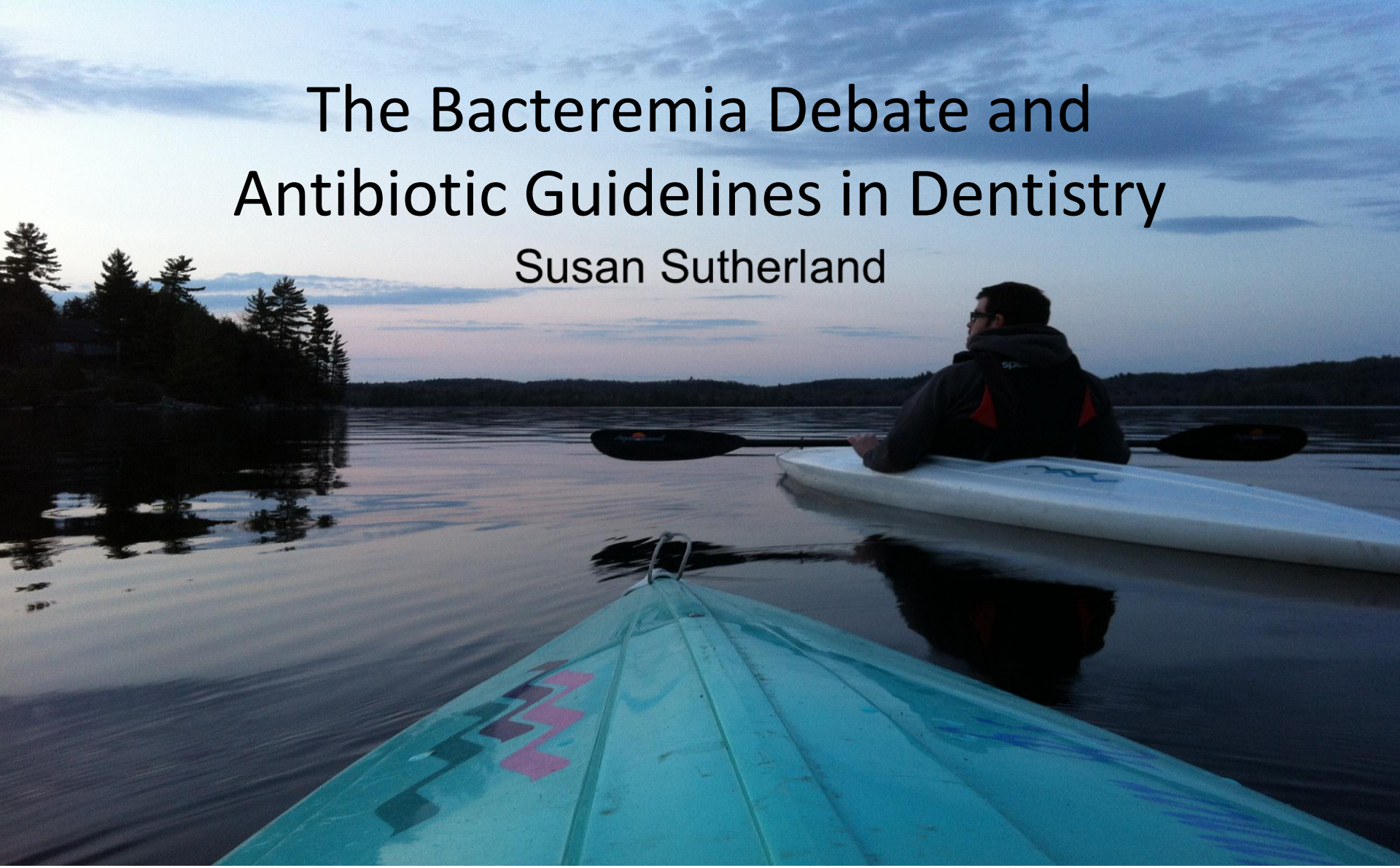
The Bacteremia Debate and Antibiotic Guidelines in Dentistry

