The practice of hospital dentistry in Brazil: an integrative literature review

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• Conflicts of interest: none declared.

ABSTRACT
Objective: this study aims to show the practice of hospital dentistry in Brazil by reviewing scientific papers on this subject published in our country. Material and Methods: an integrative review of the literature, including Brazilian scientific papers addressing hospital dentistry in Brazil was carried out. Case reports, literature reviews and original research studies not performed with patients were excluded. Google scholar, Pubmed, Lilacs, Scopus and Scielo are the online databases used. Results: the following outcomes were obtained from the 28 studies retrieved in the search: 6 (21.4%) were performed with a control group; 17 (60.7%) were related to patients’ oral health profile, 5 (17.9%) were questionnaire-based studies, 13 (46.4%) were performed with patients admitted to intensive care units (ICUs) 16 (57.1%) were performed in adults patients, in 21 (75%) studies the inpatients received some kind of oral examination with or without local intervention, and 4 (14.3%) studies involved collection of material for laboratory analysis. Conclusion: most part of the studies addressed patients admitted to ICUs. The participants of the studies, i.e., patients, companions or the health team, considered it necessary and relevant that dentists are present in a hospital environment and provide oral health care instructions to the inpatients and the nursing team. It is necessary to increase the number of studies in the area of hospital dentistry in Brazil.

Keywords: Dentistry; Intensive Care Units; Hospital.

Introduction
Hospital dentistry, which includes care, prevention, and oral education in inpatients, emerged in 1901 in the United States, when the 1st Department of Dentistry was structured at the General Hospital of Philadelphia by the Dental Service Committee of the American Dental Association.¹ Sixty-eight years later, in 1969, that same institution found out through research that 34.8% of US hospitals had both conditions and needs to implement a hospital dental service.²

The beginning of hospital dentistry in Brazil cannot be indicated precisely due to the lack of documents with information. However, it is known that it started in the middle of the 20th century in several centers, by institutions and professionals seeking to improve and integrate oral and general care to inpatients.¹

The experiences of patients during hospital admissions can be considered as isolated, limiting and dependent on care, influencing the patient’s emotional and physiological status and resulting in anxiety and stress, which can lead to alterations in their oral health such as xerostomia, gingivitis, herpes, among other conditions.³ Inpatients are also debilitated and have their attention focused on the disease that caused their hospitalization and therefore neglect the basic oral hygiene, which can lead to complications such as infections, problems to their oral and general health, and systemic disorders.⁴ For this reason the presence of the dentist in the hospital environment is important, with a view to improve the patient’s general condition, preventing infections and systemic complications through oral care.²

Dentists working at hospitals must be able to: carry out emergency procedures (bleeding, toothache, mouth sores, etc.); provide expert opinions and explanations regarding stomatognathic alterations; provide complex care (clinical and/or surgical) to special needs patients; train and supervise the dental assistant team to maintain the oral health of inpatients, perform dental and periodontal prophylaxis, encourage oral hygiene of inpatients, constantly examine their mouth and adjacent structures, create protocols for oral hygiene of inpatients, as well as notify the dentist if changes occur in or related to the patient’s oral structures.⁵,⁶

Oral health care in hospitalized patients is of paramount importance and mandatory and thus oral hygiene should be performed routinely.⁶ Poor oral hygiene results in greater accumulation of oral biofilm favoring the proliferation of pathogenic microorganisms, which makes the patients more susceptible to biofilm-dependent oral pathologies in combination with systemic diseases and infections.⁷ These biofilm-dependent pathologies may be aggravated when related to other oral conditions such as caries, periodontal disease, tooth fractures, oral lesions and necrotic pulp, which also can exacerbate systemic complications.⁷,⁹

Hospital infections are considered a public health problem, associated with high morbidity, longer hospital stay and increase of hospital costs. Pneumonia is considered one of the most frequent infections in a hospital environment.³,¹⁰ Ventilator-associated pneumonia (VAP) is the most significant infection affecting patients admitted at intensive care units (ICUs) and there are studies showing a direct relationship between the oral biofilm found in inpatients and VAP. Thus it is important to preserve oral health in patients with mechanical ventilation in order to prevent and minimize VAP occurrence.⁷,¹⁰

