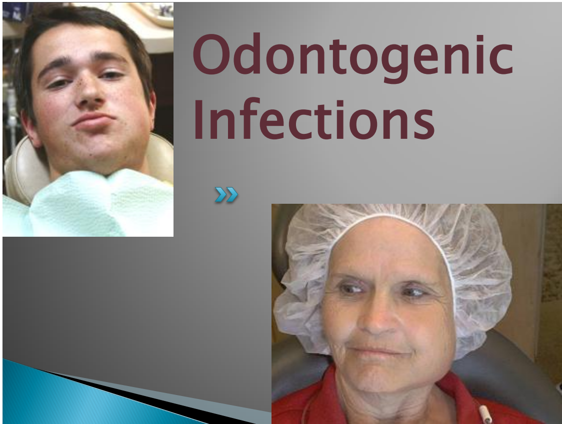

CINCINNATI (WTLW 5)-- Doctors at University Hospital in Cincinnati said a 24-year-old father **died Wednesday from a tooth infection.**

But doctors said that rare as it may be, what started out as a toothache eventually killed the young father and aspiring paralegal.

Family members said Willis' wisdom tooth started hurting two weeks ago. Dentists said it needed to be pulled, but being an unemployed single father, Willis decided to ignore the pain. He was out of work and didn't have health insurance. But when Willis started getting headaches and his face began to swell, he went to the emergency room.

"The (doctors) gave him antibiotic and pain medication. But he couldn't afford to pay for the antibiotic, so he chose the pain meds, which was not what he needed."

Doctors told Willis' family that while the pain had stopped, the infection kept spreading -- eventually attacking his brain and causing it to swell.

DRUG INFORMATION HANDBOOK for DENTISTRY

17th Edition

Pen VK: 500mg qid, Amoxicillin 500mg tid or 875mg bid
Clindamycin 300 mg tid, Cephalexin 500mg qid
Metronidazole 500mg tid.

Table 1.
EMPIRIC ANTIBIOTICS OF CHOICE FOR ODONTOGENIC INFECTIONS

Type of Infection	Antibiotic of Choice
Early (first 3 days of symptoms)	Penicillin VK, amoxicillin Clindamycin Cephalexin (or other first generation cephalosporin)[1]
No improvement in 24-36 hours	Beta-lactamase-stable antibiotic: Clindamycin or amoxicillin / clavulanic acid Augmentin
Penicillin allergy	Clindamycin Cephalexin (if penicillin allergy is not anaphylactoid type) Clarithromycin (Biaxin®)[2]
Late (>3 days)	Clindamycin Penicillin VK-metronidazole, amoxicillin-metronidazole
Penicillin allergy	Clindamycin

[1]For better patient compliance, second generation cephalosporins (cefaclor; cefuroxime) at twice daily dosing have been used; see text. Ceclor Ceftin

[2]A macrolide useful in patients allergic to penicillin, given as twice daily dosing for better patient compliance; see text. Or Z-Pak "as directed": (500+250 each day after after for 4 days.)

1.

- Generally best to use the most specific narrow-spectrum antibiotic to which the micro-organisms are susceptible.
- Narrow-spectrum antibiotics frequently are more effective than broad-spectrum agents against specific groups of susceptible micro-organisms.

Goodchild, JH and Donaldson, M. Appropriate antibiotic prescribing For the general dentist. General Dentistry, Nov.-Dec. 2009.

AND they help prevent resistant strains and super-infections.

The antibacterial spectrum of Pen VK is consistent with most of the organisms in odontogenic infections.

Table 2.
PENICILLIN VK: ANTIBACTERIAL SPECTRUM

Gram-Positive Cocci	**Oral Anaerobes**
Streptococci	*Bacteroides*
Nonresistant staphylococci[1]	*Porphyromonas*
Pneumococci	*Prevotella*
	Peptococci
Gram-Negative Cocci	Peptostreptococci
Neisseria meningitides	*Actinomyces*
Neisseria gonorrhoeae	*Veillonella*
	Eubacterium
Gram-Positive Rods	*Eikenella*
Bacillus	*Capnocytophaga*
Corynebacterium	*Campylobacter*
Clostridium	*Fusobacterium*
	Others

Penicillin*:

- Is bacteriocidal.
- Is narrow spectrum – to produce less alteration of normal microflora, thereby reducing "superinfections".
- Kills gram+ cocci and the major pathogens of mixed anaerobic infections.
- Has no adverse effects except allergy in some.

