Antibiotic Prophylaxis

Prosthetic Joint Patients
History: Prosthetic Joint

- 2003 AAOS/ADA Joint Recommendation
- 2009 AAOS Information Statement
- 2012 AAOS/ADA Joint Recommendation
- 2015 ADA Clinical Practice Guideline
- 2017 AAOS/ADA Appropriate Use Criteria
History 2003 Guideline

- All patients in first 2 years after joint replacement
- High risk patients: immunocompromised patients ....rheumatoid arthritis, lupus
- Comorbidities: previous PJI
  - malnourishment
  - hemophilia
  - HIV infection
  - insulin dependent diabetes
  - malignancy
Given the potential adverse outcomes and cost of treating an infected joint replacement, the AAOS recommends that clinicians consider antibiotic prophylaxis for all total joint replacement patients prior to any invasive procedure that may cause bacteremia.

All patients take prophylaxis for life.
This statement provides recommendations to supplement practitioners in their clinical judgment regarding antibiotic prophylaxis for patients with a joint prosthesis. It is not intended as the standard of care nor as a substitute for clinical judgment as it is impossible to make recommendations for all conceivable clinical situations in which bacteremias may occur. The treating clinician is ultimately responsible for making treatment recommendations for his/her patients based on the clinician’s professional judgment.
Any perceived potential benefit of antibiotic prophylaxis must be weighed against the known risks of antibiotic toxicity, allergy, and development, selection and transmission of microbial resistance. Practitioners must exercise their own clinical judgment in determining whether or not antibiotic prophylaxis is appropriate.
The Practitioner might consider discontinuing the practice of routinely prescribing prophylactic antibiotics for patients with hip and knee prosthetic joint implants undergoing dental procedures.

Limited Recommendation: the quality of the supporting evidence that exists is unconvincing, or that well conducted studies show little clear advantage to one approach vs another.

Patient preference should have a substantial influencing role.
Unable to recommend for or against the use of topical oral antimicrobials in patients with prosthetic joint implants or other orthopedic implants undergoing dental procedures.

In the absence of reliable evidence linking poor oral health to prosthetic joint infection, it is the opinion of the work group that patients with prosthetic joint implants maintain appropriate oral hygiene.
Shared Decision Making Tool

- Information statement for patients.
- 3 question quiz.
- I have adequate understanding of implant infection and dental procedures
- Dentist has discussed my specific risk factors
- I am immunocompromised because:
- I will/will not take AP before treatment
LET THE PATIENT DECIDE!
I DON’T KNOW WHAT TO DO EITHER!

2012 GUIDELINE
2012 Guideline

- Potential legal risk for dentists
- Dentist decides for patient – adverse outcome
- Patient decides – adverse outcome

Adverse outcomes:
- no prophylaxis and PJI
- prophylaxis and *C. diff*
But I was just following the Guidelines!
In general, for patients with prosthetic joint implants, prophylactic antibiotics are NOT recommended prior to dental procedures to prevent prosthetic joint infection.
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

ABSTRACT

Background. A panel of experts (the 2014 Panel) convened by the American Dental Association Council on Scientific Affairs developed an evidence-based clinical practice guideline (CPG) on the use of prophylactic antibiotics in patients with prosthetic joints who are undergoing dental procedures. This CPG is intended to clarify the “Prevention of Orthopaedic Implant Infection in Patients Undergoing Dental Procedures: Evidence-based Guideline and Evidence Report,” which was developed and published by the American Academy of Orthopaedic Surgeons and the American Dental Association (the 2012 Panel).

Types of Studies Reviewed. The 2014 Panel based the current CPG on literature search results and direct evidence contained in the comprehensive systematic review published by the 2012 Panel, as well as the results from an updated literature search.
Prevention of Orthopaedic Implant Infection in Patients Undergoing Dental Procedures

The Use of Prophylactic Antibiotics Prior to Dental Procedures in Patients with Prosthetic Joints
Joint Statement with Canadian Orthopedic Association and Association of Medical Microbiology and Infectious Disease

Patients should not be exposed to the adverse effects of antibiotics when there is no evidence that such prophylaxis is of any benefit

Routine antibiotic prophylaxis is not indicated for dental patients with total joint replacements

Patients should be in optimal oral health prior to having total joint replacement
Prosthetic Joint Arthroplasty

