

# The Role of a Multidisciplinary Approach in Managing Dental-Related Infections in Hospitalized Patients

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## Abstract

Dental-related infections are a significant concern for hospitalized patients, particularly those with compromised immune systems or chronic conditions, due to the risk of systemic spread and complications. This study evaluated the impact of a multidisciplinary approach—incorporating dentists, pharmacists, nurses, and sonographers—on the management of dental-related infections in a tertiary hospital. A mixed-methods approach was used, combining quantitative analysis of clinical outcomes and qualitative interviews to assess the effectiveness of the collaborative care model. Findings indicated that multidisciplinary care significantly reduced hospital stay, infection duration, and complications, while improving adherence to antimicrobial guidelines. Qualitative data highlighted improved communication, role clarity, and comprehensive patient care as key benefits of the approach. The results suggest that a multidisciplinary team can provide superior care for dental infections, improving outcomes and patient satisfaction.

**Keywords:** Dental-Related Infections, Multidisciplinary Care, Hospitalized Patients, Antimicrobial Stewardship, Collaborative Healthcare, Patient Outcomes

## Introduction

Dental-related infections represent a significant health concern, especially in hospitalized patients, due to their potential to spread systemically and complicate existing medical conditions. Oral infections such as periodontitis, dental abscesses, and pericoronitis can escalate, leading to severe complications like cellulitis, sepsis, and endocarditis if not properly managed (Scannapieco, 1999). Hospitalized patients, particularly those with compromised immune systems or chronic conditions, are at a heightened risk for these infections, which can adversely affect their recovery and overall prognosis (Genco & Van Dyke, 2010). Effective management requires timely diagnosis, appropriate antimicrobial therapy, and ongoing patient monitoring—all of which can benefit significantly from a multidisciplinary approach.

A collaborative team composed of dentists, pharmacists, nurses, and sonographers can provide comprehensive care that enhances outcomes for patients with dental-related infections. Dentists play a central role in diagnosing and treating the infections, while pharmacists contribute by optimizing antimicrobial therapy to prevent resistance and manage drug interactions (Palmer et al., 2000). Nurses are essential in providing day-to-day care and monitoring the patient's condition, ensuring adherence to treatment protocols and facilitating communication among team members (Bridges et al., 2011).

Additionally, sonographers can assist in the diagnosis of deep-seated infections in the head and neck region through ultrasound imaging, which is a non-invasive and valuable tool for assessing the extent of infection (Bialek et al., 2006).

Multidisciplinary collaboration has been shown to improve patient outcomes across various healthcare settings, including infection management. For example, studies have demonstrated that integrated care models involving different healthcare professionals can lead to more accurate diagnoses, tailored treatment plans, and improved patient satisfaction (Zwarenstein et al., 2009; Reeves et al., 2010). In the context of dental infections, such collaboration may not only expedite recovery but also reduce the risk of systemic complications by ensuring a more holistic approach to patient care. The involvement of pharmacists helps to mitigate the risks associated with inappropriate antibiotic use, while nursing care ensures adherence to oral hygiene and infection control practices—all critical components in managing oral infections effectively (Sweeney et al., 2004).

### **Literature Review**

The management of dental-related infections in hospitalized patients presents unique challenges, particularly when patients have underlying medical conditions that compromise their immunity. Studies have highlighted that effective treatment of dental infections requires not only prompt clinical intervention but also a coordinated effort among different healthcare professionals (Scannapieco, 1999). The need for a multidisciplinary approach in the management of oral infections has been emphasized in numerous healthcare settings, where the integration of diverse expertise has proven beneficial in enhancing patient care and outcomes (Zwarenstein et al., 2009; Reeves et al., 2010).

Dentists play a pivotal role in diagnosing and managing dental infections, but their work can be significantly enhanced by collaborating with other healthcare professionals. Pharmacists are key contributors to this multidisciplinary team, as their expertise in pharmacotherapy allows for the careful selection and management of antimicrobial agents. Palmer et al. (2000) examined antibiotic prescription patterns among dentists and identified concerns regarding overprescription and inappropriate use, which underscores the importance of involving pharmacists to optimize antimicrobial use and minimize resistance. The involvement of pharmacists not only improves the efficacy of treatment but also helps prevent adverse drug interactions, particularly in patients who are on multiple medications.

The role of nurses in managing dental-related infections is equally crucial. Nurses are responsible for maintaining optimal oral hygiene, administering prescribed medications, and providing patient education regarding infection prevention (Bridges et al., 2011). Studies have shown that nurses who are well-informed about oral health can play a vital role in preventing the progression of oral infections, especially in patients who are unable to perform their own oral care due to physical or cognitive impairments (Genco & Van Dyke, 2010). Effective nursing care also includes monitoring patients for signs of infection progression or complications, ensuring that any changes in the patient's condition are communicated promptly to the rest of the healthcare team.

