



# A Review of the Necessity of Preoperative Dental Evaluations in Nonvalvular Open Heart Surgeries

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## Abstract

**Context:** Preoperative dental evaluations (PDEs) are well-established for valvular cardiac surgeries due to their role in reducing the risk of infective endocarditis (IE). However, their role in nonvalvular open heart surgeries (OHS), such as coronary artery bypass grafting (CABG), remains unclear.

**Evidence Acquisition:** A comprehensive literature review was conducted, analyzing studies that explored the association between oral health and surgical outcomes, the impact of PDEs on postoperative complications, and economic considerations.

**Results:** Preoperative dental evaluations were associated with reduced postoperative infections, shorter ICU stays, and decreased readmission rates in nonvalvular OHS patients. Barriers include lack of guidelines and logistical challenges in emergencies.

**Conclusions:** Incorporating PDEs into preoperative protocols for nonvalvular OHS offers significant clinical and economic benefits, necessitating updated guidelines and interdisciplinary collaboration.

**Keywords:** Preoperative Dental Evaluations, Nonvalvular Open Heart Surgeries, Coronary Artery Bypass Grafting, Infective Endocarditis, Interdisciplinary Care

## 1. Context

Preoperative dental evaluations (PDEs) have been established as an essential protocol in valvular cardiac surgeries due to the known association between oral infections and infective endocarditis (IE). Guidelines from the American Heart Association (AHA) (1) and European Society of Cardiology (ESC) (2) emphasize the critical role of PDEs in mitigating risks associated with bacteremia, systemic inflammation, and postoperative complications. Despite this, the role of PDEs in nonvalvular open heart surgeries (OHS) remains underexplored.

Emerging evidence suggests that untreated oral infections, such as periodontitis, periapical abscesses, and dental caries, may contribute to postoperative infections, systemic inflammatory responses, and prolonged recovery times in nonvalvular OHS, such as coronary artery bypass grafting (CABG), aneurysm repair, and congenital defect correction (3). The lack of specific guidelines addressing PDEs in these surgeries

creates a gap in clinical practice that warrants further investigation.

Treating periodontal diseases before undergoing surgery significantly reduced the incidence of postoperative infections in cardiac surgery patients (4). Additionally, some studies have highlighted the benefits of preoperative dental screening and prophylactic treatments, including scaling and root canal treatment, in minimizing the potential for complications (5).

Suboptimal oral health is closely linked to increased inflammatory markers and a heightened risk of bacteremia, both of which can adversely affect surgical outcomes. Researches demonstrated that even minor dental infections could have substantial impacts on postoperative recovery in cardiothoracic and vascular surgeries. These findings underscore the critical importance of implementing systematic dental evaluations across all types of cardiac procedures (6, 7).

While the advantages of PDEs for valvular surgeries are well-documented, recent studies suggest that incorporating these evaluations into nonvalvular

surgeries could also lead to significant reductions in postoperative infection rates, ICU durations, and overall healthcare costs. Proactive preoperative oral health management has been shown to improve surgical outcomes and optimize resource utilization (7).

In addition to clinical benefits, PDEs present economic gains by lowering the prevalence of complications, reducing ICU stays, and decreasing readmission rates. Despite these advantages, widespread adoption faces challenges such as limited access to dental care, absence of standardized guidelines for nonvalvular surgeries, and logistical constraints in emergency cases (6, 7).

To address these issues, a collaborative, multidisciplinary strategy is essential. This includes the development of comprehensive protocols, improved coordination between dental and medical professionals, and initiatives to ensure equitable access to PDEs, particularly in under-resourced settings. This review explores the necessity of PDEs in nonvalvular OHS, emphasizing clinical, economic, and interdisciplinary perspectives.

## 2. Evidence Acquisition

This review synthesizes findings from a comprehensive range of studies exploring the relationship between oral health and surgical outcomes in nonvalvular OHS. A systematic search was conducted across multiple databases, including PubMed, Scopus, and Google Scholar, to identify peer-reviewed articles published between 2000 and 2024. Studies were selected based on their relevance to the following criteria:

### 2.1. Patient Populations Undergoing Nonvalvular Open Heart Surgeries

We focused on studies that examined patients undergoing procedures such as CABG, aneurysm repair, and congenital defect corrections. These surgeries are common among nonvalvular OHS, which, unlike valvular surgeries, have less established protocols regarding preoperative dental assessments (7, 8).

