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Original Article



# Assessment of the nursing staff's knowledge on periodontal disease and its associations with systemic changes

## Avaliação do conhecimento da equipe de enfermagem sobre doença periodontal e suas associações com alterações sistêmicas

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## Resumo

**Introdução:** A manutenção da saúde bucal em pacientes internados é essencial, especialmente para evitar complicações decorrentes da doença periodontal, que não apenas afetam a saúde bucal, mas também podem agravar problemas sistêmicos durante a hospitalização. **Objetivo:** Este estudo teve como objetivo avaliar o conhecimento da equipe de enfermagem em relação ao manejo da doença periodontal e sua associação com doenças sistêmicas. **Material e método:** Este estudo observacional transversal foi conduzido em um hospital geral de referência do Sistema Único de Saúde (SUS) do Brasil. Um total de 504 profissionais de enfermagem completaram um questionário autoaplicável com 24 questões, abordando procedimentos de cuidados bucais e a importância da saúde bucal em pacientes hospitalizados. Os dados foram analisados por meio de análise descritiva e teste qui-quadrado ($\alpha = 0,05$). **Resultado:** A maioria dos entrevistados (97,8%) acreditava que infecções bucais podem afetar a saúde geral do paciente e que a higiene bucal é importante durante a hospitalização. No entanto, foram identificados déficits de conhecimento. O efeito oral da doença periodontal foi considerado moderado por 49,3% dos participantes, e 74,6% acreditavam que o açúcar era a causa mais comum da doença periodontal. **Conclusão:** Profissionais de enfermagem reconhecem a importância da manutenção da higiene bucal e a relação entre doença periodontal e doenças sistêmicas. No entanto, seu conhecimento prático em higiene bucal é limitado. Recomenda-se um programa de treinamento em cuidados bucais para pacientes internados e a inclusão de tópicos de higiene bucal nos currículos dos profissionais de enfermagem.

**Descritores:** Doenças periodontais; doença; equipe de enfermagem; saúde bucal; pacientes internados.

## Abstract

**Introduction:** The maintenance of oral health in inpatients is essential, particularly to avoid complications arising from periodontal disease, which not only affect oral health but can also exacerbate systemic issues during hospitalization. **Objective:** This study aimed to assess nursing staff's knowledge regarding the management of periodontal disease and its association with systemic diseases. **Material and method:** This cross-sectional observational study was conducted in a general referral hospital of the Brazilian National Health System (SUS). A total of 504 nursing professionals completed a self-administered 24-item questionnaire on relating to oral care procedures and the importance of oral health in hospitalized patients. Data were analyzed using descriptive analysis and the chi-squared test ($\alpha = 0.05$). **Result:** Most respondents (97.8%) believed that oral infections can affect a patient's general health and that oral hygiene is important during hospitalization. However, knowledge deficits were identified. The oral effect of periodontal disease was considered moderate by 49.3% of the participants, and 74.6% believed that sugar was the most

common cause of periodontal disease. **Conclusion:** Nursing professionals are aware of the importance of maintaining oral hygiene and the relationship between periodontal and systemic diseases. However, their dental hygiene practice knowledge is limited. A training program on oral healthcare for inpatients and the inclusion of oral hygiene topics in the curricula of nursing professionals are recommended.

**Desciptors:** Periodontal diseases; disease; nursing staff; oral health; inpatients.

## INTRODUCTION

Oral health care is an essential component of inpatient medical care and is primarily provided by nurses and healthcare staff professionals[1]. Knowledge and awareness of oral health measures for these patients are critical for preventing oral pathologies and systemic bacterial dissemination[2,3]. Moreover, oral hygiene usually deteriorates after hospitalization[4,5].

Absence or poor toothbrushing leads to plaque accumulation on the tooth surfaces, resulting in periodontal disease (PD)[6]. PD is characterized by the destruction of the supporting tissues of the teeth, causing tooth mobility and tooth loss[6]. Periodontal pathogens produce endotoxins that are directly related to systemic diseases[7]. Studies have shown an interaction between PD and several systemic diseases, including atherosclerosis, stroke, chronic kidney disease, cancer, cardiovascular diseases, type 2 diabetes, and respiratory tract infection[7,8]. Controlling PD may reduce systemic inflammation, and therefore, contribute to controlling diabetes, cardiovascular disease, and other systemic complications[9]. Healthcare professionals must be informed of the potential impact of periodontal disease on a patient's overall health, so that they can, in turn, inform their patients[10].

