



## **The Comprehensive Hospital Dentistry Concept: A Brazilian Military Hospital Conceptual Framework for Monitoring, Evaluation and Practice**

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**Abstract**

*This paper outlines a conceptual framework for a humanized comprehensive hospital dentistry care. It is developed by first identifying the dentist's work activities in the hospital environment and the main characteristics of the determining agents that impact on hospital dentistry practiced with the beneficiaries of the health system of the Brazilian Air Force. This framework was conducted for three years at the Dental Division of the Galeao Air Force Hospital, Rio de Janeiro - Brazil. This is an observational descriptive study based on the literature review and experience of producing comprehensive hospital dentistry guidance at HFAG. The framework has been used to shape the revisions to HFAG's hospital dentistry process and methods manuals for use post 2020 and will inform the hospital dentistry guidance which HFAG will produce from December 2022. The framework is based on the precept that both individual and population patterns of oral diseases have causal mechanisms. These are analytically separate. Explanations of individual oral diseases involve the interaction between biological, social, and related phenomenon. The population patterns involve the same interactions, but between a range of another phenomenon working in tandem. The causal pathways therefore involve the social, economic, and political determinants of health, as well as psychological and biological factors. Four causative agents were related to the theme: population, environmental, organizational, and social. The bridge between the wider determinants and individual oral health outcomes is integration of the life course and, the world of lived experience inhabited by us as conscious beings.*

**Keywords:** *Hospital Dentistry, Oral disease; Social determinants of health; Inequalities in health; Quality of Life; Life course.*

## Introduction

The dental profession is responsible for the prevention, diagnosis, and treatment of diseases and disorders of the oral cavity and related structures.[1]

Hospital Dentistry is defined as the area of activity of the Dentist in a hospital environment, promoting low, medium, or high complexity dental care to hospitalized patients, aiming to contribute to the cure and general improvement of the patient's quality of life.[2]

The current knowledge of the oral and oropharyngeal microbiota, as well as the increasing evidence that this microbiota plays a role in the pathogenesis of respiratory infections in hospitalized patients, shows that negligence of oral care is a risk factor for the development of nosocomial pneumonia. The inclusion of monitoring and decontamination of the oral cavity of hospitalized patients by qualified professionals in the protocol for the prevention of nosocomial pneumonia seems to be an important ally in attempts to reduce pulmonary colonization by oral pathogens and, consequently, the incidence of nosocomial pneumonia. [3]

According to the American Dental Association (ADA) Periodontal disease has been associated with several health conditions, including heart disease and diabetes. While several associations have been found between periodontitis and systemic conditions, finding direct causality remains elusive. Periodontal and systemic diseases share many common risk factors, including smoking and poor diet. Dental Care Implications of Systemic Conditions. Several systemic conditions and disease can affect oral health, systemically or due to physical inability to maintain appropriate oral hygiene. Systemic conditions that can affect oral health include: Alzheimer's disease and dementia; Chronic kidney disease; Diabetes; Osteoarthritis; Osteoporosis (including treatments); Radiation therapies (Oncology Agents and Medications); Sjögren Disease and Xerostomia; Sleep disorders (including Sleep Apnea); hypophosphatasia and X-linked Hypophosphatemia; and Human Immunodeficiency Virus[4].

The relationship between diabetes and periodontal disease is seen to be bidirectional, meaning that hyperglycemia affects oral health while periodontitis affects glycemic control (e.g., increased HbA1c). [6-9] Obesity and other systemic inflammatory conditions, often exacerbated by stress or smoking and poor oral health maintenance, may contribute to periodontal breakdown and osteoclastic activity.[10, 11]

As such comorbidities or "multimorbidities" are increasing,[14] researchers are advocating an integrated approach to health care, as emphasized in recent reports from the FDI, the ADA, and the Surgeon General. A thorough review of the patient's medical and dental history prior to treatment

planning, as well as consultation with other healthcare providers, may be helpful to supporting an integrated approach to multimorbidities.[10, 12, 13]

