

## Does My "Low-Risk" Patient Need Antibiotic Prophylaxis?

Hsu Li Yang  
27<sup>th</sup> October 2018

---

---

---

---

---

---

---

---

## Potential Conflicts of Interest

- Research Funding:
  - Pfizer Singapore
  - AstraZeneca
  - Janssen-Cilag
  - Merck, Sharpe & Dohme
- Advisory Board:
  - Doripenem (Janssen-Cilag)
  - Adult pneumococcal vaccine & Tigecycline (Pfizer)
- Conference sponsorships:
  - Pfizer Singapore
  - Janssen-Cilag
  - Merck, Sharpe & Dohme

---

---

---

---

---

---

---

---

## Former Key Principles for Preventing Endocarditis:

- Infective endocarditis – uncommon but life-threatening.
  - Prevention is better than treatment of infection.
- Specific cardiac conditions predispose to endocarditis.
- Bacteremia with endocarditis-causing organisms can occur in association with invasive dental, GIT or GU procedures.
- Antimicrobial prophylaxis is likely effective in patients who undergo the above procedures.

---

---

---

---

---

---

---

---

# Bacteremia from ADL

Published in final edited form as:  
Circulation. 2008 June 17; 117(24): 3118-3125. doi:10.1161/CIRCULATIONAHA.107.758234.

## Bacteremia Associated with Tooth Brushing and Dental Extraction

Peter B. Lockhart, DDS<sup>1</sup>, Michael T. Brennan, DDSMHS<sup>1</sup>, Howell C. Sasser, PhD<sup>1</sup>, Philip C. Fox, DDS<sup>1</sup>, Bruce J. Paster, PhD<sup>2</sup>, and Farah K. Bahrani-Mougeot, PhD<sup>1</sup>

<sup>1</sup>Department of Oral Medicine, Carolinas Medical Center, Charlotte, NC

<sup>2</sup>The Forsyth Institute, Boston, MA

- Brushing teeth = 23% risk of bacteremia.
- Tooth extraction with amoxicillin = 33% risk.
- Tooth extraction with placebo = 60% risk.



Photo from Health Hub 5g  
Photo from ST, May 14, 2014.

---

---

---

---

---

---

---

---

---

---



“The thoughtless person playing with penicillin is morally responsible for the death of the man who finally succumbs to infection with the penicillin-resistant organism” (New York Times, 1945)

---

---

---

---

---

---

---

---

---

---

### MAJOR ARTICLE

## Emergency Department Visits for Antibiotic-Associated Adverse Events

Nadine Shahab, Prii R. Patel, Ajuj Srivastava, and Daniel S. Budnitz  
Division of Healthcare Quality Promotion, National Center for Detection, Prevention, and Control of Infectious Diseases, Coordinating Center for Infectious Diseases, Centers for Disease Control and Prevention, Atlanta, Georgia

(See the editorial commentary by Linder on pages 744-6)

**Background.** Drug-related adverse events are an underappreciated consequence of antibiotic use, and the national magnitude and scope of these events have not been studied. Our objective was to estimate and compare the numbers and rates of emergency department (ED) visits for drug-related adverse events associated with systemic antibiotics in the United States by drug class, individual drug, and event type.

**Methods.** We analyzed drug-related adverse events from the National Electronic Injury Surveillance System-Cooperative Adverse Drug Event Surveillance project (2008–2009) and outpatient prescriptions from national sample surveys of ambulatory care practices, the National Ambulatory Medical Care Survey and the National Hospital Ambulatory Medical Care Survey (2004–2005).

**Results.** On the basis of 6614 cases, an estimated 142,505 visits (95% confidence interval [CI], 116,506–168,504 visits) annually were made to US EDs for drug-related adverse events attributable to systemic antibiotics. Antibiotics were implicated in 19.3% of all ED visits for drug-related adverse events. Most ED visits for antibiotic-associated adverse events were for allergic reactions (78.7% of visits; 95% CI, 75.3%–82.1% of visits). One-half of the estimated ED visits were attributable to penicillins (36.9% of visits; 95% CI, 34.7%–39.2% of visits) and cephalosporins (12.2%; 95% CI, 10.7%–13.5%). Among commonly prescribed antibiotics, sulfonamides and clindamycin were associated with the highest rate of ED visits (18.9 ED visits per 10,000 outpatient prescription visits; 95% CI, 13.1–24.7 ED visits per 10,000 outpatient prescription visits) and 18.5 ED visits per 10,000 outpatient prescription visits (95% CI, 12.1–25.0 ED visits per 10,000 outpatient prescription visits), respectively. Compared with all other antibiotic classes, sulfonamides were associated with a significantly higher rate of moderate-to-severe allergic reactions (4.3% [95% CI, 2.9%–5.8%] vs. 1.9% [95% CI, 1.3%–2.3%]), and sulfonamides and fluoroquinolones were associated with a significantly higher rate of neurologic or psychiatric disturbances (1.4% [95% CI, 1.0%–1.7%] vs. 0.5% [95% CI, 0.4%–0.6%]).

