Antibiotics

THE DRUGS GENERAL DENTISTS CAN AND SHOULD PRESCRIBE

- **Antibiotics**
  - **a. for acute infection**
  - **b. for chronic infection**
- **Antimicrobials**
- **Antifungals**
- **Antivirals**
- **Analgesics**
  - **a. for acute pain**
  - **b. for chronic pain**
- **Antianxiety drugs**
- **Muscle relaxants**
- **Steroids**
- **Local anesthetics**
- **Sialagogues**
- **Ant-sialagogues**

Does the Dental Profession Encourage Development of Antibiotic Resistance?

- Yes…probably…why ?
- Prescribing off of the clinical protocols
- Prescribing to be sure patients are comfortable before or after treatment especially if the doctor is on “weekend call”
- the use of increasingly broad spectrum agents (patients that don't want an Rx for one of the “old” antibiotics)
- Patients pressuring the doctor to prescribe antibiotics since you told them that they have an infection

Antibiotics for use in general dentistry:

Useful

- **Penicillin**
- **Amoxicillin**
- **Augmentin**
- **Some cephalosporin's**
- **Zithromax, Biaxin**
- **Clindamycin**
- **Metronidazole**
- **The tetracyclines**

Probably not useful

- **The Fluoroquinolones:**
  - **ciprofloxacin**
  - **levofloxacin**
- **Methicillin**
- **Cloxacillin**
- **Dicloxacillin**
- **The aminoglycosides:**
  - **gentamycin**
  - **tobramycin**
  - **streptomycin**
  - **vancomycin**

Guidelines for use in Dentistry

- Antibiotic therapy should be used as an adjunct to dental treatment procedures and never used alone as the first line of care.
- Antibiotics are indicated when systemic signs of involvement are evident. Pain alone or small localized mucosal swellings do not require antibiotic treatment.
- Fever, lymphadenopathy and/o fascial swelling and asymmetry are clinical signs that possible spread of the infection has occurred.

Indications for systemic antibiotics
in acute dental infections requiring endodontics o
extraction:

- Pulpitis……No !
- **Necrotic Pulp with PAP, no nodes, swelling, and no fever…..No !**
- Necrotic pulp with fistula…..No !
- Necrotic Pulp with PAP, nodes and/or, fascial swelling-cellulitis, and/or fever…..***YES***

“only indicated when cellulitis is present and/or palpable nodes, and/or fever”

- Fouad AF, Rivera EM, Walton RE. Penicillin as a supplement in resolving the localized acute apical abscess. ***J Oral Surgery*** 1996; 81 (5) ; 590-595.
- Pallish TJ, Pharmacokinitic Principles of Antimicrobial Therapy. ***J Perio*** 2000 10: 5-111
- Gilmore WC, Jacabus NV, Gorbach SL, Doku HC. A prospective double-blind evaluation of penicillin vs clindamycin in the treatment of odontogenic infections. ***J Oral and Maxillofacial Surg*** 1988;46:1065-1070

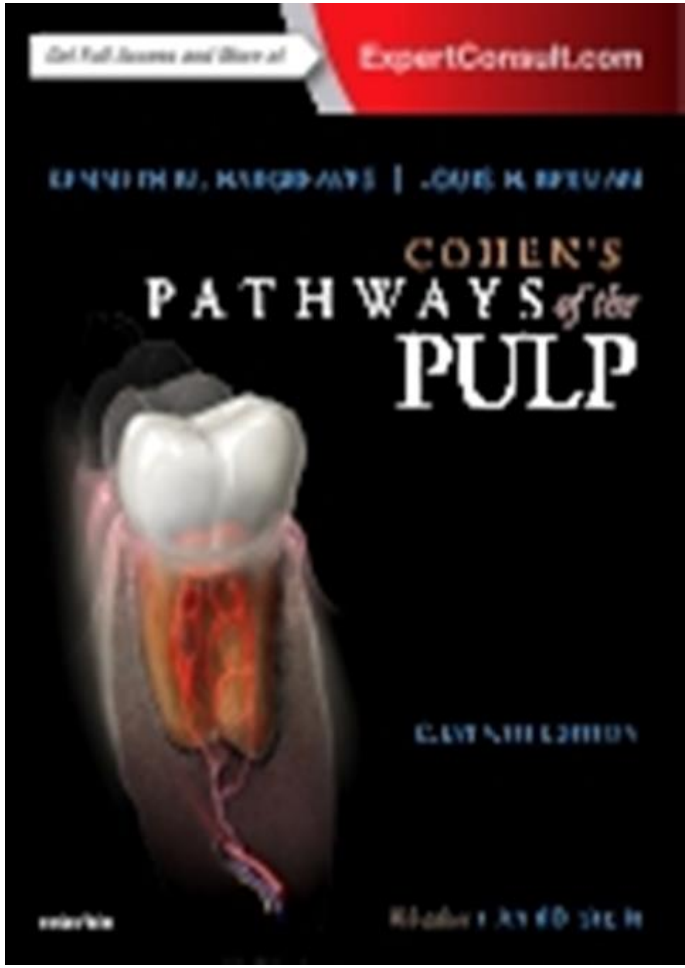
Systemic antibiotics not indicted in odontogenic infections unless systemic manifestations (fever/and/or/fascial swelling/and/or lymph nodes) are present:

- Brook I Microbiology and manifestations of endodontic infections in children ***Journal of Clinical Pediatric Dentistry*** 2003: 28 (1) 12-26

- Aminoshariae A, Kulid J Evidence based recommendations for antibiotic usage to treat endodontic infections and pain ***JADA ON Line(*ADA.org.)*** December 24, 2015

- Textbook: **Cohen's Pathways of the Pulp** Kenneth Hargraves and

  Louis Berman *Elsevier* Mosby, 11 th edition New York 2015



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Acute dental infections:

- Apical abscess
- Localized mucosal swellings
- Periodontal abscess
- Pericorinitis
- **Advancing fascial cellulitis**

Most acute early odontogenic infections are produced by mixed aerobic and anaerobic bacteria.

Gram (+) strep and/or staph

pure anaerobic < 20% in early infection

(continued next slide)

as the infection matures (> 3 days) the predominating organisms move toward having more anaerobes and gram (-) bacteria in the population

Robertson D, Smith AJ, Microbiology of the acute dental abscess *Journal of Medical Microbiology*
2009 February 58 (9) 155-162

Faizal, C Antibiotics to be used in odontogenic infections *Journal of Antimicrobial Agents* May 2016 (2) 117

so… **Most** acute odontogenic infections are produced by mixed aerobic and anaerobic bacteria.
Gram (+) strep and/or staph
pure anaerobic < 20% in **early** infection… this spectrum indicates that **Penicillin** should be the first line drug in acute odontogenic infection < 3 days duration

Penicillin G	**Penicillin V**
• Bactericidal	• Bactericidal
• narrow spectrum	• narrow spectrum
• low toxicity	• low toxicity
• acid labile	• ***acid stable***
• penicillinase labile	• penicillinase labile
• **Allergenic**	• **Allergenic**

“Penicillin VK antibiotic of choice in acute, early odontogenic infection”

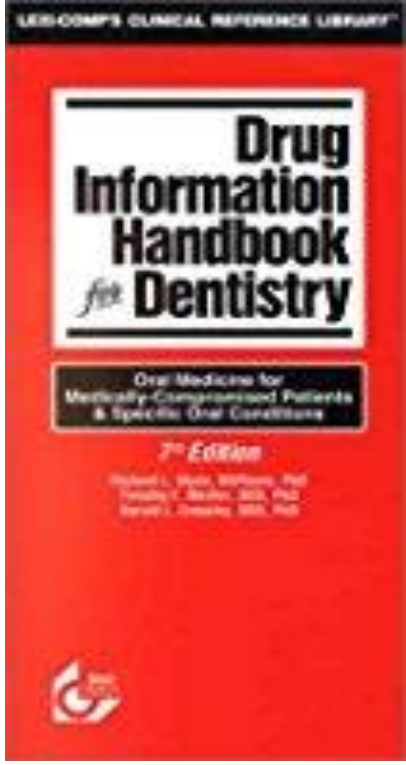
- Baumgartner JC, Xia T. Antibiotic Susceptibility of bacteria associated with endodontic infections. ***Journal Endodontics*** 2003; 29: 44-47.
- Khemaleelakul S, Baumgartner JC, Pruksakorn S. Identification of Bacteria in acute endodontic infections and their antibiotic susceptibility. ***Oral Surgery, Oral Med, Oral Pathology Oral Radiology and Endodontics*** 2012; 94 (6): 746-55
- Shweta S, Prakash S Antibiotics use in oral infections ***Journal of Dental Research*** 2012, September-October 10 (5) 585-591

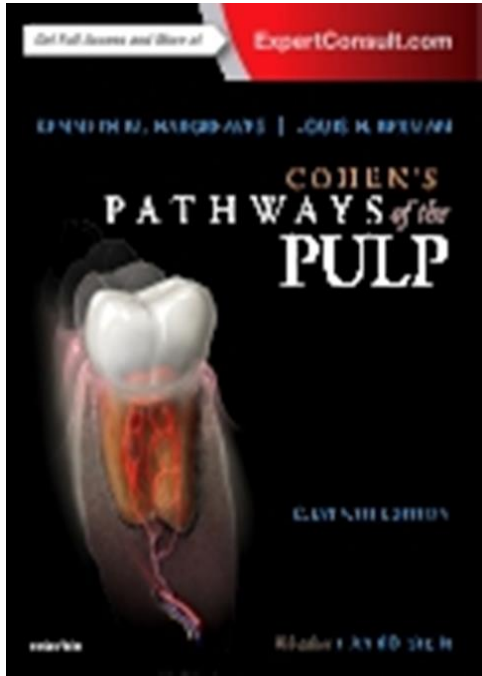
“Penicillin VK antibiotic of choice in acute, early odontogenic infection”

Faizal C Use of antibiotics in odontogenic infections ***Journal of Antimicrobial Agents*** May 2016 51 (5) 117-21

Drug Information Handbook for Dentistry Richard Wynn, Timothy Miller, Harold Crossley 20th Edition Lexicomp 2014

Cohen’s Pathways of the Pulp Kenneth Hargraves, Louis Bermen 11th edition Elsevier Mosby; New York 2015





Narrow spectrum antibiotics like the penicillin's do not encourage resistance as much as broad spectrum antibiotics

Penicillin V

V-Cillin K®

Penn VK®

Veetids ®

Penicillin Dosing:

- 500 mg. Q6h 7-10 days

Till Finished !!!