Susan Sutherland



Canadian Association of Hospital Dentists
Association canadienne des dentistes en milieu hospitalier
Sunnybrook HEALTH SCIENCES CENTRE
University of Toronto Faculty of Dentistry

Dr. Susan Sutherland

- No Funding Conflicts of Interest

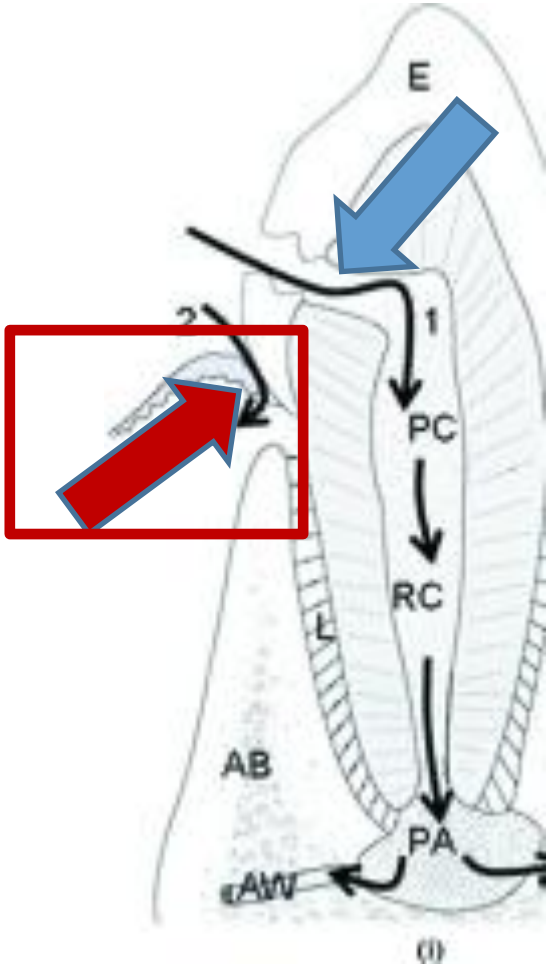
Learning Objectives

- To discuss bacteremia: from dental procedures versus daily activities
- To review the history of and recommendations for antibiotic use or prophylaxis contained in guidelines on:
  - Total joint replacement
  - Infective endocarditis
  - Apical periodontitis
  - Acute periapical abscess