Drug Information Handbook for Dentistry
Lexicomp. 15th ed.*

Penicillin:

- Is low cost.
- Has peak serum levels in 1 hour.
- Can be given with meals but will have a higher blood concentration if on an empty stomach.
- Is a beta-lactam antibiotic (like amoxicillin and the cephalosporins).

Antibiotic use for treating dental infections in children

A survey of dentists' prescribing practices

JADA 143(1)
January 2012

Misuse of antibiotics has given rise to the growing problem of antibiotic resistance.
Even when used correctly – can develop resistant microbes.

Antibiotic resistance is present in the oral flora. Gram-negative anaerobes have appeared in most microbiological studies reviewed in the literature. Most strains tested showed penicillin resistance.

10% of antibiotic prescriptions in the U.S. are related to dental care.

"Major distinction between medical and dental conditions is that most dental infections can be treated successfully by removal of the source of the infection."

Some clinicians prefer **amoxicillin** over Pen VK as the penicillin of choice for odontogenic infections.

- **Main advantage is with compliance (tid or bid over qid).**
- Better for sinus and ear infections.
- Less useful for aerobes (similar to Pen VK with anerobes).
- May be better for enteric bacteria if present in immunosuppressed people.

Gordon J. Christensen
CLINICIANS REPORT

Antibiotics in Dentistry: What to Use and When to Use It

Gordon's Clinical Bottom Line: Why do you prescribe certain antibiotics? When should you provide any antibiotics and for what clinical situations? Are there more adequate antibiotics than those you commonly use? Based on current research, most frequent use, and international data, CR staff and Evaluators have provided useful guidelines on antibiotics for use in your practice. Penicillin VK and Amoxicillin are the most prescribed antibiotics for oral conditions requiring antibiotic coverage.

Infratemporal space abscess with orbital extension, abscessed tooth #1

Submandibular space abscess with neck extension, abscessed tooth #31

Antibiotics are vitally important in the adjunctive management of dental, oral, and facial infections. ***They do not replace the need for eliminating the foci (etiology) of infection!*** However, when used properly, they can shorten its duration and lessen associated risks.

Antibiotics are also necessary to prevent the joint and heart sequelae to high-risk patients by bacteremias associated with certain dental procedures. Since a previous Clinicians Report *(Feb. 2008)* has already reviewed this topic and presented suggested situations in which prophylactic antibiotics are recommended, this aspect of antibiotic therapy will not be covered here.

This article identifies why and which drugs, doses, and durations you should prescribe.

Continued on page 4

2.

Antibiotics in Dentistry: What to Use and When to Use It *(Continued from page 1)*

Localized vs. Spreading Infections

Determine the nature of an infection and whether it is *localized* or *spreading*. In either case, incision and drainage may be warranted. A spreading infection is more likely to require the help of a specialist such as an oral and maxillofacial surgeon.

Characteristics of a local infection:

- Periapical abscess confined to bone
- Percussive tenderness
- Chronic fistula
- Gingival swelling
- Local pericoronal infection without lymph node tenderness or swelling

See table for treatment recommendations.
Although Penicillin VK *(or generic)* is empirically the first choice for this type of odontogenic infection, patient compliance increases from 42% to 70% by twice-a-day dosing with Amoxicillin 875mg.

Antibiotic Therapy in Treatment of Odontogenic Infections

Treatment dictated by determination of local vs. spreading infection. Use QD or BID dosing schedule to maximize patient compliance.