The ability of nursing staff to prioritize and adhere to inpatient oral care is a challenge[11-13]. Insufficient time for instruction, lack of instructional materials, and unwilling patients appear to be the main factors contributing to non-adherence to inpatient oral care[13,14]. The prevention and control of periodontal disease should be considered integral to various disease control and risk minimization[9]. Oral care should include the use of a fluoridated toothpaste, interproximal brush, and dental floss[8]. Training nursing staff with oral hygiene technicians as instructors may improve their oral care knowledge and skills[5,15].

To the best of our knowledge, few studies on nursing staff knowledge of the importance of managing periodontal disease are available. Therefore, this study aimed to assess the knowledge of nursing staff (nurses, technicians, and nursing assistants) regarding periodontal disease, its association with systemic diseases, and the clinical management of patients with periodontal disease.

## MATERIALS AND METHODS

### Study Design and Ethical Issues

This cross-sectional observational explorative study was developed according to the ethical guidelines for human research and approved by the Ethics Committee on Human Research of the Federal University of Uberlândia, Brazil (CAAE:52673321.3.0000.5152).

### Sampling, Context, and Study Participants

The study used a convenience sample of 504 nursing professionals (130 nurses, 286 nursing technicians, 87 nursing assistants) employed by the Public Clinical Hospital and Dental Hospital of the Federal University of Uberlândia, Brazil. The nursing staff work within a regional referral hospital of the Brazilian National Health System (SUS). A total of 526 questionnaires were completed between April 2022 and December 2022 by nursing professionals of both sexes, across all ages, and working

in all shifts (morning, afternoon, and evening). However, 22 professionals (5%) were excluded because they did not disclose whether they were nurses, nursing technicians, or assistants. Nursing staff who refused to participate, and those on vacation or work leave were excluded from the study.

## Data Collection Tool

The 24-item questionnaire was developed by a collaborative team that included dental professionals and nurses. The first part of the questionnaire identified the nursing team demography including professional categories, age, sex, income, and professional training experiences. The second part included questions relating to participation within a multidisciplinary team, interactions with dental professionals, knowledge on periodontal disease and its relationship with general health, oral care knowledge and practice routinely performed in the hospital environment, level of interest in receiving oral health-related information, and relevance to their work as nursing staff.

## Data Collection

The participants were informed about the study. After written informed consent was obtained, one interviewer (ER) offered an anonymous, self-administered questionnaire. The questionnaire took approximately 30 min to complete. Questions from the participants were answered by the interviewer. For greater participant engagement, all inpatient departments of the Clinical Hospital were visited during the morning, afternoon, and evening shifts during nursing staff breaks (breaks for snacks, lunch, dinner, and overnight rest).

## Data Analysis

Data were tested for normal distribution (Shapiro-Wilk test) and homogeneity of variance (Levene's test), and a descriptive chi-square test was performed. Contingency coefficients were used to identify differences between nurses and nursing auxiliaries concerning socioeconomic variables and knowledge of oral health. All tests were performed using Jamovi Software (version 2.3.21), with a significance value of 5%.

## Study Impact on Practice

At the end of the study, a comprehensive interdisciplinary training course on periodontal disease and inpatient oral healthcare was offered by dental professionals to interested nursing professionals. The training addressed patient management at hospitals, oral health education for the prevention of periodontal disease, and the use of hospital resources to assist in inpatient periodontal hygiene care. A standard protocol was also created to facilitate nursing professionals' access to continued oral healthcare education.

# RESULTS

Responses from the 504 nursing professionals who participated in this study are presented in Table 1. The study consisted of mostly females (380, 75.4%), with family income between levels 2 and 4 (221, 43.8%) of the minimum national wages. The mean age was 41.3 ± 10.0 years. There were no significant differences between nurses and auxiliary nursing staff.