During the last decades, periodontal diseases were associated with various chronic diseases such as diabetes, rheumatoid arthritis, adverse pregnancy outcomes and cardiovascular diseases, suggesting a systemic impact<sup>15-17</sup> with an enhanced proportion of worsened cardiovascular outcomes [18-20]. Indeed, patients with periodontitis are more prone to endothelial dysfunction, aneurysmal disease progression, [21] coronary artery narrowing, and an increased all-cause and cardio-vascular related mortality. [22,23]

The evidence demonstrates a positive association between periodontitis and nosocomial pneumonia. Individuals with periodontitis admitted to the ICU were more likely to present nosocomial pneumonia than individuals without periodontitis.[5]

### **Hospital Dentistry in Brazil**

The Brazilian Federal Council of Dentistry, based on Resolution “CFO-162/2015” recognizes the practice of Hospital Dentistry by the dentist. Is considered qualified by the Federal and Regional Councils of Dentistry, in Hospital Dentistry, the dentist who meets the provisions of this Resolution.

The Hospital Dentistry course must be carried out with a minimum of 350 (three hundred and fifty) hours, with 50% of practical classes and 50% of theoretical classes. In this qualification course, the dentist deepens his knowledge in hospital routine (management, bioethics, biosafety, medical records, prescription, rounds, clinical practice, patient safety, urgency, and emergency); clinical workup (interpretation of exams, main problems, systemically compromised patients, drug interactions); and BLS (Basic Life Support). At the end of the course, the dentist is submitted to theoretical and practical tests that assess his suitability for qualification in hospital dentistry.

In possession of the certificate, the professional may apply for registration with the Federal Council of Dentistry and registration with the Regional Council of Dentistry, where he has main registration.

Despite the autonomy granted to the Brazilian dentist qualified in hospital dentistry, by the Federal Council of Dentistry, the vast majority of Brazilian hospitals do not offer comprehensive dental treatment, in which the systemically compromised patient has access to all dental specialties in the same place.

Usually, the routine of dentists qualified in hospital dentistry is restricted to diagnosis, hygiene control and performing small bedside procedures of patients hospitalized in intensive care units. Generally, from the semiology, the patient with indication of endodontic, periodontal, prosthetic treatment for example, are referred to private offices or public outpatient services outside the hospital environment.

This scenario shows that the workforce and knowledge of the dentist in the hospital environment, as well as the important multiprofessional interaction can be better explored. It is also possible to infer that there is little or no interaction, in the hospital environment, with the other dental specialties.

### **HFAG's Comprehensive Hospital Dentistry's operating scenario**

The military staff of the Galeão Air Force Hospital takes care of the high complexity in health in the Brazilian Air Force's health system. It is a hospital with a surgical vocation. In its structure, general surgeries, neurosurgeries, cardiac surgeries, thoracic surgeries, orthopedic surgeries, bariatric surgeries, hemodynamic surgeries, oral and maxillofacial surgeries, among others are performed. In addition to the medical-surgical clinics, there are outpatient services in Oncology, Hematology, Rheumatology, Endocrinology, Dermatology, Gastroenterology, Otorhinolaryngology, Ophthalmology, Hospital Dentistry, Physiotherapy, Occupational Therapy, Psychology, Nutrition, Speech Therapy and Nursing.

The HFAG Dental Division (DOD/HFAG) has a staff of 40 Dental Officers and 20 Oral Health Graduated Assistants. Among these Dental Officers there are board certified specialists, masters, and some PhDs in the following dental specialties: Oral and Maxillofacial Surgery and Traumatology, Oral Radiology and Imaging, Stomatology and Oral Pathology, Periodontics, Endodontics, Restorative Dentistry, Prosthodontics and Implantology. There are also some Dental Officers board qualified in Laser Therapy and Hospital Dentistry.