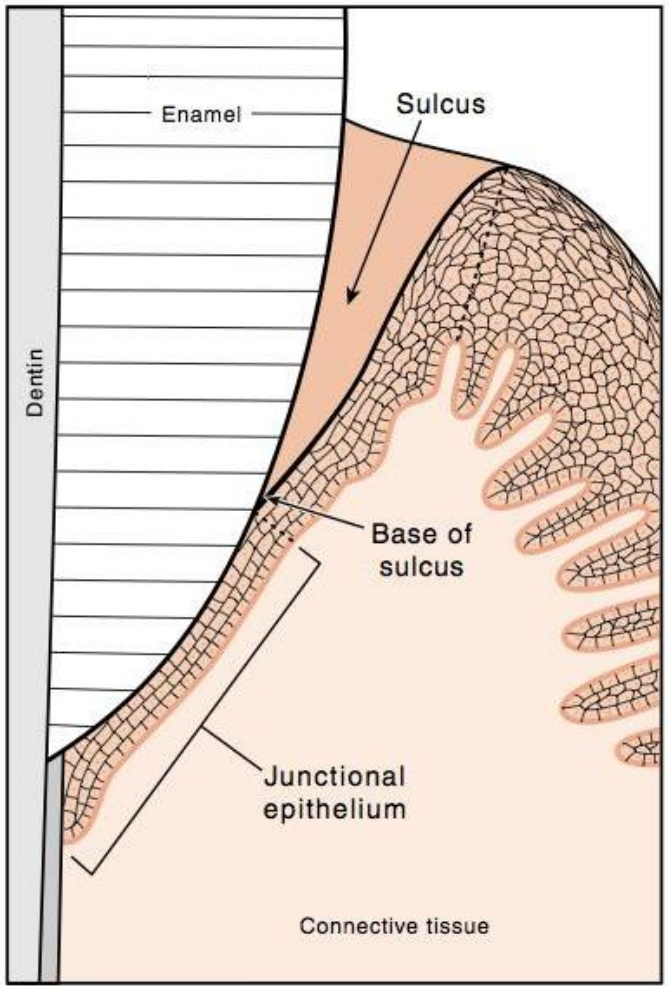
Factors Influencing Bacteremia

1. The oral biofilm
   - Chronic inflammation/bacterial burden
   - Type and attributes of oral bacteria
2. Dental procedures and daily activity - any breach in oral mucosal barrier facilitates bacteremia

Bacterial entry to systemic circulation



The Gingival Sulcus



Oral Bacteremia Isolates in Infective Endocarditis (IE)

- Predominantly streptococcus -
  - viridans group (SVG) – S. mitis, S. oralis, S. sanguis
- Gram negative rods –
  - Prevatolla intermedia, Fusobacterium nucleatum

The Guideline Journey – IE and TJR

Guideline Journey - IE

- 1909 – association between *s. viridans* and IE (Horder)
- 1909 – relationship between "alveolar pyorrhea" and *s. viridans* IE; rocking a loose tooth in these patients caused 86% positive blood cultures (Okell and Elliot)
- 1923 – IE caused by commensal organisms "almost all physiological" (Lewis and Grant)
- 1926 – *s. viridans* IE 2° gingivitis or dental abscess (Thayer)
- 1945 – 6/250 patients with IE had dental extractions; authors estimated **(anecdotally)** that 1 in 4 patients developed IE after a dental procedure (Kelson and White)
- **1955 – first AHA Guidelines Prevention of IE**

1984 – Guntheroth reviewed literature 1925-1979

- 96% of 1322 patients developed IE without dental procedures
- Frequency of + blood cultures after
  - Extraction: 40%
  - Chewing: 38%
  - Brushing: 25%
- Estimated cumulative monthly exposure in minutes to
  - Physiologic bacteremia 5370 minutes
  - Extraction bacteremia 6 minutes
- Concluded odds nearly 1000:1 that IE seeded physiologically versus procedures

Daily activities

- 1980 – 86% of patients who flossed less than once per day developed bacteremia; those who flossed daily did not (Carroll)

- 2008 –brushing versus extraction with or without amoxicillin in non-cardiac patients (Lockhart)
  - Incidence of bacteremia higher in extraction-placebo cases
  - 49% of extraction-amoxicillin cases developed significant bacteremia
  - Potential for bacteremia from brushing >200 times per year, versus <2 dental visits per year in this group of patients

- 2009 –analyzed the above data excluding amoxicillin group
  - Poor oral hygiene and gingivitis associated with IE-associated bacteremia in both groups
  - In the brushing group, the worse the OH, the greater the incidence of bacteremia

- Recent guidelines challenge existing dogma – (BSAC, ESCA, AHA)
- NICE Guidelines have come full circle – prompting a major shift in clinical practice ion the UK
- AHA 2007 Guideline made two important statements:
  - bacteremia resulting from daily activities is much more likely to cause IE than bacteremia associated with a dental procedure.
  - only an extremely small number of cases of IE **might** be prevented by antibiotic prophylaxis even if prophylaxis is 100% effective

AHA 2007 Guideline

High Risk – prophylaxis reasonable

1. Prosthetic cardiac valve or prosthetic material used for cardiac valve repair
2. Previous IE
3. 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 heter 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)
4. Cardiac transplantation recipients **who develop cardiac valvulopathy**