**Conclusions.** Antibiotic-associated adverse events lead to many ED visits, and allergic reactions are the most common events. Minimizing unnecessary antibiotic use by even a small percentage could significantly reduce the immediate and direct risks of drug-related adverse events in individual patients.

---

---

---

---

---

---

---

---

---

---



## Recommendations for Prophylaxis

2007 AHA Guidelines	2015 ESC Guidelines	2016 NICE Guidelines
<b>Antibiotic Prophylaxis:</b> <ul style="list-style-type: none"> <li>All dental procedures involving gingival tissue manipulation or periapical region of teeth or oral mucosa perforation.</li> <li>Procedures on respiratory tract or infected skin/musculoskeletal tissue.</li> </ul>	<b>Antibiotic Prophylaxis:</b> <ul style="list-style-type: none"> <li>Considered for dental procedures involving gingival tissue manipulation or periapical region of teeth or oral mucosa perforation.</li> </ul>	<b>Antibiotic Prophylaxis:</b> <ul style="list-style-type: none"> <li>Not routinely recommended.</li> </ul>

Adapted from: Curr Infect Dis Rep. 2017;19:9.

---

---

---

---

---

---

---

---

---

---

## Singapore

National Heart Centre Singapore  
 Patient Care | Appointment | Find a Condition or Treatment | Health Buddy App

Home | Patient Care | Conditions & Treatments | Specialities & Services | Your Clinic Visit | Your Hospital Stay | Visitor Information | E-Services

### Infective Endocarditis

#### Infective Endocarditis - How to prevent?

- Prophylaxis against Infective Endocarditis is recommended for the following patients:
- Prosthetic cardiac valves, including transcatheter implanted prostheses and homografts
  - Prosthetic material used for cardiac valve repair, such as annuloplasty rings and chords
  - Previous infective endocarditis
  - Unrepaired cyanotic congenital heart disease or repaired congenital heart disease, with residual shunts or valvular regurgitation at the site of or adjacent to the site of a prosthetic patch or prosthetic device.
  - Cardiac transplant with valve regurgitation due to a structurally abnormal valve.
- There is no evidence for endocarditis prophylaxis in gastrointestinal or genitourinary procedures unless there is active infection.

Dental procedures for which endocarditis prophylaxis is recommended:  
 Any dental procedures that involve manipulation of gingival tissue, manipulation of the periapical region of teeth, or perforation of the oral mucosa in patients.

- Overview
- Symptoms
- Causes and Risk Factors
- Prevention
- Diagnosis
- Treatment
- Pre-Surgery Preparation
- See our Care Team

---

---

---

---

---

---

---

---

---

---

## Singapore

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)  
 ScienceDirect  
 journal homepage: [www.elsevier.com/locate/sdj](http://www.elsevier.com/locate/sdj)

### Review

#### Infective endocarditis - An update for dental surgeons



Andrew Narendran Robinson<sup>a</sup>, Paul Anantharajah Tambyah

<sup>a</sup>Discipline of Oral and Maxillofacial Surgery, Faculty of Dentistry, National University of Singapore, Singapore  
 Department of Medicine (Division of Infectious Diseases), Yong Loo Lin School of Medicine, National University of Singapore, Singapore

---

---

---

---

---

---

---

---

---

---

## A Few Statistics...

- Amoxicillin adverse effects – 22.6/million prescriptions.
- Clindamycin – 13 fatal adverse effects and 149 non-fatal effects/million prescriptions.

### The Cost-Effectiveness of Antibiotic Prophylaxis for Patients at Risk of Infective Endocarditis

**BACKGROUND:** In March 2008, the National Institute for Health and Care Excellence recommended stopping antibiotic prophylaxis (AP) for those at risk of infective endocarditis (IE) undergoing dental procedures in the United Kingdom, citing a lack of evidence of efficacy and cost-effectiveness. We have performed a new economic evaluation of AP on the basis of contemporary estimates of efficacy, adverse events, and resource requirements.

