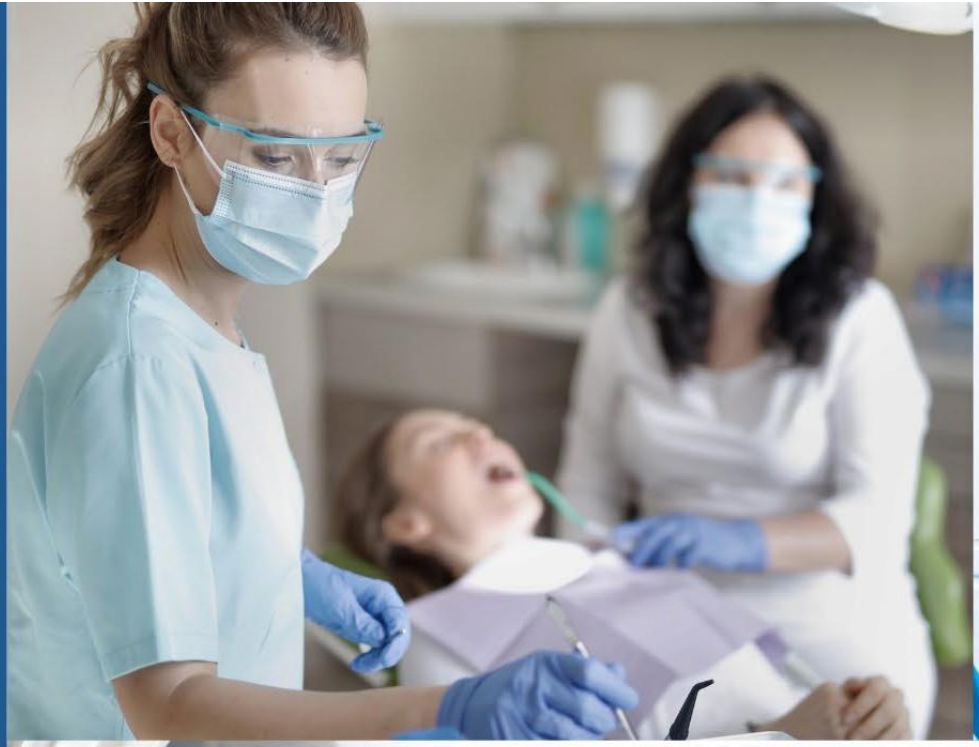


Oral Health Antibiotic Toolkit

Wisconsin Oral Health Antibiotic Stewardship Program Members

P-03109 (06/2022)

WISCONSIN DEPARTMENT of HEALTH SERVICES

Table of Contents

Antibiotic Stewardship Program

Wisconsin policy makers, oral and medical health care team members, and the public are not immune to the paramount concern for antibiotic safety, quality, and care. While antibiotics save lives and are critical tools for treating a number of common and more serious infections, including those that can lead to sepsis and antibiotic resistance, scarce antibiotic choices for multidrug-resistant organisms (MDROs) are an urgent worldwide public health problem.

Purpose

These efforts are led by the Wisconsin Department of Health Services (DHS), Division of Public Health, which receives activity support from the Centers for Disease Control and Prevention (CDC). The purpose of the Wisconsin Oral Health Antibiotic Stewardship Program is to offer education and guidance to increase awareness of evidence-based antibiotic prescribing and use.

Education, Awareness

Improving antibiotic prescribing and use is critical to effectively treating current and future bacterial infections, while protecting patients from antibiotic harm. Education and awareness for all stakeholders is essential to stem antibiotic misuse harms and the emergence and spread of antibiotic resistance.

Communication

With the goal of communicating on a quarterly basis, the Wisconsin Oral Health Antibiotic Stewardship Program will provide clinical observations, peer-reviewed articles, and national organization consensus opinions to support the development, implementation, and integration of evidence-based antibiotic advisory guidance.

Antibiotic Stewardship Guidance Limitations

The Wisconsin Antibiotic Stewardship Program provides materials and guidance with the understanding and recognition that information on antibiotic use is continuously evolving. Consensus statements, peer-reviewed articles, and evidence-based guidelines can have limitations. The following resource should not be construed as a care directive because individual needs are unique to each patient and circumstance. Conversations about antibiotic stewardship guidance should include informed clinical consideration, including informed judgement, to ensure common understanding. Prior to the implementation of a guideline, stakeholders, oral health providers, and health care organizations should conduct a review per their policies, procedures, and quality assurance functions to ensure guidelines comply with local, regional, and national requirements for patient care, safety, and quality.

Introduction

Antibiotics are an important tool to help our oral health colleagues and medical team members manage odontogenic infections. However, antibiotics are too often over-prescribed and the development of antibiotic resistance is an unfortunate result. The potential for complications related to antibiotic use led DHS to launch Wisconsin antibiotic stewardship initiatives in various health care domains.

The following *Oral Health Antibiotic Toolkit* contains source information to assistdentists to make informed, evidence-based antibiotic prescribing decisions and effectively communicate them with patients and medical team members.

What is the problem?

A study evaluating prescribing practices in the United States linked 90% of antibiotic prescriptions to outpatient and/or ambulatory settings. Of those, an estimated 30-50% were considered unnecessary (1-JAMA 2016). Several dental studies noted similar findings of up to 85% of antibiotic prescriptions as "suboptimal" or "not indicated" (2-Family Medicine 2016).

Safety, quality, and care concerns prompted the American Dental Association (ADA) to participate in a "White House Forum on Antibiotic Stewardship" in 2015. That Forum led to an ADA endorsement for member antibiotic stewardship and improved prescribing practices (3-JADA 2020). Dentists account for 1 in 10 antibiotic prescriptions in the outpatient setting, which makes them the third to fourth highest antibiotic prescribers by volume following family medicine, internal medicine and pediatrics (4-JADA 2017; 5-CID 2015). A *Journal of the American Dental Association* (JADA) study conducted in British Columbia found that while physician antibiotic prescribing decreased 18% from 1996 to 2013, prescribing by dentists increased by 62% over this same period (6-JADA 2016; 7-JADA 2017).

Top 10 Antibiotic Prescribing Provider Specialties in the US (2015) Ranked by Count of Prescriptions

Rank	Specialty	No. of Prescribers	Percent of Total Prescribers	Count of Rxs*	Percent of Total Rxs	No. of Patients	Rxs Per Prescriber*
1	Family Medicine	96,754	11.16%	5,864,247	26.30%	3,727,615	60.61
2	Internal Medicine	153,893	17.75%	4,202,961	18.85%	2,397,039	27.31
3	Dentist	155,462	17.93%	2,937,494	13.17%	2,085,777	18.90
4	Pediatrics	53,269	6.14%	2,337,232	10.48%	1,415,760	43.88
5	Emergency Medicine	42,698	4.93%	1,309,737	5.87%	1,081,099	30.67
6	Dermatology	10,822	1.25%	724,701	3.25%	322,883	66.97
7	Obstetrics & Gynecology	33,945	3.92%	703,454	3.15%	482,140	20.72
8	Urology	9,210	1.06%	596,529	2.68%	299,768	64.77
9	Otolaryngology	9,146	1.06%	409,820	1.84%	283,154	44.81
10	Surgery	23,842	2.75%	240,370	1.08%	162,968	10.08

Number of antibiotic prescriptions in Express scripts database, 38,988,099 prescriptions examined.
Source: *Durkin M., et al. Journal American Dental Association. 2017;148(12): pp 878-86.*

How Antibiotic Resistance Develops and Spreads

Antimicrobial resistance (AMR) occurs when an organism can resist the effects of drugs meant to stop its function or kill it. Prevalence of resistant organisms increases when an antimicrobial (antibiotics being one of the most commonly recognized type of antimicrobial) is used. Antibiotics kill the bulk of bacteria, leaving only those resistant to that antibiotic. Those resistant bacteria are then able to spread their evasion mechanisms with other bacteria so even more pathogens are able to survive despite the presence of an antibiotic in the body. This is deemed antibiotic resistance (AR). This same process happens with viruses to antivirals, fungi to antifungals, and so on. More information is available on the CDC AMR site.

