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Hospital dentistry and the occurrence of pneumonia

Odontologia hospitalar e a ocorrência de pneumonia

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ABSTRACT

Objective: To determine the oral health conditions of the elderly patients hospitalized and restricted to the bed and to correlate with the development of infections at a distance, especially pneumonia. To verify if the daily follow-up of the dental surgeon improves oral health and reduces the occurrence of respiratory infection in hospitalized elderly patients. **Methods**: Quasi-experimental study with hospitalized and bed restricted elderly, two simple randomized groups, one group was evaluated and monitored daily by the dental surgeon, the other group was evaluated and received guidance on health care and oral hygiene and of dental prostheses. **Results**: Both groups presented poor health and oral hygiene and prosthetic conditions. There was improvement in the oral health conditions of both groups. Seven percent of the patients developed pneumonia during the period of hospital stay and the oral health of these patients were considered regular or bad. **Conclusion**: The performance of the dental surgeon promoted improvements in the oral health of both groups in the first evaluation, with no statistical difference between the group that received daily follow-up and the group that received guidelines, so it was concluded that oral health care should be a behavior of the team multidisciplinary, dentistry should intervene if the changes interfere in the clinical condition of the patient and offer training and support to the multidisciplinary team that is in the first line of care with hospitalized patients.

Indexing terms: Dental Staff, Hospital; Oral Health; Pneumonia Aspiration.

RESUMO

***Objetivo**: Determinar as condições de saúde bucal dos pacientes idosos hospitalizados e restritos ao leito e correlacionar com o desenvolvimento de infecções à distância, sobretudo a pneumonia. Verificar se o acompanhamento diário do cirurgião-dentista melhora a saúde bucal e reduz a ocorrência de infecção respiratória em pacientes idosos internados. **Metodologia**: Estudo quase experimental com idosos internados em um hospital de ensino do sul do Brasil, restritos ao leito. A amostra teve 42 indivíduos, divididos em 2 grupos de formação aleatória simples, o grupo 1 recebeu avaliação e acompanhamento diário do cirurgião-dentista, o grupo 2 foi avaliado e recebeu orientações sobre os cuidados com a saúde e higiene bucal e das próteses dentárias. **Resultados**: Ambos os grupos apresentavam condições precárias da saúde e higiene bucal e das próteses na primeira avaliação. Houve melhora nas condições de saúde bucal de ambos os grupos no final da internação. Sete por cento dos pacientes desenvolveram pneumonia durante a internação hospitalar e a saúde bucal destes pacientes foram consideradas regulares ou ruins. **Conclusão**: A atuação do cirurgião-dentista promoveu melhoras na saúde bucal de ambos os grupos, sem diferença estatística entre o grupo que recebeu acompanhamento diário e o grupo que recebeu orientações, assim conclui-se que a atenção à saúde bucal deve ser uma conduta da equipe multidisciplinar, a odontologia deve estar presente para atuar em alterações que interfiram na condição clínica do paciente e oferecer capacitações e suporte para a equipe multidisciplinar que está na primeira linha de cuidados com os pacientes hospitalizados.*

***Termos de indexação**: Equipe Hospitalar de Odontologia; Saúde Bucal; Pneumonia Aspirativa.*

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INTRODUCTION

Respiratory diseases are responsible for significant morbidity and mortality in population [1-3]. The upper respiratory tract are in intimate contact with the oral cavity through the oropharynx. The oral cavity is irrigated constantly by saliva. Under normal conditions, the saliva is responsible for the cleaning and protection of teeth and oral mucosa, and helps maintain the balance of the oral flora. However, this balance can be upset quickly when the lack of oral hygiene promotes the accumulation of bacterial biofilm and periodontal disease, causing contamination of the oropharynx and spread to other sites, especially When the natural defense mechanisms are disturbed. This situation is common in the elderly, especially when they lose autonomy to the self-care [1,2].

Approximately 67% of pneumonia in the elderly have undetermined etiology and poor oral hygiene, associated with the alteration of the oral flora anaerobic microenvironment [4,5] may be involved in this process. The pathogenesis of aspiration pneumonia involves still risk factors that affect swallowing, resulting in the aspiration of bacterial biofilm, aggravating the impairment of immunity, reducing the cough reflex and change in swallowing. The risk factors increase with age and underlying polimorbities [2,3,6].

