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The Relevant Role of the Dental Surgeon in Intensive Care Prevention: A Mini Review

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Abstract

When patients are admitted to Intensive Care Units, they become more prone to the risk of opportunistic infections. These infections can be both systemic and stomatological. As a result, the length of hospitalisation increases, as do the costs, and the need for pharmacological therapy increases, which can lead to an increase in the morbidity and mortality rate. From a preventive perspective, the presence of a dental surgeon in hospital, particularly in intensive care, plays an important role in the prevention and treatment of stomatological alterations, sometimes temporary or permanent. The purpose of this article is to discuss preventive aspects and the importance of infection control through the presence of a dental surgeon in Intensive Care.

Keywords: Dentistry; Hospital; Intensive Care Unit; Oral Health; Oral Hygiene

Introduction

Since the COVID-19 pandemic, prevention has once again become a goal for infection control at hospital level. As patients are admitted to Intensive Care Units, they become more prone to the risk of opportunistic infections. These infections can be both systemic and stomatological. As a result, the length of stay and hospital costs increase, the need for pharmacological therapy increases, which can lead to an increase in the morbidity and mortality rate, as well as reducing hospital quality control indices [1-10].

The interrelationship between poor oral hygiene and the onset and progression of respiratory infections is well known. The main manifestation of this interrelation is ventilator-associated pneumonia or nosocomial pneumonia [1-13]. Periodontal Medicine - the branch of Periodontal Science that postulates periodontal infection as a risk factor for systemic diseases - supports this perspective. Table 1 summarises the main systemic diseases and/or conditions that can be initiated or exacerbated by periodontal infections [1, 6, 7, 11-15].

Medical Specialities	*Systemic Changes or Diseases*
Cardiology	Atherosclerosis. Infarction. Infective Endocarditis.
Pneumology	Chronic Obstructive Pulmonary Disease. Pulmonary Emphysema. Septic Lung Disease. Embolism. Empyema or lung abscesses. Cystic fibrosis.
Otorhinolaryngology	Rhinitis. Sinusitis.
Obstetrics	Premature birth. Low birth weight. Miscarriage.
Neurology	Stroke. Alzheimer's disease.
Orthopaedics	Osteoporosis. Infections in orthopaedic appliances and prostheses.
Endocrinology	Diabetes. Obesity. Thyroid disorders.
Dermatology	Alopecia *areata.*

Table 1: Main relationships in Periodontal Medicine. Systemic diseases and/or conditions that can be initiated or exacerbated by periodontal infections.

Poor dental biofilm control is the main factor in the increased colonisation of pathological microorganisms in the oral environment (Figure 1). The increased incidence of respiratory infections may be favoured by poor oral hygiene in hospitalised patients. Consequently, at hospital level, the relationship between poor oral hygiene and increased patient stay is estimated. This increase in length of stay can vary from 6 to 30 days [1-7, 9-11].

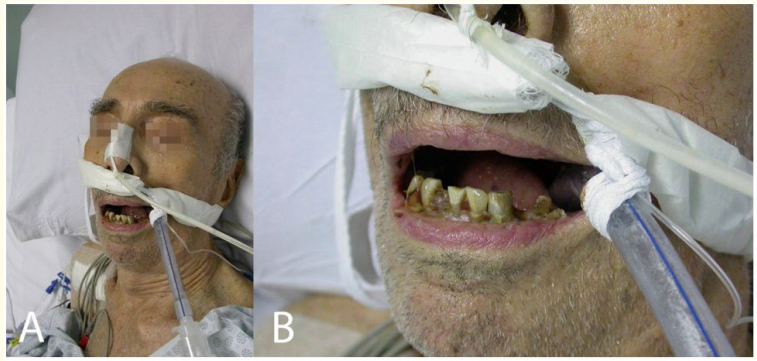

Figure 1: Patient in the ICU (A). Poor oral hygiene promotes greater colonisation of pathogenic microorganisms (B).

Critically ill patients admitted to hospital are managed in the Intensive Care Unit (ICU - Figure 2). In this environment, the provision of oral health care by nursing staff adds to the labour demand and presents difficulties in execution. From this perspective, the presence of a dental surgeon in a hospital environment, particularly in Intensive Care, plays an important role in the prevention and control of stomatological infections. In addition, when necessary, the dental surgeon can also perform therapeutic and curative actions. As such, the speciality recognised as Hospital Dentistry plays a fundamental role in the quest for the comprehensive health of patients admitted to hospital [1-7, 9-16].

Figure 2: Patients in the ICU require attention from the dental surgeon.

The purpose of this article is to discuss preventive aspects and the importance of infection control through the presence of a dental surgeon in Intensive Care.

