

# Assessing the Effectiveness of Oral Health Screening and Education in Preventing Dental Complications in Hospitalized Elderly Patients: A Multidisciplinary Approach

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## Abstract

**Background:** Oral health complications are common among hospitalized elderly patients and can lead to systemic health issues if not addressed. This study aimed to evaluate the effectiveness of a multidisciplinary intervention involving oral health screening, education, and laboratory diagnostics in preventing dental complications in elderly inpatients.

**Methods:** A total of 120 elderly patients (aged 65+) admitted to a tertiary hospital participated in the study. Oral health screenings were conducted at admission and discharge, patient education was provided by social workers, and laboratory diagnostics monitored systemic markers such as C-reactive protein (CRP). Changes in oral health status, incidence of dental complications, and systemic inflammation were analyzed.

**Results:** Significant improvements in oral health indicators, such as plaque index and gingival index, were observed from admission to discharge ( $p < 0.001$ ). The incidence of oral infections decreased from 16.7% to 4.2%, and xerostomia from 29.2% to 10.0%. CRP levels also decreased significantly ( $p < 0.001$ ), indicating reduced systemic inflammation. Patient compliance with oral hygiene practices improved, with 79.2% regularly brushing at discharge.

**Conclusion:** The multidisciplinary intervention significantly improved oral and systemic health outcomes, highlighting the importance of integrating oral health care into hospital-based elderly patient management.

**Keywords:** Oral Health, Elderly Patients, Dental Complications, Multidisciplinary Care, Hospital Care, Patient Education, Systemic Inflammation, C-Reactive Protein (CRP).

## Introduction

Oral health is a critical component of overall well-being, particularly for elderly patients, who are often vulnerable to dental complications due to underlying medical conditions, medication side effects, and reduced ability to maintain proper oral hygiene. In hospital settings, especially in tertiary care facilities, elderly patients frequently experience exacerbated oral health issues such as dry mouth, periodontal disease, and oral infections. These complications not only affect the patients' oral health but can also lead to systemic problems, including respiratory infections and cardiovascular complications (Griffin et al., 2012). Despite

this, oral health is often overlooked in the routine care of hospitalized elderly patients, leading to preventable complications.

Several studies have highlighted the importance of early oral health screening and preventive interventions, such as education on oral hygiene, in reducing the risk of dental complications (Tavares et al., 2014). However, in many healthcare settings, there is a lack of systematic screening for oral health issues in elderly patients, as well as inadequate resources for providing patient education. Moreover, the role of interdisciplinary collaboration, involving not only dental professionals but also social workers and laboratory specialists, remains underexplored in addressing the oral health needs of hospitalized elderly populations (Baumgartner et al., 2015).

This study aims to assess the effectiveness of a multidisciplinary approach to oral health, combining screening, education, and laboratory diagnostics, in preventing dental complications in elderly patients during their hospital stay. By integrating the expertise of dentists, laboratory specialists, and social workers, this approach seeks to provide comprehensive care that addresses both the clinical and social determinants of oral health. The results of this study could provide valuable insights into how hospital-based oral health initiatives can improve patient outcomes and reduce the burden of dental complications in elderly populations.

## Literature Review

### Oral Health Challenges in Hospitalized Elderly Patients

Oral health problems are particularly prevalent among elderly patients, especially those who are hospitalized for extended periods. The aging process, combined with chronic illnesses, medication use, and reduced physical abilities, contributes to poor oral hygiene, leading to issues such as dental caries, periodontal disease, and xerostomia (dry mouth) (Griffin et al., 2012). These oral health issues not only affect the quality of life but are also linked to more serious systemic conditions such as aspiration pneumonia, cardiovascular diseases, and worsening of diabetes (Baumgartner et al., 2015). Studies have shown that the lack of attention to oral health in hospital settings exacerbates these problems, creating a need for integrated oral health care.

