ORAL HEALTH STATUS OF PATIENTS IN INTENSIVE CARE UNIT: A CROSS-SECTIONAL STUDY

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Palavras-chave: Unidade de Terapia Intensiva. Manifestações Orais. Mucosa bucal. Higiene Oral. Úlceras Orais e Saliva.

RESUMO

Introdução: Pacientes em unidade de terapia intensiva (UTI) podem apresentar alterações orais como resultado das condições sistêmicas dos pacientes, uso de medicamentos, intubação ou falta de higiene bucal. Alterações orais devem ser detectadas e tratadas, pois podem agravar a condição do paciente. O objetivo deste estudo foi avaliar os tipos e frequências de alterações orais clinicamente detectadas em pacientes internados em uma UTI. **Métodos**: Estudo transversal em que foi realizada avaliação oral de pacientes internados em uma UTI de um hospital público. Características demográficas, sociais e clínicas foram coletadas dos prontuários médicos. Os exames orais foram realizados por dois dentistas treinados, com confiabilidade verificada pelo coeficiente de correlação intra-classe, enquanto os pacientes estavam deitados na cama do hospital, utilizando frontal, abaixador de língua e gaze estéril. Todos os dados foram registrados em formulários de protocolo do estudo e transferidos para uma base de dados para análise. **Resultados**: Foram avaliados 37 pacientes, com distribuição semelhante entre os sexos, com mediana de idade de 62 anos. As causas mais frequentes de internação foram cuidados pós-operatórios (51,35%) e problemas respiratórios (29,72%). Cerca de 90% dos pacientes internados apresentaram algum tipo de alteração bucal durante o período de internação. As alterações clínicas mais comuns foram lábios secos (86,5%); língua (61,1%); palidez da mucosa oral (54,1%); focos orais de infecção (37,8%) e candidíase (13,5%). **Conclusão**: A maioria dos pacientes internados em UTI apresentou algum tipo de alteração oral, sendo os mais frequentes lábios secos e língua. Os dados observados neste estudo reforçam a necessidade do apoio da equipe odontológica durante o período de internação.

Keywords: Intensive Care Unit. Oral Manifestations. Oral Mucosa. Oral Hygiene. Oral Ulcers and Saliva.

ABSTRACT

Introduction: Patients in intensive care unit (ICU) may present oral alterations as a result of patients' systemic conditions, the use of medications, intubation or poor oral hygiene. Oral alterations should be detected and treated because they may aggravate patients' condition. The objective of this study was to evaluate the types and frequencies of clinically detected oral alterations in inpatients of an ICU. **Methods:** This is a cross-sectional study in which an oral evaluation of patients hospitalized in an ICU of a public hospital was performed. Demographic, social and clinical characteristics were collected from medical records. Oral exams were performed by two trained dentists, with reliability checked by intra-class correlation coefficient, while patients were lying in the hospital bed, using a frontal headlamp, tongue depressor and sterile gauze. All data were recorded in study protocol forms and transferred to a data base for analysis. **Results:** Thirty-seven patients, with similar distribution between genders, with median age of 62 years were evaluated. The most frequent causes for hospitalization were postoperative care (51.35%) and respiratory problems (29.72%). About 90% of the inpatients presented some type of oral alterations during the hospitalization period. The most common clinical alterations were dry lips (86.5%); coated tongue (61.1%); paleness of the oral mucosa (54.1%); oral foci of infection (37.8%) and candidiasis (13.5%). **Conclusion:** The majority of inpatients of the ICU presented some type of oral alteration, and the most frequent were dry lips and coated tongue. Data observed in this study reinforce the need of the dental team support during the period of hospitalization.