Dental care for inpatients seeks to prevent and improve their systemic conditions.⁵ However, hospital dentistry practice in Brazil is still very limited. Thus, the aim of this study is to demonstrate Brazilian hospital dentistry practice by reviewing scientific papers on this subject published in the country.
Material and Methods

This study is presented in the form of an integrative review. The integrative review is a research method in which a search of relevant studies on a certain subject is performed and the data from these studies are analyzed and a synthesis of the existing knowledge is elaborated.\[11,12\]

Six stages were established: 1) identification of the subject and establishment of the guiding question of the study; 2) selection of the descriptors for the search; 3) establishment of inclusion and exclusion criteria and selection of databases; 4) tabulation of the information obtained from the selected studies; 5) critical analysis of the studies included in the literature review; 6) interpretation of results; and 7) elaboration of the review.

The guiding question of this study was: What exists about hospital dentistry research in Brazil?

The descriptors with the number of papers found in each database (Google Scholar, Lilacs, Pubmed, Scielo and Scopus) were:

1. “Hospital dentistry” and “systemically compromised patients” for Google scholar (167 papers);
2. “Hospital dentistry” and “Brazil” for Google Scholar (336 papers) and Lilacs (62 papers);
3. “Oral health” and “inpatients” for Lilacs (5 papers) Pubmed (122 papers); SciELO (18 papers) and Scopus (12 papers);
4. “Oral health” and “ICU” for Lilacs (8 papers), PubMed (219 papers), SciELO (4 papers) and Scopus (12 papers);
5. “Oral health” and “hospital” and “Brazil” for Pubmed (170 papers);
6. “Hospital dentistry and “Oral health” and “Brazil” to Pubmed (122 papers);

For Pubmed and SciELO databases the descriptors were written in English.

The inclusion criteria were: papers on hospital dentistry performed in Brazil in hospitalized patients. Exclusion criteria were: review papers, case reports, case series, studies not performed by dentists, studies not performed in patients, and studies performed in patients hospitalized for dental reasons.

For data organization and tabulation, a collection instrument was developed containing: name, authors and year of the paper, institution/place where the study was performed, patient profile, presence of control group, number of patients, age and sex of patients, type of therapeutic approach, underlying disease, analysis of laboratory tests and results. A total of 28 papers met the inclusion criteria and were selected. After examination, the papers were divided into three subgroups: studies with control group (Table 1), studies with application of questionnaire(s) (Table 2) and studies with oral health profile (Table 3).

<table>
<thead>
<tr>
<th>Author/YEAR</th>
<th>Institution/place of the study</th>
<th>Age/sex</th>
<th>Patient profile</th>
<th>Sample number in SG and CG</th>
<th>Therapeutic approach</th>
<th>Lab test</th>
</tr>
</thead>
<tbody>
<tr>
<td>SANTOS, PS (2008)[13]</td>
<td>HCICSMSP, São Paulo, SP</td>
<td>-</td>
<td>ICU fully dependent on care</td>
<td>SG: 10 CG: 10</td>
<td>Oral hygiene: SG: use of Biotène Mouth wash® and foam sticks specific for oral hygiene. CG: foam sticks soaked with oral antiseptic based on cetylpyridinium chloride and alcohol.</td>
<td>Microbial culture</td>
</tr>
<tr>
<td>VIDAL, CF (2017)[14]</td>
<td>Public Hospital, Recife, PE</td>
<td>-</td>
<td>ICU under MV</td>
<td>SG: 105 CG: 108</td>
<td>SG: toothbrushing and CHX gel CG: CHX solution</td>
<td>-</td>
</tr>
<tr>
<td>TUON, FF (2017)[15]</td>
<td>HU, Curitiba, PR</td>
<td>Mean age: 47.9 years M = 9 F = 7</td>
<td>Patients under MV</td>
<td>SG: 8 CG: 8</td>
<td>SG: 2% CHX gel CG: 0.9% NaCl solution</td>
<td>Bacterial culture and antibiogram</td>
</tr>
<tr>
<td>BELLISI-MORDRIGUES, WT (2014)[16]</td>
<td>FMRP, Ribeirão Preto, SP</td>
<td>-</td>
<td>Admitted to ICU for at least 48 hours</td>
<td>SG: 127 CG: 127</td>
<td>SG: oral care (hygiene, scaling, temporary restorations and extractions) performed by a dentist. CG: oral hygiene performed by the nursing team.</td>
<td>-</td>
</tr>
<tr>
<td>OLIVEIRA, MS (2014)[17]</td>
<td>HGU, Cuiabá, MT</td>
<td>Mean age: 23 - 62 years. 30 M 18 F</td>
<td>Admitted to ICU for at least 8 days</td>
<td>48 patients</td>
<td>G1: Gaze and CHX 12/24h G2: Gaze and CHX 24/24h G3: CHX and toothbrushing 12/24h G4: CHX and toothbrushing 24/24h</td>
<td>-</td>
</tr>
<tr>
<td>DE MARCO, AC (2013)[18]</td>
<td>HU, São José dos Campos, SP</td>
<td>Mean age: 18 - 75 years</td>
<td>UTL, intubated for more than 48h</td>
<td>23</td>
<td>Evaluation of periodontal condition in 4 groups: G1: PD + VAP G2: PD + NVAP (no VAP) G3: NPD (no PD) + VAP G4: NPD + VAP</td>
<td>-</td>
</tr>
</tbody>
</table>