Assess Degree of Infection
Localized Infection → Debridement* → Treatment of Localized Infection
Spreading Infection → Debridement* → Treatment of Spreading Infection

Treatment of Localized Infection	
Non-Penicillin Allergic	Penicillin Allergic
Amoxicillin 875mg BID x 7 days	Azithromycin Z-pak #1 as directed Tri-pak #1 as directed
	Clindamycin 300mg TID x 7 days

Treatment of Spreading Infection	
Non-Penicillin Allergic	Penicillin Allergic
Augmentin 875mg BID x 10 days	Clindamycin 300mg TID x 7 days
	Azithromycin Z-pak #1 as directed
Add Metronidazole *(Flagyl)* 500 mg TID if necessary. Caution patient not to drink alcohol *(antabuse effect)*.†	

Types of Spreading Infections

- Cellulitis
- Sinusitis
- Brain abscess
- Facial fistulization
- Retropharyngeal space
- Distant seeding

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*Debridement: surgical removal of lacerated, devitalized, or contaminated tissue *(i.e. RCT, Extraction, I&D)*
†When to add Metronidazole: If no improvement of spreading infection is evident after 48 hours of initial regimen, then add metronidazole *(Flagyl)*.

Alternative antibiotics if allergic to penicillin*:

- Clindamycin and Azithromycin
- Metronidazole useful only against anerobes so is reserved only for when they are suspected or in combination with an anti-aerobic bacteria like penicillin.

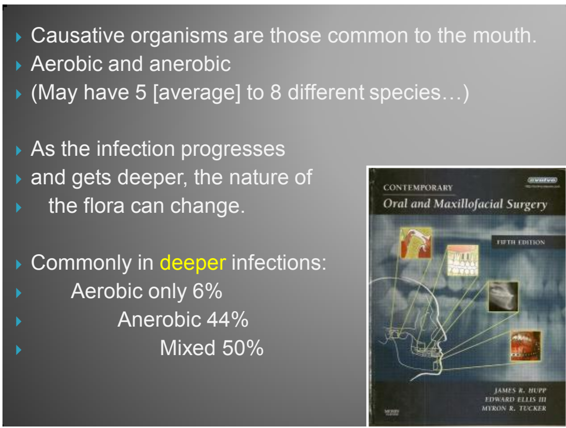
* Contemporary Oral and Maxillofacial Surgery, 5th ed.

Clarithromycin – but it has many side-effects like erythromycin.

And the cephalosporins, like Keflex, if the allergy is not of the immediate hypersensitivity (anaphylaxis) type.

Why can't we depend on just one or two antibiotics?

Because the nature of the infection changes as it progresses.



- Predominant aerobic bacteria: strep in 65% of cases – mostly in S. viridans group.
  - are facultative: can grow w or w.o. oxygen.
- More variety with anerobic bacteria.
- 65% of cases are gram positive cocci
- 75% of cases are gram negative rods
- Usually don't cause the infection but are opportunistic.

3.

Nov.-Dec. 2009
General Dentistry

PHARMACOTHERAPEUTICS

self instruction — CDE 2 HOURS CREDIT

Appropriate antibiotic prescribing for the general dentist

Jason H. Goodchild, DMD ▪ Mark Donaldson, PharmD, FASHP

While it is important for dental providers to keep current with published antibiotic guidelines (which may represent standards of care), there remains some controversy as to the evidence base for the efficacy of these recommendations. When antibiotics are indicated, their appropriate prescription remains an important challenge for dental and medical professionals alike.

Received: May 27, 2009
Accepted: June 26, 2009

General dentists regularly prescribe antibiotics, both to prevent infections or

concerning the continuation of this practice for different patient groups. This article will focus specifically

Although these recommendations were intended to help guide prophylactic antibiotic use, a 2007

Antibiotic indication	First choice	Second choice	For patients allergic to penicillin*	For patients unable to tolerate oral therapy
Treatment of an acute dental infection where culture and sensitivity data for the organism(s) are unknown	Amoxicillin (500 mg orally three times a day)	Augmentin (875 mg orally twice a day)†; penicillin VK (500 mg orally three times a day)‡	Clindamycin (300 mg orally three times a day); azithromycin (500 mg initially, followed by 250 mg orally once a day)	Consider medical referral for outpatient IV antibiotics

* Any time a patient reports a history of anaphylaxis, angioedema, or urticaria following penicillin, ampicillin, or amoxicillin

† Consider augmentin in place of amoxicillin if methicillin-resistant *Staphylococcus aureus* (MRSA) is either suspected or highly prevelant in the community.

