Antibiotic Prophylaxis
Why the new guidelines?

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Antibiotic Prophylaxis

A. Cardiac conditions
B. Intravascular Prosthesis
C. Prosthetic Joints
D. Hemodialysis
E. CAPD
F. Transplant
G. Neutropenia
Cardiac Conditions

Antibiotic prophylaxis is being used to avoid infection of the heart valve and/or endothelial surfaces of the heart. (Bacterial Endocarditis)
Cardiac Conditions

Effects of Bacterial Endocarditis
- Local complications
- Embolic complications
- Immune complex mediated complication
Cardiac Conditions

- Local complications:

  Valvular Insufficiency, CHF
  Myocardial Abscesses
Cardiac Conditions

- Embolic complications:
  - Skin
  - Eyes
  - Brain
  - Liver
  - Spleen
  - Kidney
  - Intestine
Cardiac Conditions

- Immune complex mediated complications:
  - Arthritis
  - Glumeronephritis
Cardiac Conditions

- Extremely rare
- A concern in patients with Pre-existing conditions
- 7-10% mortality and severe morbidity
- Treatment: Aggressive antibiotic and surgical therapy
Cardiac Conditions

- Incidence of SBE
  2-5/100,000 in general population
  20/100,000 Bicuspid Aortic Valve
  25/100,000 MVP w/o Regurgitation
  56/100,000 MVP with Regurgitation
  220/100,000 Ventricular Septal Defect
  10,000/100,000 Previous history of one SBE
  25,000/100,000 Previous history of two SBE
**Cardiac Conditions**

- 30 – 40 % of patients with SBE have streptococcal infections
- S. Viridans (most common, only in oral cavity)
- S. Sanguis
- S. Salivarius
- S. Mutans
- S. Mitis
- S. Anginosus
Cardiac Conditions

Clinical Triad:

X. Known underlying cardiac defect
Y. Organism from Oral Flora
Z. Dental Procedure within 90 days.
Cardiac Conditions

- Cheurbin, et al (1971): 15% of patients with SBE had dental work in past 90 days
Strom (2000): 273 cases
37 had the clinical triad (13.5 %)
27/37 had AHA Prophylaxis (87 %)
10/37 had triad and did not have prophylaxis 13%
10/273 (4%)
Recent Studies suggest 78% of IE cases occur within 7 days and another 7% within the following 7 days.
Cardiac Conditions

- Procedure | Bactreimia
- Mastication | 0- 55 %
- Flossing | 5- 86 %
- Brushing | 24- 26 %
- Scaling | 30 – 70 %
- Extraction | 9- 100 %
- Endo | 0 –54 %
- Perio Surgery | 58 %

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Cardiac Conditions

- Guntheroth in 1984, reviewed 21 articles from 1935-1976 and 2403 cases:
  - Bacteremia due to extraction 40%
  - Bacteremia due to mastication 38%
  - Estimated a cumulative exposure of 5730 minutes of bacteremia over a 1-month period from daily activities.
  - The bacteremia due to extraction is 6-30 minutes following the extraction.
Cardiac Conditions

- Roberts (1999):
  - Estimated that tooth brushing 2 times daily for a year had a 154,000 times greater risk of exposure to bacteremia than that resulting from a single tooth extraction.
  - The cumulative exposure during this period may be as high as 5.6 million times greater than that resulting from a single tooth extraction.
Conclusion:

1. Infective Endocarditis (IE) is more likely results from daily activities.
2. Prophylaxis may prevent an exceedingly small number of cases.
3. Risk of antibiotic-associated adverse events exceeds the benefits, if any, from prophylactic AB therapy.
4. Optimal oral health and hygiene may reduce the incidence of bacteremia from dental activities.
Cardiac Conditions

Adverse reactions:
1. Non-fatal adverse reaction: rash, diarrhea and GI upset
2. Fatal anaphylactic reactions:
   - 15-25 / 1 million individuals (64% had no history of penicillin allergy)
   - 1 / 1 millions for clindamycin
Adverse reaction Cont’d:

3. Bacterial resistance:


Antimicrobial susceptibility patterns among viridans group isolated from infective endocarditis patients from 1971 to 1986 and from 1994 to 2002.
Prabhu and colleagues in 2002:

<table>
<thead>
<tr>
<th>Year Range</th>
<th>Susceptibility to Viridans</th>
<th>Year Range</th>
<th>Susceptibility to Viridans</th>
</tr>
</thead>
<tbody>
<tr>
<td>1971 - 1986</td>
<td>0 % resistant to penicillin</td>
<td>1994 - 2002</td>
<td>13% resistant to penicillin</td>
</tr>
<tr>
<td></td>
<td>11 % resistant to macrolides</td>
<td></td>
<td>26 % resistant to macrolides</td>
</tr>
<tr>
<td></td>
<td>0 % resistant to clindamycin</td>
<td></td>
<td>4 % resistant to clindamycin</td>
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</tbody>
</table>
Cardiac Conditions

New Guidelines

Conditions requiring AB prophylaxis:
1. Prosthetic cardiac valve
2. Previous infective endocarditis
3. Cardiac transplantation recipients who develop cardiac valvulopathy
**Cardiac Conditions**

4. The following congenital heart diseases:

A. Un-repaired Cyanotic CHD, including palliative shunts and conduits

B. Completely repaired congenital heart defect with prosthetic material or device, whether placed by surgery or by catheter intervention, during the first six months after the procedure

C. Repaired CHD with residual defects at the site or adjacent to the site of a prosthetic patch or device (which inhibit endothelialization)
Cardiac Conditions

Cyanotic heart defects:

- Due to oxygenated blood bypassing the lung and entering the systemic circulation.
- The patient appears blue (cyanotic).
Cardiac Conditions

Cyanotic Heart Defects:
- Transposition of great arteries
- Tetralogy of Fallot
- Truncus ateriosus
- Total anomalous pulmonary return
- Hypoplastic left heart syndrome
- Pulmonary atresia
Cardiac Conditions

Patient that no longer need AB Prophylaxis:
Mitral Valve Prolapse
Rheumatic Heart Disease
Bicuspid Valve Disease
Calcified Aortic Stenosis
Congenital Heart Conditions such as VSD, ASD and hypertrophic cardiomyopathy
**Bacterial Endocarditis**

- **Recommendation**
  - **Standard**
  
<table>
<thead>
<tr>
<th>Adults</th>
<th>Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amoxicillin</td>
<td>2.0 grams</td>
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</table>

  One hour before procedure

  Unable to take oral medications:
  
<table>
<thead>
<tr>
<th>Amoxicillin</th>
<th>2.0 grams</th>
<th>50mg/kg</th>
</tr>
</thead>
</table>

  IM/ IV 30 minutes before the procedure
Bacterial Endocarditis

- Bacterial Endocarditis
  - Allergic to penicillin:

<table>
<thead>
<tr>
<th>Medicine</th>
<th>Adult</th>
<th>Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azithromycin (zithromax)</td>
<td>500mg</td>
<td>15mg/kg</td>
</tr>
<tr>
<td>Clarithromycin (biaxin)</td>
<td>500mg</td>
<td>15mg/kg</td>
</tr>
<tr>
<td>Clindamycin (cleocin)</td>
<td>600mg</td>
<td>20mg/kg</td>
</tr>
<tr>
<td>*Cephalexin (Keflex)</td>
<td>2.0 grams</td>
<td>50mg/kg</td>
</tr>
<tr>
<td>*Cefadroxil (Duracef)</td>
<td>2.0 grams</td>
<td>50mg/kg</td>
</tr>
</tbody>
</table>

All one hour before the procedure
Bacterial Endocarditis

- Allergic to penicillin and unable to take oral medications:
  - Clindamycin: Adults 600mg, Children 20mg/kg
  - *Cefazolin: Adults 1.0 gram, Children 25mg/kg
  - IM/ IV 30 minutes before the procedure
Next guideline:
- Keflex will be omitted from the list
- Possible change in dosage and type of the antibiotic
- Berney’s Rule: Although is advisable to take antibiotics an hour in advance, but antibiotic can be given immediately before the procedure.
Bacterial Endocarditis

Commonly Asked Questions:

1. Q: What procedures need AB prophylaxis?
   A: Procedures that cause bacteremia and/or severe bleeding
Bacterial Endocarditis

2.

Q: I am already on amoxicillin for another condition. Is that o.k?

A: Flora changes within 48 hours change the antibiotic protocol. Same antibiotic can not be used within 9-14 days of the procedure.
Q: I need a lot of dental work, what should I do?
A:
- Interval procedure 9-14 days
- Alternate antibiotics
Bacterial Endocarditis

4.

- Q: I didn’t expect bleeding or I instrument my endo beyond apex. What should I do?

A: 2 hours rule: Berney, et al. 1990
- Less than two hours: effective antibiotic prophylaxis
- More than four hours: antibiotic not effective
- 2-4 hours?
Bacterial Endocarditis

5. Q: I forgot to take my antibiotic?

A: Reschedule the patient
Give the antibiotic, and wait one hour
2 hour rule?
**Bacterial Endocarditis**

6a.