Sonographers also play an important role in the multidisciplinary management of dental-related infections, particularly when imaging is required to assess the extent of infection in the head and neck region. Bialek et al. (2006) demonstrated the utility of ultrasound in diagnosing salivary gland infections and other deep-seated oral infections, which can be challenging to diagnose with clinical examination alone. Ultrasound

provides a non-invasive and reliable method for assessing infection, thereby aiding in the formulation of an effective treatment plan.

The importance of a multidisciplinary approach to managing infections has been supported by research across various healthcare settings. Zwarenstein et al. (2009) and Reeves et al. (2010) found that interprofessional collaboration leads to more accurate diagnoses and better patient outcomes, emphasizing that the integration of different healthcare professionals' skills is key to successful infection management. In dental care, such collaboration is particularly beneficial as it ensures that all aspects of patient care—from diagnosis and treatment to monitoring and follow-up—are addressed comprehensively.

Antibiotic stewardship is another critical area where multidisciplinary collaboration is essential. Sweeney et al. (2004) highlighted the growing concern of antibiotic resistance in dental practice, which can be mitigated through the involvement of pharmacists in developing appropriate antibiotic protocols. By working together, dentists and pharmacists can ensure that antibiotic prescriptions are both necessary and optimized, reducing the risk of resistance and improving patient outcomes. Moreover, nurses play a key role in ensuring adherence to these protocols by educating patients and monitoring their progress throughout the treatment process.

Overall, the literature supports the notion that managing dental-related infections in hospitalized patients requires a cohesive, multidisciplinary approach. Each member of the healthcare team brings unique expertise that, when combined, results in improved patient care, reduced complications, and better overall outcomes. This collaborative approach is particularly important in vulnerable patient populations, such as those with compromised immune systems or multiple comorbidities, where the risks associated with untreated or poorly managed infections are significantly heightened.

## **Methodology**

This study was conducted at a tertiary hospital over a period of six months, focusing on the management of dental-related infections in hospitalized patients. The research utilized a mixed-methods approach, combining quantitative data collection with qualitative interviews to assess the impact of a multidisciplinary approach involving dentists, pharmacists, nurses, and sonographers.

### **Study Design**

A prospective cohort design was used to evaluate the outcomes of patients with dental-related infections who received care from a multidisciplinary team. The study included patients admitted to the hospital with confirmed diagnoses of dental infections such as periodontitis, dental abscesses, or pericoronitis. Patients were divided into two groups: those who received standard dental care and those who received multidisciplinary care involving the collaboration of dentists, pharmacists, nurses, and sonographers.

### **Participants**

A total of 120 patients were recruited for the study. Inclusion criteria included patients aged 18 years and older, admitted with a dental-related infection, and requiring inpatient care. Patients with immunocompromising conditions, such as diabetes or undergoing chemotherapy, were included to assess the effectiveness of a multidisciplinary approach in a high-risk population. Patients who were unable to provide informed consent were excluded from the study.

### **Data Collection**

Quantitative data were collected through medical record reviews to evaluate clinical outcomes, including the duration of infection, length of hospital stay, and the incidence of complications. Antibiotic usage patterns were also assessed, with a particular focus on the appropriateness of prescriptions and adherence to antimicrobial stewardship guidelines. Data on patient outcomes, such as resolution of infection and any adverse events, were recorded.

Qualitative data were gathered through semi-structured interviews with patients and healthcare professionals involved in the multidisciplinary care process. Interviews were conducted with dentists, pharmacists, nurses, and sonographers to explore their perspectives on the effectiveness of the collaborative approach, communication among team members, and challenges faced during the management of dental infections. Patient interviews focused on their experiences with the care provided and their perceptions of the multidisciplinary approach.

#### Data Analysis

Quantitative data were analyzed using descriptive and inferential statistics. Descriptive statistics, such as means and standard deviations, were used to summarize patient demographics and clinical outcomes. Inferential statistics, including t-tests and chi-square tests, were employed to compare outcomes between the standard care group and the multidisciplinary care group. A p-value of <0.05 was considered statistically significant.

Qualitative data from interviews were transcribed verbatim and analyzed using thematic analysis. Themes were identified to capture key aspects of the multidisciplinary care experience, including communication, role clarity, and perceived benefits of the collaborative approach. NVivo software was used to assist in organizing and coding the qualitative data.

#### Ethical Considerations

Ethical approval for the study was obtained from the ethics committee. Written informed consent was obtained from all participants before their inclusion in the study. Participants were assured of the confidentiality of their responses, and all data were anonymized prior to analysis. The study adhered to the principles outlined in the Declaration of Helsinki.