‡ Penicillin is still the best single agent against *Streptococcus* infections (including *Peptostreptococcus*); however, it has no activity against Gram-negative infections. Consider including clindamycin for severe infections to improve this coverage.

Start as soon as possible after I&D or opening tooth to drain.

Dental literature: Shorter treatment courses (2-3 days after resolution of symptoms) are becoming the standard since there is strong evidence to suggest that reduced antibiotic usage results in fewer complications while still providing similar outcomes.

Too long or too weak a dose can lead to the emergence of resistance.

Loading doses are suggested to achieve bacterial eradication and clinical cure.

Do you think this patient needs an antibiotic?*

1. Is there swelling, is it progressing rapidly, is there a diffuse cellulitis?

*From Contemporary Maxillofacial Surgery, 5th ed.

2. Can adequate surgical treatment be accomplished?
   - Begin endodontic TX or removal of the tooth.
   - Provide drainage of accumulated pus and necrotic debris. (Still give it.)
3. Does the patient have adequate host defenses?

Do you extract an infected tooth?

- Contrary to widely held opinion, extraction of a tooth in the presence of infection does not promote the spread of infection.
- Several studies have shown that removal of a tooth in the presence of infection hastens its resolution and minimizes the complication of the infection, such as time out of work, hospitalization, and the need for I&D.
- Therefore, prompt removal of the offending tooth in the presence of infection is to be encouraged. A prior period of antibiotic therapy (the week prior) is not necessary. (Contemporary Oral and Maxillofacial Surgery, 5th ed. Page 302.)

What about after the extraction? I would give it.

Implants and Antibiotics

Prophylactic Antibiotic Regimens in Oral Implantology: Rationale and Protocol

Randolph R. Resnik, DMD, MDS,* and Carl Misch, DDS, MDS†

Postoperative wound infections may have a significant impact on the success of dental implants and bone grafting procedures. The occurrence of surgical wound infection requires local inoculums to overcome host defenses and allow an environment that is conducive for bacterial growth. This process is very complex with interactions of host, local tissue, systemic and microbial virulence factors. Various measures attempt to minimize infection by modifying the host and local tissue factors. Such measures include control

The use of antimicrobials reduces the incidence of surgical wound infection in oral implantology. Antimicrobial prophylaxis is indicated in all Class 2 (clean-contaminated) surgical procedures, which include sufficient blood levels at the time of bacterial contamination of dental implant and bone graft procedures. Timing and dosage are critical to the efficacy of antibiotics. Antibiotic selection is determined mainly by the bacteria which is most likely to cause an infection from the specific procedure. The authors have developed a classification and protocol that allows the dental practitioner to properly prescribe medication based on procedural, local host and systemic factors. (Implant Dent 2008;17:142–150)

Key Words: dental implants, antibiotic prophylaxis, surgical wound infection, pharmacologic protocol, risk factors

Table 4. Misch International Implant Institute Prophylactic Protocol

Type	Patient Selection	Procedures	Antibiotic	Antimicrobial
Type 1	ASA1/ASA2	Simple extractions of uninfected teeth Single tooth implants 2nd stage surgery Limited soft tissue reflection surgery	None	Chlorhexidine (intra/extra oral): 1/2 oz. bid for 2 wk
Type 2	ASA1/ASA2	Multiple simple extractions Traumatic extractions Multiple implants/limited reflection Socket grafting Immediate implants/no pathology	Amoxicillin: 1 g 1 h before surgery 500 mg 6 h later	Chlorhexidine (intra/extra oral): 1/2 oz. bid for 2 wk
Type 3	ASA1/ASA2	Membrane bone grafting (allograft/zenograft/alloplast) Multiple implants/extensive reflection Multiple immediate implants	Amoxicillin: 1 g 1 h before surgery, then 500 mg tid for 3 d	Chlorhexidine (intra/extra oral): 1/2 oz. bid for 2 wk
Type 4	Any of the following: >ASA2 Long duration surgery Less experienced surgeon Immuno-compromised Active periodontal disease	Full arch implants/extensive reflection Sinus lift (SA2) Autogenous bone grafts	Amoxicillin: 1 g 1 h before surgery, then 500 mg tid for 5 d	Chlorhexidine (intra/extra oral): 1/2 oz. bid for 2 wk
Type 4 Sinus	SA3/SA4 sinus patients	SA3/SA4 sinus patients	Augmentin (875 mg/125 mg): 2 tabs starting 1 d before, then 1 tab bid for 5 d	Chlorhexidine (intra/extra oral): 1/2 oz. bid for 2 wk