- 1 million joint replacements done yearly in US
- 600,000 knee replacements each year
- 400,000 total hip replacements each year
- By 2030 estimated to be over 4 million total joint replacements per year
Prosthetic Joint Arthroplasty

Total hip replacement

Bilateral hip replacement
Prosthetic Joint Arthroplasty

Total knee replacement

Right knee replacement
Prosthetic Joint Infection (PJI)

- Estimated at 1–2%
- High morbidity and cost with revision or replacement
- EARLY defined as within 3 months of surgery and usually associated with surgery
- LATE defined as after 3 months and suspected as hematogenous spread
- Majority occur within first 2 years post-surgery
- Vast majority caused by *Staph*
- Late PJI sentinel event
Prosthetic Joint Infection (PJI)
PJL Pre Operative Risk Factors

- Obesity
- Diabetes (controversial)
- Rheumatoid arthritis
- Immunosuppressive medications
- Malignancy
PJL Risk Factor: Diabetes

- Chrastil, J, Journal of Arthroplasty (2015): Preoperative hyperglycemia was associated with an increased incidence of PJI. While HbA1c did not perfectly correlate with the risk of PJI, perioperative hyperglycemia did, and may be a target for optimization to decrease the burden of PJI.
PJL Risk Factor: Diabetes

- 20,171 hip and knee arthoplasty procedures
- Observed a significantly higher risk of PJL among patients with a diagnosis of diabetes, patients using diabetes medications, and patients with perioperative hyperglycemia.
- Effects attenuated when adjusting for BMI, type of surgery, ASA score and operative time.
- Conclusion: There was no association with hemoglobin A1c values and PJL.
PJL Risk Factor: Diabetes

- Conclusion: No significantly increased risk of revision arthroplasty, deep infection, or DVT was found in patients with diabetes compared to patients without diabetes in the study population of patients who underwent elective knee arthroplasty.
PJI Risk Factor: Diabetes

- Perioperative hyperglycemia
- Increased biofilm formation in presence of elevated glucose
- Impaired leukocyte function
- Microvascular changes
- Impaired healing
Biologic drugs for RA inhibit tumor necrosis factor and increase risk of surgical site infection

Methotrexate generally not problematic

Withhold drugs before Arthroplasty or if develop PJI
High Risk for PJI

- Unrelated to dental treatment/bacteremia

- Post-operative conditions:
  - Infection or drainage at the surgical site
  - Hematoma
  - Urinary Tract Infection (UTI)
PJIs Pathogenesis

- Majority occurring in first year originate at time of surgery
- Biofilm-bacterial protection
- Low inoculum of bacteria needed to establish infection of prosthetic material
- Contiguous spread of infection .... During healing and late infection
- Hematogenous seeding .... rare .... *S. aureus* much higher risk
- In majority of hematogenous infections, bacteremia and PJIs symptoms occur almost simultaneously
- First 3 weeks greatest risk
Microbiology of PJI

- *S. aureus* and coagulase-negative *Staph* account for 50–60%
- *Strep* and *enteroccci* approximately 10%
- Aerobic gram negative bacilli 9%
- Polymicrobial 15%
- Anaerobes 4%
- Culture negative 14%
- *Viridans strep* (oral) uncommon
Bacteremia

- Transient Bacteremia ... 6–30 minutes per procedure

- Chronic Bacteremia .... Normal daily activity including chewing, brushing and flossing teeth ..... 5370 minutes per month (90 hr)

- Bacteremia from normal daily activity can be the equivalent of that from an invasive dental procedure
Bacteremia Frequency

- Extraction 10%–100%
- Periodontal surgery 36%–88%
- Scaling and root planing 8%–80%
- Prophy up to 40%
- Rubber dam/matrix band placement 9%–32%
- Endodontic procedures up to 20%
- Brushing and flossing 20%–68%
- Toothpick use 20%–40%
- Water irrigation device 7%–50%
- Chewing food 7%–51%
Efficacy of Antibiotic Prophylaxis

- Reduces but does not eliminate bacteremia
- Decreased bacteremia provides no protection against PJI
- Many PJI occur in patients who have taken antibiotic prophylaxis prior to dental procedures
Risks of Antibiotic Prophylaxis

- Overuse of antibiotics – resistant organisms
- Adverse reactions – allergy, anaphylaxis, GI distress
- *C. difficile* infection – 500,000/year, 29,000 deaths/year
- Cost – estimated at $50 million/year
**C. diff Infection**