There was no statistically significant difference between SG and CG in relation to the microbiological culture before and after oral hygiene. The simplified oral hygiene index showed a statistically significant improvement in SG compared with CG.

There was no difference between groups.

SG had lower occurrence of Methicillin-resistant Staphylococcus aureus (MRSA). There was statistical significance between cultures of oral mucosa and dental plaque.

Infection in the lower respiratory tract and VAP were more frequent in CG. There was no difference in mortality between groups.

There was a decrease in visible dental plaque and gingival bleeding in the 4 groups and there was no difference between the 4 protocols used in the study.

There was no significant difference in the incidence of periodontal disease in relation to VAP, but the number of teeth and surfaces with loss of insertion above 4 mm was higher in patients with VAP.
HCISCMS-P- Hospital Central da Irmandade da Santa Casa de Misericórdia de São Paulo; HU- Hospital Universitário; HGU- Hospital Geral de Cuiabá; HV- Hospital Vivalle; FMERP- Faculdade de medicina de Ribeirão Preto; ICU- intensive care unit; SG- study group; GC- control group, M- male, F- female, CHX- chlorhexidine, G1- group 1, G2- group 2, G3- group 3, G4- group 4, DP- periodontal disease, VAP- ventilator-associated pneumonia, MV- mechanical ventilation, NPVM- no VAP, NDP- no periodontal disease.