Hospitalized elderly patients often face difficulties maintaining oral hygiene due to physical limitations and a lack of access to proper oral health tools and services. Furthermore, systemic diseases and certain medications, such as antihypertensives and diuretics, can lead to conditions like xerostomia, increasing the risk of dental caries and oral infections (Tavares et al., 2014). Given these challenges, it is essential to implement routine oral health screenings and provide education to prevent complications during hospitalization.

### Importance of Oral Health Screening

Oral health screening is a critical first step in preventing dental complications in elderly patients, particularly those in hospitals who are at higher risk due to their medical conditions and the hospital environment. Screening allows healthcare professionals to detect early signs of oral disease, such as gingivitis, periodontitis, or infections, that may otherwise go unnoticed. Studies have demonstrated that routine oral health assessments can significantly reduce the incidence of hospital-acquired oral infections and improve overall health outcomes in elderly patients (Aurlene et al., 2023).

Despite this, oral health screening is not always a priority in hospital care. Many hospitals lack the infrastructure and trained personnel to perform systematic oral health evaluations, leaving dental issues unaddressed. This lack of screening can result in delayed detection of oral health problems, which may lead to more severe complications over time (Baumgartner et al., 2015). Thus, incorporating oral health screening as part of routine care for elderly patients in hospitals is crucial for improving patient outcomes and reducing healthcare costs associated with managing preventable dental complications.

#### Role of Education in Oral Health Prevention

Education plays a fundamental role in promoting oral health, particularly in vulnerable populations such as the elderly. Several studies have emphasized the importance of educating patients about proper oral hygiene practices, such as brushing techniques, the use of fluoride toothpaste, and the importance of regular dental check-ups, to prevent oral health deterioration (Ortíz-Barrios et al., 2019). For hospitalized elderly patients, education is especially important, as they may be unaware of how their oral health can impact their overall medical condition.

Research has shown that targeted educational interventions, particularly those delivered by healthcare professionals, can lead to improved oral hygiene and reduced dental complications (Tavares et al., 2014). These programs typically involve one-on-one or group sessions that focus on practical aspects of maintaining oral health, tailored to the needs of elderly patients who may have cognitive or physical limitations. Social workers, who often play a key role in patient support and education, can collaborate with dental professionals to ensure that patients understand the importance of oral hygiene and have access to the resources they need to maintain it.

#### Multidisciplinary Approaches to Oral Health Care

The integration of multidisciplinary approaches in healthcare has been shown to improve patient outcomes in various settings, including oral health. In hospital environments, particularly for elderly patients, collaboration between dental professionals, laboratory specialists, and social workers is essential for comprehensive care (Baumgartner et al., 2015). A multidisciplinary team can address the various aspects of a patient's health that influence their oral condition, including their social determinants of health, underlying systemic conditions, and laboratory markers that may indicate oral or systemic infections.

Laboratory diagnostics play an important role in identifying systemic conditions that may exacerbate oral health problems. For example, elevated levels of inflammatory markers such as C-reactive protein (CRP) or specific bacterial cultures can indicate ongoing infections or inflammatory processes that impact both oral and systemic health (Benedek, 2017). Through close collaboration, laboratory specialists can assist in monitoring the impact of oral health interventions, providing valuable feedback that informs clinical decisions.

Social workers are also crucial in addressing the psychosocial factors that affect oral health, particularly in elderly patients who may face barriers to care such as lack of transportation, financial challenges, or cognitive impairments. By working with dentists and laboratory specialists, social workers can help bridge these gaps, ensuring that patients receive the care and education they need to maintain oral hygiene (Ortíz-Barrios et al., 2019).

#### Existing Gaps in Hospital-Based Oral Health Interventions

Although there is growing recognition of the importance of oral health in overall patient care, there remain

significant gaps in the implementation of hospital-based oral health interventions. Many hospitals lack dedicated dental teams, and there is often little collaboration between dental professionals and other healthcare workers (Baumgartner et al., 2015). Moreover, social and structural barriers, such as inadequate funding and lack of awareness about the importance of oral health, prevent the widespread adoption of screening and educational programs for hospitalized elderly patients.

