

The Importance of the Dental Surgeon in the Intensive Care Unit: Preventive Aspects

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Abstract

Patient admission to the Intensive Care Unit leads to pathological changes in the stomatognathic system. Most of the time, due to the absence of enteral feeding when patients are intubated, xerostomia is widely observed, increasing the risk of intra-oral opportunistic infections. These infections, in turn, can lead to other systemic complications, increasing hospitalization time and costs and requiring prolonged pharmacological therapies, thus increasing the morbidity and mortality rate. In view of this, considering the preventive aspects, the presence of a dental surgeon in the Intensive Care Unit promotes oral hygiene care for patients, favouring quality of life and improvements in hospital care.

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

Introduction

The COVID-19 pandemic has highlighted the importance of prevention in many ways. In the hospital environment, prevention aims to control hospital-acquired infections. As soon as patients are admitted to the Intensive Care Unit, there is a greater predisposition to the risk of opportunistic infections. Opportunistic infections can be systemic or stomatological. Most of the time, stomatological infections can also be a risk factor for systemic infections, as is the case with periodontal disease as a risk factor for nosocomial pneumonia or ventilator-associated pneumonia. These alterations and dysfunctions can increase length of stay and hospital costs, requiring more pharmacological therapy, particularly antibiotics. This chain leads to higher morbidity and mortality rates, reducing hospital quality control indices [1-14].

Precarious oral hygiene is a risk factor for periodontal disease, which in turn leads to the onset and progression of respiratory infections. From this perspective, the precepts of Periodontal Medicine - the branch of Periodontology that postulates periodontal infection as a risk factor for systemic diseases - support this thesis [1-14].

Poor control of dental biofilm is the main factor in the increased colonization of periodontopathogens in the oral cavity (Figure 1). In view of this, respiratory infections can be favoured by precarious oral hygiene in hospitalized patients. In the hospital environment, it is also hypothesized that there is a relationship between poor oral hygiene and increased length of stay in hospital beds. Length of stay can vary from 6 to 30 days [1-8, 10-12].

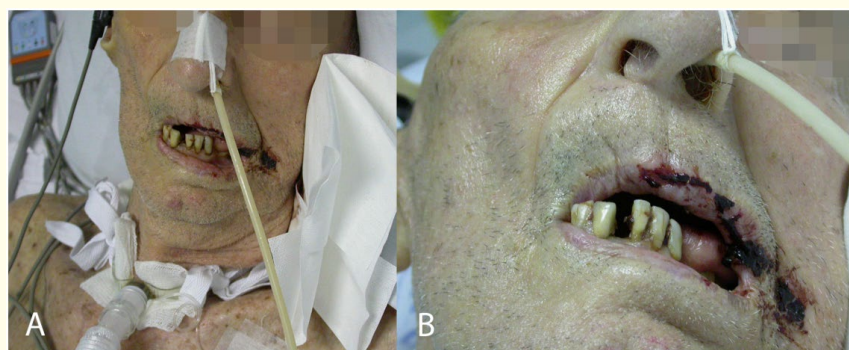


Figure 1: Lip crusts (A) and increase in dental biofilm (B) caused by xerostomia in patient admitted to the Intensive Care Unit.

Critical patients are managed in the Intensive Care Unit. Oral health care in this environment is most often provided by the nursing staff, who are usually very busy due to the high demands of their jobs. In this sense, the dental surgeon in a hospital environment plays an important role in the prevention and control of oral infections. In addition, the dental surgeon can also carry out therapeutic and curative procedures. In this way, Hospital Dentistry - a recently recognized dental speciality in Brazil - plays an important role in the oral and holistic health of patients admitted to hospitals and Intensive Care Units [1-8, 10-17]. The purpose of this article is to present the preventive aspects arising from the activity of the dental surgeon in the hospital environment and in Intensive Care Units.

Discussion

Periodontal Medicine does not rule out the importance of Stomatology - the dental science that studies oral and peribuccal manifestations, sometimes caused by systemic diseases - at hospital level.

Hospital Dentistry accepts both ideologies. Periodontal Medicine has its origins in the Focal Infection Theory proposed by Rush and Hunter at the beginning of the 19th century. However, Hippocrates, in the Ancient Ages, already hypothesized this theory [1, 2, 12, 13].

The etiopathogenic relationships between periodontal infections and systemic diseases or conditions are supported by Periodontal Medicine. Thus, the role of prevention and periodontal therapy in the control of systemic diseases is also foreseen. Consequently, at hospital level, these precepts can also favour the prevention of other systemic diseases or opportunistic infections [1, 2, 13-16], considering that hospitalized patients are more susceptible to opportunistic infections due to immunosuppression [1, 2, 11-14].

In Cardiology, the relationship between the occurrence of infective endocarditis and the presence of *Streptococcus viridans* in the oral cavity is well known. Atherosclerosis is classified as an infectious disease, and may also have an etiopathogenic relationship with periodontal pathogenic microorganisms. Periodontopathogenic microorganisms residing in the oral cavity of susceptible patients, such as *Porphyromonas gingivalis*, *Aggregatibacter actinomycetencomitans*, *Prevotella intermedia* and *Tannerella forsythia*, can reach target organs through bacteremia. Subsequently, leukocytosis occurs, in which cytokines and inflammatory mediators are exposed to the host. These toxic by-products (prostaglandins, interleukins, lipopolysaccharides and TNF- α) can deregulate endothelial integrity,

causing vascular degeneration, favouring platelet aggregation and blood coagulation, while also increasing fibrinogen levels. These phenomena make up atherogenesis. Consequently, infarction and stroke can be observed as clinical events [1, 2, 7-9, 13, 14].