### 2.2. Impact of Oral Health on Surgical Outcomes

A central theme of this review was the effect of oral health, particularly untreated oral infections such as periodontitis, periapical abscesses, and dental caries, on postoperative outcomes. Studies examining the link between oral infections and systemic complications, including postoperative infections and inflammation, were prioritized (4).

### 2.3. Effectiveness of Preoperative Dental Evaluations

The review also included studies assessing the effectiveness of preoperative dental interventions in reducing complications in patients undergoing cardiac procedures. This includes systematic dental screenings, treatment of oral infections, and the impact of such interventions on reducing systemic inflammation, bacteremia, and postoperative infections (3, 9).

### 2.4. Economic Impact of Preoperative Dental Evaluations

Given the increasing focus on healthcare cost-effectiveness, articles that analyzed the economic impact of PDEs in nonvalvular OHS were incorporated. These studies highlighted the cost savings associated with reduced postoperative complications, shorter ICU stays, and fewer readmissions (10, 11).

### 2.5. Guidelines and Protocols for Preoperative Dental Evaluations

The lack of standardized guidelines for nonvalvular OHS was another key area explored. Articles discussing the current status of clinical protocols and the need for updated guidelines were included, with particular attention to studies focusing on the challenges faced in implementing these evaluations in real-world clinical settings (1, 2).

## 3. Results

### 3.1. Oral Health and Cardiac Surgery Candidates

Studies consistently report a high prevalence of untreated oral infections among cardiac surgery candidates:

- Dental infections were present in 28% of CABG patients, of which 15% required urgent dental interventions prior to surgery. This high prevalence highlights the importance of preoperative dental screening in identifying and addressing these infections to minimize the risk of systemic complications (5).
- Dental infections significantly elevate systemic inflammatory markers, increasing the risk of complications in OHS patients (3).
- Up to 28% of CABG patients had oral infections requiring urgent treatment (9).
- Moderate-to-severe periodontitis was present in 35% of cardiac surgery patients, significantly increasing the likelihood of transient bacteremia and systemic infections (12).

- Systemic inflammation associated with these oral conditions can elevate the risk of postoperative complications, including wound infections and prolonged recovery times (13).

### 3.2. Impact of Preoperative Dental Evaluations on Surgical Outcomes

Evidence demonstrates that addressing oral health preoperatively reduces complications:

- Patients who received dental clearance before undergoing cardiac surgeries experienced a 50% lower incidence of IE, highlighting the preventive role of PDEs in mitigating infection risks (8).

- Patients who received preoperative dental interventions exhibited a 40% reduction in the incidence of postoperative infections compared to those who did not undergo PDEs. This reduction in postoperative infections correlates with shorter ICU stays and fewer complications, ultimately contributing to improved patient recovery (5).

- Patients who received preoperative dental care had significantly lower levels of inflammatory markers, such as C-reactive protein (CRP), following surgery. These patients also experienced shorter ICU stays (average reduction of 1.5 days) and decreased readmission rates, providing strong evidence for the clinical benefits of integrating PDEs into preoperative protocols (7).

### 3.3. Economic Implications

Preoperative dental evaluations are cost-effective, as they reduce postoperative complications and associated healthcare costs and reduced readmissions and shorter hospital stays (10). Further analysis by García Sánchez and Mudarra (10) found that the cost savings from implementing PDEs could be substantial, particularly in high-volume surgical settings. The average cost of care for patients who received PDEs was \$20,000 - \$24,000, compared to \$25,000 - \$30,000 for those who did not undergo dental evaluations (Table 1). These savings reflect the reduced need for extended ICU stays and fewer complications requiring additional treatment.