**Table 1.** Analysis of socio-demographic characteristics of nursing staffs (nurses and nursing assistant team) included in the study

| Socioeconomic Variables | Nurse N (%) | Nursing Assistant team N(%) | Total N (%) | Difference between groups (*p* value) |
|---|---|---|---|---|
| *Gender Informed* | | | | |
| Male | 26 (5.2) | 93 (18.5) | 119 (23.6) | 0.2814 |
| Female | 103 (20.4) | 277 (55.0) | 380 (75.4) | |
| Not informed | 1 (0.2) | 4 (0.8) | 5 (1.0) | |
| *Skin Color Informed* | | | | |
| White | 48 (9.5) | 114 (22.7) | 162 (32.2) | 0.8087 |
| Black | 10 (2.0) | 53 (10.5) | 63 (12.5) | |
| Brown | 19 (3.8) | 90 (17.9) | 109 (21.6) | |
| Not informed | 53 (10.5) | 117 (23.2) | 170 (33.7) | |
| *Family Income* | | | | |
| 0-2 salaries | 4 (0.8) | 22 (4.4) | 26 (5.2) | <0.001* |
| 2-4 salaries | 19 (3.8) | 202 (40.1) | 221 (43.8) | |
| 4-10 salaries | 81 (16.1) | 117 (23.1) | 198 (39.3) | |
| 10-20 salaries | 18 (3.6) | 14 (2.8) | 32 (6.3) | |
| Over 20 salaries | 0 (0.0) | 1 (0.2) | 1 (0.2) | |
| Not informed | 8 (1.6) | 18 (3.6) | 26 (5.2) | |
| *Marital Status* | | | | |
| Single | 49 (9.8) | 107 (21.4) | 156 (31.2) | 0.0025* |
| Married | 60 (12.0) | 158 (31.6) | 218 (43.6) | |
| Stable Union | 8 (1.6) | 47 (9.4) | 55 (11.0) | |
| Divorced | 10 (2.0) | 54 (10.8) | 64 (12.8) | |
| Widower | 1 (0.2) | 6 (1.2) | 7 (1.4) | |

* $p<0.05$ indicate significant differences between the groups.

Approximately 66.5% of the respondents were able to identify normal gingiva. Nursing assistants reported higher knowledge of gum normality than graduated nurses ($p < 0.05$). Most participants (99.8%) reported that oral hygiene was important during hospitalization, and 98.6% reported that dental professionals should perform routine examinations for inpatients (Table 2). No significant difference was found between the graduate and auxiliary nursing staff ($p = 0.861$). Only 28% of the participants reported knowledge in toothbrushing techniques.

Staff responses regarding the effects of PD on general health demonstrated that the topic was not widely discussed, and their knowledge ranged between moderate (49.3%) to poor (31.1%). Additionally, 74.6% of the participants believed that sugar consumption was the most important etiological factor for PD. Knowledge of the influence of PD on systemic diseases was reported by 96.7% of participants. A significative percentage of respondents (88.9%) expressed an interest in specific training to deepen their knowledge about the impact of PD on the oral cavity and general health.

The participants' answers to questions regarding inpatients' oral hygiene instructions are shown in Table 3. It was found that 70.8% had never asked their inpatients whether they had been diagnosed with PD. Only 27.5% reported that they routinely instructed patients on the importance of maintaining oral hygiene during hospitalization. A moderate proportion of the

participants (49.6%) had never or rarely (25.5%) instructed their patients about the general health consequences of PD.