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INTRODUCTION

Inpatients of intensive care units (ICU) are continuously monitored, because they present critical conditions, and may be at imminent risk for complications of the diseases or of death.[1] In the hospital environment, patients are more susceptible to infections due to their compromised systemic condition, the environment and the procedures to which they are submitted to.[2,3] During the period of admission in the ICU, patients may develop oral changes which may be associated with the underlying diseases, use of medications, equipment for artificial respiration, or poor oral hygiene.[2,3,4,5,6] In addition, oral infections, may be associated to systemic complications, like nosocomial pneumonia, which is responsible for 20 to 50% deaths of patients in ICU.[2,3,7]

Some oral features, such as dry lips, coated tongue or candidiasis, have been reported in patients hospitalized in the ICU and can cause more harm to these patients undergoing a critical phase.[2,3,7,8,9] Patients from ICU may also have pre-existing oral conditions such as caries, periodontal disease and absence of teeth.[2,3,7]

The importance of the oral care in the evolution and recovery of patients hospitalized in the ICU has been reported.[10] The assessment and treatment of oral conditions of patients admitted in the ICU may contribute to infection control within the hospital environment. However, until recently the dental team was not included in the multidisciplinary ICU team. Therefore, the objective of this study was to evaluate the types and frequencies of oral alterations clinically detected in ICU patients.

MATERIALS AND METHODS

This cross-sectional study was performed with the data collected on dental visits to the ICU of the Hospital Clementino Fraga Filho (HUCFF) from the Universidade Federal do Rio de Janeiro (UFRJ), within the period from September 2015 to February 2016. This ICU, is not exclusive of any medical specialty, and receives patients with a variety of causes of hospitalization. The study was approved by the Research Ethics Committee of the HUCFF, under protocol 44105815000005257. All patients or their representatives signed a consent form.

The study sample was composed by patients admitted to the ICU and who were submitted to routine oral examination. Patients who could not be examined because of physical or technical difficulties, those who did not allow the oral exam, or were not willing to participate were excluded from the study.

Data related to social, demographic and clinical characteristics were collected from the medical records. Patients informed if oral hygiene was being performed. If patients were unconscious, the information was obtained through a family member, or the nursing team in charge.

Oral exams were performed simultaneously by two dentists of the Oral Health Program, of the HUCFF. The professionals were properly qualified for the oral examination and they were supervised by a stomatology specialist. To verify the reliability of the evaluation, slides of normal and altered oral mucosa were projected and analyzed by the two investigators. The intra-class correlation coefficient for each one of the examiners were 0.80 and 0.70 (95% confidence interval: 0.59-0.93), respectively, when compared to the specialist.

The patients were examined in the hospital bed by professionals using personal protective equipment, a light emitting diode (LED) frontal headlamp, tongue depressors and sterile gauzes. In cases of intubated patients, the exams were assisted by a nurse, in order to assure security in the positioning of the orotracheal tube. A study protocol form was used to record the collected data.

The diagnoses of the oral alterations were based on established concepts in the literature, with the following specific definitions:

• Coated tongue was considered as the presence of white-yellowish material at the surface of the tongue, which may be removable by gauze soaked in sterile saline solution.[11]

• Dry lips were diagnosed when the vermillion border was opaque, friable, or presented desquamation, ulcerations, fissures or crusts.[12]

• Oral dryness was defined as a reduction or absence of saliva, characterized by the absence of the "sublingual saliva lake" or the adherence of wooden tongue depressor to the buccal mucosa.[12]

• The saliva was considered viscous, when it was thick and adherent presenting foamy aspect.[12]

• Candidiasis was diagnosed clinically, when one or more of the following oral changes were present: fissures or erythematous plaques in the labial commissures which may extend over the adjacent skin (angular cheilitis); white-yellowish removable plaques (pseudomembranous candidiasis); erythematous plaques (atrophic or erythematous candidiasis); and non-removable white plaques (hyperplastic candidiasis), not suggestive of any other oral lesions. [13]

Data storage and statistics analysis were performed in the SPSS 20.0 (Statistical Package for the Social Sciences) software program (IBM, New York, USA). A descriptive analysis was performed for the distribution and frequency of the collected data. Chi-square or Fisher's exact tests were used to check for differences between dichotomous variables, and Mann-Whitney for measurable variables.