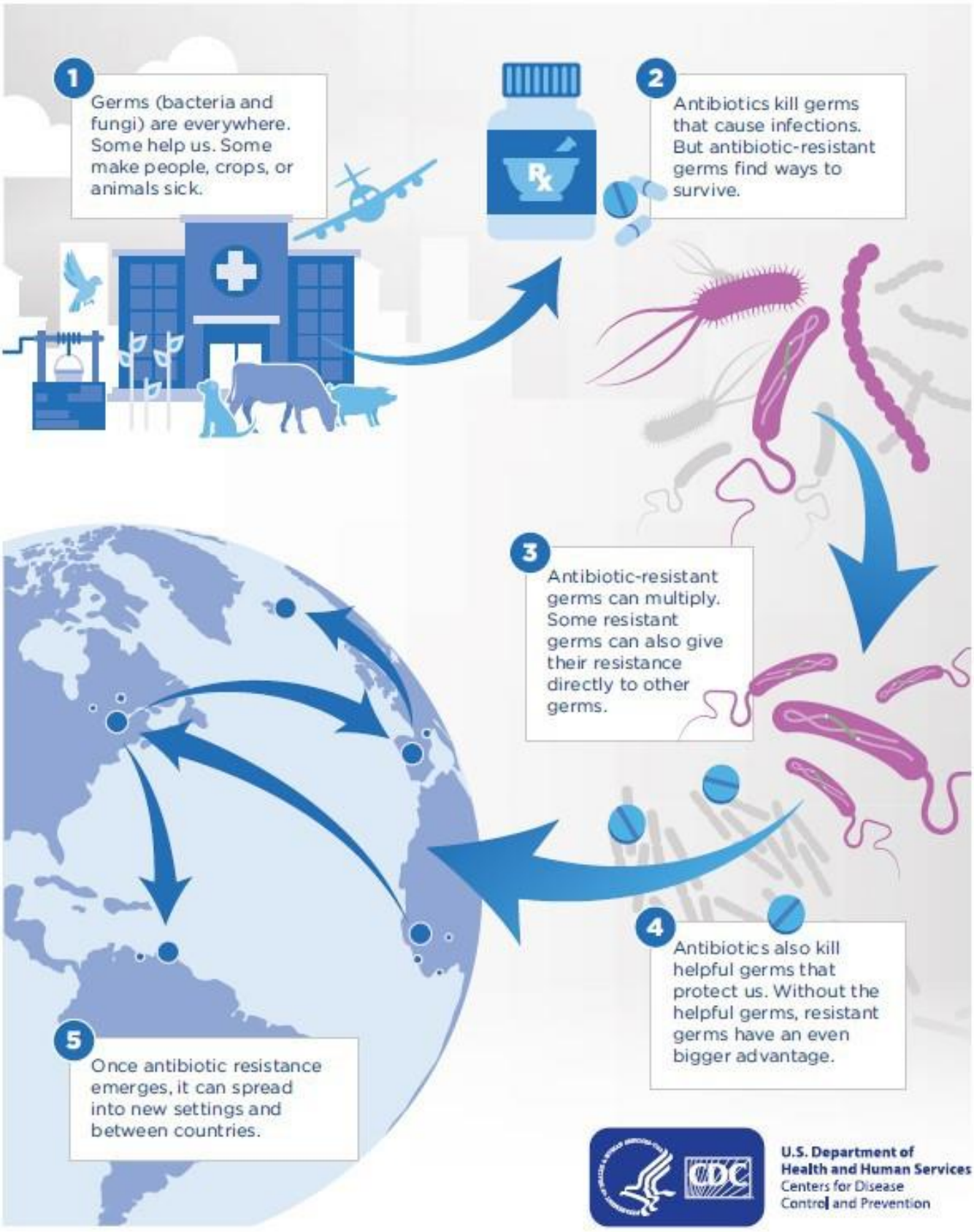
AR happens rapidly. In one study, while on antibiotics (azithromycin or clarithromycin), 54% of patients' bacteria (*Streptococcus pneumonia*) recovered from throat swabs became resistant to those antibiotics within a week. Most people with resistant pathogens are asymptomatic, in which no signs or symptoms of infection are exhibited at all. However, when an infection does develop, treatment is more complex, more expensive, and often associated with greater morbidity and mortality. More information on this is available on the CDC AR site.

There are significant risks of patients developing both antibiotic-related diarrhea, and more importantly, antibiotic-induced colitis due to overgrowth of *Clostridioides difficile* (*C. diff*). *C. diff* overgrowth produces inflammation in the colon that can cause severe diarrhea that can lead to dehydration and significant medical morbidity. Clindamycin has been identified as an antibiotic at higher risk for producing this complication and, therefore, should be used only when true beta-lactam antibiotic allergy makes it the most appropriate choice. A 2013 study found that over 40% of patients with *C. difficile* infection visited a dentist's or physician's office in the preceding four months (7-JADA 2017).

Dentists are uniquely positioned to play a role in preventing the spread of antibiotic resistance. CDC outlines seven "how-tos" for safe, appropriate antibiotic prescribing and use when treating dental infections.

1. Make an accurate diagnosis.
2. When prescribing an antibiotic, choose the right drug for the right dose and duration.
3. Use narrow-spectrum antibiotics for simple infections and preserve broad-spectrum drugs for more complex infections.
4. Avoid prescribing antibiotics for viral infections.
5. For empiric treatment, revise treatment regimen based on patient progress and/or test results.
6. Know the side effects and drug interactions of an antibiotic before prescribing it.
7. Teach your patients about appropriate antibiotic use and emphasize the importance of taking antibiotics exactly as prescribed.