Amoxicillin

- Bactericidal
- broad spectrum
- acid stable (very)
- low toxicity
- **penicillinase labile**
- Very rapidly absorbed from GI

Amoxicillin Dosing:

- 500 mg. q8h 7 days

- 875 mg. Q12h 7 days

Why do the first line antibiotics sometimes fail ?

- **Wrong spectrum**

Why do the first line antibiotics sometimes fail ?

- **Wrong spectrum**
- **Presence of penicillinase (β lactamase) producers**

Augmentin (Amoxicillin + Clavulanic acid)

- Bactericidal
- broad spectrum
- low toxicity
- acid stabile
- **penicillinase stabile**

Augmentin Dosing:

- 500 mg. q8h 7 days

- 875 mg. Q12h 7 days

as the infection matures (> 3 days) the predominating organisms move toward having more anaerobes and gram (-) bacteria in the population……**Clindamycin**

Robertson D, Smith AJ, Microbiology of the acute dental abscess *Journal of Medical Microbiology*
2009 February 58 (9) 155-162

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Clindamycin® (Cleocin)

- Bacteriostatic
- Broad spectrum
- Rapidly absorbed from GI tract
- Some activity vs. β lactamase producers
- Effective against gram (+) cocci and staph and also maney gram(-) anaerobes…bacteroides
- Low molecular weight allows for deep penetration to bone

Bactericidal vs. Bacteriostatic

“the supposed superiority of bactericidal antibiotics over bacteriostatic agents is of little clinical relevance when treating the vast majority of infections”

Pankey G, Sabath L Clinical relevance of bactericidal verses bacteriostatic mechanisms of action in the treatment of Gram (+) and (-) bacterial infections ***Clinical Infectious Diseases*** March 2004 vol.38 (3) pp. 864-870

Clindamycin .....stronger side effect profile than the penicillin's

- Abdominal pain
- Nausea
- Diarrhea
  a. garden variety (most common)
  b. pseudomembranous colitis (perhaps precipitated by **C. *diff*)**

Clindamycin® (Cleocin®)

First choice for acute odontogenic infection in penicillin allergy patients

First choice for acute odontogenic infection with swelling and other symptoms > 3 days duration at the time of presentation for treatment

Clindamycin® (Cleocin®)

First choice for acute apical odontogenic infection in penicillin allergy patients any point in the course of infection

First choice for acute apical odontogenic infection with swelling and other symptoms > 3 days duration at the time of presentation for treatment w/wo pen allergy

First choice for acute periodontal abscess w/wo pen allergy

Clindamycin dosing:

- 150 mg. or 300mg. q6h 7-10 days

Clindamycin and dry socket prevention.

- Kupfer SR Prevention of Dry Socket with Clindamycin ***New York State Dental Journal*** 1995, June-July ; 61 (6): 30-3

- Chapnick P, et al. A review of dray socket: a double blind study on the effectiveness of clindamycin on reducing the incidence of dry socket ***Canadian Dental Journal*** 1999 September 35, (9) 441-43

- Ramos E, et.al Do systemic antibiotics prevent dry socket and infection after third molar extraction ? : A meta-analysis ***Oral Surgery***, ***Oral Medicine, Oral Pathology, Oral Radiology and Endodontics*** 2016, October; 122 (4): 403-13

Macrolides

- Erythromycin
- Biaxin
- Zithromax
- Same approximate spectrum as penicillins but less effective

Macrolides:

- Bacteriostatic
- Narrow spectrum
- Some activity against β lactamase producers
- Acid-stabile for good GI tract absorption **except for erythromycin…less so**
- More drug-drug interactions than the penicillin's or clindamycin **especially erythromycin**
- **Stronger side effect profile** than the penicillin’s **especially erythromycin**

Erythromycin

- 4 to 5 hours to peak blood levels PO
- Very **high side effects profile** especially GI :

  abdominal pain

  nausea

  cramping
- Cholestatic hepatitis

Cephalosporin's

First, Second and Third generation….

