

# Infective endocarditis: a contemporary update -scoping review

## Abstract

Infective Endocarditis (IE) is a rare, severe, and complex disease. As a result, it has been the subject of research for decades, and the prevention of IE in at-risk individuals has been the focus of international guidelines since 1955, when the American Heart Association (AHA) first advocated for antibiotic prophylaxis (AP) prior to invasive medical and dental procedures. However, due to the potential development of antibiotic resistance, in 2007, the AHA recommended that AP be administered only to patients at high risk for IE, significantly reducing the number of antibiotics prescribed as prophylaxis. Therefore, the aim of this review article is to evaluate, based on the literature, the impacts of the 2007 AHA recommendation regarding AP, addressing key topics related to dental management, and emphasizing the need for dental surgeons to stay updated on developments concerning IE.

**Keywords:** dentistry, endocarditis, antibiotic prophylaxis

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## Introduction

Infective Endocarditis (IE) is a rare but generally severe and often fatal inflammatory disease that affects the endocardial surface, native and prosthetic heart valves, or cardiac devices.<sup>1</sup> According to the American Heart Association, the primary cause of IE is bacteria that enter the bloodstream and attach to a damaged part of the endocardium or abnormal heart valves. This infection can also develop in implanted devices within the heart, such as artificial heart valves, pacemakers, or implantable defibrillators.

Given the severity of IE and its high mortality rate, international guidelines have focused on preventive measures, particularly through antibiotic prophylaxis (AP). Recognizing the need to regulate the use of antibiotics to avoid adverse effects, including the development of antibiotic resistance, the AHA made significant changes in its recommendations in 2007. The AHA restricted the use of AP to patients at high risk for developing IE, thereby reducing the unnecessary administration of antibiotics and limiting the potential for resistance.

This review article aims to examine the major changes regarding the use of AP since the 2007 AHA guidelines, as well as the impacts these changes have had, particularly in the context of dental management. Using primarily the studies by Wilson et al.,<sup>2</sup> this paper will explore key aspects of how the revised recommendations have influenced clinical practice, with a specific focus on the dental profession. It is important to understand that dental procedures can present a risk for bacteremia, which may potentially lead to IE in susceptible individuals. Therefore, dental professionals must be aware of the updated guidelines to ensure appropriate care for their patients, minimizing the risk of developing this serious infection while avoiding unnecessary antibiotic use.

Moreover, while the AHA's 2007 recommendations emphasized a more cautious approach to antibiotic prophylaxis, there remains a continuous need for further research and education regarding the evolving nature of IE, the role of dental care in its prevention, and how to balance effective prevention strategies with the global challenge of antibiotic resistance. Through the review of recent literature and the findings of Wilson et al.,<sup>2</sup> this article will provide valuable insights into the ongoing management of IE and its prevention, reinforcing the critical role of dental healthcare providers in adhering to the latest evidence-based practices.

## Methodology

### Selection of sources

A bibliographic search was carried out in the main health databases PUBMED ([www.pubmed.gov](http://www.pubmed.gov)) and Google Scholar ([www.scholar.google.com.br](http://www.scholar.google.com.br)), which collected studies published from 2010 to 2025. In the first stage, the list of retrieved articles was examined by reading the titles and abstracts. In the second stage, the studies were selected by reading the full content. Two authors (JDMM and VCA) performed stages 1 and 2. Experimental, clinical, case-control, randomized controlled and laboratory cohort studies, case reports, systematic reviews and literature reviews, which were developed in living individuals, were included. Therefore, articles that did not address the subject in question, letters to the editor, opinion articles, duplicate literature in databases and literature that did not address the variables under study were excluded.

### Data sources

Through a bibliographic search, 15 articles were selected, of which 10 articles were extracted from PUBMED ([www.pubmed.gov](http://www.pubmed.gov)) and

5 from Google Scholar ([www.scholar.google.com.br](http://www.scholar.google.com.br)). The following titles and keywords of specific medical subjects were used: Dentistry (DeCS/MeSH terms); Endocarditis (DeCS/MeSH terms); ; Antibiotic Prophylaxis (DeCS/MeSH terms).