**Table 2.** Analysis of knowledge of nurses and nursing assistant team regarding patients' oral health

| Questions Analyzed | Nurse N (%) | Nursing Assistant team N (%) | Total N (%) | Difference between groups (*p* value) |
|---|---|---|---|---|
| *Are you aware that an infection in the mouth can damage the health of the rest of the body?* | | | | |
| No | 2 (0.4) | 9 (1.8) | 11 (2.2) | 0.5596 |
| Yes | 128 (25.4) | 365 (72.4) | 493 (97.8) | |
| *Do you think oral hygiene is important during the patient's stay in the Hospital?* | | | | |
| No | 0 (0.0) | 1 (0,2) | 1 (0.2) | 0.5546 |
| Yes | 130 (25.8) | 372 (74,0) | 502 (99.8) | |
| *Do you think it is important for a dentist to carry out an oral assessment of the hospitalized patient?* | | | | |
| No | 2 (0.4) | 5 (1.0) | 7 (1.4) | 0.8609 |
| Yes | 127 (25.3) | 368 (73.3) | 495 (98.6) | |
| *Do you have knowledge about toothbrushing techniques?* | | | | |
| No | 31 (6.4) | 105 (21.6) | 136 (28.0) | 0.2366 |
| Yes | 98 (20.2) | 251 (51.8) | 350 (72.0) | |
| *Do you know how to recognize the normal aspects of the gum?* | | | | |
| No | 31 (6.4) | 132 (27.2) | 163 (33.5) | 0.0163* |
| Yes | 94 (19.3) | 229 (47.1) | 323 (66.5) | |
| *Do you think that periodontal disease can influence the course of systemic diseases?* | | | | |
| No | 3 (0.6) | 13 (2.7) | 16 (3.3) | 0.4700 |
| Yes | 126 (26.0) | 343 (70.7) | 469 (96.7) | |
| *Do you think that excessive consumption of sugar is a more important causal factor for periodontal disease?* | | | | |
| No | 38 (7.9) | 84 (17.4) | 122 (25.2) | 0.0924 |
| Yes | 89 (18.4) | 272 (56.2) | 360 (74.6) | |
| Don’t know | 1 (0.2) | 0 (0.0) | 1 (0.2) | |
| *How do you consider your knowledge about the relationship between periodontal disease and its effects on the oral cavity?* | | | | |
| Very good | 0 (0.0) | 5 (1.0) | 5 (1.0) | 0.6733 |
| Good | 10 (2.1) | 32 (6.6) | 42 (8.7) | |
| Moderate | 67 (13.8) | 172 (35.5) | 239 (49.3) | |
| Bad | 39 (8.0) | 112 (23.1) | 151 (31.1) | |
| Too bad | 12 (2,5) | 36 (7.4) | 48 (9.9) | |
| *Are you interested in receiving specific training on oral health practices for hospitalized patients?* | | | | |
| No | 9 (1.9) | 45 (9.3) | 54 (11.1) | 0.0854 |
| Yes | 119 (24.5) | 312 (64.3) | 431 (88.9) | |

* $p<0.05$ indicate significant differences between the groups.

**Table 3.** Analysis of the nursing team's conduct regarding oral hygiene guidance

| Questions Analyzed | Nurse N (%) | Nursing Assistant team N (%) | Total N (%) | Difference between groups (*p* value) |
|---|---|---|---|---|
| *Do you ask the patient if he has ever been diagnosed with periodontal disease?* | | | | |
| Always | 1 (0.2) | 2 (0.4) | 3 (0.6) | 0.2389 |
| Often | 0 (0.0) | 1 (0.2) | 1 (0.2) | |
| Sometimes | 10 (2.1) | 32 (6.6) | 42 (8.6) | |
| Rarely | 17 (3.5) | 79 (16.2) | 96 (19.7) | |
| Never | 100 (20.6) | 245 (50.3) | 345 (70.8) | |
| *Do you usually advise your patient about the possible problems that "sick gums" can cause in their general health?* | | | | |
| Always | 3 (0.6) | 9 (1.9) | 12 (2.5) | 0.9906 |
| Often | 6 (1.2) | 14 (2.9) | 20 (4.1) | |
| Sometimes | 24 (4.9) | 65 (13.4) | 89 (18.3) | |
| Rarely | 31 (6.4) | 93 (19.1) | 124 (25.5) | |
| Never | 64 (13.2) | 177 (36.4) | 241 (49.6) | |
| *Do you advise your patients on the importance of maintaining oral hygiene during the hospitalization period?* | | | | |
| Always | 33 (6.8) | 100 (20.7) | 133 (27.5) | 0.8847 |
| Often | 29 (6.0) | 78 (16.1) | 107 (22.1) | |
| Sometimes | 25 (5.2) | 75 (15.5) | 100 (20.7) | |
| Rarely | 15 (3.1) | 47 (9.7) | 62 (12.8) | |
| Never | 25 (5.2) | 57 (11.8) | 82 (16.9) | |

## DISCUSSION

The results of this study showed that most nursing professionals were aware of the systemic consequences of PD and had the knowledge that oral infections could harm patients' general health. These findings are similar to the results in previous studies[16]. However, patients were almost never instructed about the systemic effects of "diseased gums".

Poor oral health directly affects the quality of life and overall health of hospitalized patients[3]. The host immune response to PD can trigger dysbiosis, resulting in the progressive loss of tooth-supporting tissues[16]. Moreover, periodontal pathogens can directly or indirectly trigger the development of systemic diseases[3,7]. The presence of endotoxin-producing bacteria is directly associated with systemic diseases[7]. The risk of oral pathogens entering the bloodstream is part of the intricate relationship between PD and chronic conditions, such as diabetes, cardiovascular disease, kidney disease, and respiratory problems[10]. Additionally, the oral cavity structures, including the lips, tongue, mucosa, and gums, can serve as indicators of underlying systemic issues[17].