- Bactericidal
- broad spectrum (more gram (-) and anaerobe activity than penicillin)
- acid stabile
- B lactamase labile
- Cross reactivity with penicillin allergy patients approx. 1 to 3 %

Cephalosporin generations

Each successive generation becomes more effective against gram (-), less effective against gram (+), more toxic, and more expensive

Cephalosporin's

- **First Generation**

Cefadroxil (Duricef ®)
Cephalexin (Keflex®)

Keflex: 250 mg. q6h 7-10 days

Duricef: 500 mg q12h 7-10 days

- **Second Generation**

Cefaclor (Ceclor®)
Cefuroxime (Ceftin®)

Ceclor 500 mg. q8h 7-10 days

Ceftin 500 mg q12h 7-10 days

Flagyl® metronidazole

(antiprotozoal)

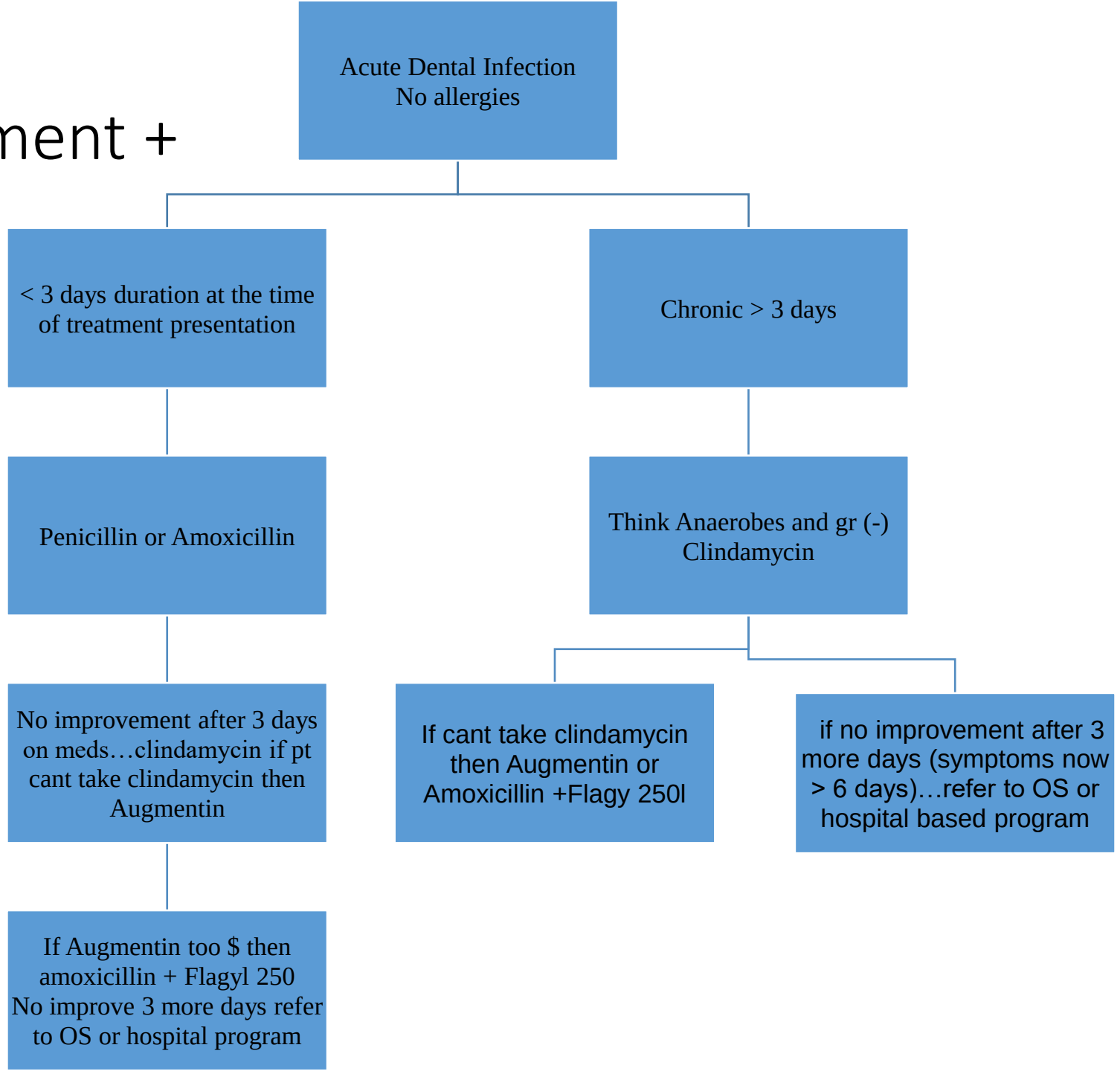
Bactericidal and Broad Spectrum

-
- Good against most anaerobe and many gram (-)
- Not good against most gram (+)
- Very few oral organisms exhibit resistant strains
- Used in combination with amoxicillin in non-pen-allergy patients with acute odontogenic infection as a second line antibiotic if no response to a first line in 3 days
- **Cannot be taken with alcohol !**
- Rarely **used alone** in oral infection…..dose: 500 mg. q8h
- In combination with amoxicillin…..dose: 250 mg. q8h