- Hospital acquired
- Physician office acquired
- Community acquired
- Antibiotic associated
- May occur 6–10 weeks after antibiotic use
C. diff Infection Risk Factors

- Recent hospitalization
- Recent antibiotic use
- Advanced age – 65 or older
- Previous C. diff infection
- Surgery of the GI tract
- Inflammatory Bowel Disease (IBD)
- Colorectal Cancer, Chemotherapy
- Immunosuppression
- Kidney disease
- Use of proton pump inhibitors
C. *diff* Infection Symptoms

- Diarrhea 3x or more daily for several days
- Abdominal pain or tenderness
- Loss of appetite
- Fever
- Blood or pus in stool
- Weight loss
C. diff Infection Treatment

- Discontinue antibiotic
- Refer to PCP or GI physician
- Metronidazole (Flagyl) or Vancomycin 10–14d
- Possible fecal transplant, endoscopy
- Probiotics
- Fluids
Antibiotic Prophylaxis and *C. diff*

- 13 fatal and 149 non-fatal reactions per million courses of 600mg Clindamycin for prophylaxis
- No fatal adverse drug reactions related to 3g Amoxicillin for prophylaxis

Adverse reaction to AP
When should I consult the orthopedic surgeon?
Fact Sheet for Patients with Prosthetic Joints

Dr. Paumier has recommended that you should NOT take antibiotics to prevent a prosthetic joint infection before having dental work done. This is a change from previous recommendations that have been used over the last decade. This may seem confusing recommendations from your orthopedic surgeon. We are confident there is no additional risk of infection of your joint by not taking antibiotics before dental work. There are significant potential risks associated with taking antibiotics. We are committed to providing you the best oral health care to enhance your overall health using the most scientific research to guide our decisions. If you prefer to continue taking antibiotics prior to dental work, please contact your orthopedic surgeon to prescribe them in advance of your treatment.

Current Guideline, January 2015, Journal of the American Dental Association

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

EVIDENCE TO SUPPORT CURRENT GUIDELINE

- Dental procedures are not associated with prosthetic joint infections
- Antibiotics taken before dental procedures do not prevent prosthetic joint infections
- The vast majority of prosthetic joint infections are caused by Staph; bacteria commonly found on the skin
- The bacteria of the mouth are mostly Strep with very few strains of Staph
- Similar amounts of bacteria enter the bloodstream from normal daily activities such as brushing teeth and chewing food as from dental procedures such as cleaning and extraction
- Overuse of antibiotics are associated with resistant strains of bacteria making antibiotics less effective to fight life-threatening infections
- Antibiotic use is associated with serious infections of the bowel known as C. diff infections causing an estimated 300,000 infections and 29,000 deaths yearly
- There are no clinically relevant medical conditions which might increase your risk for prosthetic joint infection when having dental work done

Letter to surgeon

Gust Partestas, MD
8512 Whipple Ave NW
North Canton, OH 44720

Dear Gust,

I am enclosing a reprint of the January issue of JADA related to updated Guidelines for antibiotic prophylaxis prior to dental treatment for patients with prosthetic joint replacements. After the 2012 AAO/AJGA Joint Recommendations, there was much confusion about what clinicians should do, and when prophylaxis might be appropriate. As a consequence, most orthopedic surgeons and dentists tended to default to the 2002 Guidelines or pre-medicate all patients.

Recognizing the lack of clarity, the ADA appointed an expert panel to re-evaluate the systematic review done by the 2012 panel and any new research. I was fortunate to be a member of that panel. The result was a new guideline stating “in general, for patients with prosthetic joint implants, prophylactic antibiotics are NOT recommended prior to dental procedures to prevent prosthetic joint infection.”

It was clear there is no association between dental procedures and PJL or any protection for PJL from antibiotic prophylaxis. Additionally there is no clinically significant difference in the incidence between bacteremias from dental procedures such as extraction and scaling, and those induced from normal daily activity such as chewing, brushing teeth. The microbiology of PJL being predominantly staph and the oral flora being largely staph with very few strains of staph explains the lack of association between oral-induced bacteremias and PJL. The overuse of antibiotics has become a real concern due to the increase in resistant organisms as well as adverse effects. It is estimated there are over 500,000 infections and 29,000 deaths per year due to C. diff. Recognizing many patients with prosthetic joints are elderly and have other health issues and may have taken antibiotics shortly before dental care, antibiotic prophylaxis may increase their risk for opportunistic infection by C. difficile.