Q: Should I use antimicrobial agents before the procedure?

A: AHA recommendation: 15cc of chlorhexidine 30 seconds before the procedure
**Bacterial Endocarditis**

6b. Does it make sense?

Lockhart in 1996:

Use 70 patients

37 were placed on chlorhexidine

31/37 post extraction bacteremia

33 patients were placed on placebo

31/33 post extraction bacteremia
Q: Should I contact the physician about what kind of antibiotic I should prescribe?

A: NO
AHA:
Consequences of substantive changes in recommendation:
1. Violate long-standing expectations and practice patterns
2. Make fewer patients eligible for IE prophylaxis
3. Reduce malpractice claims related to IE prophylaxis
4. Stimulate prospective studies on IE prophylaxis
• ADA division of legal affairs:

What should the dentist do if the patient brings to the appointment a recommendation for premedication from his or her physician with which the dentist disagrees?

The courts recognize that each independent professional is ultimately responsible for his or her treatment decisions.
Q: Should we pre-medicate patients that had coronary stent?
A: Stents usually endothelialize 6-8 weeks after placement, so premedicate the patient only for the first six months after stent placement.
Antibiotic Prophylaxis

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Intravascular prosthesis

Intravascular prosthesis such as aortic graft, femoral popliteal graft, abdominal and thoracic grafts and etc, all endothelialize within six months.

Antibiotic prophylaxis is required the first six months.
Positive proof of global warming.
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Prosthetic joint

- Only 17 cases reported
- Most common organism is Staph especially aureus and epidermidis which are not common in the mouth
- It is an extra vascular prosthesis and not exposed to blood vessels.
Prosthetic Joint

• Why should we premedicate the patients?
  It has very high morbidity

Treatment:
- Remove the joint
- 6 weeks on antibiotic
- Need a new joint replacement
- Patient can’t work for three months
Prosthetic joint

- AAOP recommendations
  - Not recommended for routine procedures
  - To be use only on high risk patients
  - Be use in the procedures that cause high bacteremia
Prosthetic Joint

- High risk joints:
  - Joint placement within past two years
  - Prior history of joint infection
  - Patients with hemophilia
  - Patients with diabetic mellitus
  - Patients on immunosuppressive therapy
  - Rheumatoid arthritis
Which antibiotic should we use?

Cephalixin  2.0 grams
Clindamycin  600 mg
Azithromycin  500 mg
Clarithromycin  500 mg
Amoxicillin  2.0 grams
Antibiotic Prophyxis

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Renal Dialysis can be done in two different ways:

1. Hemodialysis: Blood cleansing machine
2. CAPD: Continuous Ambulatory Peritoneal Dialysis
Hemodialysis

- Patients on blood cleansing machine need to go to dialysis every other day.
- Dialysis patients are repeatedly punctured and infections can happen
- Dialysis patients receive heparin during dialysis
Hemodialysis Patients

- Schedule treatment on non-dialysis day; this will minimize excessive bleeding due to residual heparin in blood stream.
- Standard antibiotic prophylaxis need to be use on these patients.
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Continuous Ambulatory Peritoneal Dialysis:
- Patient requires a permanent catheter to be implanted through the wall of stomach into the peritoneum.
- Four times every day a bag of warmed glucose fluid is drain through this catheter to peritoneum.
- Through osmosis impurities present outside the peritoneum will be drawn inside the fluid.
- This fluid then will be drained out, a new bag of warm fluid will be drain in and the catheter will be seal until next exchange.
• Patient on CAPD can develop Peritonitis
• They require standard antibiotic prophylaxis
Antibiotic prophylaxis

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All transplant patients are immunosuppressed

Use standard antibiotic prophylaxis

Avoid clarithromycin (Biaxin), as it will increase the level of cyclosporine.
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Neutropenia

- Mild: 1000-2000 mm$^3$
- Moderate: 500-1000 mm$^3$
- Severe: < 500
Neutropenia

Conditions that can cause severe neutropenia:
- HIV/ AIDS
- Chemotherapy
- Drug toxicity
- Infections such as TB and typhoid
- Bone marrow disorders
- etc

Patients with severe neutropenia require AB prophylaxis
References

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   Michael A Huber, DDS / Geza Terezhalmy Journal of Academy of General Dentistry
   (March- April 2005; p 130-140)

2) Prevention of Bacterial Endocarditis: Recommendation by the American Heart Association, 2007

3) CE Magic: Volume 1, Antibiotics in Dentistry
   Leslie Shu-Tung Fang M.D., PhD