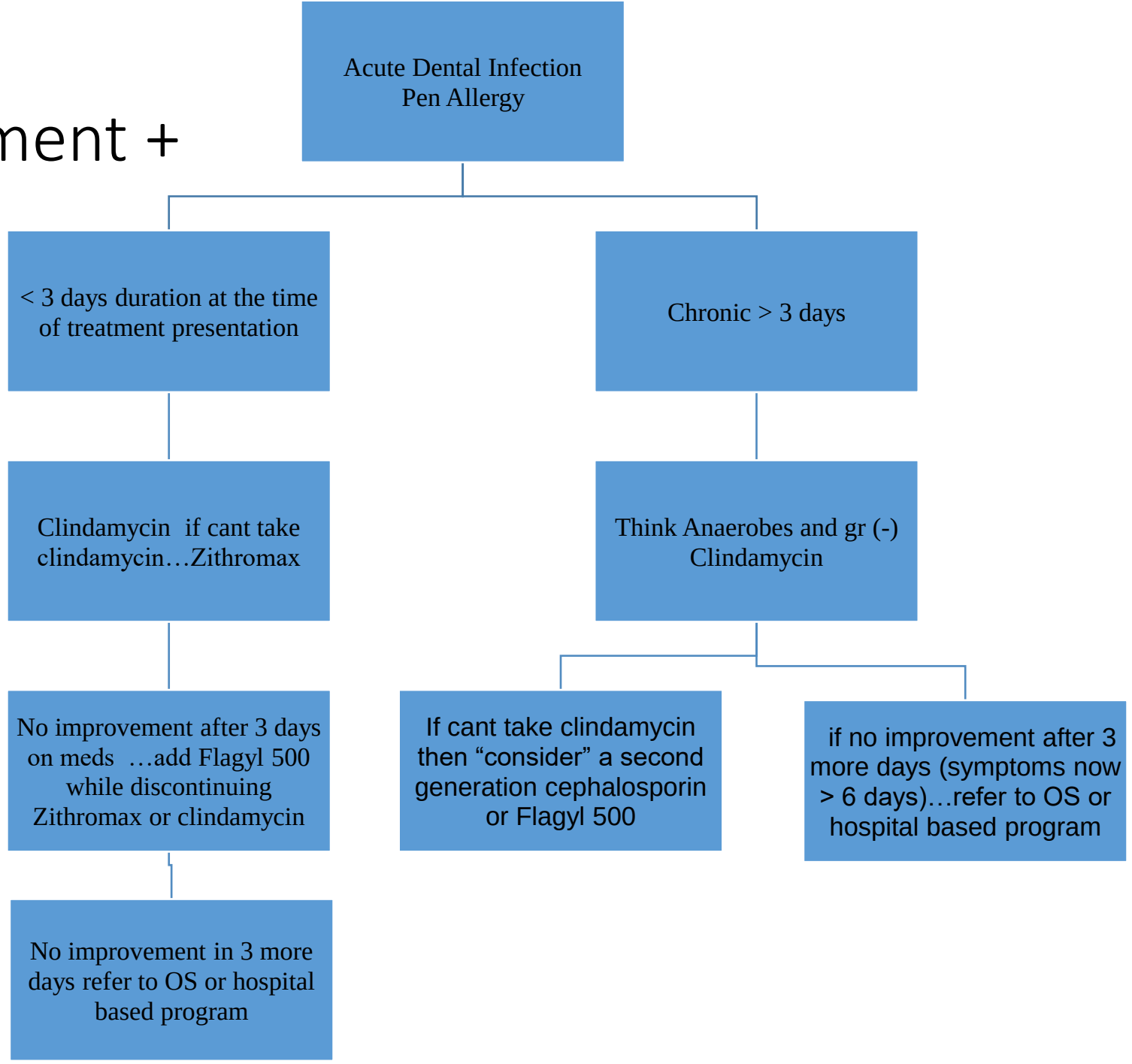
“Azoles” upregulate:

- Caffeine
- Benzodiazepines
- SSRI’s
- Tricyclics
- HMg-CoA Reductase inhibitors
- **Many anticonvulsants**
- **Coumadin**

Local treatment +



Local treatment +



For the general dentist……vis a vis acute odontogenic infection:

One antibiotic change

Antibiotic therapy for the periodontal diseases:

- Gingivitis
- Chronic Periodontitis
- **Aggressive Periodontitis (refractory)**
- **Localized Aggressive Periodontitis**

All antibiotic therapy protocols for the treatment of periodontal disease presupposes that it is used in conjunction with local mechanical treatments (scaling and root planing)

Antibiotic therapy for the periodontal diseases:

Local-topical

Systemic

Systemic

Amoxicillin 250 mg caps q8h +

Flagyl 250 mg q8h   for 2 weeks

The Tetracyclines

- ***Bacteriostatic/broad spectrum***
- Tetracycline
- doxycycline
- minocycline

The tetracycline family of drugs:

- Not to be used in children < 10 years
- Not to be used last half of pregnancy
  a. crosses the placental barrier
  b. in addition to staining may cause fetal toxicity
- Binds calcium in antacids, calcium supplements and dairy
- Upregulates some anticonvulsants and antidepressants
- Best taken **“around”** meals