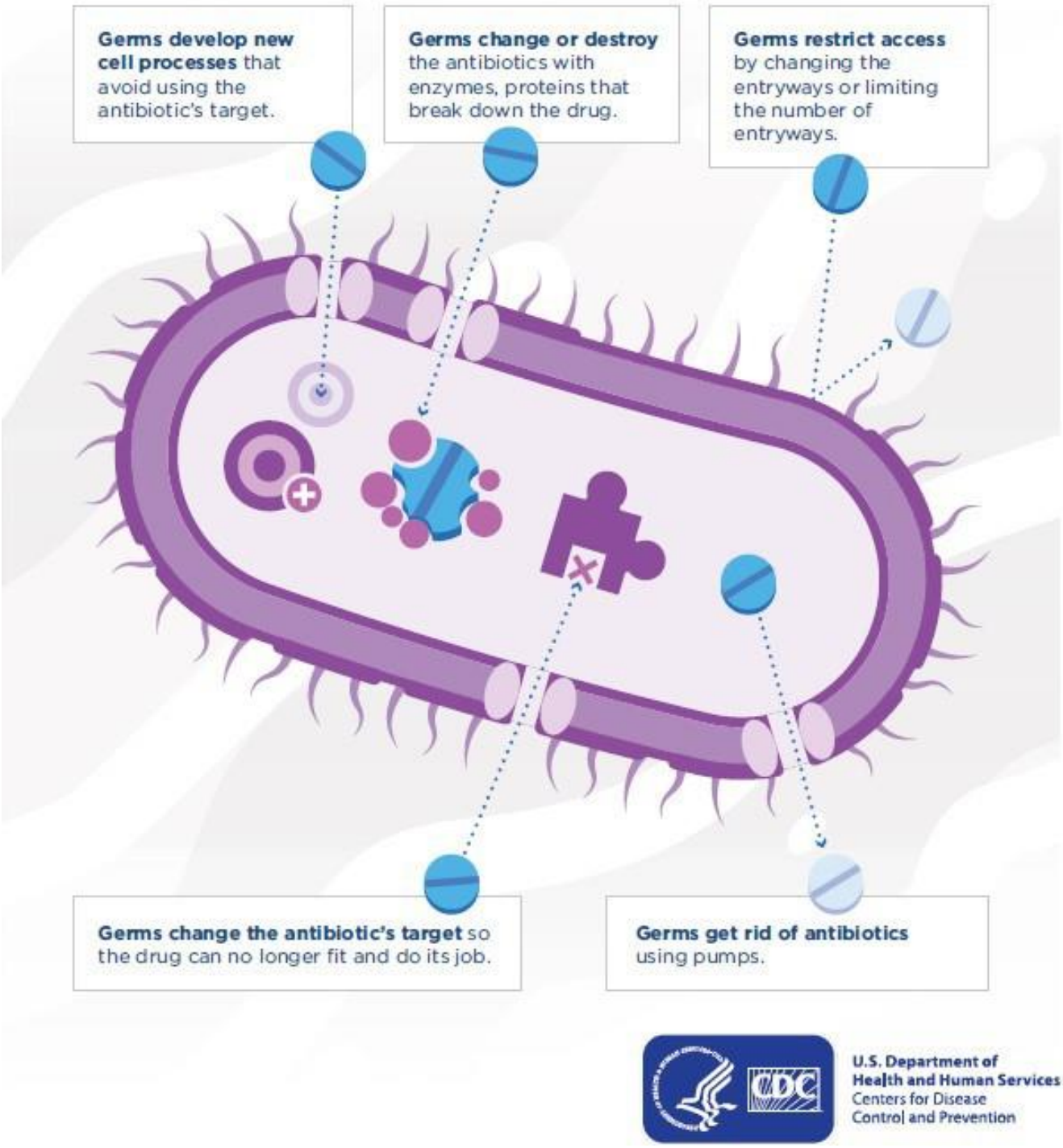
How Antibiotic Resistance Spreads



[How Antibiotic Resistance Spreads (cdc.gov)]

How Bacteria and Fungi Fight Back Against Antibiotics

Antibiotics fight germs (bacteria and fungi). But germs fight back and find new ways to survive. Their defense strategies are called **resistance mechanisms**. Only germs, not people, become resistant to antibiotics.



U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

[How Bacteria and Fungi Fight Back Against Antibiotics (cdc.gov)]

What about penicillin allergy and the use of cephalosporins?

Many patients claim to have an allergy to penicillin or amoxicillin. In a recent study published in JAMA (8-JAMA 2019), 10% of patients in the U.S. claim penicillin allergy. However, studies suggest that actually less than 5% of these patients have clinically significant penicillin hypersensitivity. Hence, more than 90% of patients with alleged penicillin allergy can safely receive penicillin or derivatives of penicillin. It is also interesting to note that previously reported risks of cephalosporin cross-reactivity in penicillin allergic patients has been overstated. Only about 2% of true penicillin allergic patients will also have hypersensitivity to the cephalosporins.

For these reasons, it is generally safe to prescribe cephalosporins when indicated for odontogenic infections or prophylaxis to patients with a low-risk history of penicillin allergy (e.g., non-allergic symptoms, pruritus without rash, delayed-onset rash that was not hives, or unknown reactions) (8-JAMA 2019; 9-CID 2017; 10-JACI 2016).

Separate dental professional- and patient-focused two-minute educational videos on debunking penicillin allergy myths are currently available from the DHS Antimicrobial Stewardship Resources webpage.

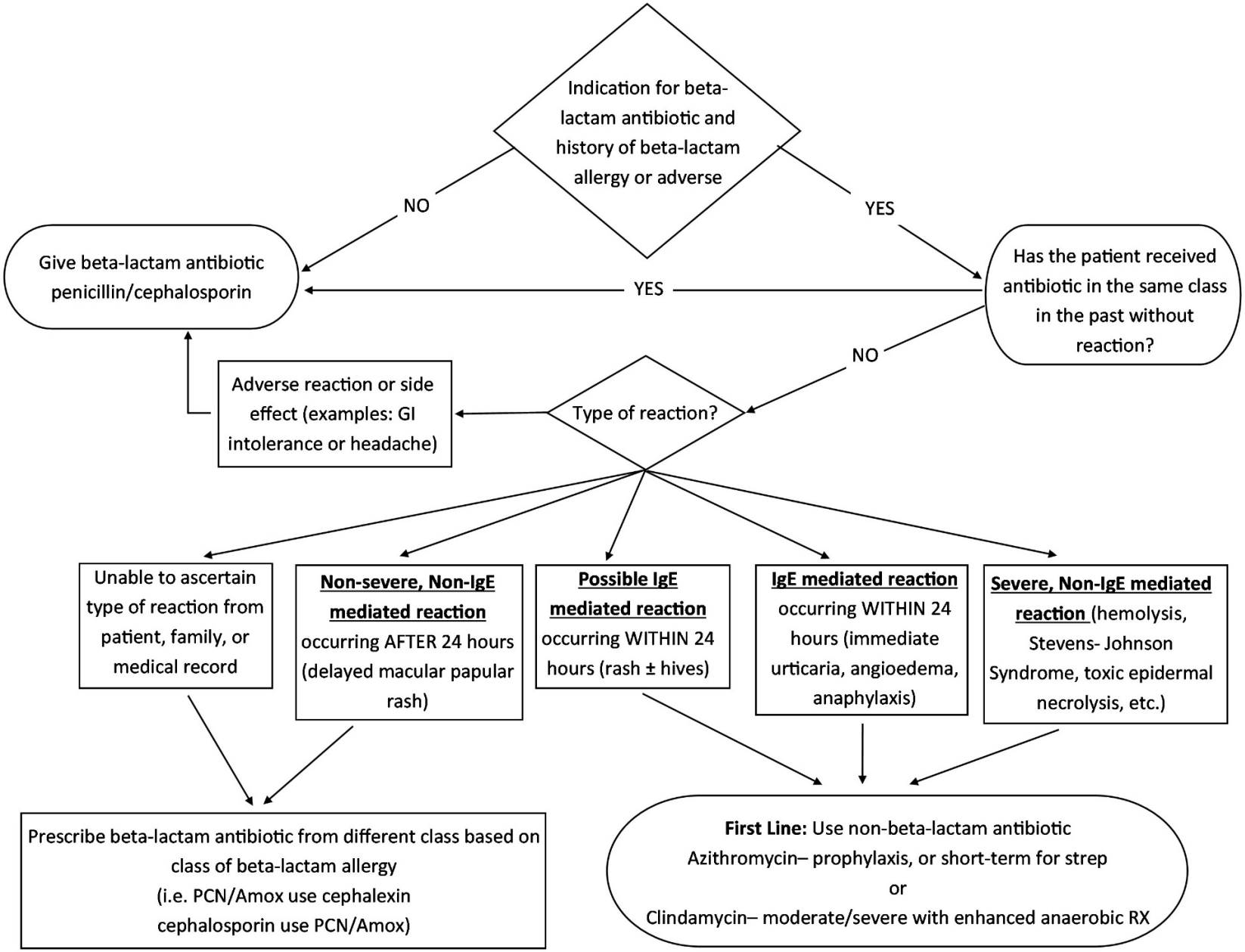
Clindamycin is no longer the preferred choice for patients with penicillin allergies when a stronger antibiotic is indicated. Aside from immediate short-term gastrointestinal side effects, the risk of *C. diff* is too great for routine clindamycin use (11-OFID 2017; 12-JDR 2019). An algorithm for deciding on beta-lactam antibiotic alternatives is provided below. Select patients with severe penicillin allergies may be considered for clindamycin therapy. Due to clindamycin resistance among oral strep (18-30%) and anaerobic resistance [*Prevotella* sp*., Porphyromonas* sp.] (31-38%) levels, penicillin remains the preferred choice (13-OSOM 2010; 14-Anaerobe 2014; 15-JAC 2014). For infections that are slow to respond and might hypothetically involve resistant *Bacteriodes* sp., amoxicillin-clavulanate or metronidazole could be substituted or added to the penicillin regimen (16-PathBio 1991).