RESULTS

Thirty-seven patients admitted to the ICU of the HUCFF were included in the study. Table 1 shows the demographic and clinical characteristics of these patients. The most frequent cause of hospitalization was postoperative recovery, followed by respiratory and neurological conditions. There was a wide variation in the length of stay in the ICU, varying from 1 to 82 days. The most common underlying diseases were, malignant conditions and diabetes, with similar distribution between men and women. The most frequent complications in these patients from the ICU were respiratory problems, followed by septicemia. Six patients (16.2%) were intubated by the time of the oral exam and 12 (32.4%) had been previously intubated, for a period of 1 to 20 days. Among the drugs used during the period of hospitalization, antacid/antiulcer (89.2%), analgesics (81.1%), anticoagulants (73.0%), antiemetics (70.3%) and antibiotics (56.8%) were the most frequent.

Most of the patients (94.5%) presented some type of alteration in the oral mucosa, or in the vermillion border. The oral alterations observed in the 37 patients in the ICU are shown in Table 2. The majority of patients presented dry lips (86.5%), coated tongue (61.1%) and paleness of the oral mucosa (54.1%). Oral manifestations of blood dyscrasia were detected in 2 patients (5.4%). Among the 20 patients who had pale mucosa, 90% of them exhibited some degree of anemia. One of the patients with oral dryness developed crusts on the tongue.

Oral foci of infection were detected in 14 patients (37.8%). There were 25 (67.6%) patients with dental prosthesis, and the majority of them were instructed not to use the prosthesis during ICU hospitalization. Oral hygiene performed by the nursing staff was recorded for 32 (86.5%) patients.

Table 1: *Demographic and clinical characteristics of the 37 patients evaluated in the intensive care unit.*

Characteristics	Total	
	N = 37	100%
Age		
Median (range)	62 (17-94)	
Cause of hospitalization		
Postoperative	19	51.35
Respiratory	11	29.72
Neurological	10	27.02
Septicemia	8	21.62
Gastrointestinal	8	21.62
Malignant condition	6	16.21
Cardiac	5	13.51

Note*: *Patients may present more than one disease or complication and were taking more than one type of medication.*

***Table 2**: Oral alterations observed in the 37 evaluated patients from an intensive care unit.*

Characteristics observed during oral examination*	Total		Male		Female	
	N=37	100%	N= 18	48.6%	N=19	51.4%
Alterations of the vermillion border	33	89.2	14	77.8	19	100
Dry lips	32	86.5	14	77.8	18	94.7
Ulcer/crusts	5	13.5	2	11.1	3	15.8
Alterations of the oral mucosa	35	94.6	16	45.7	19	54.3
Coated tongue	22	61.1	9	52.9	13	68.4
Paleness of the mucosa	20	54.1	10	55.6	10	52.6
andidiasis**	5	13.5	1	5.6	3	15.8
Lesions caused by injuries						
Bruises	2	5.4	0	0	2	10.5
Traumatic ulcer	2	5.4	1	5.6	1	5.3
Focal fibrous hyperplasia	1	2.7	0	0	1	5.3
Depapillated tongue	4	10.8	2	11.1	2	10.5
Mucositis	1	2.7	0	0	1	5.3
Oral manifestations of blood dyscrasia						
Petechiae	1	2.7	0	0	1	5.3
Spontaneous bleeding	1	2.7	0	0	1	5.3
Salivary alterations						
Oral dryness	16	40.5%	8	44.4	7	36.8
Viscous saliva	14	37.8	7	38.9	7	36.8
Oral foci of infection	14	37.8	9	50	5	26.3
Residual roots	7	18.9	5	27.8	2	10.5
Gingivitis	6	16.2	5	27.8	1	5.3
Others (tooth decay and calculus)	7	18.9	5	27.8	2	10.5
Characteristics of dental prosthesis						
Usage of dental prosthesis	25	67.6	1	61.1	14	73.7
Type of dental prosthesis						
Partial removable prosthesis	2	5.4	1	5.6	1	5.3
Total prosthesis	19	51.4	8	44.4	11	57.9
Total and partial prosthesis	4	10.8	2	11.1	2	10.5
Anatomic location of dental prosthesis						
Upper jaw	6	16.2	2	11.1	4	21.1
Lower jaw	1	2.7	1	5.6	0	0
Upper and lower jaw	18	48.6	8	44.4	10	52.6
Used prosthesis during hospitalization	3	8.1	1	5.6	2	10.5