Systemic continued: the tetracycline family

- Tetracycline 250 mg q6h 3 to 4 weeks
- Tetracycline 250 mg q6h +

  Flagyl 250 mg q6h for 3 to 4 weeks (especially for suspected AA* related disease)

Systemic continued :

- Doxycycline 100 mg twice/day 3 weeks

Systemic continued :

- Doxycycline 20 mg twice/day for 9 months

Periodontal diseases: **Local/topical**

- Atridox (doxycycline)
- Actisite (tetracycline)
- Arestin (minocycline)
- Chlorhexidine
  a. rinse
  b. chip
  c. gel

Chlorhexidine gel has been shown to prevent in mandibular 3rd molar surgery

- Hita-Iglesias P et. al Effectiveness of Chlorhexidine gel in reducing alveolar osteitis in mandibular third molar surgery ***Journal of Oral and Maxillofacial Surgery*** March 2008; 66 (3) 441-45

- Yengopal J Mickinautsh S Chlorhexidine for the prevention of acute alveolar osteitis ***International Journal of Oral and Maxillofacial Surgery*** October 2012; 41 (10) 1253-54

IE Prophylaxis

Antibiotic Prophylaxis

- American Heart Association
  April 2007

No mo:

Mitral valve prolapse

Rheumatic heart disease

Bicuspid valve disease

Aortic stenosis

Systemic Lupus Erythematosus

Hypertrophic cardiomyopathy

Heart murmurs

Still:

- Previous history of BE
- **Prosthetic heart valves (mechanical and animal)**
- Congenital heart disease only as follows:
  1. Unrepaired cyanotic congenital heart disease
  2, Repaired congenital heart disease if prosthetic material was used and within 6 months post op
  3. Repaired sites with prosthetic patches that may inhibit endotheliazation

Heart transplant patients if the transplanted heart has valveulopathy

Antibiotic Regimens

Amoxicillin
Biaxin or Zithromax
Clindamycin

If treatment is started inadvertently before the antibiotic prophylaxis is initiated:

- The antibiotic regimen can be started up to two hours after the procedure is started

AHA 2016

If treatment is delayed up 3 to 6 hours after the appropriate antibiotic prophylaxis dose is taken:

- Patient should take 1 gram of amoxicillin or 300 milligrams of clindamycin or 250 milligrams of macrolide

- AHA 2016

If patient is and has been on an antibiotic for other reasons at the time of treatment and needs prophylaxis:

- Have the patient take the standard antibiotic prophylaxis dose in the AHA regimen using an antibiotic of a **different class** than the one that the patient is currently on

AHA 2016

JADA August 2017-Systematic Lit Review:

- “There is inconclusive evidence on the effectiveness of using antibiotic prophylaxis before dental procedures to prevent IE”
- “The 2007 AHA guidelines on the prevention of IE are logical and intuitive and should be used until better evidence is available.”

Abdallah, M Inconclusive evidence of using antibiotic prophylaxis to prevent IE ***Journal of the American Dental Association*** August 2017; vol. 149 (7)

Prosthetic Joint Prophylaxis

- No mo!

- 2012 ADA collaboration with the American Academy of Orthopedic Surgeons (AAOS) updated systematic review found no association between dental procedures and prosthetic joint infections. Based on this review, the 2012 panel concluded that prophylactic antibiotics given prior to dental procedures to prevent prosthetic joint infection ***is not recommended***
- www.ada.org

Subsequent to the 2012 edict many dentists still had problems with not implementing something that they had done for so long

So…in 2014 the ADA council on scientific affairs (CSA) convened to further investigate with metanalytic studies-
results: prophylaxis not needed for prosthetic joints !

By the way….don't ask…..but…

What if the orthopedic surgeon says do it ?

What if patient is not comfortable with treatment while ignoring their joint ???

Antifungals

Antivirals

Antifungals

Topical

- Nystatin
- Clotrimazole
- Ketoconazole

Systemic

- Ketoconazole
- Fluconazole

Antifungals

Topical

- Nystatin
- Clotrimazole
- Ketoconazole

Systemic

- **Ketoconazole**
- **Fluconazole**

Treatment of Candidiasis
In Healthy Patients:

- Removal of the systemic antibiotics or topical flora challenges such as alcoholic oral rinses or topical antibiotics
- **Topical** Antifungal Agents
- Systemic antifungals usually not needed in the general dentistry setting with **healthy patients**

Topical Antifungal Agents

For Angular Cheilitis best to use the creams or ointments

- Nystatin *(mycostatin*) ointment

Disp: I tube

Sig: apply to affected site after meals and at bedtime

- Clotrimazole (*lotrimin, mycellex*) cream otc

Disp: 1 tube

Sig: apply to affected areas after meals and before bed

Angular Cheilitis Treatment (continued)

- Nizoral (*ketoconazole*)

Disp: one tube

Sig: apply to affected areas once per day at bedtime

- Mycolog II (*nystatin + triamcinolone*) ointment

Disp: one tube

Sig: apply to affected areas after meals and at bedtime

Oral Candidiasis tx. Generalized Cases

- **Clotrimazole** (Mycelex) troches 10 mg.