An amoxicillin and metronidazole combination may be considered if treatment requires enhanced anaerobic activity. The risk of *C. diff* is potentially reduced with this antibiotic choice. However, the use of metronidazole may cause some patients to experience nausea. Augmentin (amoxicillin/clavulanate) is a suitable alternative to the amoxicillin/metronidazole combination for enhanced anaerobic activity (16-PathBio1991).

Penicillin Allergy Assessments

GI upset, nausea, diarrhea	• **Not an allergy** • **Try penicillin again**
Itching or rash	• **Non-IgE mediated, cross-reaction unlikely** • **Use alternative penicillin or any cephalosporin**
Hives or anaphylaxis	• **Ig-E mediated, cross-reaction possible** • **Avoid all beta-lactams**

DENTAL Beta-Lactam Allergy Practice Parameter Algorithm



Pharmacokinetic (PK) and Pharmacodynamic Principles

Pharmacokinetics of the beta-lactam/penicillin class of antibiotics should also be considered. The half-life of penicillin is a short 0.5-0.7 hours, and for amoxicillin it is 1-1.3 hours (17-PR 2018; 18-MCP 1999). Also, a minimum of 40% of time above the minimum inhibitory concentration (MIC) of germs is the guiding principle for effective therapy (17-PR 2018; 18-MCP 1999). Hence, prescriptions for penicillin and cephalosporin class antibiotics should generally include dosing every eight hours, in spite of any compliance concerns. Every 12-hour antibiotic dosing is less desirable to achieve these goals. Treatment for group A strep follows a different PK paradigm and should not be considered a valid model in dentistry.

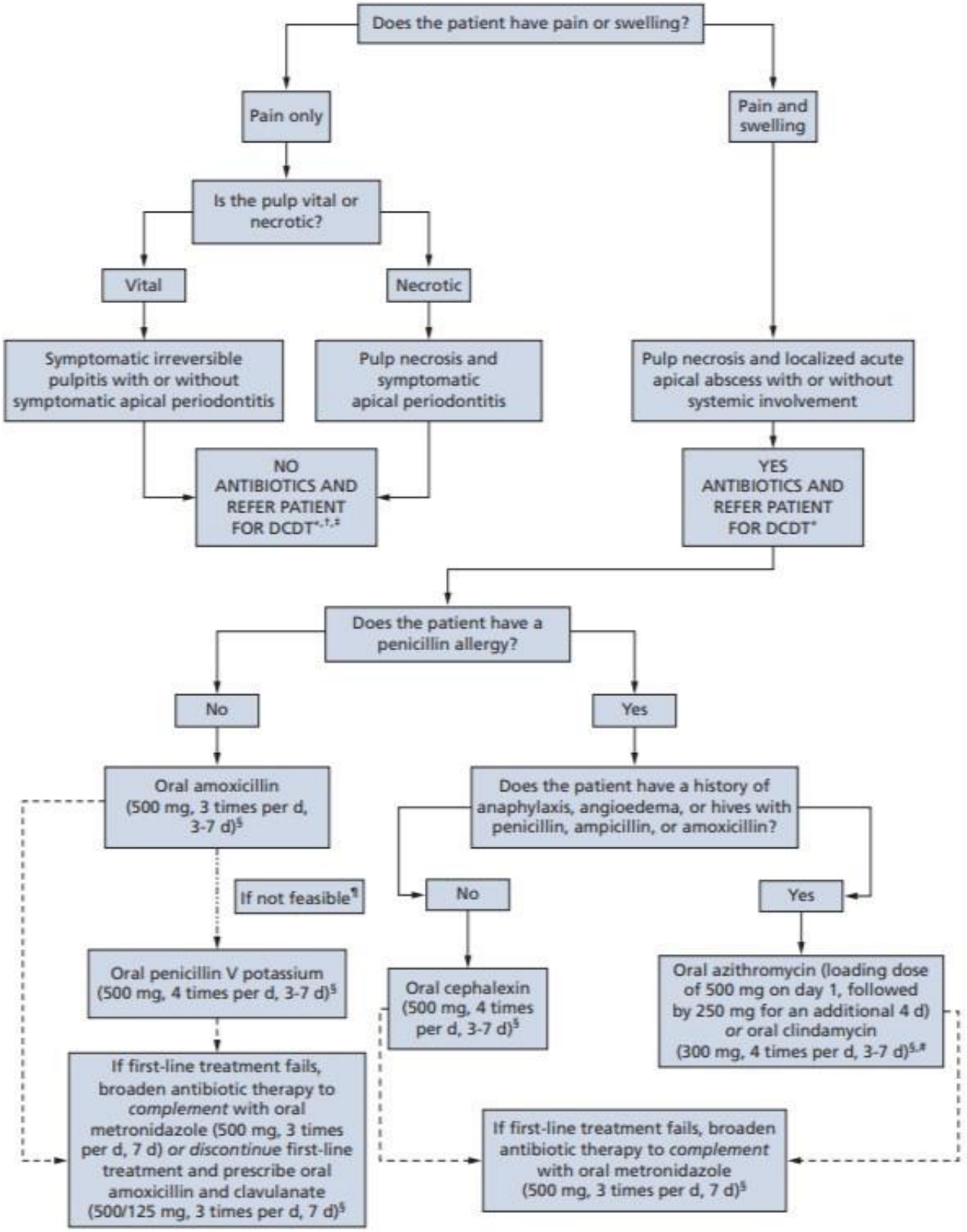
For more serious infections, and for patients with BMI greater than 35 or weight greater than 230 pounds, higher doses of amoxicillin (i.e., 1 gram orally three times daily), may be considered without any significant risk of increased gastrointestinal side effects. Combinations of amoxicillin 500mg and Augmentin 500mg three times daily may also be reasonable, in spite of the need for two generic prescriptions. Augmentin XR (extended release, 2 grams two times daily) may be considered as well, but may not necessarily be covered under insurance plans, or may be covered with a higher co-payment.

Duration of antibiotic therapy should generally cohere with length of time to accomplish the clinical goal. Prescriptions that are not for prophylaxis should generally be no longer than 5-7 days, with 14 days the upper limit for any prescribing (19-CID 2019).