Prophylaxis NOT recommended

- Non-valvular cardiovascular devices
  - Pacemakers
  - Implanted defibrillators
  - Ventriculoatrial (VA) shunts
  - Devices for patent ductus arteriosus, atrial septal defects, ventricular septal defect occlusion, after 6 months
- Arterial devices
  - Stents, vascular grafts (e.g. CABG patients)
  - Hemodialysis prosthetic vascular grafts
  - Coronary artery stents
  - Carotid patches
- Venous – vena cava filters

History of Guidelines for Total Joint Replacement (TJR)

“So that is unanimous then – nobody has a clue what to do”

Guideline Journey - TJR

1970's – attention focused on role of dental bacteremia in late PJI

2003 – AAOS -ADA –IDSA Advisory Statement

- No coverage for patients with pins/plates/screws
- Coverage for:
  - All patients in first two years
  - Patients with "high risk" systemic conditions
  - Patients with previous joint infection

2009 – AAOS "Information Statement"

- all patients covered forever

2012 AAOS- ADA Guideline – Confusion begins!

- The practitioner might consider discontinuing the practice of routinely prescribing prophylactic antibiotics for patients with hip and knee prosthetic joint implants undergoing dental procedures ??????????????????????
  - Grade of evidence: Limited – use caution, exercise judgment, be alert to new evidence, patient preference
- Topical oral antimicrobials [rinses]
  - Grade: inconclusive
- Maintain appropriate oral hygiene
  - Grade: Consensus

?

2013 - CDA Committee on Clinical and Scientific Affairs (CCSA)

- understood that Canadian dentists wanted clarity
- reviewed 2012 CPG, guidelines from other jurisdictions and evidence related to IE prophylaxis
- updated our position statement

?

- 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 and should maintain good oral hygiene and oral health following surgery. Orofacial infections in all patients, including those with total joint prostheses, should be treated to eliminate the source of infection and prevent its spread.

2014 - ADA Guideline:

Updated systematic review found no association between dental procedures and prosthetic joint infections.

"Based on this review and the risk of harm associated with antibiotic resistance, adverse drug reactions, and cost, the 2014 Panel concluded that prophylactic antibiotics given prior to dental procedures are ***not recommended*** for patients with prosthetic joint implants."

ADA Guideline NOT well received!

2015 JAAOS Guest Editorial -

Full Text

One Size Does Not Fit All: Involve Orthopaedic Implant Patients in Deciding Whether To Use Prophylactic Antibiotics With Dental Procedures

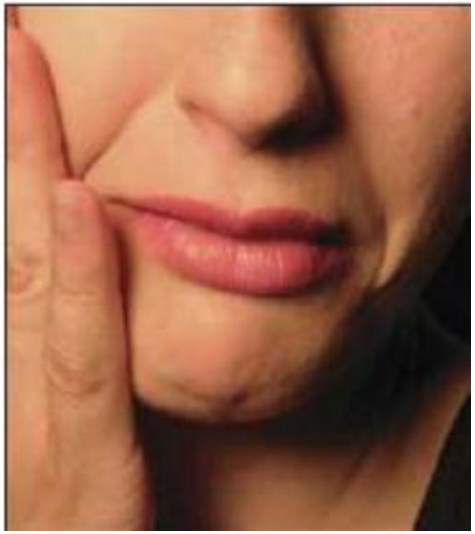
David S. Jevsevar,
Deborah S. Cummins,
Frederick M. Azar,
Brian S. Parsley,
Thomas K. Fehring,
Paul F. Lachiewicz,
and William C. Watters III

J Am Acad Orthop Surg March 2015 ; 23:141-142.; published ahead of print February 9, 2015,

- New ADA Guideline again creates disagreement between the ADA and AAOS
- 2012 collaborative CPG supported by limited evidence
- Our primary concern is that the ADA guideline is not supported by evidence

- Collaboration between AMMI Canada, CDA and Canadian Orthopedic Association (2 members from each)
- Work began in 2014
- Goal: achieve consensus statement endorsed by all three Boards
- Presentation by all three groups at AGM of COA in June 2015
- Status: consensus statement recommending no prophylaxis now before the three respective Boards