The literature suggests that more research is needed to explore the effectiveness of multidisciplinary approaches to oral health care in hospital settings. While some studies have examined the impact of educational interventions or screening programs, few have investigated how collaboration between dentists, laboratory specialists, and social workers can improve oral health outcomes in hospitalized elderly populations (Baumgartner et al., 2015). Addressing these gaps is crucial for developing effective strategies to prevent dental complications and improve the quality of care in hospital settings.

The literature highlights the importance of oral health in elderly populations and the role of hospital-based interventions in preventing dental complications. Early screening, patient education, and multidisciplinary collaboration are essential components of effective oral health care in hospital settings. However, significant gaps remain in the implementation of these strategies, particularly in integrating dental care with other healthcare services. This study aims to address these gaps by assessing the effectiveness of a multidisciplinary approach to oral health screening and education in preventing dental complications in hospitalized elderly patients.

## **Methodology**

### **Study Design**

This study employed a prospective interventional design conducted over a period of six months, in a tertiary hospital. The aim was to assess the effectiveness of a multidisciplinary oral health intervention involving oral health screening, education, and laboratory diagnostics in preventing dental complications among hospitalized elderly patients.

### **Study Setting**

The study was carried out in a tertiary hospital, focusing on the geriatrics ward. This ward primarily serves elderly patients admitted for various medical conditions, many of whom were identified as having poor oral health upon admission. The hospital did not have a pre-existing structured oral health program for inpatients, which provided an opportunity to assess the impact of the intervention.

### **Study Population**

The study population consisted of hospitalized elderly patients aged 65 years and older who were admitted to the geriatrics ward during the study period. A total of 150 patients were initially assessed for eligibility, and 120 patients met the inclusion criteria and consented to participate. The inclusion criteria were:

- Aged 65 years or older.
- Admitted to the hospital for at least one week.
- Medically stable to participate in the oral health intervention.
- No cognitive impairment that would prevent the patient from understanding and following oral hygiene instructions.

Patients with severe cognitive impairments, terminal illnesses, or those receiving palliative care were excluded from the study.

## Intervention

The intervention involved three key components: oral health screening, patient education, and laboratory diagnostics.

### 1. Oral Health Screening

Upon admission, all participants underwent an initial oral health screening conducted by a dental professional. The screening assessed:

- The presence of dental caries, periodontal disease, and oral infections.
- Gingival health using the Gingival Index (GI) and Plaque Index (PI).
- Signs of xerostomia (dry mouth) and oral lesions, such as candidiasis.

The results of the screening were recorded, and patients were categorized into three groups based on their oral health status: good, fair, or poor. Any immediate dental concerns were referred to the hospital's dental department for further treatment.

### 2. Patient Education

Following the screening, each patient participated in a one-on-one educational session led by a social worker, who worked in collaboration with the dental team. The education session covered:

- Proper oral hygiene practices, including brushing techniques, the use of fluoride toothpaste, and the importance of hydration to manage dry mouth.
- Information about the link between oral health and overall health, particularly how oral infections could impact their recovery.
- The use of available dental hygiene tools such as interdental brushes and mouthwashes.

The social worker also provided educational materials and ensured that patients were supported throughout their hospital stay in maintaining oral hygiene practices.

### 3. Laboratory Diagnostics

Blood samples were collected from all participants during the first week of their hospitalization to analyze systemic markers related to oral and systemic health. These included:

- C-reactive protein (CRP) levels to assess inflammation.
- Bacterial cultures from the oral cavity (for patients with suspected infections).

The laboratory specialist tracked these markers throughout the patient's stay and correlated them with changes in oral health status, as observed in subsequent screenings.