### Findings

#### Quantitative Findings

**Table 1: Patient Demographics and Clinical Outcomes**

| Characteristic                       | Standard Care Group (n=60) | Multidisciplinary Care Group (n=60) |
|--------------------------------------|----------------------------|-------------------------------------|
| Age (mean $\pm$ SD)                  | 52.3 $\pm$ 14.5            | 50.8 $\pm$ 13.9                     |
| Male (%)                             | 55%                        | 58%                                 |
| Length of Hospital Stay (days, mean) | 9.4 $\pm$ 3.2              | 6.8 $\pm$ 2.5                       |
| Duration of Infection (days, mean)   | 12.7 $\pm$ 4.1             | 8.3 $\pm$ 3.6                       |

| Characteristic                 | Standard Care Group<br>(n=60) | Multidisciplinary Care Group<br>(n=60) |
|--------------------------------|-------------------------------|--|
| Incidence of Complications (%) | 18%                           | 10%                                    |

**Table 2: Antibiotic Usage Patterns**

| Antibiotic Usage                          | Standard Care Group<br>(n=60) | Multidisciplinary Care Group<br>(n=60) |
|---|-------------------------------|--|
| Appropriate Antibiotic Prescription (%)   | 72%                           | 93%                                    |
| Adherence to Antimicrobial Guidelines (%) | 65%                           | 92%                                    |

The findings indicate that patients in the multidisciplinary care group had significantly better outcomes compared to those receiving standard care. The length of hospital stay and duration of infection were both reduced in the multidisciplinary group, with mean differences of 2.6 days ( $p < 0.05$ ) and 4.4 days ( $p < 0.01$ ), respectively. Additionally, adherence to antimicrobial stewardship guidelines and appropriate antibiotic prescribing were markedly higher in the multidisciplinary care group ( $p < 0.01$ ).

## Findings

### Qualitative Findings

Thematic analysis of the qualitative data revealed several key themes and sub-themes related to the experiences of both patients and healthcare professionals with the multidisciplinary care approach.

#### Theme 1: Improved Communication

##### - Sub-theme 1.1: Interprofessional Collaboration

- Participant 1 (Dentist): "Working closely with the pharmacists and nurses helped ensure that all aspects of the patient's care were addressed efficiently. The communication among the team was seamless, which improved the decision-making process."

- Participant 4 (Nurse): "It was easier to get answers to questions related to medication adjustments since the pharmacist was part of our regular discussions."

##### - Sub-theme 1.2: Patient Communication

- Participant 7 (Patient): "I felt well-informed because different members of the team explained things to me. It was comforting to know that everyone was working together for my benefit."

#### Theme 2: Role Clarity

##### - Sub-theme 2.1: Clear Definition of Roles

- Participant 2 (Pharmacist): "Having clearly defined roles helped us avoid overlap and confusion. Each professional had a specific contribution, which made the entire process more organized."

- Participant 5 (Sonographer): "I knew exactly when my expertise was required, and that made my work more focused and effective."

#### Theme 3: Perceived Benefits of Multidisciplinary Care

##### - Sub-theme 3.1: Comprehensive Patient Care

- Participant 8 (Patient): "I felt like I was in good hands because I had so many experts looking after me. They all seemed to know what they were doing and communicated well with each other."
- Participant 3 (Dentist): "The comprehensive approach ensured that we didn't miss any aspect of the patient's care, which ultimately improved outcomes."
  
- Sub-theme 3.2: Reduced Complications
  - Participant 6 (Nurse): "By working together, we noticed early signs of complications that might have been missed otherwise. This helped in providing timely interventions."

## Discussion

The findings from this study demonstrate that a multidisciplinary approach to managing dental-related infections in hospitalized patients significantly improves clinical outcomes compared to standard care. The quantitative data clearly showed that patients who received care from a multidisciplinary team had shorter hospital stays, reduced infection duration, and lower incidence of complications. These improvements can be attributed to the comprehensive and coordinated care provided by the collaboration of dentists, pharmacists, nurses, and sonographers.

One of the key strengths of the multidisciplinary approach observed in this study was the optimization of antibiotic use. The involvement of pharmacists in prescribing and managing antibiotics resulted in significantly higher rates of appropriate antibiotic prescriptions and adherence to antimicrobial guidelines. This is consistent with previous studies that have highlighted the importance of pharmacist involvement in antibiotic stewardship to reduce resistance and improve patient outcomes (Palmer et al., 2000; Sweeney et al., 2004). By ensuring that antibiotics were used appropriately, the multidisciplinary team not only treated the dental infections more effectively but also minimized the risk of adverse drug reactions and antibiotic resistance.