Table 2. Questionnaire-based studies

<table>
<thead>
<tr>
<th>AUTHOR/YEAR</th>
<th>Institution/ Place of the study</th>
<th>Age/sex</th>
<th>Patient profile</th>
<th>Number of patients</th>
<th>Underlying disease</th>
<th>Therapeutic approach</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROCHA, AL (2014)</td>
<td>HRTN, Belo Horizonte, MG</td>
<td>Mean age: 54 years 96 M 41 F</td>
<td>Inpatients</td>
<td>137</td>
<td>-</td>
<td>-</td>
<td>58.3% referred to oral pathological conditions, 11.3% requested “dental evaluation”, 11.9% reported symptoms, 6% referred to oral hygiene and 12.5% mentioned other observations.</td>
</tr>
<tr>
<td>LIMA, DC (2011)</td>
<td>Hospital da Cidade de Aracatuba, Aracatuba , SP</td>
<td>Mean age: 28.94 years 44 M 20 F</td>
<td>Inpatients</td>
<td>64</td>
<td>59.37% motorcycle accidents, 28.13% sports practice, 12.50% car accident</td>
<td>Clinical examination, oral hygiene orientation and supervised toothbrushing.</td>
<td>50% of the patients had visited a dentist 6 to 12 months before due to periodontal disease (35%) and caries (20%). As much as 67.93% of patients required periodontal treatment and believed having “good oral health”. The presence of the dentist at the hospital was considered essential by 100% of the interviewees and 90.63% of them stated that the dentist’s role is “caring for the teeth”</td>
</tr>
<tr>
<td>FERDANDES, AS (2016)</td>
<td>Hospital in Sertão region, Caicó, RN</td>
<td>Mean age: 40.1 years 118 M 98 F</td>
<td>Inpatients</td>
<td>166</td>
<td>-</td>
<td>-</td>
<td>85.5% of the patients had toothbrush and toothpaste and of these, 15.7% did not brush their teeth and 18.1% brushed only once during hospitalization. 97.6% of patients reported not to use dental floss. 97.6% of the patients did not receive oral hygiene instructions. 58% of the hospital health team considered their knowledge about oral health unsatisfactory.</td>
</tr>
<tr>
<td>GAZOLA, FM (2015)</td>
<td>HMISC, Criciúma, SC</td>
<td>Mean age: 18 months</td>
<td>Pediatric Inpatients</td>
<td>80</td>
<td>28 hospitalizations due to respiratory diseases, 11 due to digestive system diseases, 11 due to blood and hematopoietic diseases.</td>
<td>Examination, oral hygiene instructions and referral to the dentist.</td>
<td>70% of the interviewees did not perform oral hygiene in the hospitalized children. 35% of hospitalizations were due to respiratory diseases.</td>
</tr>
<tr>
<td>BARBOSA, AM (2010)</td>
<td>HUG, Florianópolis, SC</td>
<td>28 children aged 0-10 years.</td>
<td>Pediatric inpatients and caregivers</td>
<td>43</td>
<td>48% had acute lymphoblastic leukemia (ALL), 7% had Burkitt lymphoma, 7% had neuroblastoma, 6% had osteosarcoma.</td>
<td>-</td>
<td>Oral hygiene of the hospitalized children was carried out by caregivers (90.7%), who received instructions from the nursing team in 21.4% of the cases. 100% of the nursing team reported that all patients had oral clinical manifestations, while only 62.8% of the caregivers reported these occurrences. 100% of the participants considered it important to have a dentist in the Oncology Unit.</td>
</tr>
</tbody>
</table>

HRTN- Hospital Risoleta Tolentino Neves; HMISC- Hospital Materno Infantil Santa Catarina; HUG- Hospital Infantil Joana de Gusmão, M-male, F- female.
Table 3. Studies assessing oral health profile