## Follow-Up and Monitoring

Patients were followed throughout their hospital stay. Follow-up oral health screenings were conducted at two additional points: at the midpoint of the hospital stay (approximately 10 days after admission) and at discharge. The same oral health assessment tools were used to evaluate the progress of oral health outcomes. Changes in plaque index, gingival health, and the resolution of oral infections were recorded.

To assess the effectiveness of the educational component, compliance with oral hygiene practices was monitored by nursing staff, who recorded patients' daily oral hygiene activities. Additionally, a brief survey was conducted at discharge to evaluate patient knowledge retention regarding oral health practices.

## Data Collection

Data were collected from multiple sources, including:

- Oral Health Assessments: Baseline, midpoint, and discharge data on oral health status (e.g., plaque and gingival index, presence of oral infections).
- Laboratory Results: CRP levels and bacterial cultures were analyzed to assess the systemic impact of oral health.
- Patient Surveys: These surveys assessed patients' knowledge retention of oral hygiene practices, their perceived importance of oral health, and their compliance with the recommended oral hygiene routines.
- Clinical Records: Data on the incidence of dental complications during the hospital stay, including new infections, worsening of pre-existing conditions, and the need for dental referrals.

## Data Analysis

### 1. Quantitative Analysis

Descriptive statistics were used to summarize the demographic data, baseline oral health status, and laboratory results. Comparative analysis was performed to evaluate the effectiveness of the intervention, using paired t-tests to compare the pre- and post-intervention oral health indices (plaque index, gingival index) and systemic markers (CRP levels) between admission and discharge.

The incidence of dental complications (e.g., oral infections) before and after the intervention was also analyzed. Chi-square tests were used to compare the rates of complications across patients with varying degrees of compliance with the oral hygiene education program.

### 2. Qualitative Analysis

The qualitative data collected from patient surveys were analyzed using thematic analysis to identify recurring themes regarding patients' perceptions of the oral health education provided. Themes such as improved understanding of oral hygiene practices, perceived barriers to maintaining oral health, and satisfaction with the educational materials were explored.

## Ethical Considerations

The study was approved by the ethics committee. All participants provided written informed consent, and their confidentiality was maintained throughout the study. The educational sessions and oral health screenings were offered as part of routine patient care to minimize any perceived burden on participants.

## Limitations

One limitation of the study was the relatively short follow-up period, limited to the patients' duration of hospitalization. As a result, long-term oral health outcomes post-discharge could not be assessed. Additionally, the study was conducted in a single tertiary hospital, which may limit the generalizability of the findings to other settings.

## Findings

### 1. Demographic Characteristics of Participants

A total of 120 elderly patients participated in the study, all of whom were admitted to the geriatrics ward of the tertiary hospital. The demographic details of the participants are presented in Table 1.

Demographic Variable	Number of Participants (n=120)	Percentage (%)
Gender		
Male	65	54.2
Female	55	45.8
Age Group		
65-70 years	25	20.8
71-75 years	40	33.3
76-80 years	30	25.0
81+ years	25	20.8
Length of Hospital Stay		
1-2 weeks	65	54.2
3-4 weeks	35	29.2
>4 weeks	20	16.6

**Table 1: Demographic characteristics of study participants**

## 2. Oral Health Status at Admission and Discharge

The baseline oral health status of patients upon admission, as assessed by the Plaque Index (PI) and Gingival Index (GI), is compared with their status at discharge in Table 2. The findings show a significant improvement in oral health following the intervention.

Oral Health Indicator	At Admission (Mean $\pm$ SD)	At Discharge (Mean $\pm$ SD)	P-value
Plaque Index (PI)	2.8 $\pm$ 0.5	1.5 $\pm$ 0.4	<0.001
Gingival Index (GI)	2.5 $\pm$ 0.6	1.2 $\pm$ 0.5	<0.001

**Table 2: Comparison of oral health status at admission and discharge**

## 3. Incidence of Oral Health Complications

The incidence of oral health complications, such as oral infections and xerostomia, was monitored during the hospital stay. As shown in Table 3, there was a notable reduction in the incidence of these complications after the intervention, particularly in patients who adhered to the educational program.

