, the ADA Council on Scientific Affairs is developing additional antibiotic-related guidelines related to antibiotic use before implant placement and extractions. The ADA Living Guideline Program is the first to provide evidence-informed, oral health guidelines, continuously monitoring the scientific literature for the latest evidence that provides updates in a timely manner.

The ADA already has shown what evidence-based leadership can accomplish. During the opioid epidemic, organized dentistry helped transform pain management by promoting nonsteroidal anti-inflammatory drugs alone or in combination with acetaminophen, as first-line therapy for most dental pain, based on high-quality scientific evidence showing superior effectiveness and fewer adverse effects than opioid analgesics.[18] Those efforts have saved countless lives by reducing the likelihood of addiction and potential overdose-related deaths.

We now must shine a light on the next epidemic: antibiotic resistance and antibiotic-related deaths from inappropriate antibiotic use. Every dentist can contribute. Stay current with ADA clinical practice guidelines. Monitor antibiotic prescribing patterns within your practice. Evaluate whether prescriptions follow evidence-based recommendations regarding indication, antibiotic selection, dose, and duration. Limit contingency prescriptions when definitive care is unavailable. Carefully assess reported penicillin allergies and refer appropriate patients for allergy testing. Reduce clindamycin prescribing whenever suitable alternatives exist.

CONCLUSIONS

As a profession, we have both an ethical obligation and an extraordinary opportunity. Antibiotics remain among the most powerful tools in medicine, but they are not benign. Every unnecessary prescription increases the risk of CDI, antimicrobial resistance, and preventable patient harm.

Primum non nocere. First, do no harm.

The ADA has provided the scientific evidence, the clinical guidelines, and the leadership necessary to improve antibiotic stewardship.[19] It is now up to every dentist to put that evidence into practice. By embracing responsible antibiotic prescribing, we can protect our patients today, preserve the effectiveness of antibiotics for future generations, and once again show that organized dentistry leads health care through science, ethics, and an unwavering commitment to patient safety. ■

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DISCLOSURES

Dr. Paumier did not report any disclosures.

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