**METHODS:** A decision analytic cost-effectiveness model was used. Health service costs and benefits (measured as quality-adjusted life years) were estimated. Rates of IE before and after the National Institute for Health and Care Excellence guidelines were available to estimate prophylactic efficacy. AP adverse event rates were derived from recent UK data, and resource requirements were based on English Hospital Episode Statistics.

**RESULTS:** AP was less costly and more effective than no AP for all patients at risk of IE. The results are sensitive to AP efficacy, but efficacy would have to be substantially lower for AP not to be cost-effective. AP was more than cost-effective for patients at high risk of IE. Only a marginal reduction in annual IE rates (1.64 cases in high-risk and 33 cases in all at-risk patients) would be required for AP to be considered cost-effective at £27,000 (US\$6,000) per quality-adjusted life year. Annual cost savings of £3.5 to £5.2 million (US \$3.5 to \$5.0 million) and health gains >2000 quality-adjusted life years could be achieved from reinstating AP in England.

**CONCLUSIONS:** AP is cost-effective for preventing IE, particularly in those at high risk. These findings support the cost-effectiveness of guidelines recommending AP use in high-risk individuals.

Matthew Pebody, PhD  
Alan White, PhD  
Mark J. Davey, MBBS, PhD  
Simon James, PhD  
Bernard Hoogkamp, PhD  
Liam M. Brennan, MD  
Paula B. Lockhart, DDS  
Marie A. Thornton, MSc, BSc, PhD

Correspondence to: Matthew Pebody, PhD, Centre for Health Economics and Policy Studies, University of Birmingham, Edgbaston, Birmingham, B15 2TT, UK; e-mail: m.p.eh@bham.ac.uk  
© Pebody et al.; licensee BioMed Central Ltd. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/2.0/>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

#### Cochrane Database of Systematic Reviews Antibiotics for the prophylaxis of bacterial endocarditis in dentistry

View search | View article information  
Anne-Marie Glenny | Richard Oliver | Graham J Roberts | Lee Hooper | Helen V Worthington  
View authors' declarations of interest

Thornhill MH, et al. J Antimicrob Chemother. 2015;70:2382-8.

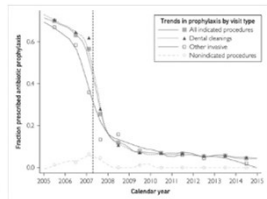
## Impact in Change in Guidelines (US)

Effect of the American Heart Association 2007 Guidelines on the Practice of Dental Prophylaxis for the Prevention of Infective Endocarditis in Olmsted County, Minnesota

David C. DeGroot, MD, Abolghasem El Rafiq, MD, Douglas W. Chalmers, PhD, Alan B. Carr, PhD, James A. Kelly, DDS, Walter A. Rouse, PhD, MPH, Jonathan L. St Sauver, PhD, Cynthia M. Rhee-Goodman, BS, Brad D. Lahr, MS, James M. Steckelberg, MD, Walter A. Wilson, PhD, and Larry M. Baddour, MD

**Patients and Methods:** The study included all adults (≥18 years old) with a moderate-risk (MR) or high-risk (HR) cardiac condition who received dental care at participating dental offices from January 1, 2005 through June 1, 2013, in Olmsted County, Minnesota. Data collected included the date and type of dental procedure performed and receipt of antibiotic prophylaxis (AP).

**Results:** A total of 1351 patients underwent 8874 dental visits at participating dental offices during the study period; 1230 patients had an MR cardiac condition and 121 had an HR condition. The percentage of visits in which antibiotic drugs were used for indicated dental procedures in the MR group declined from 64.6% before to 6.6% after publication of the 2007 AHA guidelines (P<0.001), for the HR group, AP declined from 95.9% before to 81.3% after publication of the guidelines (P=0.02).

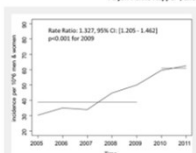


## Impact in Change in Guidelines (Netherlands)

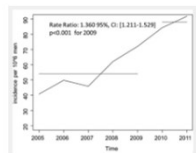
European Heart Journal - Quality of Care and Clinical Research (2015) 36, 101-107  
ORIGINAL ARTICLE

### Increased incidence of infective endocarditis after the 2009 European Society of Cardiology guideline update: a nationwide study in the Netherlands

Floris S. van den Brink<sup>1</sup>, Martin J. Swales<sup>1</sup>, Mark G. Hoopendaal<sup>1</sup>, Arash Allipour<sup>1</sup>, Johannes C. Kaldor<sup>1</sup>, Wylfoer Jaarsma<sup>1</sup>, Frank D. Esling<sup>1</sup>, Bijm Groeneweg<sup>1,2</sup>, A. Jan Funke Kupper<sup>1</sup>, and Jorren M. van Berg<sup>1</sup>



**Figure 2** Nationwide retrospective secular trend analysis of an unadjusted time series (RR). 1.202, 95% CI: 1.205–1.462, P<0.001 for 2009. The horizontal line indicates the average infective endocarditis incidence before and after the 2009 European Society of Cardiology guideline update.