In an effort to develop consensus between orthopedic surgeons and dentists to minimize conflicting recommendations and patient confusion, I hope this latest research may persuade surgeons to advise patients not use antibiotic prophylaxis for dental procedures after prosthetic joint surgery. If you recommend prophylaxis and the patient prefers to pre-medicate prior to dental visits, we request your office provide the patient with the prescription. I would be happy to discuss this issue if you would like.

Respectfully,

Thomas M. Paumier DDS
2017 Appropriate Use Criteria

- Planned dental procedure
- Immunocompromised status
- Glycemic Control
- Previous history of PJI requiring surgery
- Time since joint replacement
- AAOS Rating System
  - “Appropriate”
  - “May Be Appropriate”
  - “Rarely Appropriate”
American Dental Association guidance for utilizing appropriate use criteria in the management of the care of patients with orthopedic implants undergoing dental procedures

Approximately 332,000 primary total hip arthroplasties and 710,000 primary total knee arthroplasties were performed in the United States in 2010, 96% of hip replacement and 98% of knee replacement surgeries were performed on patients 45 years and older. Reported infection rates for such operations range from 0.8% to 2.2%.13,17 Infections can be caused by introduction of microorganisms at the time of surgery, hematogenous seeding, or contiguous spread of infection from an adjacent site.17,18 Infections of total joint replacements can result in failure of the initial surgical procedure and the need for extensive revision, prolonged antibiotic treatment, functional impairment, considerable cost of care, and even death.

In 2014, the American Dental Association (ADA) Council on Scientific Affairs (CSA) assembled an expert panel to update and clarify the clinical recommendations found in a 2011 joint ADA and American
2017 AAOS AUC

- [www.orthoguidelines.org/go/auc](http://www.orthoguidelines.org/go/auc)
- 64 scenarios considered
- 8 (12%) “Appropriate”
- 17 (27%) “May be Appropriate”
- 39 (61%) “Rarely Appropriate”
2017 AUC Appropriate Conditions

- Severely immunocompromised, previous history of infection (3)
- Severely immunocompromised, Active diabetic A1C>8, no hx of infection (2)
- Severely immunocompromised, Active diabetic A1C>8, hx of infection (2)
- Severely immunocompromised, Active diabetic A1C unknown, hx of infection, <1yr
Immunocompromised patients

- Stage 3 HIV (AIDS) T lymphocyte < 200 or opportunistic infection
- Cancer patients on immunosuppressive chemo with febrile neutropenia (ANC < 2000) or severe neutropenia (ANC < 500)
- Rheumatoid Arthritis with use of biologic disease modifying agents or prednisone > 10mg/day
- Solid organ transplant on immunosuppressant
- Bone marrow transplant
“It is appropriate for the dentist to make the final judgment to use antibiotic prophylaxis for patients potentially at higher risk of experiencing PJI (independent of dental treatment) using the AUC as a guide, without consulting the orthopedic surgeon”
CLINICAL RECOMMENDATION

In general, for patients with prosthetic joint implants, prophylactic antibiotics are NOT recommended prior to dental procedures to prevent prosthetic joint infection
Summary

CLINICAL RATIONALE

- There is evidence that dental procedures are not associated with prosthetic joint infections.
- There is evidence that antibiotics provided before oral care do not prevent prosthetic joint infections.
- There are potential harms of antibiotics including risk for anaphylaxis, antibiotic resistance, and opportunistic infections like *C. difficile*.
- The benefits of antibiotic prophylaxis may not exceed the harms for most patients.
So When Should I Consider AP?