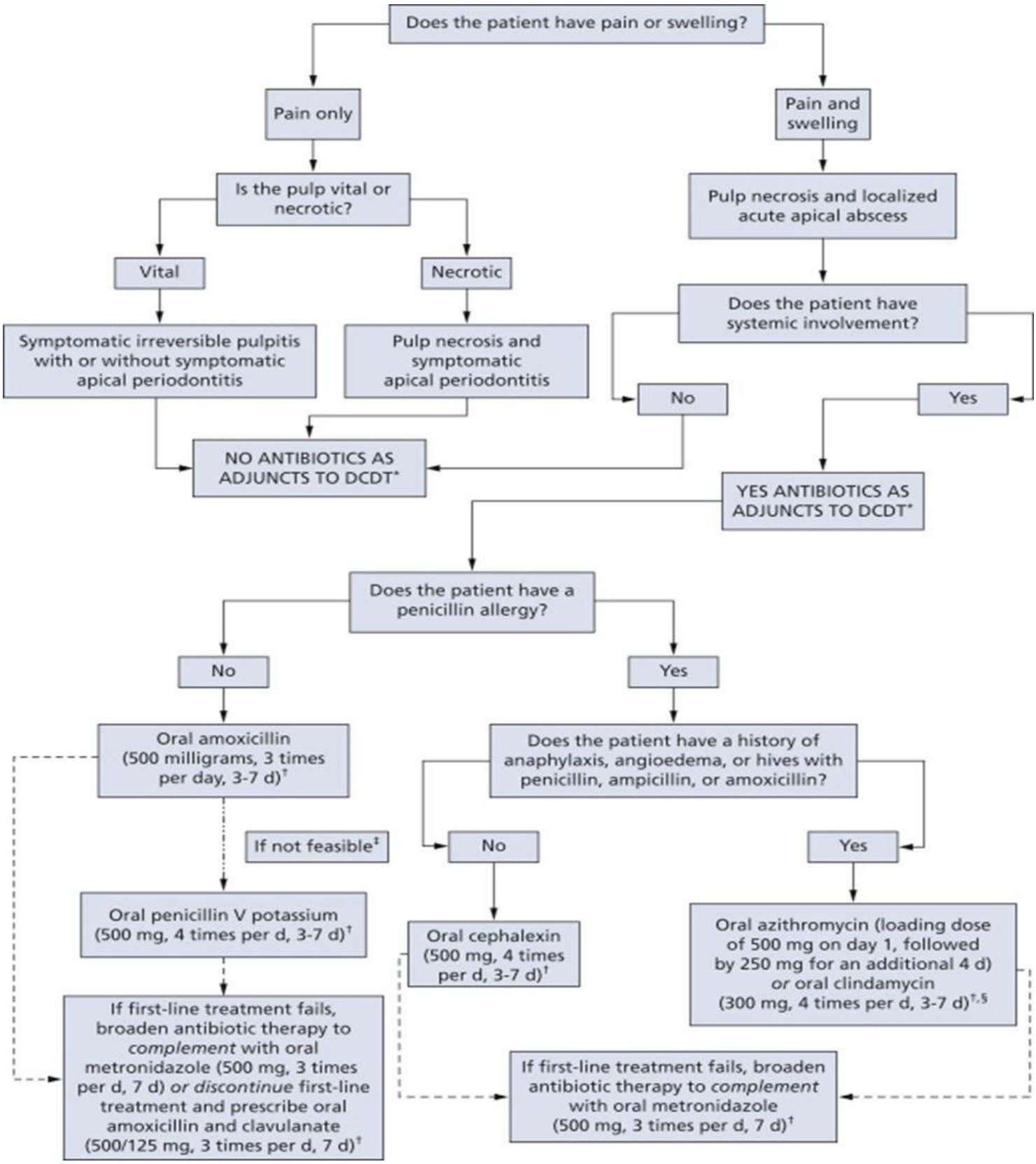
Clinical Recommendations for Antibiotic Prescribing in Dentistry: Acute Dental Pain

In 2019, the ADA published antibiotic evidence-based guidelines for treating patients in acute dental pain (20-JADA 2019). A set of decision-making trees were developed, one for patients where definitive treatment is not available and one for patients where definitive treatment is available.

For patients where definitive treatment is NOT immediately available:



For patients where definitive treatment is immediately available:



Antibiotic Prophylaxis for Heart Conditions

Since 2007, prophylactic antibiotic administration guidelines have evolved to reduce the risk of acquiring bacterial endocarditis among patients with cardiac conditions. Patients with pacemakers and/or defibrillators are not considered to have a heart condition that requires routine antibiotic prophylaxis (24-Circulation 2010). The current standard is summarized below (43-Circulation 2021; 21-Circulation 2007; 22-JACC 2017; 23-Circulation 2018). Note that Clindamycin has been removed as a choice of antibiotic since 2007.

Antibiotic Regimens for a Dental Procedure Regimen: Single Dose 30 to 60 Minutes Before Procedure

Situation	Agent	Adults	Children
Oral	Amoxicillin	2 g	50 mg/kg
Unable to take oral medication	Ampicillin OR	2 g IM or IV	50 mg/kg IM or IV
	Cefazolin or ceftriaxone	1 g IM or IV	50 mg/kg IM or IV
Allergic to penicillin or ampicillin—oral	Cephalexin* OR	2 g	50 mg/kg
	Azithromycin or clarithromycin OR	500 mg	15 mg/kg
	Doxycycline	100 mg	<45 kg, 2.2 mg/kg >45 kg, 100 mg
Allergic to penicillin or ampicillin and unable to take oral medication	Cefazolin or ceftriaxone†	1 g IM or IV	50 mg/kg IM or IV

Clindamycin is no longer recommended for antibiotic prophylaxis for a dental procedure.

IM indicates intramuscular; and IV, intravenous.

* Or other first- or second-generation oral cephalosporin in equivalent adult or pediatric dosing.

† Cephalosporins should not be used in an individual with a history of anaphylaxis, angioedema, or urticarial with penicillin or ampicillin.

Position on Antibiotic Stewardship in Patients with Prosthetic Joints Undergoing Dental Procedures

Summary Recommendation

The Wisconsin Oral Health Antibiotic Stewardship Program recommends that dental professionals, in conjunction with their patients, adopt the American Dental Association (ADA) guidance to limit use of antibiotic prophylaxis among patients with prosthetic joints and promote dental antibiotic stewardship among their patients.

Statement of the Problem

Dental patients with prosthetic joints are a focused population in need of better dental antibiotic stewardship. The topic of dental prophylactic antibiotic use among those with prosthetic joints continues to be of major concern among dental and infectious disease clinicians. Antibiotic prescription guidelines for this patient group have been repeatedly revised by the American Dental Association (ADA) and the American Academy of Orthopedic Surgeons (AAOS) since first published in 2009, but both entities are united in the opinion that most patients do not require prophylactic antibiotics for dental procedures following joint replacement.

Unfortunately, adherence to the recommendations has been lacking among many providers despite that clear position in the ADA's most recent version of the guidelines from 2015 and a consensus statement from 2012. These guidelines need additional promotion and communication to achieve better adherence and understanding from providers and patients on the risks and benefits of antibiotic interventions on the occurrence of prosthetic joint infection (PJI).

Matters for Consideration

a. Antibiotic overprescribing

Indiscriminate antibiotic prescription practices have far-ranging impact, from altering the microbial ecology to unanticipated adverse drug events (ADEs). In 2015, *Clinical Infectious Diseases* (25) published a national analysis of oral antibiotic prescribing data representing prescribing patterns for all outpatient U.S. antibiotic prescriptions in 2011. An unanticipated finding of the analysis was that 10% of all antibiotic courses were prescribed by dentists. A recent study conducted by Suda et al. at the University of Illinois at Chicago (26) found that 81% of dental prophylaxis prescriptions between 2011 and 2015 were unnecessary, and that 4% of those prescriptions resulted in an ADE within two weeks following antibiotic initiation. *Clostridium difficile* infection (CDI) is a known ADE following the use of any antibiotic. It is strongly associated with clindamycin use, and dentists are a leading prescriber of clindamycin (27, 28) in the U.S. A 2017 study in the *Journal of the American Medical Association* (JAMA) on hospitalized patients also demonstrated that every additional 10 days of antibiotic use led to a 3% increased ADE risk. (29)

b. Microbiology considerations

Whether dental procedures increase the risk of PJI has been debated for decades. The primary misconception is that bacteremia that may occur related to dental cleanings and/or extractions are directly linked to a risk for infective endocarditis or PJI, thereby making antibiotic prophylaxis (AP) warranted for all such procedures. However, there are two major considerations that argue against routine dental AP.

