# Use of Antibiotic Therapy for Pediatric Dental Patients

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## Purpose

The American Academy of Pediatric Dentistry (**AAPD**) recognizes the increasing prevalence of antibiotic-resistant microorganisms and potential for adverse drug reactions and interactions. These recommendations are intended to provide guidance in the proper and judicious use of antibiotic therapy in the treatment of oral conditions. The use of antibiotic prophylaxis for dental patients at risk for infection is addressed in a separate best practices document.[1] Information regarding commonly prescribed antibiotics can be found in "Useful Medications for Oral Conditions".[2]

## Methods

Recommendations on the use of antibiotic therapy were developed by the Council on Clinical Affairs and adopted in 2001.[3] This document is a revision of the previous version, last revised in 2014.[4] The revision was based upon a new literature search of the PubMed®/MEDLINE database using the terms: antibiotic therapy, antibacterial agents, antimicrobial agents, dental trauma, oral wound management, orofacial infections, periodontal disease, viral disease, and oral contraception; fields: all; limits: within the last 10 years, humans, English, clinical trials, birth through age 18. Three hundred forty-three articles matched these criteria. Papers for review were chosen from this search and from hand searching. When data did not appear sufficient or were inconclusive, recommendations were based upon expert and/or consensus opinion by experienced researchers and clinicians.

## Background

Antibiotics are beneficial to patient care when prescribed and administered correctly for bacterial infections. However, the widespread use of antibiotics has permitted common bacteria to develop resistance to drugs that once controlled them.[5-7] Drug resistance is prevalent throughout the world.[7] In the United States, at least two million people are infected by antibiotic-resistant bacteria per year.[6] Some microorganisms may develop resistance to a single anti-microbial agent, while others develop multidrug-resistant strains.[7] To diminish the rate at which resistance is increasing, health care providers must be prudent in the use of antibiotics.[6,8] Conservative use of antibiotics is indicated to minimize the risk of developing resistance to current antibiotic regimens.[6,7] Adverse events such as allergic reactions, development of *C. difficile*, or drug interactions and side effects can occur.[9] The Centers for Disease Control and Prevention reports that every year there are 140,000 emergency department visits for reactions to antibiotics, and that antibiotics are the most common cause of emergency department visits for adverse drug events in children under the age of 18 years.[9]

## Recommendations

Practitioners should adhere to the following general principles when prescribing antibiotics for the pediatric population.

**Oral wounds**

Factors related to host risk (e.g., age, systemic illness, co-morbidities, malnutrition) and type of wound (e.g., laceration, puncture) must be evaluated when determining the risk for infection and subsequent need for antibiotics. Wounds can be classified as clean, potentially contaminated, or contaminated/dirty. Facial lacerations and puncture wounds may require topical antibiotic agents.[10] Intraoral puncture wounds and lacerations that appear to have been contaminated by extrinsic bacteria, debris (e.g., dirt, soil, gravel), foreign body, open fractures, and joint injury have an increased risk of infection and should be managed by systemic antibiotics.[10] Tetanus immunization status should be determined. If it is decided that antibiotics would be beneficial to the healing process, the timing of the administration of antibiotics is critical to supplement the natural host resistance in bacterial killing. The drug should be administered as soon as possible for the best result. The most effective route of drug administration (intravenous vs. intramuscular vs. oral) must be considered. The clinical effectiveness of the drug must be monitored. The minimal duration of drug therapy should be five days beyond the point of substantial improvement or resolution of signs and symptoms; this is usually a five- to seven-day course of treatment dependent upon the specific drug selected.[11-13] In light of the growing problem of drug resistance, the clinician should consider altering or discontinuing antibiotics following determination of either ineffectiveness or cure prior to completion of a full course of therapy.[14] If the infection is not responsive to the initial drug selection, a culture and sensitivity testing of a swab from the infective site or, in some cases, a blood microbiology, culture, and sensitivity may be indicated.

**Pulpitis/apical periodontitis/draining sinus tract/localized intra-oral swelling**

Bacteria can gain access to the pulpal tissue through caries, exposed pulp or dentinal tubules, cracks into the dentin, and defective restorations. If a child presents with acute symptoms of pulpitis, treatment (i.e., pulpotomy, pulpectomy, or extraction) should be rendered. Antibiotic therapy usually is not indicated nor effective if the dental infection is contained within the pulpal tissue or the immediate surrounding tissue. In this case, the child will have no systemic signs of an infection (i.e., no fever and no facial swelling).[5]

Consideration for use of antibiotics should be given in cases of advanced non-odontogenic bacterial infections such as staphylococcal mucositis, tuberculosis, gonococcal stomatitis, and oral syphilis. If suspected, it is best to refer patients for microbiology, culture and sensitivity, biopsy, or other laboratory tests for documentation and definitive treatment.