The aspiration of oropharyngeal secretions is a common occurrence in healthy subjects during sleep. When there are risk factors for aspiration pneumonia, such as dysphagia, chronic obstructive pulmonary disease, when it becomes necessary to supply alternative-common situations in the elderly-the risk of respiratory infection is greater [1-4].

The reduction of contamination with the simple practice of oropharyngeal oral hygiene can reduce the risk of aspirative pneumonia and spending on hospitalizations and extended periods2,4-6. Thus, the present study aimed to evaluate oral health conditions of patients in the medical and surgical clinics of a hospital in the South of Brazil, to verify that the conditions of health and oral hygiene of patients influence the occurrence of respiratory infections.

METHODS

We conducted a quasi-experimental study with groups naturally formed by users of the unified health system, during the period of hospitalization in medical and surgical clinic of a teaching hospital in the South of Brazil. Inclusion criteria were patients with 60 years or more, restricted to bed, with cognitive, motor or other difficulties that prevent the realization of one's oral hygiene. Two groups were formed, from simple randomization, those admitted to individual or collective rooms numbered pair were included in Group 1, a total of 22 individuals and the odd numbering were inserted in the Group 2, a total of 20 individuals. There was no restriction of gender or race. The data collection period was 60 days duration. In the survey were excluded individuals with compromises that prevent access to examination of the oral cavity.

Patients were covered up to a maximum of 48 hours after hospitalization, after authorization by signing the informed consent, oral clinical examination was carried out in the hospital bed itself, by previously calibrated examiner using auxiliary light source (flashlight), mirror number 5 clinical, clinical and periodontal probe clamp. The teeth were not dried or cleaned before the exam. When observed dental needs, patients were advised to seek elective treatments in basic health network after hospital discharge and restoring overall health. Were described conditions of the oral mucosa related to integrity, hygiene; use of prostheses and conditions of hygiene and care. It was determined the extent and severity of periodontal disease through the index of Carlos et al. [7,8]. To evaluate the presence of cavities, fillings and dental losses was used the Teeth Decayed, Missing or Filled (DMFT) [9], in accordance with the criteria of the World Health Organization. Sample characterization was performed from anamnesis and complement with information contained in the electronic health record of patients.

In Group 1, in addition to the initial evaluation and recording of health and oral hygiene and prostheses, and dental hygiene monitoring was performed by the surgeon-dentist once a day with toothpaste and brush in the dentulous, saline and gauze in edentulous or patients with contraindication to the presence of free liquid in the oral cavity, as well as guidance and motivation to the patient, caregiver or nursing staff perform the care in other shifts of the day and on weekends. In cases where the patient has regained the ability to make their own care, were maintained the daily visits of motivation. On the day of discharge was held further evaluation and recording of health and oral hygiene and prosthetics.

In Group 2 was held the initial assessment until 48 hours after the hospitalization and recording of health and

oral hygiene and dental prostheses by the surgeon, as well as the demonstration of the oral hygiene along the same lines 1 and Group guidelines to maintain caution 3 times a day during the period of hospitalization. New evaluation and registration was held on the day of discharge.

Oral health was considered good when the patients had oral mucosa, hydrated, without presence of caries or periodontal disease actively and with a small amount of biofilm attached mucosa and teeth. Regular considered when observed hyposalivation, presence of caries or periodontal disease light and presence of biofilm joined the mucosa and teeth. Patients with lesions in the oral mucosa, the presence of caries, periodontal disease, root debris or biofilm joined mucosa and teeth aplenty were considered with bad oral health.

The dentures were classified taking into account the conditions of hygiene and conservation, those well adapted and free food waste or pollutants were considered with good storage conditions, with up to a third of your surface covered with biofilm and/or food waste but reasonable adaptation and retention were classified as regular; those already with more than 1/3 of the surface covered with biofilm, with impregnated waste without retention, inadapted, broken and replacement indication, are classified as bad.

The statistical analyses were performed with the software SPSS (Statistical Package for the Social Sciences), for Windows, version 22. Frequency analysis were made, descriptive analysis, Chi-square test and analysis of cross-

Table 1. Sample characterization and dental conditions. n. 42.