Complication	Before Intervention (n=120)	After Intervention (n=120)	P-value
Oral infections (e.g., candidiasis)	20 (16.7%)	5 (4.2%)	0.002
Xerostomia (dry mouth)	35 (29.2%)	12 (10.0%)	0.001

**Table 3: Incidence of oral health complications before and after the intervention**

#### 4. Laboratory Markers of Systemic Health

Systemic inflammatory markers, such as C-reactive protein (CRP) levels, were assessed at admission and discharge. A significant reduction in CRP levels was observed in patients with improved oral health, as shown in Table 4.

Laboratory Marker	At Admission (Mean $\pm$ SD)	At Discharge (Mean $\pm$ SD)	P-value
C-reactive Protein (CRP) (mg/L)	8.2 $\pm$ 2.5	4.5 $\pm$ 1.8	<0.001

**Table 4: Changes in CRP levels from admission to discharge**

#### 5. Patient Compliance and Knowledge Retention

Patient compliance with oral hygiene practices and their retention of oral health education were assessed at discharge through a brief survey. The results indicate that most patients demonstrated good compliance and knowledge retention, as shown in Table 5.

Compliance/Knowledge Indicator	Number of Patients (n=120)	Percentage (%)
Regular brushing (2x per day)	95	79.2
Use of mouthwash	88	73.3
Knowledge of oral hygiene importance	105	87.5

**Table 5: Patient compliance with oral hygiene practices and knowledge retention at discharge**

#### 6. Qualitative Feedback from Patients

Patients provided feedback on the oral health education and support they received. Common themes included:

- Increased Awareness: Most patients reported an improved understanding of the connection between oral health and overall health.
- Practical Challenges: Some patients mentioned difficulties in maintaining oral hygiene due to physical limitations, despite receiving education on proper techniques.
- Support from Social Workers: Patients appreciated the social workers' involvement, particularly in providing ongoing encouragement and ensuring access to oral hygiene tools.

#### Discussion

The findings of this study provide strong evidence for the effectiveness of a multidisciplinary oral health intervention in improving oral health outcomes and reducing dental complications among hospitalized elderly patients. The intervention, which included oral health screening, patient education, and laboratory diagnostics, resulted in significant improvements in both oral and systemic health markers, highlighting the importance of incorporating oral health care into the broader management of hospitalized elderly populations.

#### Improvement in Oral Health Status

The significant improvements in the Plaque Index (PI) and Gingival Index (GI) from admission to discharge

demonstrate the effectiveness of the oral health intervention. At admission, many patients presented with poor oral hygiene, as indicated by high PI and GI scores. By discharge, the mean PI and GI scores had decreased significantly, reflecting better oral hygiene and reduced inflammation. These results align with previous studies showing that structured oral health interventions, particularly those that involve education and regular follow-up, can lead to substantial improvements in oral hygiene among elderly patients (Ortíz-Barrios et al., 2019; Aurlene et al., 2023).

The reduction in oral infections and xerostomia (dry mouth) further underscores the success of the intervention. The observed reduction in the incidence of oral infections, particularly oral candidiasis, is notable. At the beginning of the study, 16.7% of patients exhibited signs of infection, while only 4.2% presented with infections by discharge. This aligns with other research that suggests oral health interventions, when combined with good oral hygiene practices, can significantly reduce the risk of oral infections in hospitalized patients (Baumgartner et al., 2015). Similarly, the reduction in xerostomia prevalence from 29.2% to 10.0% suggests that educating patients about hydration and saliva substitutes was effective in managing dry mouth symptoms, which are common in elderly populations due to medications and systemic conditions (Tavares et al., 2014).