First, several clinical and experimental studies have demonstrated that routine daily and physiologic activities, such as tooth brushing, flossing, and chewing are all associated with a transient low-grade bacteremia. The duration of such routine bacteremia would depend on the length of the activity. When considering the risk of bacteremia with an office dental procedure, some studies have shown that dental cleanings and extractions are associated with a bacteremia that is similarly transient and low-grade, but linked to a single event (30-33). This would indicate that the cumulative risk of bacteremia from daily dental hygiene generally exceeds that resulting from a single dental procedure.

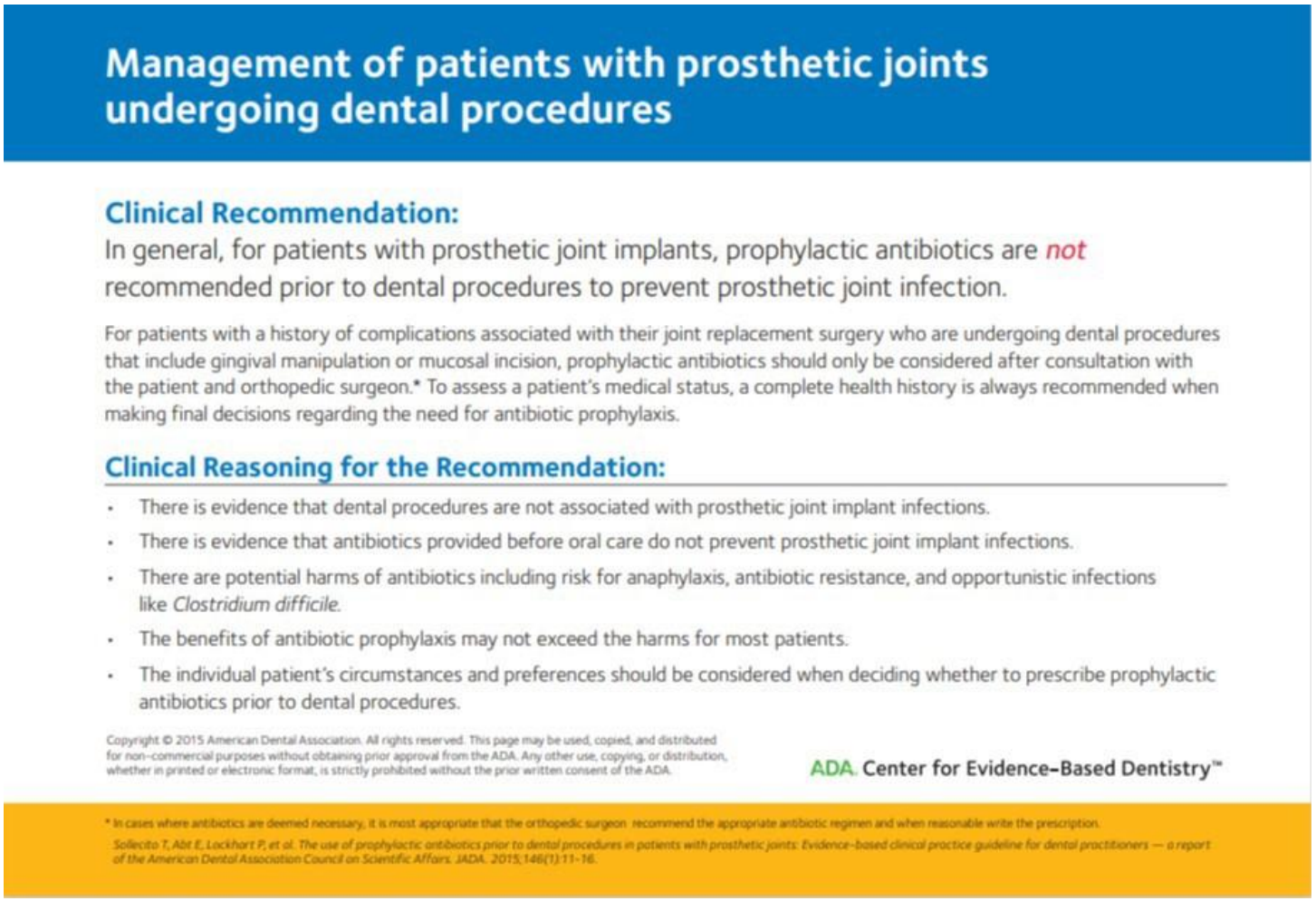
Second, actual prosthetic contamination as a consequence of dental procedures is very unusual, even in studies of patients without antibiotic prophylaxis (34-36). Furthermore, animal modeling studies suggest that on a quantitative basis, there is a large difference between the low-grade bacteremia caused by physiologic activities and dental procedures ($<10^4$ colony-forming units (CFU)/mL) compared to the high-density bacteremia needed for hematogenous seeding of distant sites ($3–5 \times 10^8$ CFU/ mL) (37).

In 2014, an ADA expert panel carefully reviewed the available literature, including from a microbiological perspective, and concluded that the evidence did not support a direct association between dental procedures and PJI (38). Organisms originating from an odontogenic source that are capable of causing a distant infection, including infective endocarditis and PJI, include *Strep viridans sp.*, other strep species, and gram-positive anaerobic bacteria. In contrast, the majority of PJIs (50-60%) are secondary to staphylococci (S. *aureus*, coagulase-negative staphylococci sp.) (39-41). Streptococci and enterococci together account for only approximately 10% of PJI cases (39-41). Even if oral bacteria are recovered from joint cultures in a suspected case of PJI, it is difficult to prove when a hematogenous dissemination might have occurred from the oral cavity to the prosthetic joint, in part because of the daily episodes of transient bacteremia that occur with the above-mentioned activities of daily living.

Summary of Recommendations

a. ADA National Expert Panel

In light of the above information, and as shown in the graphic below, it is the current recommendation of the ADA expert panel that AP before dental procedures in patients with prosthetic joints generally should ***not*** be given.



Management of patients with prosthetic joints undergoing dental procedures

Clinical Recommendation:

In general, for patients with prosthetic joint implants, prophylactic antibiotics are *not* recommended prior to dental procedures to prevent prosthetic joint infection.

For patients with a history of complications associated with their joint replacement surgery who are undergoing dental procedures that include gingival manipulation or mucosal incision, prophylactic antibiotics should only be considered after consultation with the patient and orthopedic surgeon.* To assess a patient's medical status, a complete health history is always recommended when making final decisions regarding the need for antibiotic prophylaxis.

Clinical Reasoning for the Recommendation:

- There is evidence that dental procedures are not associated with prosthetic joint implant infections.
- There is evidence that antibiotics provided before oral care do not prevent prosthetic joint implant infections.
- There are potential harms of antibiotics including risk for anaphylaxis, antibiotic resistance, and opportunistic infections like *Clostridium difficile*.
- The benefits of antibiotic prophylaxis may not exceed the harms for most patients.
- The individual patient's circumstances and preferences should be considered when deciding whether to prescribe prophylactic antibiotics prior to dental procedures.

ADA Center for Evidence-Based Dentistry™

* In cases where antibiotics are deemed necessary, it is most appropriate that the orthopedic surgeon recommend the appropriate antibiotic regimen and when reasonable write the prescription.