Toothache and abscess



Misuse of antibiotics for apical periodontitis (irreversible pulpitis, “toothache”)
and acute localized periapical abscess

Irreversible pulpitis

Two Cochrane reviews, one Canadian systematic review and guideline, position of American Academy of Endodontics:

- Antibiotics do not affect pain (subjective or objective) nor reduce quantity of pain medication required
- Definitive treatment – extraction or endodontic therapy should be initiated

Acute localized apical abscess

One Cochrane reviews, one Canadian systematic review and guideline, position of the American Academy of Endodontics:

- The abscess should be drained through a pulpectomy or incision and drainage
- Antibiotics are of no additional benefit
- In the event of systemic complications (e.g., fever, lymphadenopathy or cellulitis), or for an immunocompromised patient, antibiotics may be prescribed in addition to drainage of the tooth.

Summary

- Most bacteremias arise from daily activities
- Dental procedures have been given a bad rap
- Guidelines for prevention of IE and PJIs have an interesting history and a questionable evidence base
- 2007 AHA Guidelines recommend prophylaxis for only four conditions
- We will soon have a “no antibiotics for prosthetic joints” consensus statement endorsed by three credible Canadian organizations
- Antibiotics should not be used for irreversible pulpitis or acute localized periapical abscess

References

- Guntheroth WG. How important are dental procedures as a cause of infective endocarditis? Am J Cardiol. 1984;54(7):797-801.

- Carroll GC, Sebor RJ. Dental flossing and its relationship to transient bacteremia. Journal of Periodontology. 1980;51(12):691-2.

- Lockhart PB et al. Bacteremia associated with toothbrushing and dental extraction. Circulation. 2008;117(24):3118-25.

- Lockhart PB et al. Poor oral hygiene as a risk factor for infective endocarditis-related bacteremia. J Am Dent Assoc. 2009;140(10):1238-44.

- National Institute of Clinical Excellence. Prophylaxis against infective endocarditis: antimicrobial prophylaxis against infective endocarditis in adults and children undergoing interventional procedures. Published: March 2008 Last updated: Sept 2015 Available: https://www.nice.org.uk/guidance/CG64.

- Wilson W et al. Prevention of infective endocarditis: guidelines from the American Heart Association: J Am Dent Assoc.138(6):739-45.

- Baddour LM et al. Nonvalvular cardiovascular device-related infections. Circulation. 2003;108(16):2015-31.

- Jevsevar DS, Abt E. The new AAOS-ADA clinical practice guideline on Prevention of Orthopaedic Implant Infection in Patients Undergoing Dental Procedures. J Am Acad Orthop Surg. 2013;21(3):195-7.

- Sollecito TP et al. 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. J Am Dent Assoc. 2015;146(1):11-6 e8.

- Jevsevar DS et al. One size does not fit all: involve orthopaedic implant patients in deciding whether to use prophylactic antibiotics with dental procedures. J Am Acad Orthop Surg. 2015;23(3):141-11.

- Matthews D, Sutherland S. Clinical practice guidelines on emergency management of acute apical periodontitis and acute apical abscess. Evidence-based Dentistry 2004;5:7-11. Evid Based Dent. 2004;5(3):84.

- Agnihotry *A* et al. Antibiotic use for irreversible pulpitis. Cochrane Database of Systematic Reviews 2016*, Issue* 2*. Art. No.: CD004969. DOI:* 10.1002/14651858.CD004969.pub4

- Cope A et al. Systemic antibiotics for symptomatic apical periodontitis and acute apical abscess in adults. Cochrane Database of Systematic Reviews 2014*, Issue* 6*. Art. No.: CD010136. DOI:* 10.1002/14651858.CD010136.pub2.

- American Association of Endodontists. Use and abuse of antibiotics. Colleagues for Excellence Newsletter. Winter 2012. Available at: www.aae.org/colleagues