Disp: 50 troches

Sig: dissolve one troche in mouth q4h until Rx is finished

- **Nystatin** (mycostatin) oral suspension

Disp: 300 ml.

Sig: rinse and swish then swallow q6h till Rx is finished

For patients who are “sick” debilitated or otherwise immune suppressed and have oral candidiasis:

- Use the aforementioned topical approaches and in addition, *perhaps* in consultation with the patients physician…

**Fluconazole (*diflucan*) 100 mg,

Disp: 20 tablets

Sig: take one tablet per day till Rx is finished

** **up-regulates Coumadin and several anticonvulsants**

Antivirals

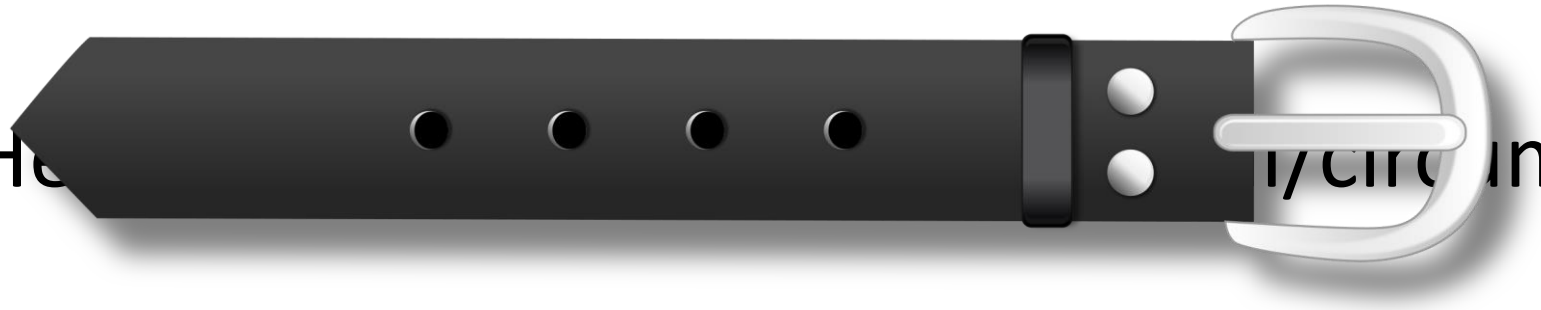
Antivirals for General Dentistry

- Acyclovir (Zovirax®)
- Penciclovir (Denavir®)
- Valaciclovir (Valtrex®)
- Famciclovir (Famvir®)
- Docosanol Abreva®)

Herpes Simplex Virus Infection

- Herpes Simplex 1 **(HSV 1)** oral/circum-oral

- He l/circ m-anal



HSV 1

Primary

- The very first exposure to the virus
- Usually age 1 to 6 (but can be older)
- Usually sub-clinical but can make the kid very sick for a few days with pan-stomatitis- after that…
- Virus lives quietly in lip mucosa or cranial nerves V or VII for the rest of the patients life

Secondary (reactivation HSV)

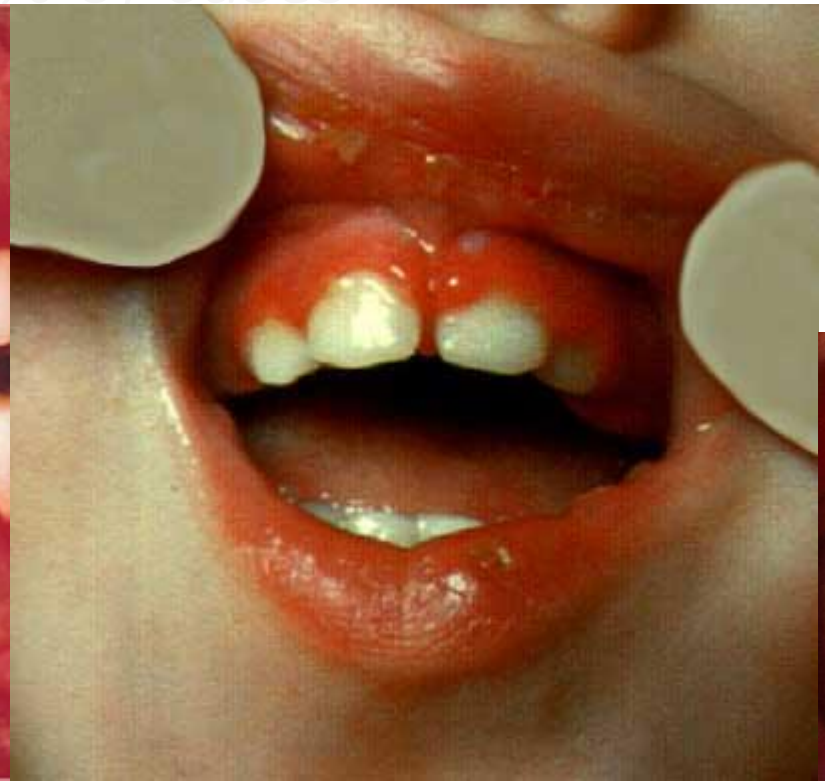
- Many years later when/if systemic or local resistance goes down…
- The virus breaks out…
- Vesicles form at the vermilion boarder of the lips and eventually begin to dry and form crusts