Sollecito T, Abt E, Lockhart P, et al. The use of prophylactic antibiotics prior to dental procedures in patients with prosthetic joints: Evidence-based clinical practice guideline for dental practitioners — a report of the American Dental Association Council on Scientific Affairs. JADA. 2015;146(1):11-16.

[Management of Patients with Prosthetic Joints Undergoing Dental Procedures (ada.org)]

b. Recommendations of the Wisconsin Oral Health Antibiotic Stewardship Program

1. **ADA Guidance**: The Wisconsin Oral Health Antibiotic Stewardship Program recommends that dental professionals in the state adopt the ADA guidance to limit use of AP among patients with prosthetic joints and promote dental antibiotic stewardship among their patients.
2. **Patient History**: It is also imperative that dental health care professionals take a detailed patient history that includes any unique circumstances that might be an indication for AP.

a. In conjunction with the patient's primary care provider and/or orthopedic surgeon, a carefully weighed decision should be taken that is centered on the risks and benefits of AP.
b. According to the official 2015 ADA report on the evidence-based clinical practice guidelines on AP for patients with prosthetic joints (38), as well as the 2012 orthopedic consensus document (42), patient groups undergoing dental procedures that include gingival manipulation and that could *possibly* warrant consideration for AP (based on expert opinion) include those with a **history of complications associated with their joint replacement surgery or those who may be immunosuppressed.**
c. In the case of immunosuppression, discussion with the patient's oncology or rheumatology teams may also be useful before deciding on AP.
d. Advancing age as a single consideration is not sufficiently considered a reason for AP.

3. **Patient Education**: It is the responsibility of every health care provider, including all oral health professionals, to educate patients about the evolution of scientific evidence in any medical area.
    a. **Current evidence**: Patients should be made aware of the general lack of association between dental procedures and PJI, as well as the risks and benefits of AP. To support that education, the Wisconsin Oral Health Antibiotic Stewardship Program also developed a companion patient handout that can be used to share these recommendations for patients with artificial joints.
    b. **Oral hygiene**: The fact that the cumulative risk for a hematogenous PJI from routine daily oral health care is higher than that from a single dental procedure also highlights an important point that poor oral hygiene is associated with risk for PJI. Therefore, good oral hygiene practices must be emphasized and reviewed by oral health providers for all patients with either existing or impending prosthetic joint placements.

c. Discussion: Misconceptions and Consequences

Unfortunately, the issue of AP has been complicated because many patients have historically been told that they need antibiotic prophylaxis on the basis of historic practices prior to a pre-2012 ADA position consensus with orthopedic surgeons (42). Some orthopedic surgeons continue to advise patients to take antibiotics for at least the first 6-24 months (or sometimes for life) after a joint implantation as they construe this to be the time window at highest risk for infection until the prosthesis is more maturely seated. In

addition, it should be recognized that many patients request antibiotic prophylaxis from their primary care physicians, rather than their orthopedic surgeon, especially if considerable time has expired since their original prosthetic joint implantation.

The dentist or primary care physician's reluctance to avoid prescribing or the orthopedic surgeon's discomfort advising a patient to cease dental AP with existing or future prosthetic joint implantation is understandable. On the other hand, antibiotic-associated complications can lead to adverse events and carry other implications. Therefore, it is recommended that the ADA evidence-based 2015 guidelines are adhered to by all health care providers involved in the care of a patient with a prosthetic joint implant.

Patients may present with a recommendation from the orthopedic surgeon or primary family health care provider that are inconsistent with the 2015 guideline. This may reflect a lack of familiarity with the 2012 consensus statement or special considerations about the patient's medical condition of which the dentist is unaware. In such circumstances, members are encouraged to discuss the current evidence with the patient and consider consulting with the orthopedic surgeon or primary health care provider regarding the reason for the recommendation and the specific procedures for which antibiotic prophylaxis is suggested.

Each provider is ultimately responsible for his or her own treatment decisions. Following a consultation, the dentist may decide to follow the recommendation of the orthopedic surgeon or the primary family health care provider or, if professional judgment dictates that antibiotic prophylaxis is not indicated, decline to provide it. In the latter circumstance, the dentist may suggest that the orthopedic surgeon or primary family health care provider should be the prescribing health care provider for the patient as he or she deems appropriate.

Finally, in the event of an adverse drug event occurring as a result of dental AP, it would also be important for non-dental health care providers assessing the patient to inform the dental provider of the unintended consequences of the AP. This could foster accountability, responsibility, and awareness of the potential harm of all antibiotics, both individually and collectively.

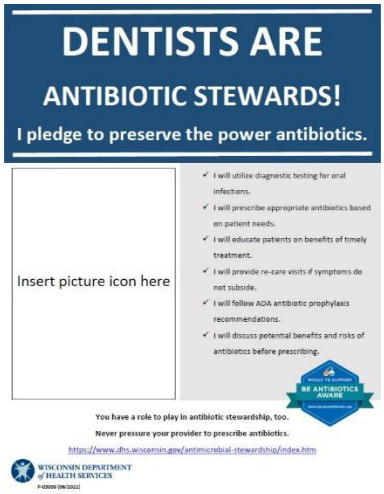
In conclusion, a thoughtful and multi-disciplinary approach for patients undergoing dental procedures with prosthetic joint implantation is crucial to stem the rise of antimicrobial resistance and avoid unnecessary factors that could contribute to adverse patient outcomes.

What can be done at your office or clinic?

We encourage oral health practitioners to make an office or clinic statement on antibiotic use. Engaging health care workers is an important component to improving antibiotic use, but shifting the facility's culture and conveying this to patients is the key to lasting change. Patients should be encouraged to commit to improving antibiotic use as well. Pledging improvement can mean more than simply raising awareness.

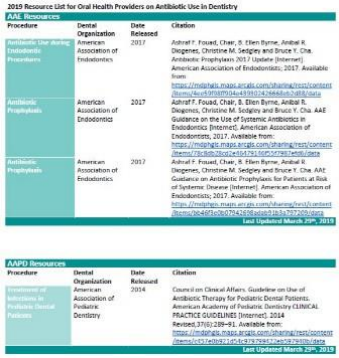
We encourage clinics to post commitments within view of their front desk, waiting areas, and possibly even exam rooms.

A sample template from Wisconsin, adaptable for your office with an individual picture, is available on the Wisconsin DHS antimicrobial stewardship dental webpage.

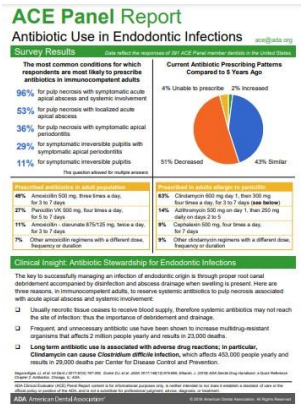


Other Useful Resources

[Checklist for Antibiotic Prescribing in Dentistry]



[2019 Resource List for Oral Health Providers on Antibiotic Use in Dentistry], Courtesy of the Massachusetts Department of Public Health



[ADA Clinical Evaluators (ACE) Panel Report: Antibiotic Use in Endodontic Infections]

[Patient Education Documents], Courtesy of the Massachusetts Department of Public Health

[Antibiotics Before Dental Procedures in Patients with Artificial Joints: Patient Fact Sheet]

Consider selective use of CDC poster documents: [CDC Patient Education and Promotional Resources]

Contact Information for the Wisconsin Antibiotic Stewardship Program

Statewide Antibiotic Stewardship Coordination
Healthcare-Associated Infections (HAI) Prevention Program
Wisconsin Department of Health Services, Division of Public Health
Phone: 608-267-7711
dhswihaipreventionprogram@dhs.wisconsin.gov

Wisconsin Oral Health Antibiotic Stewardship Program Members

- Russell Dunkel, DDS, FPFA, FICD, FACD, Wisconsin State Dental Director, Wisconsin Department of Health Services
- Greg Theis, DDS, MBA, Director – Dental Services, Delta Dental of Wisconsin
- Jesley Ruff, DDS, MPH, Forward Dental
- Scott Murphy, DMD, Service Line Director Marshfield Dental Clinic
- Joseph Best, DDS, PhD, Adjunct Associate Professor, Marquette University School of Dentistry, Private Practice, Oral and Maxillofacial Surgery Associates of Waukesha

The Wisconsin Oral Health Antibiotic Stewardship Program Members also acknowledge with appreciation the collaboration and development assistance by Ambar Haleem, MD, Assistant Professor, Division of Infectious Diseases, Department of Medicine, University of Wisconsin School of Medicine and Public Health.