- Isolated individual cases
- Within first month of arthroplasty?
- No evidence to support AP

- *C. diff* risk assessment
Antibiotics for Prophylaxis

- Oral: Adult 2g Amoxicillin
  Child 50mg/kg Amoxicillin
- Allergic to Penicillin or Ampicillin:
  Adult 2g Cephalexin (Keflex, Duricef, Ceclor)
  Child 50mg/kg Cephalexin
- Azithromycin (Zithromax) 500mg (15mg/kg)
- Clarithromycin (Biaxin) 500mg (15mg/kg)
- NO CLINDAMYCIN
- Probiotics??
Direct Bonded Bridge
Direct Bonded Bridge
Direct Bonded Bridge
Direct Bonded Bridge
ANTIBIOTIC PROPHYLAXIS

Infective Endocarditis
Table 3. Cardiac Conditions Associated With the Highest Risk of Adverse Outcome From Endocarditis for Which Prophylaxis With Dental Procedures Is Reasonable

- Prosthetic cardiac valve or prosthetic material used for cardiac valve repair
- Previous IE
- Congenital heart disease (CHD)*
  - Unrepaired cyanotic CHD, including palliative shunts and conduits
  - Completely repaired congenital heart defect with prosthetic material or device, whether placed by surgery or by catheter intervention, during the first 6 months after the procedure†
  - Repaired CHD with residual defects at the site or adjacent to the site of a prosthetic patch or prosthetic device (which inhibit endothelialization)
- Cardiac transplantation recipients who develop cardiac valvulopathy

*Except for the conditions listed above, antibiotic prophylaxis is no longer recommended for any other form of CHD.
†Prophylaxis is reasonable because endothelialization of prosthetic material occurs within 6 months after the procedure.
Table 2. Primary Reasons for Revision of the IE Prophylaxis Guidelines

IE is much more likely to result from frequent exposure to random bacteremias associated with daily activities than from bacteremia caused by a dental, GI tract, or GU tract procedure.

Prophylaxis may prevent an exceedingly small number of cases of IE, if any, in individuals who undergo a dental, GI tract, or GU tract procedure.

The risk of antibiotic-associated adverse events exceeds the benefit, if any, from prophylactic antibiotic therapy.

Maintenance of optimal oral health and hygiene may reduce the incidence of bacteremia from daily activities and is more important than prophylactic antibiotics for a dental procedure to reduce the risk of IE.
NICE Guideline 2008

- No AP for any dental procedures for any risk categories for IE
- Incidence of IE increasing between 2000–2013 and more so after 2008
- On average 419 more cases than expected of IE per year since 2008
- Possible 66 more deaths per year from IE
- Updated July 2016 ….. No change
Infective Endocarditis (IE)

- 80–90% left side (mitral or aortic)
- 10–20% right side (tricuspid or pulmonic)
- Nidus of infection usually a sterile fibrin–platelet vegetation formed when damaged endothelial cells release tissue factor.
- Invaded by microorganisms from a distant site.
- *Streptococci* and *Staphylococcus aureus* account for 80–90% of cases .... More easily adhere to fibrin clot.
- Microorganisms covered by layer of fibrin and platelets and inaccessible to PMNs, host defenses
IE Signs and Symptoms

- Vague initially: low grade fever, night sweats, fatigue, malaise and weight loss.
- Chills and arthralgia may occur.
- Initially less than 15% have a murmur or fever, but eventually almost all develop both.
- Physical exam may be normal or include pallor, fever, change in pre-existing murmur or new regurgitant murmur and tachycardia.
- Retinal emboli (Roth spots), cutaneous petechiae, hemorrhagic macules on palms or soles, splinter hemorrhages under nails.
Infective Endocarditis (IE)

- Time frame between bacteremia and the onset of symptoms of IE is usually 7–14d for viridans *Strep*

- 78% occur within 7d and 85% within 14d

- Upper time limit unknown, but it is likely many cases of IE with incubation periods of greater than 2 weeks after a dental procedure were incorrectly attributed to the procedure
Strom studied AP and the following cardiac risk factors for IE: MVP, congenital heart disease (CHD), rheumatic heart disease (RHD), and previous cardiac valve surgery.

Control subjects were more likely to have undergone a dental procedure than those with cases of IE.

Conclusion: dental treatment was not a risk factor for IE even in patients with valvular heart disease.

Few cases of IE could be prevented with prophylaxis even if it were 100% effective.
Cases of IE caused by oral bacteria probably result from the exposures to low inocula of bacteria in the bloodstream that result from routine daily activities and not from a dental procedure.

Additionally, the vast majority of patients with IE have not had a dental procedure within the 2 weeks before onset of symptoms of IE.