<table>
<thead>
<tr>
<th>AUTHOR/ YEAR</th>
<th>Institution/ Place of the study</th>
<th>Age/sex</th>
<th>Patient profile</th>
<th>Number of patients</th>
<th>Underlying disease</th>
<th>Therapeutic approach</th>
<th>Lab tests</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>COSTA, DC (2016)</td>
<td>NHU - UFMS, Campo Grande - MS</td>
<td>Mean age: 56 years 98 M 90 F</td>
<td>Patients treated at the Multi-professional Health Residency</td>
<td>188</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>42.55% of patients were under MV; 55.32% were fully dependent on care; 10.11% had facial asymmetry; 32.39% had a traumatic lip injury; 21.28% erythematous oral mucosa; 17.55% pale oral mucosa; 21.28% dry oral mucosa; 27.13% had hyposalivation; 17.55% had denuded tongue; 6.38% had fissured tongue and 2.66% had hairy tongue. Traumatic injuries: 35.48% in the tongue, 48.39% in oral or lip mucosa, 38.71% in gingiva or gingival border, 5.32% had traumatic hematoma, 23.94% used CD, RPD or FD, 22.87% were edentulous</td>
</tr>
<tr>
<td>PETRONI, VV (2014)</td>
<td>HOC, Curitiba, PR</td>
<td>Mean age: 41 years 289 M 153 F</td>
<td>Individuals admitted to conventional hospital or outpatient service</td>
<td>442</td>
<td>Tuberculosis, AIDS, Toxoplasmosis, syphilis and other infectious and contagious diseases</td>
<td>Dental examination, and, if necessary, patients referred for treatment or treated at the hospital</td>
<td>-</td>
<td>Most commonly found oral conditions: periodontal disease, caries, tongue coating and oral candidiasis. Dental conditions: caries (29%), residual roots (20%), dental calculus (25.19%), dental fracture (3.82%), wear (2.44%), intracanal medication (2.14%), amalgam (13.13%) and composite resin (2.6%). Use of prostheses: CD (4.89%), RPD (3.21%) and FD (0.31%).</td>
</tr>
<tr>
<td>SILVEIRA, ER (2014)</td>
<td>HEUFP, Pelotas, RS</td>
<td>Mean age: 0-12 years. 30 M 33 F</td>
<td>Children admitted to the pediatric unit.</td>
<td>63</td>
<td>Respiratory, cardiac, neurological, oncological diseases and other reasons.</td>
<td>Initial clinical examination and periodic follow-up.</td>
<td>-</td>
<td>20% of the individuals had dental caries (cxd / DMFT&gt; 0) and 62.8% had visible dental plaque. 52.3% reported to perform oral hygiene before hospitalization. Variables associated with oral hygiene habits: child's age and type of dentition.</td>
</tr>
<tr>
<td>SANTOS, CM (2011)</td>
<td>HGCA, Feira de Santana, BA</td>
<td>Mean age de 35 years 55 M 45 F</td>
<td>Patients admitted to ICU</td>
<td>100</td>
<td>-</td>
<td>Periodontal clinical examination</td>
<td>-</td>
<td>Moderate/severe periodontitis: associated with age over 35 years, black/brown skin color, marital status without partner, schooling &lt;4 years, diabetes mellitus and systemic arterial hypertension, daily toothbrushing ≤1 time a day, absence of oral hygiene instructions, smoking and consumption of alcohol.</td>
</tr>
<tr>
<td>EUZÉBIO, LF (2013)</td>
<td>HC da UFG, Goiânia, GO</td>
<td>408 infants, 194 children and adolescents, 59 adults and 77 of unknown age 220 M 269 F 251 sex not mentioned</td>
<td>-</td>
<td>740</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>88% of the patients participated in educational and preventive activities, 8% received curative care and 4% participated in both. 73% received non-outpatient care, 24% outpatient care and 3% received both.</td>
</tr>
<tr>
<td>CRUZ, MK (2014)</td>
<td>SCMB, Barretos, SP</td>
<td>Mean age: 49 years 15 M 20 F</td>
<td>UTI</td>
<td>35</td>
<td>Circulatory diseases, respiratory diseases, accidents, digestive system diseases, liver diseases and endocrine diseases.</td>
<td>Intraoral clinical examination 48 and 72 h after hospitalization</td>
<td>-</td>
<td>Ulcerations were observed in 17% of patients, candidiasis in 5%. 57% presented biofilm; 72% after the first evaluation biofilm increase in 100% of the patients. 100% of the patients presented tongue coating and 58% had thick tongue coating after 72h. 40% were total edentulous, 31% used CD, 3% RPD and 3% FD.</td>
</tr>
<tr>
<td>DA SILVA, JL (2016)</td>