Primary HSV 1

Acute herpetic gingivostomatitis

oral pain, fever and lymph nodes

remember: only small % of cases



Primary HSV 1

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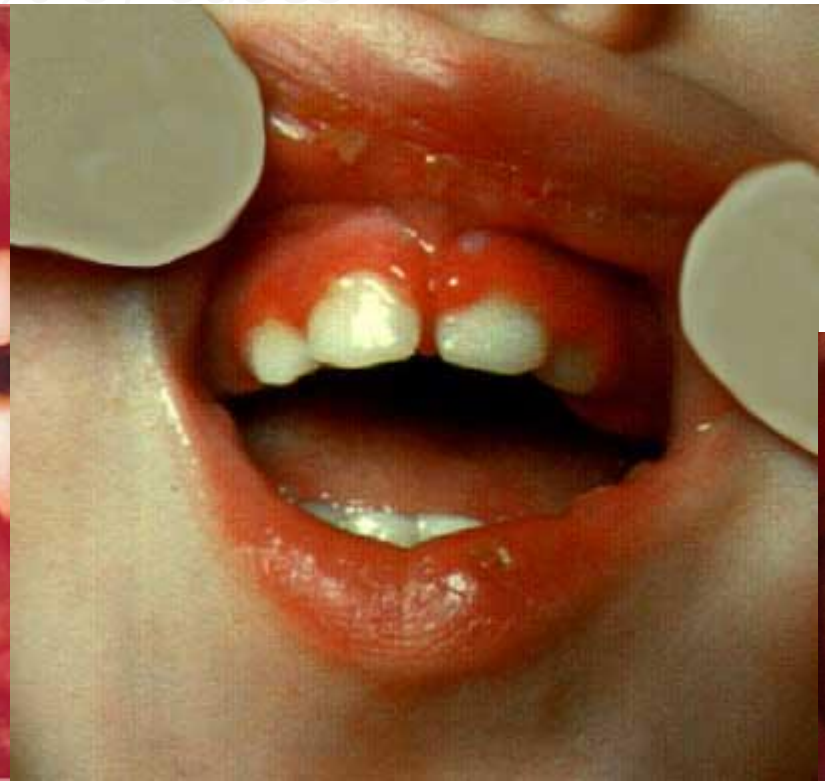

Treatment of Primary HSV 1

- < 12 y.o. If parents bring child to you first before primary care physician or pediatrician, make your diagnosis and refer to physician with your clinical impressions. If they can't get to physician for a day or two you can recommend ice chips, and Tylenol or children's Motrin for pain and fever.

- > 12 y.o Rx viscous lidocaine or "Magic Mouth Wash."
- Tylenol or Motrin OTC for pain/fever
- Valtrex (valacyclovir) 1000 mg.
  Disp: 20 tabs
  Sig: one tablet twice per day

  Famvir (famciclovir) 500 mg.
  Disp: 20 tabs
  Sig: one tablet 2 X day

Secondary or reactivation HSV is the one we will see the most of in our practices

Treatment of Secondary (reactivation) HSV 1 (topical)

- Treatment must take place at the prodrome phase
- By the time vesicles appear may be too late
- By the time crusting occurs treatment does not work
- Healthy patients with basically neg. medical histories do not need systemic antiviral therapy
- Topical antiviral therapy is helpful even in healthy patients if the ointment can be applied during and after the prodromal phase

who are chronically ill or immune
hysician **may** consid

Penciclovir

- Two randomized, prospective, double blind, parallel group multicenter clinical trials performed in USA and Europe
- 4,573 Immune competent people
- 28 % faster resolution of pain
- 31 % faster healing

Raborn W et.al Effective treatment of herpes simplex labialis with penciclovir ***Journal of the American Dental Association*** March 2002. vol 133 (3) 303-309

Denavir ® (penciclovir 1 %)

- Denavir cream 1 %

- Disp: 1 5 gr. tube

- Sig : apply area q2h for 4 days while awake and as soon as symptoms start

Systemic Rx recurrent

- Valtrex

2 grams q12h for one day

comes in 500 mg or 1000 mg caps

Sitavig®

Acyclovir 50 mg

Patient to open the
blister packet remove
and immediately use the tablet by putting the tablet flat side on the finger and press on to the alveolar mucosa in the area of the lateral fossa buccal to the apical area of tooth #7 or 10 depending on which side the prodromal symptoms are occurring. One dose…dissolves in 6 to 8 hours

Rx for prodrome only

Rx for Sitavig®

- Sitavig 50 mg.
- Disp: one blister packet
- Sig: apply as directed by packet

Dr. Q's suggestion…