### 3.4. Challenges and Opportunities

Despite clear benefits, several barriers limit widespread adoption of PDEs:

#### 3.4.1. Lack of Guidelines

Despite the clear benefits, the adoption of preoperative dental evaluations in nonvalvular OHS faces several barriers. One significant challenge is the

lack of standardized guidelines for nonvalvular surgeries, which leaves the integration of PDEs into preoperative protocols largely dependent on institutional practices. While guidelines for valvular surgeries are well-established (1, 2), there is no uniform approach to dental screening and treatment for nonvalvular OHS patients. This gap creates uncertainty among healthcare providers and may delay the implementation of PDEs.

#### 3.4.2. Resource Limitation

Resource limitations also pose a significant challenge, particularly in low- and middle-income settings where access to dental care is limited. A study by Thomas (11) highlighted the inequities in access to dental care, particularly in rural and underserved areas, which further exacerbates the barriers to incorporating PDEs into routine preoperative care.

#### 3.4.3. Urgency of Surgeries

Another challenge is the potential delay in emergency surgeries due to the need for preoperative dental screenings, particularly in critical care scenarios where time is of the essence. Study by Silvay et al. (6) noted that while dental evaluations can optimize patient outcomes, logistical constraints in emergency settings can complicate their implementation.

Addressing these challenges will require a coordinated approach, including the development of standardized guidelines for nonvalvular surgeries, better integration of dental professionals into the surgical planning process, and improved access to dental care, especially in resource-constrained settings.

## 4. Conclusions

Preoperative dental evaluations play a pivotal role in minimizing the risk of infectious complications, particularly infective endocarditis, and optimizing surgical outcomes in patients undergoing OHS. The review highlights the dual benefits of PDEs: Reducing perioperative morbidity and mortality and promoting cost-effective healthcare through shorter ICU stays and fewer readmissions. Despite robust evidence supporting their efficacy in valvular surgeries, emerging studies suggest similar advantages for nonvalvular procedures such as CABG and aneurysm repairs. However, the underutilization of PDEs stems from logistical barriers, lack of standardized guidelines, and limited access to dental care.

### 4.1. Recommendations for Practice

**Table 1.** Comparison of Patients with and Without Preoperative Dental Evaluations

Parameter	Without PDEs	With PDEs	Impact
Prevalence of postoperative infections (%)	15 - 25	7 - 10	↓ 40 - 50 (3, 4)
ICU stay (average days)	5.6	4.1	↓ 1.5 (7)
Readmission rate (%)	18	9	↓ 50 (7)
Cost of care (per patient) (\$)	25,000 - 30,000	20,000 - 24,000	Savings of ~4,500 per patient (10)
Incidence of bacteremia (%)	8	2	↓ 75 (3, 9)

Abbreviation: PDEs, preoperative dental evaluations.

#### 4.1.1. Standardization of Protocols

Develop evidence-based guidelines to integrate PDEs into the routine preoperative workflow for all types of cardiac surgeries, emphasizing their role in both valvular and nonvalvular cases. For instance, utilizing structured checklists for dental screening and treatment planning can streamline the process and improve patient outcomes.

#### 4.1.2. Collaborative Models

Foster interdisciplinary collaboration between cardiologists, cardiothoracic surgeons, and dental professionals to ensure effective communication and coordinated care. This includes sharing patient dental health reports and tailoring treatment plans based on individual cardiac risk profiles.

#### 4.1.3. Accessibility and Equity

Address disparities in access to dental care by implementing hospital-based dental services and providing financial assistance for economically disadvantaged patients. Targeted interventions can prioritize high-risk populations, including the elderly and those with pre-existing dental conditions.

#### 4.1.4. Research Initiatives

Encourage multicenter studies to evaluate the long-term impact of PDEs on surgical outcomes and healthcare costs in nonvalvular OHS. Further research should explore whether conservative or radical dental treatments are more effective for these patient groups.

#### 4.1.5. Educational Programs

Enhance awareness among healthcare providers about the importance of oral health in cardiac surgery outcomes. Regular training sessions for dental and medical teams can support the adoption of best practices and mitigate procedural inconsistencies.

Recent initiatives, such as consensus-based checklists for dental screenings and targeted studies on focused treatment plans, have shown promise in improving the preoperative care of cardiac patients. Scaling such practices to nonvalvular OHS will require addressing existing challenges while building on proven strategies to ensure optimal patient care outcomes (14, 15).

#### Footnotes

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