In patients with poor oral hygiene, the frequency of positive blood cultures just before dental extraction may be similar to that after extraction.
“In patients with dental disease, the focus on the frequency of bacteremia associated with a specific dental procedure and the AHA Guideline for the prevention of IE have resulted in an overemphasis on antibiotic prophylaxis and an under emphasis on maintenance of good oral hygiene and access to routine dental care, which are likely more important in reducing the lifetime risk of IE than the administration of antibiotic prophylaxis for a dental procedure.”
Tooth brushing 2x daily for 1 year had 154,000x greater risk of exposure to bacteremia than a tooth extraction.

1 year cumulative exposure to bacteremia from normal daily activities may be as high as 5.6 million times greater than bacteremia related to an extraction.
New AHA Guideline

- Being studied currently
- Likely released late 2017 or early 2018
- Changes?
- Clindamycin?
I want a New Denture
Pathology
Pathology
Pathology
Pathology
Antibiotic Prophylaxis for Other Conditions

- Kidney Dialysis patients (AV shunt)
- Solid tissue organ transplants
- Cancer Chemotherapy
- HIV/AIDS Immunosuppression
- Bone Marrow Transplant
- Bone plates, pins, screws
- Breast implants
- Asplenism
- Pacemakers/Defibrillators
- CSF Shunts
Renal Dialysis AV Shunts

- 22% become infected—primarily with *S. aureus* and other *Staph*
- Infections can lead to IE—60% caused by *S. aureus*
- 25% require valve replacement
- Peritoneal dialysis—peritonitis—primarily caused by *S. aureus, S. epidermidis* and GI bacteria
- Oral bacteria not implicated
Immunospression: HIV/AIDS, Chemotherapy, Organ Transplants

- Clinically significant neutropenia
- Neutrophil count 1000–2000 greatest risk
- Disease process (Leukemia)
- Indwelling venous access lines/ports
- Oral bacteria commonly cultured from bacteremia
- NO support for AP
- Oral health extremely important, especially patients receiving bisphosphonates
Asplenism

- Spleen important for phagocytosis, especially encapsulated bacteria
- 25,000 splenectomies/year
- 4.25% of asplenic patients become septic
- 2.5% die
- 80% of infections caused by encapsulated bacteria *Strep.pnuemoniae*, *H.influenzae*, *N.menigitidis*, *E.coli*, *Pseudomonas*
- Rare to find *Strep viridans*
Paacemakers/Defibrillators

- Infection usually in pocket, but can occur at tip and lead to endocarditis
- Almost all are *S. aureus*, *S.epidermidis* and Gram – bacilli
CSF Shunts

- Infections occur in 5–40% of patients
- Majority in first month (86% within 6mo)
- Primarily S.aureus, *S.epidermidis* and Gram–bacteria
- Hematogenous seeding of CNS is rare
Systemic Lupus Erythematosus

- More than 50% of patients with SLE have cardiac involvement
- 4–4% develop IE
Direct Crown
Direct Crown Posterior
Direct Crown Posterior
Direct Crown Posterior
Direct Crown Posterior
Direct Crown Posterior
Direct Crown Anterior
Direct Crown Anterior
Direct Crown Anterior
Questions?

Thanks for your attention!
References


References

- Skaar DD, O’Conner H, Hodges JS, Michalowicz, BS. Dental procedures and subsequent prosthetic joint infections: findings from the Medicare Current Beneficiary Survey. *JADA*. 2011;142(12):1343–1351
References


References

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Thomas M. Paumier DDS
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Current Guideline, January 2015, Journal of the American Dental Association
(Authors: Thomas Sollecito, DMD; Elliot Abt, DDS; Peter Lockhart, DDS; Edmond Truelove, DDS; Thomas Paumier, DDS)

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EVIDENCE TO SUPPORT CURRENT GUIDELINE

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-- Antibiotics taken before dental procedures do not prevent prosthetic joint infections

-- The vast majority of prosthetic joint infections are caused by Staph; bacteria commonly found on the skin

-- The bacteria of the mouth are mostly Strep with very few strains of Staph

-- Similar amounts of bacteria enter the bloodstream from normal daily activities such as brushing teeth and chewing food as from dental procedures such as cleaning and extraction

-- Overuse of antibiotics are associated with resistant strains of bacteria making antibiotics less effective to fight life threatening infections

-- Antibiotic use is associated with serious infections of the bowel known as C. diff infections causing an estimated 500,000 infections and 29,000 deaths yearly

-- There are no clinically relevant medical conditions which might increase your risk for prosthetic joint infection when having dental work done