It is valuable for the healthcare team to have knowledge and awareness of the systemic consequences of PD[9]. In this study, nurses' self-reported knowledge of the influence of PD on patients' overall health was good. However, most had never applied this guidance to their patients.

The participants in this study reported the importance of oral hygiene during hospitalization. A similar result was found in a previous study that showed that nurses agreed that oral health should be a priority in patient care, although they found it difficult to maintain patients' oral hygiene[12]. This difficulty may be related to challenges with toothbrushing. Some participants in this study had no knowledge about toothbrushing techniques. As demonstrated by a previous nurses are not trained regarding the proper toothbrushing techniques for cleaning patients' teeth[14].

Nursing care frequently uses technology to provide patient health support[18]. In healthcare, technology is commonly understood as the use of high technology equipment[19]. However,

technology encompasses a range of professional skills, starting with soft technologies or interpersonal skills[19,20]. Health care through soft-hard technologies includes the professional use of structured knowledge and does not require complex equipment[21]. Oral health and oral disease-related knowledge are soft-hard technologies necessary for nursing staff in the hospital environment[21].

Knowledge of healthy gingival characteristics and possible pathological changes is important[22]. Some participants demonstrated a lack of awareness regarding the normal gingival appearance. This may be a consequence of the lack of oral health content in the nursing curriculum[1,11,23,24]. The knowledge gap in oral health also resulted in most participants not asking whether their patients had previously been diagnosed with PD.

Knowledge of the potential risks of PD to the health of hospitalized patients makes it essential to conduct continued preventive evaluations in hospital[25]. It is important for nursing teams to have comprehensive knowledge on oral health and oral diseases[15]. The present study demonstrated that the participants' knowledge of PD was rated as moderate or unsatisfactory.

Both participating groups, nurses and nursing assistants, believed that excessive sugar consumption was the primary causal factor of periodontal disease, which contradicts the scientific evidence[25,26]. A patient's diet influences the development of PD only when oral hygiene is insufficient or ineffective[25]. Moreover, sugar consumption is not a primary factor in the development of PD[26]. The nursing staff who participated in this study also misunderstood the etiologies of PD and caries, both of which are common in hospitalized patients[27].

The importance of the presence of dental professionals in the inpatient monitoring team was an important finding in this study. This finding is consistent with the results of previous studies[28,29]. Nearly 86% of the nursing staff working in intensive care units in the city of Belém, Brazil, reported benefits of having dental professionals in the hospital teams[28]. However, most hospitals do not include dentists in their interdisciplinary teams[29].

The lack of knowledge and self-confidence of untrained nursing professionals results in inadequate patient management[13,23,29]. Most participants reported a desire for further training. Only a few participants answered differently, and this may be explained as perceiving oral hygiene practice for patients as unpleasant[23], and a lack of time to do it[30]. Awareness and training should be offered to nursing staff and updated continuously in the hospital environment[2,24].

This study has some limitations. The use of a convenience sample from a single teaching hospital limits the generalizability of the results. Additionally, the use of a self-administered questionnaire requires participant cooperation. Thus, there may have been a response bias due to favorable responses and data loss.

Strategies to overcome these issues may include comprehensive nursing training on oral care techniques for inpatients and hospital provision of all requisite materials and instruments for the optimal maintenance of patients' oral hygiene. Creating a dedicated daily schedule to guide and assist patients with oral hygiene practices and for assessing oral health as part of general health should also be considered.

## CONCLUSION

Our study on nursing staff demonstrated a lack of knowledge regarding the presence, development, and prevention of periodontal disease. This may be due to a lack of specific training within nursing education. To address this, a well-structured training program with comprehensive guidelines on oral healthcare and hygiene of hospitalized patients should be considered in the nursing curriculum.

## AUTHORS' CONTRIBUTIONS

Elisângela Rodrigues: Investigation, Visualization, Writing – original draft, Writing – review & editing.

Guilherme José Pimentel Lopes de Oliveira: Formal Analysis, Writing – original draft, Writing – review & editing.

Roberta de Oliveira Alves: Investigation ,Writing – original draft, Writing – review & editing.

Isabella Silva de Abreu: Investigation ,Writing – original draft, Writing – review & editing.

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Flávio de Freitas Mattos: Writing – original draft, Writing – review & editing.

Priscilla Barbosa Ferreira Soares: Conceptualization, Supervision, Writing – original draft, Writing – review & editing.

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## CONFLICTS OF INTERESTS

The authors declare that there is no conflict of interest related to this study.

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