Orally administered amoxicillin decreases the risk of implant failures

A critical summary of Esposito M, Grusovin MG, Talati M, Coulthard P, Oliver R, Worthington HV. Interventions for replacing missing teeth: antibiotics at dental implant placement to prevent complications. Cochrane Database Syst Rev 2008;(3). doi: CD004152.

Stacy Geisler, DDS, PhD

Systematic review conclusion. Evidence suggests that 2 grams of amoxicillin administered orally one hour before implant placement surgery significantly reduces the failure of dental implants placed in ordinary conditions.
Critical summary assessment. The authors conducted a meta-analysis of two clinical trials, resulting in a finding that antibiotics had a significant effect in decreasing the risk of implant failure.
Evidence quality rating. Limited.

Clinical question. What are the effects of preoperative administration of antibiotics on dental implant placement versus the administration of placebo or no antibiotic?

Review methods. The review authors conducted a hand search of four databases of journals in all languages with published data regarding dental implants. The review included only randomized controlled clinical trials involving human participants and a minimum of three months of follow-up; the authors defined specific inclusion and exclusion criteria a priori. The authors performed data extraction and used statistical methods as outlined in the Cochrane Handbook for Systematic Reviews of Interventions 5.0.1.[1] They also completed a formal quality assessment of each trial. In addition, they conducted a meta-analysis of the data to estimate whether and to what degree systemic antibiotic administration decreased the risks associated with implant surgery.

Main results. The review authors found that only two clinical trials met all criteria. Investigators in the first reviewed trial involving 80 participants who underwent implant surgery

THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION

JADA

Orally Administered Amoxicillin Decreases the Risk of Implant Failures
Stacy Geisler
J Am Dent Assoc 2009;140;1294-1296

Principle 3: Tissue Concentration

The minimum inhibitory concentration is the lowest antibiotic concentration needed to destroy a specific bacteria. A sufficient tissue concentration of antibiotic should be present at the time of bacterial invasion. To accomplish this goal, the antibiotic must be given in a dose that will reach plasma levels that are 3-to-4 times the minimum inhibitory concentration of the expected bacteria.[32] It has been shown that normal therapeutic blood levels are ineffective to counteract bacterial invasion.[33] Most often, to achieve this tissue concentration, the antibiotic must be given at twice the therapeutic dose and at least 1 hour before surgery.[1] If antibiotic administration occurs after bacterial contamination, no preventive influence occurs and similar clinical results are reported as compared with taking no preoperative antibiotic.[13]

For implant surgery:

Give twice the therapeutic dose at least 1 hour before surgery.

If not, no preventive influence occurs.

Pre-op antibiotics: half the failure rate.

Antibiotic to mix in bone graft material: Ancef and Clindamycin.

Cefuroxime axetil (Ceftin), a second generation cephalosporin, may be used as an alternative antibiotic for sinus augmentation procedures. In addition, the parental form of a cephalosporin, Cephazolin (Ancef), may be used within the graft material.

Clindamycin (cleocin phosphate) is also supplied in an aqueous 300 mg/2 mL solution, which makes it suitable for incorporation into graft materials for sinus augmentation procedures. 25 mg

Sterile Instrument.

20-25 mg

Cefazolin = Ancef (1000 mg)
Similar to Cephalexin /Keflex.

$2.50 + shipping. So. Anesthesia Surgical (800-624-5926)

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