The qualitative findings provide further insight into why the multidisciplinary approach was effective. Improved communication among healthcare professionals was a recurring theme, with both healthcare providers and patients noting the benefits of seamless communication. Effective communication allowed for quicker decision-making and a more coordinated response to patient needs, which is crucial in the management of complex infections. Previous research has emphasized that interprofessional collaboration leads to better patient outcomes by reducing gaps in care and ensuring that all aspects of treatment are addressed (Zwarenstein et al., 2009; Reeves et al., 2010).

Role clarity was another important theme identified in the qualitative analysis. When roles were clearly defined, each healthcare professional was able to focus on their area of expertise without duplication of effort. This clarity not only improved the efficiency of care delivery but also ensured that patients received the most appropriate interventions at each stage of their treatment. The involvement of sonographers, for example, allowed for accurate and timely imaging of deep-seated infections, which facilitated targeted treatment. The positive impact of role clarity on healthcare delivery has been documented in other studies, which found that well-defined roles lead to greater job satisfaction among healthcare professionals and better patient care (Bridges et al., 2011).

Patients' perceptions of the care they received further underscore the benefits of the multidisciplinary approach. Many patients reported feeling well-cared-for and appreciated the comprehensive nature of the treatment they received. The presence of multiple healthcare professionals working together gave patients a

sense of security and confidence in the care provided. This aligns with previous findings that multidisciplinary care can improve patient satisfaction by providing holistic, patient-centered care (Reeves et al., 2010).

The reduction in complications observed in the multidisciplinary care group is particularly noteworthy. By combining the expertise of different healthcare professionals, the team was able to identify early signs of complications and intervene promptly. Nurses played a crucial role in monitoring patients and communicating any concerns to the rest of the team, allowing for timely adjustments to the treatment plan. This proactive approach likely contributed to the lower incidence of complications observed in the multidisciplinary group.

Despite the positive findings, this study has some limitations. The sample size was relatively small, and the study was conducted at a single tertiary hospital, which may limit the generalizability of the results. Future research could involve larger, multi-center studies to validate these findings and explore the impact of multidisciplinary care in different healthcare settings. Additionally, the long-term outcomes of the multidisciplinary approach were not assessed in this study, and future studies could benefit from including follow-up data to evaluate the sustainability of the benefits observed.

In conclusion, the findings of this study highlight the significant advantages of a multidisciplinary approach in managing dental-related infections in hospitalized patients. By leveraging the unique skills of dentists, pharmacists, nurses, and sonographers, the multidisciplinary team was able to provide comprehensive care that improved clinical outcomes, reduced complications, and enhanced patient satisfaction. The results support the continued implementation of multidisciplinary care models in the management of complex infections, particularly in high-risk patient populations where the need for coordinated care is paramount.

## Conclusion

Given the complexity and potential severity of dental-related infections in hospitalized patients, this paper aims to explore the impact of a multidisciplinary approach involving dentists, pharmacists, nurses, and sonographers in managing these infections. By leveraging the unique skills and expertise of each profession, the proposed approach seeks to provide comprehensive care, minimize complications, and ultimately improve patient outcomes.

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#### الملخص

تمثل العدوى المرتبطة بالأسنان مصدر قلق كبير للمرضى المقيمين في المستشفيات، وخاصة أولئك الذين يعانون من ضعف في جهاز المناعة أو أمراض مزمنة، بسبب خطر الانتشار الجهازى والمضاعفات. قامت هذه الدراسة بتقييم تأثير النهج متعدد التخصصات - الذي يضم أطباء الأسنان والصيدلة والمرضات وأخصائي الموجات فوق الصوتية - على إدارة العدوى المرتبطة بالأسنان في مستشفى ثالثي. تم استخدام نهج مختلط الأساليب، يجمع بين التحليل الكمي للنتائج السريرية والمقابلات النوعية لتقييم فعالية نموذج الرعاية التعاونية. أشارت النتائج إلى أن الرعاية متعددة التخصصات قللت بشكل كبير من مدة الإقامة في المستشفى ومدة العدوى والمضاعفات، مع تحسين الالتزام بالمبادئ التوجيهية للمضادات الميكروبية. سلطت البيانات النوعية الضوء على تحسين التواصل ووضوح الدور والرعاية الشاملة للمرضى كفوائد رئيسية للنهج. تشير النتائج إلى أن الفريق متعدد التخصصات يمكن أن يوفر رعاية متفوقة للعدوى السنية، وتحسين النتائج ورضا المريض الكلمات الرئيسية: العدوى المرتبطة بالأسنان، الرعاية متعددة التخصصات، المرضى المقيمين في المستشفى، إدارة مضادات الميكروبات، الرعاية الصحية التعاونية، نتائج المرضى