<td>-</td>
<td>-</td>
<td>UTI</td>
<td>45</td>
<td>Evaluation of the oral biofilm classification index.</td>
<td>-</td>
<td>More biofilm was found in partially dentate or edentulous patients than in the dentate patients.</td>
<td></td>
</tr>
<tr>
<td>MAE-STRELLI, B (2010)14</td>
<td>HNSC, Tubarão, SC</td>
<td>Mean age: 60 years</td>
<td>ICU Unit 7</td>
<td>115</td>
<td>Cardiologic problems and others.</td>
<td>Clinical examination and interview with patients.</td>
<td>-</td>
<td>80% brushed their teeth two or more times a day; 26.96% had not visited to dentist for at least 10 years; ulcerations were found in 19.13% of the patients, gingival bleeding was found in 13.04% of the patients, 99.13% did not receive oral hygiene instructions.</td>
</tr>
<tr>
<td>AMARAL, CO (2016)22</td>
<td>HR, Presidente Prudente, SP</td>
<td>Mean age: 18-88 years</td>
<td>Hospitalized pre-cardiac surgeries</td>
<td>75</td>
<td>Valvuloplasty, MR surgery, pacemaker implantation, catheterization, stent placement and congenital heart disease.</td>
<td>-</td>
<td>-</td>
<td>Need of invasive dental treatment: periodontal (58.6%), restorative (26.6%), surgical (18.6%), endodontic (12%), pain of dental origin (2.6%), abscess (1.9%).</td>
</tr>
<tr>
<td>GEMAQUE, K (2014)26</td>
<td>HU da UFP, Belém do Norte, PA</td>
<td>Mean age: 45.4 years</td>
<td>Inpatients admitted to the department of infectious and contagious diseases</td>
<td>107</td>
<td>Tuberculosis, AIDS, hepatitis B e C, leishmaniasis and meningitis.</td>
<td>Head, neck and oral examination, periodontal evaluation and biopsies when necessary.</td>
<td>-</td>
<td>Periodontal disease in 57.5% of the patients, candidiasis in 22.8%, aphthous ulcer in 12.6%, tongue coating in 5.5%, herpes simplex in 0.8% and CEC in 0.8%.</td>
</tr>
<tr>
<td>PORTO, AN (2016)14</td>
<td>HGU, Cuiabá, MT</td>
<td>Mean age de 48,19 years</td>
<td>UTI</td>
<td>36</td>
<td>-</td>
<td>-</td>
<td>P. gingivalis and T. forsythia were found at higher levels in edentulous areas of dentate patients. The total counts of A. actinomyceetes, P. gingivalis, and T. forsythia were not different in the endotracheal tube of dentate or edentulous patients. The total number of bacteria in the mouth was significantly different from the counts in the tubes. Patients with higher levels of bacteria in the oral samples, presented more T. forsythia in the endotracheal tube. In edentulous patients, the same bacterial levels of the mouth were those of the endotracheal tube</td>
<td></td>
</tr>
<tr>
<td>CARRIL-HO-NETO, A (2011)28</td>
<td>HUNRP, Londrina, PR</td>
<td>Mean age: 49 M 33 F</td>
<td>Inpatients</td>
<td>82</td>
<td>-</td>
<td>-</td>
<td>All patients with teeth presented dental plaque, 69% had poor oral hygiene, 98.1% gingival inflammation, 74.5% periodontal disease and 60% caries. Oral lesions were detected in 36.5%, the most frequent being candidiasis, (in 19.6% of the cases it was the most frequent oral mucosa lesion). Length of hospital stay and age were associated with increased DPI and Gl while caries was associated with tobacco use.</td>
<td></td>
</tr>
<tr>
<td>BAEDER, FM (2012)21</td>
<td>HSP, João Pessoa, PB</td>
<td>Mean age: 53.8 years</td>
<td>UTI</td>
<td>50</td>
<td>Neurological causes, chronic kidney problems, respiratory problems or sepsis.</td>
<td>Oral examination and review of medical files.</td>
<td>-</td>
<td>60% of the individuals were edentulous, 68% had oral candidiasis, 10% had traumatic injuries, 14% had dentalveolar abscess, 14% had residual roots, 70% presented poor oral hygiene conditions.</td>
</tr>
<tr>
<td>SCHMITT, B (2011)22</td>
<td>HSC, Blumenau, SC</td>
<td>Mean age: ≥65 years</td>
<td>Hospitalized cardiac patients</td>
<td>118</td>
<td>Cardiac diseases</td>
<td>-</td>
<td>-</td>
<td>72.88% were partially edentulous; 45.6% presented gingival inflammation; 87.8% presented dental plaque and 74.4% presented calculus. Regarding oral hygiene, 88.98% brushed their teeth two or more times a day; 38.1% had never received oral hygiene instructions 61.01% regularly visited the dentist.</td>
</tr>
</tbody>
</table>
Results