Discussion

Periodontal Medicine underpins the aetiopathogenic and subsequent therapeutic relationships of periodontal infections as risk factors for systemic diseases and conditions. From this perspective, the concept of Periodontal Medicine scientifically supports the need for prevention at hospital level, especially after the COVID-19 pandemic [1, 12-15]. It should be noted that these hospitalised patients are more susceptible due to high immunosuppression [1, 10-13].

Stomatology should also be highlighted as the dental speciality that studies the oral and peribuccal manifestations of systemic diseases. Periodontal Medicine does not dispense with the importance and necessity of Stomatology at hospital level. Hospital Dentistry therefore encompasses both ideologies. Periodontal Medicine is based on the Theory of Focal Infection, conceptualised at the beginning of the 19th century by Rush and Hunter. However, it can be hypothesised as far back as the Ancient Ages by Hippocrates [1, 12, 13].

In the field of Cardiology, the relationship between the detection of *Streptococcus viridans* in the oral cavity and the occurrence of infective endocarditis is well known. In addition, atherosclerosis has been determined to be an infectious disease and may presents etiopathogenesis by periodontal pathogenic microorganisms. Through bacteraemia, these periodontopathogenic microorganisms such as *Aggregatibacter actinomycetencomitans*, *Porphyromonas gingivalis*, *Prevotella intermedia* and *Tannerella forsythia*, resident in the oral cavity of susceptible patients, can reach target organs. Subsequently, leukocytosis occurs, exposing the host to cytokines and inflammatory mediators such as prostaglandins, interleukins, lipopolysaccharides and TNF-α. These by-products can act on endothelial integrity, cause vascular degeneration, platelet aggregation and blood coagulation, while also raising fibrinogen levels. These phe-

nomena can initiate or exacerbate atherogenesis. Clinically, these events translate into cardiovascular (infarction) and cerebrovascular (strokes) thromboembolic alterations [1, 6-8, 12, 13].

The two-way relationship between periodontal disease and diabetes is widely known. Diabetic patients are generally at greater risk of infections and peripheral vasculopathies, as can be seen in periodontopathies. On the other hand, periodontal infections, as is generally the case with any infection, hinder glycaemic control and lead to complications in diabetic patients. Also in endocrinology, there may be links between periodontal diseases and obesity and thyroid dysfunction [1, 7, 12, 13].

Periodontal disease can be understood as a putative source of pathogenic microorganisms in the oral cavity and oropharynx. By tissue contiguity, periodontal diseases can cause rhinitis and sinusitis. By aspiration, periodontal diseases can cause aspiration pneumonia (also known as nosocomial pneumonia); chronic obstructive pulmonary disease (COPD); septic embolism; pulmonary emphysema; empyema or lung abscesses; and cystic fibrosis. Other routes of contamination are also foreseen, such as haematogenous dissemination through bacteraemia or direct inoculation (trauma or surgery) [1, 6-8, 10-13].

In the field of Obstetrics, periodontal infections can trigger or stimulate complications such as premature labour and low birth weight. In a murine model, the relationship between periodontal disease and miscarriage has been demonstrated. High levels of prostaglandin E2 were observed in the gingival fluid of pregnant patients with obstetric alterations. Changes in the chorionic-amniotic membranes were promoted by the inflammatory process resulting from periodontal infections [1, 11-13].

During a stay of patient in hospital, microorganisms colonise the oral cavity to a greater extent. After 72 hours of endotracheal intubation, there is a significant increase in some species of bacteria such as *Haemophilus influenzae*, *Streptococcus pneumoniae*, *Pseudomonas aeruginosa*, *Staphylococcus aureus* and *Acinetobacter sp.* These species are closely related to the aetiology of ventilator aspiration pneumonia [1-5, 7, 8, 10]. On the other hand, edentulous hospitalised patients are more prone to colonisation by *Candida albicans* [1-7, 11].

From this perspective, the reduction and control of pathogenic microorganisms in the oral cavity can be achieved through oral hygiene procedures. These preventive procedures promote the local and general wellbeing of the patient and may even reduce their stay in hospital [1-5, 7, 8, 10].

In addition, when possible, periodontal treatment should also be carried out prior to admission or hospitalisation for elective procedures. Some authors have reported a reduction in serum inflammatory biomarkers such as C-reactive protein, interleukin-6 and TNFα. Leucocyte and fibrinogen levels were also reduced by periodontal treatment. All these factors have been linked to cardiovascular risk [1-5, 11-13, 16].

In a hospital environment, the main oral hygiene protocol is to use mouthwash 0.12% chlorhexidine. Chlorhexidine is a bactericidal antiseptic against Gram-positive and Gram-negative bacteria. It lasts for 12 hours and can be used twice a day with a swab or gauze [1-6, 8, 10, 11, 16]. However, other antiseptics can be used, such as hydrogen peroxide, cetylpyridine chloride, triclosan and povidone-iodine [1-5, 8, 10, 11, 16].