Antibiotic Stewardship Guidance Limitations

The Wisconsin Antibiotic Stewardship Program provides materials and guidance with the understanding and recognition that information on antibiotic use is continuously evolving. Consensus statements, peer-reviewed articles, and evidence-based guidelines can have limitations. The following resource should not be construed as a care directive because individual needs are unique to each patient and circumstance. Conversations about antibiotic stewardship guidance should include informed clinical consideration, including informed judgement, to ensure common understanding. Prior to the implementation of a guideline, stakeholders, oral health providers, and health care organizations should conduct a review per their policies, procedures, and quality assurance functions to ensure guidelines comply with local, regional, and national requirements for patient care, safety, and quality.

References

1. JAMA 2016;315:1864-73. Prevalence of inappropriate antibiotic prescriptions amongUS ambulatory care visits, 2010-2011.
2. Family Practice. 2020;37:276-82. The inconvincible patient: how cliniciansperceive demands for antibiotics in the outpatient setting.
3. JADA 2020;151: 589-95. Antimicrobial stewardship in dental practice.
4. JADA 2017;148: 878-86. An evaluation of dental antibiotic prescribing practices inthe United States.
5. Clin Infect Dis. 2015;60:1308-16. US outpatient antibiotic prescribing variationaccording to geography, patient population, and provider specialty in 2011.
6. JADA 2016;147:320-7. Antibiotic prescribing by dentists has increased: why?
7. JADA 2017; 148:172-178. Antibiotic prescribing by general dentists in the UnitedStates for 2013 and risk of *Clostridium difficile*.
8. JAMA 2019; Jan 15;321:188-199. Antibiotic allergy discussion.
9. Clin Infect Dis. 2017;64:531-32. Penicillin allergy testing: a key componentof antibiotic stewardship.
10. J Allergy Clin Immunol. 2016;137:1148-53. Consequences of avoiding β-lactams in patients with β-lactam allergies.
11. Open Forum Infect Dis. 2017;4: S1. Antibiotic prescribing for dental procedures in community-associated *Clostridium difficile* cases, Minnesota,2009-2015.
12. J Dent Res. 2019 Sep;98:1081-1087. Risks of clindamycin use.
13. Oral Surg Oral Med Oral Pathol Oral Radiol Endod. 2010;110:151-156. Antimicrobial susceptibility and resistance of the odontogenic microbiologicspectrum and its clinical impact on severe deep space head and neck infections.
14. Anaerobe. 2014;28:120-125. Antimicrobial susceptibility of clinical isolatesof anaerobic bacteria in Ontario, 2010-2011.
15. J Antimicrob Chemother. 2014;69:155-61. Multicentre survey of antibioticsusceptibility of anaerobic bacteria.
16. Pathol Biol 1991;39:558-60. Augmentin, amoxicillin, and metronidazole.
17. Pharmacological Research 2018;134;280-288. Beta-lactam pharmacokineticsreference.
18. Mayo Clin Proceed 1999;74;290-307. Pharmacokinetics of antibiotics.
19. Clin Infect Dis 2019;69:1467-75;1476-79. Duration of antibiotic Rx.
20. JADA 2019;150:906-921. Evidence-based clinical practice guidelines on antibiotic use for the urgent management of pulpal and periapical-relateddental pain and intraoral swelling.
21. Circulation 2007;116:1736-54. Original AHA guidelines to prevent endocarditisdental work.
22. J Am Coll Cardiol 2017;70:252-89. 2017 AHA/ACC Focused update of the 2014 AHA/ACC guideline for the management of patients with valvular heart disease: areport of the ACC/AHA task force on clinical practice guidelines.
23. Circulation 2018;138:356-63. Risk of infective endocarditis after dental treatments.
24. Circulation 2010;121;458-477. AHA guidelines to prevent endocarditis withimplantable medical devices.

25. Clin Infect Dis. 2015;60:1308-16. U.S. outpatient antibiotic prescribing variation according to geography, patient population, and provider specialty in 2011.
26. JAMA Open Network. 2019 May 3;2:e193909. Assessment of the appropriateness of antibiotic prescriptions for infection prophylaxis before dental procedures, 2011 to 2015.
27. J Am Pharm Assoc. 2016;56: 621-6 e1. Antibiotic prescriptions in the community by type of provider in the United States, 2005-2010.
28. JADA. 2017;148:878-86. An evaluation of dental antibiotic prescribing practices in the United States.
29. JAMA Intern Med. 2017 Sep 1;177:1308-1315. Association of adverse events with antibiotic use in hospitalized patients.
30. J Dent. 2008 Jul;36:481-7. Prevalence, intensity and nature of bacteremia after toothbrushing.
31. Oral Microbiol Immunol. 2009;24 :177-82. Prevalence, intensity and identity of bacteremia following conservative dental procedures in children.
32. J Clin Microbiol. 1990;28:2205-9. Detection and quantitation by lysis-filtration of bacteremia after different oral surgical procedures.
33. J Clin Periodontol. 2006;33 :401-7. Incidence of bacteremia after chewing, tooth brushing and scaling in individuals with periodontal inflammation.
34. Clin Infect Dis. 2010;50 :8-16. Dental procedures as risk factors for prosthetic hip or knee infection: a hospital-based prospective case-control study.
35. Infect Control Hosp Epidemiol. 2017 Feb;38:154-161. Prosthetic joint infection following invasive dental procedures and antibiotic prophylaxis in patients with hip or knee arthroplasty.
36. Crémieux AC, Carbon C. Experimental models of bone and prosthetic joint infections. Clin Infect Dis. 1997 Dec;25:1295-302.
37. Poultsides LA, Papatheodorou LK, Karachalios TS, et al. Novel model for studying hematogenous infection in an experimental setting of implant-related infection by a community-acquired methicillin-resistant S. aureus strain. J Orthop Res. 2008;26:1355–62.
38. JADA. 2015;146:11-16, e8. The use of prophylactic antibiotics prior to dental procedures in patients with prosthetic joints: Evidence-based clinical practice guideline for dental practitioners—a report of the American Dental Association Council on Scientific Affairs. http://dx.doi.org/10.1016/j.adaj.2014.11.012
39. N Engl J Med. 2004; 351:1645-54. Prosthetic-joint infections.
40. Clin Microbiol Rev. 2014 Apr;27:302-345. Prosthetic joint infection.
41. Clin Infect Dis. 1998;27:1247–54.Risk factors for prosthetic joint infection: case-control study.
42. American Academy of Orthopedic Surgeons Evidence-Based Clinical Practice Guideline for the Prevention of Orthopedic Implant Infections in Patients Undergoing Dental Procedures https://www.aaos.org/globalassets/quality-and-practice-resources/dental/pudp_guideline.pdf. Published December 7, 2012.
43. Circulation 2021;143;e963–e978. Prevention of Viridans Group Streptococcal Infective Endocarditis.