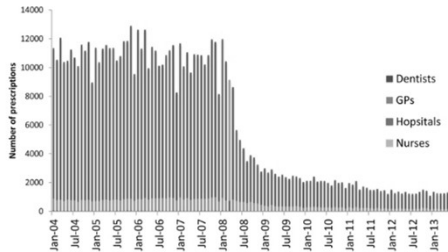
**Figure 3** Nationwide retrospective secular trend analysis of an unadjusted time series in men only (RR). 1.360, 95% CI: 1.211–1.529, P<0.001 for 2009. The horizontal line indicates the average infective endocarditis incidence before and after the 2009 European Society of Cardiology guideline update.

## Impact of Change in Guidelines (UK)

Published in final edited form as:  
 Lancet. 2015 March 28; 385(9974): 1219–1228. doi:10.1016/S0140-6736(14)62007-9.

### An Increase in the Incidence of Infective Endocarditis in England since 2008: A secular trend interrupted time series analysis

Mark J Dayer<sup>1</sup>, Simon Jones<sup>2</sup>, Bernard Prendergast<sup>3</sup>, Larry M. Baddour<sup>4</sup>, Peter B Lockhart<sup>1</sup>, and Martin H Thornhill<sup>6</sup>




---



---



---



---



---



---



---



---



---

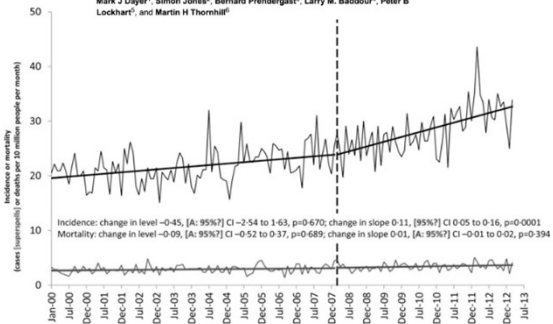


---

Published in final edited form as:  
 Lancet. 2015 March 28; 385(9974): 1219–1228. doi:10.1016/S0140-6736(14)62007-9.

### An Increase in the Incidence of Infective Endocarditis in England since 2008: A secular trend interrupted time series analysis

Mark J Dayer<sup>1</sup>, Simon Jones<sup>2</sup>, Bernard Prendergast<sup>3</sup>, Larry M. Baddour<sup>4</sup>, Peter B Lockhart<sup>1</sup>, and Martin H Thornhill<sup>6</sup>




---



---



---



---



---



---



---



---



---

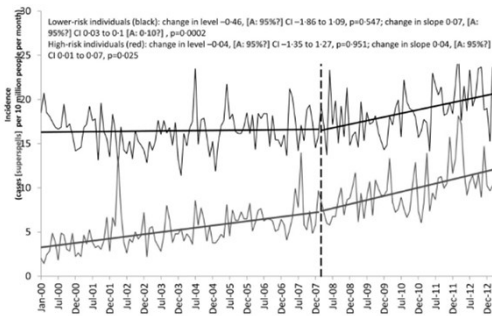


---

Published in final edited form as:  
 Lancet. 2015 March 28; 385(9974): 1219–1228. doi:10.1016/S0140-6736(14)62007-9.

### An Increase in the Incidence of Infective Endocarditis in England since 2008: A secular trend interrupted time series analysis

Mark J Dayer<sup>1</sup>, Simon Jones<sup>2</sup>, Bernard Prendergast<sup>3</sup>, Larry M. Baddour<sup>4</sup>, Peter B Lockhart<sup>1</sup>, and Martin H Thornhill<sup>6</sup>




---



---



---



---



---



---



---



---



---



---

## Conclusion

- Antibiotic prophylaxis:
  - Has a role in the prevention of infective endocarditis.
  - Main benefit in “high risk” patients.
  - No RCT’s available for clearer guidance.
- Consequences:
  - Adverse effects of antibiotics.
  - Issue of antimicrobial resistance.

---

---

---

---

---

---

---

---

The End

---

---

---

---

---

---

---

---