During the search, a total of 1,345 papers on hospital dentistry were found, of which 108 were selected for being authored by Brazilian researchers and performed in Brazil. Out of them, 27 were excluded because they were duplicates. From the 81 remaining publications, 28 papers referring to Brazilian studies performed by dentists in Brazilian hospitals were selected for this study.

The studies were conducted between 2008 and 2017. As much as 17 (60.7%)14,15,17,19,21,22,24,26 published in 2014 and 2017, 4 (14.3%)15,24,26,27,29,33 in 2011, 3 (10.7%)14,15,24,26,28 in 2010, 2 (7.1%)17,20 in 2013, and 1 (3.6%) in 2008 and 1 in 2012.15,31

Most of the studies were conducted in São Paulo state, with 7 (25%)2,15,17,19,22,24,26 publications, followed by the states of Santa Catarina (n=4, 14.3%)2,7,10,18,21,23,26,27,29,33 and Mato Grosso (n=2, 5.6%).18,23 The states of Bahia, Goiás, Mato Grosso do Sul, Minas Gerais, Pará, Paraíba, Pernambuco, Piauí, Rio Grande do Norte and Rio Grande do Sul had 1 (2.8%) publication each, accounting to 28% of the sample.3-5,10,14,16,20,27,29,31,21,33 Two (5.6%) studies did not mention where they had been carried out.

In order to identify the scenario of hospital dentistry in Brazil through published studies, it was found that 6 (21.4%)15,17,23,26 studies had a control group; 17 (60.7%)4,6,16,18,19,20,22,24,27,33 were related to patients’ oral health profile and 5 (17.9%)3,7,10,25 were questionnaire-based studies of which 42,10 involved only patients and 125 involved patients, caregivers and healthcare professionals.

From studies that had a control groups, 5 (83.3%)14,15,17,23,26 were performed with patients admitted to ICUs and 1 (16.7%)15 with patients under mechanical ventilation. Three (50%)14,15,23 studies were conducted in adult patients, and the others did not mention the age of the individuals.14,15,26 Material collection for laboratory analysis of microbial culture was performed in only 2 studies (33.3%)14,15 and an antibiotic was also done in one of them.15

Control Groups from each of the 6 studies14,15,17,23,26 received the standard oral hygiene protocol provided by the respective health institution, i.e., use of chlorhexidine (CHX), sodium chloride solution (NaCl) or foam sticks and oral antiseptic solutions. On the other hand, oral hygiene in the Study Groups was performed with toothbrushing plus chlorhexidine, toothbrushing and/or periodontal scaling and/or treatment of carious lesions and/or extraction in addition to the use of 2% chlorhexidine and Biotêne Mouthwash® with foam sticks. In a randomized study only intraoral physical examination was performed.

Among the studies addressing the patients’ oral health profile, 8 (47%)14,6,22,24,27,29,30,32 were performed with patients admitted to conventional hospital beds, 6 (35.3%)16,18,19,21,31,33 with ICU patients, 25,28 (11.8%) with patients admitted to ICUs and conventional hospital beds and 1 (5.9%)29 did not mention. Twelve (70%)4,6,16,18,19,22,28,29,31,32 of the studies addressing the oral health profile were carried out with adult patients only, 2

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with pediatric patients only, 1 (5.9%)21 with patients of all ages and 2 (11.8%)23,25 studies did not mention the age of patients. Regarding the type of approach to the patients, the following results were obtained: in 9 (52.9%)4,16,19,21,27,28,30,32 studies only oral examination was performed without any kind of intervention; in 1 (5.9%)29 oral examination was performed followed by dental procedures if necessary and the patients received oral hygiene instructions; in 1 (5.9%)6 study patients received oral examination and were referred for dental care if necessary; and 4 (23.6%)4,5,20,22 studies did not mention the therapeutic approach. In only 2 (11.8%)18,33 studies samples were collected for laboratory analysis of microbial culture and antibiogram.

Among the questionnaire-based studies, 5 (100%)2,3,7,10,25 were conducted with patients in conventional hospital beds. In one of these studies, the participants were the patients, their caregivers and some members of the nursing team. Three (60%)2,3,10 studies were conducted with adults and 2 (40%) with children.2,25

Overall, among all the 28 studies, 13 (46.4%)13-19,21,23,26,28,31,33 were performed with ICU patients, 18 (64.2%)6,13,16-19,22,28,29,31-33 with adult patients, in 21 (75%)2,4,6,7,13-19,21,23,26-33 the inpatients received some kind of oral examination with or without local procedures and oral samples were collected for laboratory analysis in 4 (14.3%)14,15,18,33 studies.