## Discussion

According to the scientific statement published by Wilson et al.,<sup>2</sup> the 2007 guidelines brought about significant changes compared to the previous nine AHA guidelines on the prevention of group Viridans streptococcal (VGS) infective endocarditis (IE). These changes include the following: (1) It is much more likely that VGS IE is caused by transient VGS bacteremia originating from routine daily oral activities rather than from a dental procedure; (2) Therefore, only an extremely small number of cases of VGS IE could be prevented by antibiotic prophylaxis (AP) for a dental procedure, even if such prophylaxis were 100% effective; (3) AP is no longer recommended as primary prophylaxis to prevent VGS IE in patients with underlying heart disease, even if it represents a lifelong risk for acquiring VGS IE; (4) If AP is effective in preventing only a small number of VGS IE cases, it should only be recommended for patients with underlying conditions that pose the greatest risk for adverse outcomes from VGS IE, such as heart failure, aortic root abscess, the need for heart valve replacement, complex surgical revisions in patients with congenital heart disease, recurrent VGS IE, or death; (5) Maintaining good oral health and regular dental care is far more important in preventing VGS IE than administering AP for a dental procedure. These recommendations led to a reduction of approximately 90% in the number of patients qualifying for AP. Thornhill et al.,<sup>3,4</sup> reported that by August 2015, there had been an overall 20% reduction in AP prescriptions for high-risk patients, a 64% reduction for moderate-risk patients, and a 52% reduction for low-risk or unknown-risk patients, indicating broad acceptance of the guidelines.

Dental procedures that require antibiotic prophylaxis are those involving manipulation of the gingival tissue, the periapical region of the teeth, or perforation of the oral mucosa.<sup>5-7</sup> In contrast, AP is not recommended for: anesthetic injections through non-infected tissue, dental radiographs, placement of removable orthodontic or prosthetic appliances, adjustment of orthodontic appliances, placement of orthodontic brackets, the loss of primary teeth, and bleeding due to trauma to the lips or oral mucosa.<sup>8-10</sup>

The antibiotic regimens for dental procedures were also outlined in this review by Wilson et al.,<sup>2</sup> noting that the antibiotic should be administered in a single dose 30 to 60 minutes prior to the procedure. For oral administration: Amoxicillin, 2g for adults and 50mg/kg for children. For those unable to take oral medications: (1) Ampicillin 2g IM or IV for adults and 50mg/kg IM or IV for children; (2) Cefazolin or Ceftriaxone 1g IM or IV for adults and 50mg/kg IM or IV for children.<sup>11</sup> For patients allergic to penicillin or ampicillin -oral: (1) Cephalexin 2g for adults and 50mg/kg for children; (2) Azithromycin or Clarithromycin 500mg for adults and 15mg/kg for children; (3) Doxycycline 100mg for adults, and for children <45kg, 2.2mg/kg, and >45kg, 100mg. For penicillin or ampicillin-allergic patients unable to take oral medications: Cefazolin or Ceftriaxone 1g IM or IV for adults and 50mg/kg IM or IV for children.

Finally, in the AHA's 2021 scientific statement, as mentioned above, several suggestions were made, based on a comprehensive review and evaluation of the impacts caused by the 2007 guidelines: (1) AP for a dental procedure involving manipulation of gingival tissues, the periapical region of the teeth, or perforation of the oral mucosa is recommended only for patients with a higher risk of adverse

outcomes from VGS IE; (2) AP for a dental procedure involving manipulation of gingival tissues, the periapical region of the teeth,<sup>12</sup> or perforation of the oral mucosa is recommended only for patients with a higher risk of adverse outcomes from VGS IE; (3) Shared decision-making is important between patients and healthcare providers. There may be cases where a healthcare provider and a patient disagree with the suggestions in the 2021 scientific statement. In such cases, the healthcare provider should be familiar with and understand the 2021 recommendations to appropriately inform the patient about the risks and benefits of AP for a dental procedure, ensuring that an informed decision can be made.

## Final considerations

It can be concluded that further studies are needed to provide more evidence regarding the management of high-risk patients for infective endocarditis (IE) and effective prophylactic regimens. Additionally, there is a recognized need for healthcare professionals to deepen their understanding of IE and its prevention, considering the recent updates from the American Heart Association (AHA). This knowledge is crucial to ensure that recommendations are properly followed and that patients receive safe care, thereby reducing the risks of IE and the incorrect administration of antibiotics.

## Data availability

All data analyzed during this study are available from the corresponding author upon reasonable request.

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## Conflicts of interest

The authors report no conflicts of interest regarding any of the products or companies discussed in this article.

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