In the field of Endocrinology, there is a bidirectional relationship between diabetes and periodontal disease. Diabetic patients may be at greater risk of periodontal disease because they are more prone to infections and peripheral vasculopathies. On the other hand, infections in diabetic patients make glycaemic control more difficult and can lead to complications in these patients. Also in Endocrinology, there is speculation about the relationship between obesity and thyroid dysfunction and periodontal diseases [1, 2, 8, 13, 14].

By tissue contiguity, periodontal disease can clearly cause odontogenic rhinitis and sinusitis, as it is a source of pathogenic microorganisms in the oral cavity and oropharynx. Widely discussed in the medical literature, periodontal diseases are risk factors for aspiration pneumonia or nosocomial pneumonia. However, other respiratory pathologies can be correlated such as cystic fibrosis; chronic obstructive pulmonary disease (COPD); pulmonary emphysema; septic embolism; empyema or lung abscesses. Haematogenous dissemination by bacteraemia or direct inoculation (trauma or surgery) are also foreseen as other routes of contamination [1, 2, 7-9, 11-14].

Periodontal infections have attracted the attention of obstetricians, as they can trigger or stimulate complications such as low birth weight or premature labour. The relationship between periodontal disease and miscarriage was demonstrated in a murine model. The gingival fluid of pregnant patients with obstetric alterations was found to have high levels of prostaglandin E2. The inflammatory process resulting from periodontal infections can lead to alterations in the chorionic-amniotic membranes [1, 2, 12-14].

Generally, during the period of hospitalization, the greatest colonization of microorganisms occurs in the oral cavity. Within 72 hours of endotracheal intubation, there is a significant increase in bacterial species such as *Pseudomonas aeruginosa*, *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Staphylococcus aureus* and *Acinetobacter sp.* These species are commonly related to the aetiology of aspiration pneumonia or nosocomial pneumonia [1-6, 8, 9, 11]. In addition, edentulous patients admitted to Intensive Care Units are more prone to colonization by *Candida albicans*, favouring candidosis as an opportunistic infection [1-8, 12].

Thus, the reduction and control of pathogen species in the oral cavity can be achieved through oral hygiene procedures. In addition, periodontal treatment, when possible, which is carried out before admission or hospitalization for elective procedures, can favour the patient's stomatological and systemic health, even presumably reducing the length of hospital stay [1-6, 8, 9, 11].

Reduction in serum inflammatory biomarkers such as C-reactive protein, interleukin-6 and TNF α has been reported, as well as fibrinogen and leukocyte levels, after periodontal treatment. It is worth emphasising that all these factors have been associated with cardiovascular risk [1-6, 12-14, 17].

In the Intensive Care Unit, the recommended oral hygiene protocol is to use mouthwash with 0.12% chlorhexidine digluconate. Chlorhexidine is a bactericidal antiseptic that acts against Gram-positive and Gram-negative bacteria. It has high substantivity (lasting 12 hours) and can be used twice a day, with a cotton swab or gauze [1-7, 9, 11, 12, 17]. However, hydrogen peroxide, cetylpyridine chloride, triclosan and povidone-iodine can also be used as substitute antiseptics [1-6, 9, 11, 12, 17].

In the Intensive Care Unit, the action of the dental surgeon benefits the stomatological and systemic health of hospitalized patients through preventive and curative procedures. In addition, these benefits are translated into hospital administration [1-14]. For example, in cases of nosocomial pneumonia, treatment requires an average of 10 days of hospitalization and the administration of two different types of antibiotics. Through preventive procedures carried out by the dental surgeon (oral hygiene), the mortality rate can be reduced by approximately 40%, and the length of hospitalization by 4 days. Taking a medium-sized hospital with 8 to 10 Intensive Care Unit beds as an example, savings of ₹ 40 million per year are estimated [1, 2, 13].

Table 1 summarizes the protocol's main steps in the care of patients hospitalized in the Intensive Care Unit.

Oral health care and procedures
Medical and dental history and progress.
Conscious patients perform their own oral hygiene.
Biosafety procedures: avoid cross-infection.
Removal of removable prostheses as soon as the patient is admitted (containerized with water + antiseptic).
Evaluation of the oral cavity, including the salivary flow.
Prophylaxis and removal of infectious foci.
Evaluation of lesions and dysfunctions of the Stomatognathic System.
Oral hygiene procedures: conventional toothbrush (soft bristles); complementary brushes (tuft and interdental); dental floss.
Swabbing or mouthwash with 0.12% chlorhexidine or hydrogen peroxide.
Oral and oropharyngeal aspiration in intubated patients.
Xerostomia: moisturise the mouth with artificial saliva and the lips with lanolin or vaseline.

Table 1: Protocol of oral health procedures for patients in the Intensive Care Unit.

Conclusions

The presence and action of the dental surgeon in the Intensive Care Unit is essential to the management of hospitalized patients. By means of procedures, most of which are preventive, the professional can help the health team with oral health issues, favouring not only the patient and improvements in quality of life during the hospital stay, but also hospital savings. The latter translates into financial values and the administration of drugs, particularly antibiotics. The control of periodontal diseases, for example, can favour the control of nosocomial pneumonia.

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