**Discussion**

In Brazil, hospital dentistry has gained increased attention in ICUs. In this integrative literature review, 46.4% of the studies were carried out with ICU patients having a dentist acting on the prevention and treatment of oral infections, especially those associated with VAP.13-26

In the studies with a control group, although patients’ oral hygiene was performed by the nursing team, dentists were responsible for providing oral care guidance, which led, in some cases, to a significant reduction in the mean hospital stay under mechanical ventilation14 and to a reduction of primary sources of infection in the mouth15 compared with the study groups in which preventive and curative measures were implemented in addition to oral care not supervised by dentists. The presence of the dentist resulted in benefits for these inpatients and possibly for the hospitals by reducing the hospitalization time of these individuals.

In half of oral health studies, most inpatients had periodontal problems,6,16-21 which reinforces the need of treating these patients to reduce the infection rate. The need of oral hygiene instructions was observed in 60% of the studies but in only 40% of them either the patients or the nursing team received some kind of orientation on oral care, which emphasizes the importance of the dentist to guide, supervise and consequently prevent oral infections that may lead to secondary infections during the hospital stay.

The lack of oral hygiene instructions for inpatients was addressed in four studies among the questionnaire-based surveys. It was also investigated whether the patients had oral hygiene kits while in hospital stays, how often daily they performed oral hygiene and whether it was done by the patients themselves or by their companions.2,3,16,25 In addition to the lack of oral hygiene orientation, these patients had poor access to oral health care, as some of them reported that the last visit to the dentist had occurred 12 months prior to hospitalization, mainly to caries and periodontal disease.3 In some cases, the hospitals’ nursing teams stated to be not qualified or trained to perform inpatients’ oral hygiene and provide proper oral care instructions.26 The need for dental team in hospitals has become increasingly evident and recognized by patients and their companions as well as by the hospital health staff.

Most of the studies reported the importance of the dentist in the hospital environment. It is noteworthy that the cooperation between dentists and other health professionals in hospitals benefits the inpatients, in such a way that monitoring, care and treatment of oral conditions during hospital stay reduced the hospital infection rates, which shortened the hospitalization time, reduced the hospital costs and increased the quality of life, reducing morbidity and mortality.

In addition to the ICUs, it is necessary to conduct studies in critical units such as Coronary Units, Burn Units, neuro- logical ICUs, and pediatric and neonatal ICUs. Patients admitted to medical clinic or surgical wards and other medical specialties should also be evaluated, since most published studies deal with systemically compromised patients non-hospitalized but rather admitted to outpatient services. It is also important that the studies provide more detailed information, such as medications in use, laboratory test results, impairments and oral conditions. Although the first publication on the hospital dentistry in Brazil occurred only in 2008 and only few studies involve intervention, the number of annual publications has increased. Further and continuous research on hospital dentistry is important to improve the performance of dentists in hospitals as well as their integration with other health professionals. In addition, hospital dentistry studies conducted by dentists at hospitals must mention both of these facts to facilitate the search for systematic and/or integrative reviews.

**Conclusion**

This integrative literature review revealed that most hospital dentistry studies conducted by Brazilian researchers addressed patients admitted to ICUs. The participants of the studies, i.e., patients, companions or the health team, considered it necessary and relevant that dentists are present in a hospital environment and provide oral health care instructions to the inpatients and the nursing team. Further studies with inpatients and other areas of hospital dentistry must be conducted and published by Brazilian researchers.
References


Mini Curriculum and Author’s Contribution

1. Isabel Saturnino de Souza, DDS student. Contribution: bibliographical research and manuscript writing.
2. Natalia Garcia Santalla, DDS. Contribution: manuscript writing and manuscript review.
3. Paulo Sérgio da Silva Santos, DDS and PhD. Contribution: manuscript writing, manuscript review, and work supervisor.

Submitted: 07/24/2017 / Accepted for publication: 08/24/2017

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