On March 13, 2020, the HFAG was indicated as the reference for the treatment of COVID-19 disease in the Brazilian Air Force Health System, in Rio de Janeiro - Brazil. At that time all the DOD/HFAG Dental Officers received specific training in how to deal with the critically ill intubated patient on mechanical ventilation and updated information on diagnosis of oral pathologies. Keeping patients free from oral pathologies and with controlled oral hygiene protects the entire health team from aerosols generated in intubation/extubating procedures, respiratory physiotherapy, bed bath, for example and prevents opportunistic nosocomial infections.

The prompt employment and engagement of the hospital dentistry team during the successive events resulting from the Sars Cov-2 pandemic without neglecting to attend oncological and hematological outpatients, in addition to preparing the oral health of patients for major surgeries, highlighted the need to create a full (with almost all dental specialties) and comprehensive hospital dentistry conceptual framework.

Many different models and frameworks are used to describe oral public health and the ways in which population health is shaped. However, the oral health of patients with high systemic complexity treated in a hospital dentistry service is a subject little explored in the literature.

The processes and methods used were reviewed during 2020–2022 to take account of the experience of producing the full dentistry hospital guidance. During the review, a conceptual framework was developed to assist the process and to inform future guidance development. It is described in this paper.

## **Methods**

In evidence-based medicine, clinical research questions may be addressed by different study designs. According to the Centre for Evidence-Based Medicine, study designs can be divided into analytic and non-analytic (descriptive) study designs. Analytic studies aim to quantify the association of an intervention (eg, treatment) or a naturally occurring exposure with an outcome. They can be subdivided into experimental (ie, RCT) and observational studies.[24]

The present study focuses on unintended effects of interventions (ie, effects of an intervention that are not intended or fore-seen). That way an observational descriptive study is the most suitable study design. Furthermore, non-analytic studies (ie, descriptive studies) also rely on observational study designs.[24]

## **Results**

The DOD/HFAG's hospital dentistry conceptual framework

The DOD/HFAG Hospital Dentistry team is responsible for a set of preventives, diagnostic, therapeutic and palliative actions aimed at the stomatognathic system of patients with high systemic complexity undergoing outpatient and/or inpatient medical treatment performed by dentists with different training and skills to provide exchange of experiences and knowledge.

An updated, well prepared, high compromised and in line with the hospital's mission team is requested for this kind of activity. Such action demands a multiprofessional approach and close exchange between dental, medical, nursing, physiotherapy, speech therapy, nutrition, psychology, and other health professionals, with the purpose of maintaining or restoring masticatory, phonatory and aesthetic functions of the patients, leaving them in adequate oral health conditions and so patients can undergo medical treatment without complications.

DOD/HFAG hospital dentistry is consolidated as the mouth is seen as a site of long-term chronic inflammation, with consequent release of pro-inflammatory cytokines, changes in innate and acquired immunity and dysbiosis of the oral and gastrointestinal microbiota. The correlations between such oral pathology and its consequence at the systemic level are the subject of constant studies in the scientific literature, and its consequences have been proven in relation to Cardiology, Endocrinology, Onco-hematology, Neurology, among others.

The strategies used to expand the scope of action and monitoring of hospital patients were the active recruitment of hospital patients from the medical specialties; the welcoming approach and monitoring of hospital patients; the expansion of work with hospitalized patients; the expansion of the dentist's role in the surgical center; the expansion of performance in laser therapy; interdisciplinary action by inserting the dentist in the Palliativism Commission of the HFAG.

A Dental Risk Classification system (Table 1) is also proposed, by the DOD/HFAG team, to be evaluated in an initial visit to all new patients admitted to this hospital, as well as their companions who are regularly registered in the Brazilian Air Force health service. This classification is similar to Victoria's Hospice Society Palliative Performance Scale - version 2 (PPSv2) 25. The classification proposed assesses the presence of dental emergencies to be attended to; the priority in care, according to pre-established criteria; individualized adjustments to the dental treatment plan, respecting the particularities of the patient's medical condition; possibility of travel to DOD/HFAG for the interventions themselves; and feasibility of intervention at the bedside or in the operating room.