#### Impact on Systemic Health

The significant reduction in C-reactive protein (CRP) levels observed in this study highlights the link between improved oral health and reduced systemic inflammation. At admission, many patients had elevated CRP levels, reflecting underlying inflammatory processes, which may have been exacerbated by poor oral health. By discharge, CRP levels had decreased significantly, particularly in patients whose oral health improved. This finding supports the growing body of evidence that suggests poor oral health, particularly periodontal disease, can contribute to systemic inflammation and increase the risk of conditions such as cardiovascular disease and diabetes (Benedek, 2017).

The improvement in systemic health markers as a result of better oral health underscores the importance of integrating oral health into the overall care plan for elderly patients. By addressing oral health issues early, healthcare providers may be able to mitigate systemic complications, which can improve patient outcomes and reduce the length of hospital stays (Griffin et al., 2012). This study's findings emphasize the need for hospital-based oral health initiatives that include both dental care and laboratory diagnostics to monitor the broader impact of oral health on systemic conditions.

#### Role of Patient Education

The high levels of compliance with oral hygiene practices observed in this study, particularly regular brushing and the use of mouthwash, suggest that the educational component of the intervention was effective. At discharge, 79.2% of patients reported brushing their teeth twice daily, and 73.3% reported using mouthwash regularly. This is a significant improvement from the baseline, where many patients reported poor oral hygiene practices.

The education provided by the social workers, in collaboration with dental professionals, was critical to this success. Previous studies have shown that patient education plays a key role in improving oral health behaviors, particularly when it is tailored to the specific needs of the elderly population (Tavares et al., 2014). Social workers played an essential role in ensuring that patients not only understood the importance of oral hygiene but also had access to the necessary tools and resources to maintain it. This multidisciplinary

approach, which involved both education and practical support, proved to be highly effective in improving patient compliance.

### Multidisciplinary Approach and Its Implications

One of the most significant findings of this study is the effectiveness of a multidisciplinary approach to oral health care in hospitalized elderly patients. By integrating the efforts of dentists, social workers, and laboratory specialists, the intervention addressed the full spectrum of oral health needs, from screening and diagnosis to education and ongoing support. The collaboration between these disciplines was key to the success of the intervention.

Laboratory specialists played a crucial role in monitoring systemic health markers, such as CRP levels, which provided valuable insights into the relationship between oral health and systemic inflammation. This interdisciplinary collaboration helped ensure that patients received comprehensive care that extended beyond the oral cavity, improving both oral and systemic health outcomes. Such collaborative approaches have been recommended in previous studies as a way to address the complex health needs of elderly patients (Baumgartner et al., 2015).

### Study Limitations

While the findings of this study are promising, there are some limitations that should be acknowledged. First, the study was conducted in a single tertiary hospital, which may limit the generalizability of the findings to other hospital settings. Additionally, the follow-up period was limited to the duration of the hospital stay, which prevented the assessment of long-term oral health outcomes post-discharge. Future studies should consider longer follow-up periods to evaluate the sustainability of the oral health improvements achieved during hospitalization.

Another limitation was the reliance on patient self-reports for compliance with oral hygiene practices. Although nursing staff monitored patients' oral hygiene practices, some degree of reporting bias may have occurred. Despite these limitations, the study provides valuable insights into the effectiveness of a multidisciplinary oral health intervention in preventing dental complications in hospitalized elderly patients.

This study demonstrates that a multidisciplinary approach to oral health care, involving oral health screening, education, and laboratory diagnostics, can significantly improve oral and systemic health outcomes in hospitalized elderly patients. The reduction in dental complications, improved oral hygiene, and decreased systemic inflammation observed in this study highlight the importance of integrating oral health into the broader care plan for elderly patients. These findings underscore the need for hospital-based oral health initiatives that involve collaboration between dental professionals, social workers, and laboratory specialists to provide comprehensive care.

Future research should explore the long-term impact of such interventions and assess how they can be scaled to other healthcare settings. By continuing to emphasize the importance of oral health in hospital care, healthcare providers can improve the quality of life for elderly patients and reduce the risk of dental and systemic complications.

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