**Acute facial swelling of dental origin**

A child presenting with a facial swelling or facial cellulitis secondary to an odontogenic infection should receive prompt dental attention. In most situations, immediate surgical intervention is appropriate and contributes to a more rapid cure.[15] The clinician should consider age, cooperation, the ability to obtain adequate anesthesia (local vs. general), the severity of the infection, the medical status, and any social issues of the child.[15,16] Signs of systemic involvement and septicemia (e.g., fever, malaise, asymmetry, facial swelling, lymphadenopathy, trismus, tachycardia, dysphagia, respiratory distress) warrant emergency treatment. Additional testing such as a complete blood examination, c-reactive protein, blood cultures, and bacterial culture and sensitivity can aide in assessment and diagnosis. Intravenous antibiotic therapy medical management is indicated.[15,16] Penicillin derivatives remain the empirical choice for odontogenic infections; however, consideration of additional adjunctive antimicrobial therapy (i.e., metronidazole) can be given where there is anaerobic bacterial involvement.[14,17] Cephalosporins could be considered as an alternative choice for odontogenic infections.[17]

**Dental trauma**

Systemic antibiotics have been recommended as adjunctive therapy for avulsed permanent incisors with an open or closed apex.[18-20] Tetracycline (doxycycline twice daily for seven days) is the drug of choice, but consideration of the child's age must be exercised in the systemic use of tetracycline due to the risk of discoloration in the developing permanent dentition.[21] Penicillin V or amoxicillin can be given as an alternative in patients under 12 years of age.[18,20] The use of topical antibiotics (minocycline or doxycycline) to enhance pulpal revascularization and periodontal healing in immature non-vital traumatized teeth has shown some potential.[18,20,22] However, further randomized clinical trials are needed.[23,24] For luxation injuries in the primary dentition, antibiotics are not indicated.[18,25] Antibiotics can be warranted in cases of concomitant soft tissue injuries (see **Oral wounds**) and when dictated by the patient's medical status.

**Pediatric periodontal diseases**

Gingival inflammation due to the presence of bacterial plaque accumulation is a key factor in the development of periodontal disease and must be controlled.[26] However, a distinction must be made between a site of gingival inflammation versus a gingival case, diagnosed at the patient level, using specific criteria, including bleeding on probing.[27] Periodontal diseases recently have been classified into three groups: 1) periodontal health, gingival diseases, and conditions; 2) periodontitis and; 3) other conditions affecting the periodontium;[28] periodontitis is further classified as necrotizing periodontal disease, periodontitis as manifestation of systemic diseases, and periodontitis.[28] Prior terms of chronic or aggressive periodontitis are now included in the single category of periodontitis.[29] Dental plaque-induced gingivitis is managed by appropriate local therapeutic interventions[24] including professional oral hygiene and re-enforcement of brushing twice daily for at least two minutes.[30] Patients diagnosed with what formerly was known as aggressive periodontal disease may require adjunctive antimicrobial therapy in conjunction with localized treatment.[31-34] In pediatric periodontal diseases associated with systemic disease (e.g., severe congenital neutropenia, Papillon-Lefèvre syndrome, leukocyte adhesion deficiency), the immune system is unable to control the growth of periodontal pathogens and, in some cases, treatment may involve antibiotic therapy.[31,35] In severe and refractory cases, extraction is indicated.[31,35] Culture and susceptibility testing of isolates from the involved sites are helpful in guiding the drug selection.[31,35]

**Viral diseases**

Conditions of viral origin such as acute primary herpetic gingivostomatitis should not be treated with antibiotic therapy.[9]

**Salivary gland infections**

For acute salivary gland swellings of bacterial nature, antibiotic therapy is indicated.[36] If the patient does not improve in 24-48 hours on antibiotics alone, incision and drainage may be warranted.[6] Amoxicillin/clavulanate is used as empirical therapy to cover both staphylococcal and streptococcal species as most bacterial infections of the salivary glands originate from oral flora.[36] Clindamycin is appropriate for penicillin allergic patients.[33] The most common inflammatory salivary gland disorder in the U.S. is juvenile recurrent parotitis (**JRP**), with first onset of symptoms between ages 3-6 years old, continuing to puberty.[36] Although JRP is self-limiting, administration of ®-lacatam antibiotics can shorten symptom duration.[36] For both acute bacterial submandibular sialadenitis and chronic recurrent submandibular sialadenitis, antibiotic therapy is included as part of the treatment.[37]

**Oral contraceptive use**

Although caution is advised with the concomitant use of antibiotics and oral contraceptives,[38,39] a 2018 systematic review of drug interactions between non-rifamycin antibiotics and hormonal contraception found that most women can expect no reduction in hormonal contraceptive effect with the concurrent use of non-rifamycin antibiotics.[40] The World Health Organization also reported in 2015 that most broad-spectrum antibiotics do not affect the contraceptive effectiveness of combined oral contraceptives, combined contraceptive patch, or the combined contraceptive vaginal ring.[41] In addition, no differences in ovulation were found when oral contraceptives were combined with ampicillin, doxycycline, temafloxacin, ofloxacin, ciprofloxacin, clarithromycin, roxithromycin, dirithromycin, or metronidazole.[40] Women should be encouraged to take oral contraceptives correctly and consistently at all times, including during periods of illness.[40] Rifamcyin antibiotics, such as rifampin or rifabutin, induce hepatic enzymes that are required for hormonal contraceptive metabolism, which could compromise the contraceptive or antibiotic effect.[40,41] Use of other contraceptives should be advised with long-term use of these medications.[41]

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