<b>RISK CLASSIFICATION IN DENTISTRY FOR IN-HOSPITAL PATIENTS</b>			
	<b>Green</b>	<b>Yellow</b>	<b>Red</b>
<b>Ambulation</b>	Full	Reduced; Mainly sit or in bed	Totally Bed Bound
<b>Oral Hygiene</b>	Full	Occasional assistance necessary	Mainly or fully assistance required
<b>Infectious or irritating foci in oral cavity</b>	No oral complaints; no oral foci identified	Irritating foci; No active infection in the oral cavity; Not direct related to the medical treatment	Irritating foci provoking ulcer in the oral mucosa; Active infectious foci in the oral cavity
<b>Supplementary O2</b>	No supplementation required or Low-flow Catheter	High-flow Catheter or Oxygen Mask	Patient under endotraqueal intubation, with or without mechanical ventilation
<b>Palliative care</b>	No oral complaints	Deficient oral hygiene/oral restorations or xerostomia	Masticatory difficulties; Irritating or infectious foci in the oral cavity
<b>Management</b>	Further assistance only if required	Scheduled assistance for management of the oral condition	Regular assistance for management of the oral condition

**Table 1** Risk classification in dentistry for in-hospital patients

Dental intervention in a surgical center requires a multidisciplinary assessment for its proper planning and implementation and may be indicated for patients whose systemic and/or behavioral condition makes it difficult or impossible to perform dental treatment in an outpatient setting.

In DOD/HFAG laser therapy has been applied to patients undergoing chemotherapy and radiotherapy, aiming at salivary stimulation and the prevention of oral mucositis and taste alterations. Oral and maxillofacial surgery patients also benefit from laser therapy, to accelerate the repair of surgical wounds, regression of edema and for the treatment of postoperative paresthesia.

The HFAG Palliativism Commission (CP/HFAG) was created in April/2021 to offer comprehensive treatment to patients affected by diseases that threaten the continuity of their lives, with the purpose of seeking quality of life for the individual and your family. It is a therapeutic approach that requires an

interdisciplinary team able to take care of the symptoms that these serious diseases bring to the lives of these patients, in the physical, psychological, spiritual, family, and social spheres.

DOD/HFAG Dentists are participatory in meetings and involved with this project from the beginning. A model of full attention including palliative patients is proposed, involving their dental risk classification, aiming to keep this patient pain free and with full masticatory capacity. The oral health care of these patients is highly humanized, aiming at the relief of pain and xerostomia (dry mouth) and seeks to maintain and/or restore masticatory, phonatory and aesthetic functions, culminating in the maximum respect for human dignity.

At least the DOD/HFAG's hospital dentistry conceptual framework (Figure 1) is based on six principles. First, that there are determinants of health and disease which include social, economic, psychological, and biomedical factors. Second, these determinants not only impact on individuals to produce individual-level pathology, but also produce highly patterned health differences in populations which reflect inequalities in society. Third, the determinants work through discernable causal pathways. Fourth, the causal pathways help to identify ways of preventing and ameliorating disease. Fifth, there are also causal pathways for the promotion of health. Finally, positive, and negative causal pathways cross physical, biological, social, economic, political, and psychological discipline boundaries.



**Figure 1.** Conceptual framework for Brazilian Air Force beneficiaries' oral health guidance.

The role of organizational managers as facilitators of clinical practice is a powerful strategic component in changing organizational culture. The establishment of broad and direct communication channels, clear processes, goals, and regular and personalized follow-up to each service profile offered in a health system are powerful components of a successful organizational change strategy. Academic detailing alone or combined with auditing and feedback alone is ineffective without intensive follow-up. The provision of educational materials and the use of auditing and feedback are often integral components of multifaceted implementation strategies.