In Hospital Dentistry, the participation of the dental surgeon in the Intensive Care Unit has many benefits for hospitalised patients, both in terms of preventive and curative procedures. Subsequently, these benefits are also promising for the hospital administration [1-13]. In cases of nosocomial pneumonia, for example, treatment requires an average of 10 days of hospitalisation and the administration of two different antibiotics. Prospectively, preventive management by the dental surgeon, through guidance and oral hygiene, can reduce the mortality rate by approximately 40% and hospitalisation by 4 days. In a medium-sized hospital, with 8 to 10 ICU beds, it is estimated that there will be savings of ₹ 40 million per year [1, 12].

Table 2 shows the main stages of the protocol for the care of patients in Intensive Care.

ICU Patient Care Protocol
Conscious patients: perform their own oral hygiene.
Medical records and progress.
Avoid cross-infection through biosafety procedures.
Evaluation of the Stomatognathic System, including the presence of dentures and salivary flow.
Prophylaxis of infectious sites.
Evaluation of oral lesions.
Oral and oropharyngeal aspiration in intubated patients.
Oral hygiene procedures: conventional toothbrush (soft bristles); tuft and interdental brushes; dental floss.
Mouthwash or swabbing with 0.12% chlorhexidine or hydrogen peroxide.
Xerostomia: moisturise the mouth with artificial saliva and the lips with lanolin or vaseline.

Table 2: Simplified protocol for intensive care patients.

Conclusions

In Intensive Care, the co-operation of the dental surgeon becomes essential, through oral hygiene care, in the prevention, management and monitoring of hospitalised patients. This work aims to improve hospital services and the quality of life of the patients during hospitalisation. In addition, the work of the dental surgeon can also favour hospital savings by reducing daily hospital stays and hospital costs. From this perspective, Hospital Dentistry can help to reduce and control cross-infection and, subsequently, nosocomial pneumonia, as well as other infectious diseases, by establishing oral hygiene protocols.

References

1. Silva AT., et al. "The importance of Hospital Dentistry in improving the quality of life of patients in the Intensive Care Unit (ICU)". SVOA Dentistry 4.4 (2023): 140-144.
2. Aquino AM., et al. "The relevance of the dentist in the ICU". E-Acadêmica 3.3 (2022): e2533303.
3. Mauri AP., et al. "The importance of the dental surgeon in the hospital environment for the patient admitted to the Intensive Care Unit: a bibliographic review". E-Acadêmica 2.3 (2021): e102342.
4. Souza SCS., et al. "What is the importance of hospital dentistry for the patient in the ICU?". E-Acadêmica 3.3 (2022): e0933277.
5. Silva RR and Seroli W. "Dentistry applied in intensive care unit". E-Acadêmica 3.1 (2022): e083194.
6. Soares HL, Machado LS and Machado MS. "Dental care in ICU patients: A literature review on the association of the most common diseases caused by poor oral hygiene and the importance of the dentist in prevention". Res Soc Dev 11.12 (2022): e381111234659.
7. Meneses KS., et al. "Hospital Dentistry: the importance of the Dentist Surgeon in the prevention of oral infections in the Intensive Care Unit (ICU): a literature review". Res Soc Dev 11.16 (2022): e533111638553.
8. Di Paolo GB., et al. "Impacts of intensive care patients' oral hygiene on nosocomial and ventilator-associated pneumonia: integrative literature review". Res Soc Dev 10.13 (2021): e376101321586.
9. Silva JLMD., et al. "Hospital Dentistry: A multiprofessional view in a Public Institute of Amazonas". Res Soc Dev 11.12 (2022): e313111234341.
10. Souza VC., et al. "The role of the Dental Surgeon in the prevention of ventilator-associated pneumonia". Res Soc Dev 11.10 (2022): e247111032759.
11. Lavigne SE and Forrest JL. "An umbrella review of systematic reviews of the evidence of a causal relationship between periodontal microbes and respiratory diseases: Position paper from the Canadian Dental Hygienists Association". Can J Dent Hyg 54.3 (2020): 144-155.

12. Pedron IG. Comments on "Review of the association between periodontitis and chronic obstrutive pulmonar disease in smokers". Monaldi Arch Chest Dis 89.3 (2019): 1157.
13. Pedron IG. "Periodontal medicine". In: Varellis MLZ, editor. The patient with special needs in Dentistry - Practical guide. São Paulo: Santos (2017): 477-478.
14. Sousa SA., et al. "Association between periodontal disease and atherosclerotic cardiovascular diseases - A systematic literature review". SVOA Dentistry 3.5 (2022): 227-234.
15. Silva VS., et al. "Relationship between obesity and periodontal diseases in children and adolescents: The importance in the development of the health of youth". SVOA Dentistry 3.1 (2022): 05-07.
16. Rocha SC, Travassos DV and Rocha NB. "The benefits of Hospital Dentistry for the population: A scope review". Res Soc Dev 10.4 (2021): e33410414117.

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