***Note**: *Patients could present more than one type of oral alteration. **Clinically diagnosed during the visit to the intensive care unit.*

DISCUSSION

Little is known about the oral changes that occur during the period of hospitalization in the ICU. In the present study, some type of oral alteration was presented by the majority of the ICU inpatients. Dry lips were the most frequently observed oral alteration, followed by coated tongue, paleness of the oral mucosa, altered saliva viscosity and oral foci of infection, respectively. Early detection of these alterations is important, because some of these conditions may cause complications, especially in the frail hospitalized patient of an ICU. Oral exams should be part of the routine investigation of patients in the ICU, so oral features can be properly addressed.

Dry lips may be a result of the medical treatment related to hospitalization.[12,14,15] The desiccation may result in fissures and ulcerations in the vermillion border, which are hard to heal, and may be painful, uncomfortable and also facilitate infection.[16] This condition was previously reported in 1.79% to 86,3% [17,18] of patients hospitalized in an ICU. In the present study, dry lips were observed in 86.5% of the patients. An explanation for this discrepancy is that a diagnostic criterion was not standardized in the other studies.

Patients in ICU may present many predisposing factors for coated tongue, which may explain the high frequency of this condition on the studied population (61%). The coated tongue acts as a reservoir of microorganisms, and it is characterized by the accumulation of a biofilm formed basically by mucin, food remains, exfoliated epithelial cells, fungi, bacteria and active enzymes.[11,19,20] During the intubation procedure, the biofilm may be dislodged to the respiratory tract, and has been associated to pneumonia caused by artificial ventilation.[6,7,20] Factors like difficulties to perform oral hygiene, reduction of the salivary flow rates, reduction in tongue motility, and the sedated or constant sleep state of patients do not allow the elimination of exfoliated epithelial cells, and may promote the development of the condition.[11,20] Moreover, tracheal intubation, and the length of hospitalization, may also favor the accumulation of oral biofilm and colonization of the oropharynx, leading to halitosis.[19,21] Some drugs may change the quality of saliva, which in turn, may lead to xerostomia. [22,15] Changes in sialochemistry alter the salivary function and viscosity, favoring bacterial aggregation, thus increasing the accumulation of the tongue biofilm. This biofilm is implied in the pathogenesis of ventilator-associated pneumonia[23] The altered viscosity in saliva was frequently observed in the ICU patients (37.8%).

Quantitative changes in salivary flow rates also occur, but it is difficult to assess salivary flow rates in patients in ICU, because the patient is unable to cooperate, due to the use of analgesics and sedatives.[24] Therefore, clinical parameters were used in the methodology of this study to detect salivary changes. Oral dryness, detected as the absence of sublingual saliva accumulation was observed in 40.5% of the patients. The most common cause of hyposalivation is the use of xerogenic drugs, such as diuretics, laxatives, antacids, anorexics, anti-hypertensive, antidepressants, antipsychotics, sedatives, anti-histamines, anticholinergic and antiparkinsonians, which were often used by patients in the study.[25,26] Many systemic conditions, situations of stress and dehydration that affect these patients, may also be responsible for hyposalivation.[24] In addition, oral dryness caused by the air pathway through the oral cavity may occur in the intubated patient.[22,27]