Regardless of the sphere of action, any public health agent must act as an agent of change in the lives of human beings. Whether in public health research or practice, a dentist working as a public health agent must consider the diverse needs of the populations served by the health system where he operates, with the objective of achieving health equity from humanized and welcoming comprehensive care.

### **Environmental agent**

Environmental change agents are fundamental to many implementation strategies. Often, the environmental change agent is the individual responsible for delivering the implementation strategy and is thus largely responsible for fidelity to the intended strategy and its ultimate success in achieving desired organizational changes.

Environmental change agents are central to many implementation strategies. Often, the environmental change agent is the individual responsible for delivering the implementation strategy and, therefore, is largely responsible for fidelity to the intended strategy and its ultimate success in achieving the desired organizational changes.

In the case of DOD/HFAG Dentists, in addition to caring for the work environment so that patients feel welcomed and treated with the utmost humanity, care and attention, health professionals also observe issues such as ergonomics, compliance with guidelines issued by management and protocols designed to ensure the delivery of high-quality oral health. Therefore, health professionals also deserve to live their healthier lives, whether at home, at work or at leisure. After all, health is a human right.

### **Socio-cultural agent**

A socio-cultural concept of health and illness is based largely on the ability of individuals to cope with life experiences. The presence of medically defined symptoms may not necessarily prevent a person from carrying out his daily tasks.

The sociocultural concept of oral health and illness is largely based on the ability of individuals to cope with life experiences. The presence of clinically defined symptoms may not necessarily prevent a person from performing their daily tasks. Regardless of this, the patient who is a beneficiary of the Brazilian Air Force's health system needs more than being attended to. He needs to feel a sense of belonging and to know that the healthcare system will welcome and take care of him.

### **The population wide agent**

To improve the conditions offered to its beneficiaries the Brazilian Air Force's health service has implement actions to go beyond investments in clinical interventions with high-risk groups.

The thinking of health professionals has largely focused on the needs of sick individuals. While this reflects an important mission for health care, it is a limited mission that does little to prevent people from getting sick and typically overlooks issues related to disparities in access and quality of preventive and treatment services.

Personal health care is just one, and perhaps the least powerful, of several types of health determinants, which also include genetic, behavioral, social, and environmental factors. To modify them, the directory of health team and the health system must identify and explore the full potential of new options and strategies for health policies and actions.

### **Discussion**

The mechanism behind on the precept that both individual and population patterns of oral diseases have causal issues usually has several components. These can be subdivided in necessary and sufficient components.

Necessary and sufficient components like organizational agent, environmental agent, socio-cultural agent, and population wide agent are needed to produce a given outcome. Any one component is not sufficient on its own. Different combinations of components can produce the same outcome.

These concepts of necessary and sufficient component causes, that involve the interaction between biological, social, and related phenomenon explain the apparent differences whereby attributable fractions in a population.

The lifeworld conscious behind this framework emphasizes a state of affairs in which the hospital oral health care is experienced, and how it is lived by the patients and the dentists.

The framework proposed in this study define the philosophical and methodological principles that govern the production of a hospital dentistry guidance. The authors also set out the operational framework that dentists in a hospital environment team will follow. The manuals are prescriptive to ensure the aims and objectives of guidance production are as clear as possible and the procedures used are as systematic, transparent, auditable and accountable as possible.

## **Conclusions**

The six principles that guide the DOD/HFAG's hospital dentistry conceptual framework and the comprehensive insertion of the dentist in the hospital multi professional team not only focusing on the professional care or the individual perspective upon the lifeworld term but is also taking account of social and material environmental conditions and their relevance.

Disruptive innovations drive the discipline of science and processes in health systems that seek to increase value, safety and health care while promoting better health outcomes in the population.

Many changes underway in dentistry today are potentially more disruptive to traditional care models than in the past because they reflect the larger health care environment and because they enter dentistry through the low-end of the market.

Thinking on the comprehensive hospital dentistry conceptual framework around the world, potential changes will affect where and how care is delivered and how dentists will be paid. Dentists need to be aware of and prepared for these changes.

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