Paleness of the oral mucosa is a sign associated to anemia, which is very common in ICU inpatients.[3,27,28] There is no information if this oral condition could affect the oral defenses, but some studies have shown that anemia is associated with adverse outcomes in acute myocardial infarction, chronic kidney disease, and chronic heart failure and increased risk of re-intubation or weaning failure from mechanical.[28,29]

The oral microbiota of ICU inpatients may present an imbalance due to local and systemic changes, such as poor oral hygiene, reduction of the salivary flow rates, immune status, influence of drug therapy and hospital environment, which may lead to intense oral colonization by *Candida* species.[17,18,30] Candidiasis is the oral infection that mostly affects patients in hospital units. [9] As a result of candidiasis, patients may present dysgeusia, oral burning, local pain and dysphagia, leaving the patient susceptible to malnutrition, and slow recovery, in a way that, duration of hospitalization may be longer.[31,32] In the critically ill patient, oral candidiasis may invade the gastrointestinal tract[33,34] or the bloodstream (candidemia), and lead to death.[35,36] Oral candidiasis was observed in about 13.5% of the studied patients. Similar results were found in another study conducted in an ICU of oncologic patients[18] but they differ from another study, in which candidiasis was diagnosed in 68% of patients.[4] One important fact is that in the present study, the diagnoses were based on physical exams only. Neither cytology, nor *Candida* culture were performed by the time of oral examinations. Maybe, laboratory tests could detect subclinical candidiasis, and show increased frequency of *Candida* infection.

The traumatic ulcers of the oral mucosa were located on the lips and tongue (5.4%). This was expected, since these lesions are associated with intubation maneuvers and involuntary muscle spasms, which may traumatize the

mucosa, and are frequently observed in these patients.[37] In studies carried out in other ICU, traumatic ulcers associated to orotracheal intubation were observed from 10% to 17% of the patients.[4,18] The presence of these lesions impairs the patient's recovery, because they may favor the development of secondary infections and increase the risk of septicemia. In addition, they can be a cause for major bleeding of the mucous membranes.[38] The treatment of ulcers may be related to an increase in the time of hospitalization and hospital costs. [6,37,39]

Oral exams of patients lying in bed are difficult because of the lighting conditions, the non-ergonomic professional position, and the presence of the orotracheal tube. The lack of availability of x-ray images to complement the physical exam also makes the diagnosis difficult. Therefore, no index was used for dental and periodontal examination. The presence of residual roots, dental caries, calculus or gingivitis was observed in approximately 40% of the assessed patients. Other authors have also reported the presence of oral foci of infection in 28% of individuals examined in ICU.[4] These polymicrobial processes, formed by aerobic and anaerobic bacteria, may lead to infectious outbreaks during patient's admission. [7,40] If not properly diagnosed and treated, an odontogenic infection may aggravate the health condition, leading to airway impairment, sepsis and death.[41,42]

Approximately 70% of hospitalized patients wore some type of dental prosthesis, while in another study, conducted in similar conditions, only 30% had some type of prosthesis.[11] The large number of patients with dental prostheses is a sign of the poor oral health status of the studied population.

There are some limitations in this study. The small sample size and the heterogeneous population do not permit important conclusions. The duration of hospitalization may increase the incidence of oral features, but cross-sectional studies do not infer causality in the association of these alterations and the *temporality* of ICU hospitalization. Longitudinal studies, with larger populations should be performed in future studies, in order to properly address these questions.

Dentists should be part of the multiprofessional hospital team that attends patients hospitalized in the ICU.[6] For those patients admitted for elective surgery, a previous referral for dental evaluation would be ideal. Oral infections may aggravate systemic conditions or increase the risk for other diseases.[3] Preventive and therapeutic oral procedures for are important to avoid complications of the systemic condition and recovery of patients in the ICU.[22]

CONCLUSION

The majority of patients presented some type of oral alteration related to the admission in the ICU, and the most frequent ones were dry lips and coated tongue.

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