	Characterization of the sample		
	Minimum	Maximum	Average
Age	60	92	74,98
Length of stay	2	48	9,05
Teeth in mouth	2	17	3,52
Missing teeth	15	32	28,48
Decayed teeth	0	6	0,38
Teeth restored	0	7	0,38
DMFT	-	-	28,47
	Group 1	**Group 2**	**Total**
Gender			
Male	9	5	14
Female	13	15	28
Severity of periodontal disease*			
Mild	4	1	5
Moderated	1	2	3
Severus	2	2	4
Excluded	15	15	30
Extension of periodontal disease*			
Located	0	1	1
Generalized	7	4	11
Excluded	15	15	30
Length of stay			
1 – 5 days	6	5	11
6 – 10 days	10	9	19
More than 11 days	6	6	12

Note: Teaching hospital in southern Brazil, 2017. *Periodontal examination were excluded in individuals with 5 teeth or less.

reference. The study was submitted to the ethics and Research Committee of the Universidade de Santa Cruz do Sul (UNISC), under approval number 1.851.755.

RESULTS

The study had a sample of 42 individuals, divided into two groups of random choice simple, being 22 patients included in Group 1 and 20 patients in Group 2. The age ranged between 60 and 92 years, the average time of hospitalization was 9,02 days, being 14 males and 28 females. In this sample there is high rate of edentulous, with DMFT of 28,47. The assessment of the extent and severity of periodontal disease was possible in only 12 patients, and of these, 11 (91,66%) presented generalised periodontal disease (table 1).

From the data analysis, health conditions and oral hygiene, only 40,5% of cases were considered with good oral health (table 2) and 16,7% of the dentures were considered appropriate (table 3), obtaining improvement in the second evaluation, without difference between the groups.

Table 4 describes the types of infections occurring in the sample population, being the most frequent community infection. Highlighting the pneumonias that add up to community 3 and hospital 3. In tables 5 and 6 are described the oral health conditions and dentures for patients who have had pneumonia.

DISCUSSION

Health institutions committed to comprehensive care to inpatients must be attentive to the oral health conditions, which constitutes an integral part of overall health. Oral health conditions, constitute an important risk factor for infection, especially by the association between microorganisms present in the bacterial biofilm and potential to cause remote infections like pneumonia. The oral cavity is home to pathogenic bacteria that can permenecer hidden, but potentially aggressive when the mechanical control of biofilm is inappropriate, can compromise the overall health and put life at risk [2-5,10-14].

Of the total number of patients included in the survey, in the first assessment, only 40.5% had good oral health conditions, the rest were categorized as regular or bad, at the end of the period of hospitalization, it was observed an improvement in all categories in both groups.

Table 2. Oral health conditions by comparing the groups in the first and second evaluation. n. 42.

		Oral health conditions			
		1° Evaluation***		2° Evaluation***	
		n	%	n	%
	Good	17	40,5	20	47,6
	Regular	14	33,3	17	40,5
	Bad	11	26,2	4	9,5
	Not informed	0	0	1	2,4
Group 1*					
	Good	9	21,4	11	26,2
	Regular	5	11,9	9	21,4
	Bad	8	19	2	4,8
	Not informed	0	0	0	0
Group 2**					
	Good	8	19	9	21,4
	Regular	9	21,4	8	19
	Bad	3	7,1	2	4,8
	Not informed	0	0	1	2,4

Note: Teaching hospital in southern Brazil, 2017. *Goup 1: 1°evaluation until 48 hours after the hospital stay and daily monitoring until hospital discharge. **Group 2: 1° evaluation until 48 hours after admission and 2° assessment on the day of discharge. ***Interval between first and second evaluation varied according to period of hospitalization.

Table 3. Conditions of dental prosthetics by comparing the groups in the first and second evaluation. n. 42.

		Conditions of dental prosthetics			
		1° Evaluation***		2° Evaluation***	
		n	%	n	%
	Good	7	16,7	11	26,2
	Regular	12	28,5	12	28,5
	Bad	10	23,8	5	11,9
	Not informed	11	31	12	33,4
Group 1*					
	Good	2	4,8	5	11,9
	Regular	7	16,7	5	11,9
	Bad	4	9,5	3	7,1
	Not informed	7	16,7	7	16,7
Group 2**					
	Good	5	11,9	6	14,3
	Regular	5	11,9	7	16,7
	Bad	6	14,3	2	4,8
	Not informed	4	9,5	5	11,9

Note: Teaching hospital in southern Brazil, 2017. *Goup 1: 1°evaluation until 48 hours after the hospital stay and daily monitoring until hospital discharge. **Group 2: 1° evaluation until 48 hours after admission and 2° assessment on the day of discharge. ***Interval between first and second evaluation varied according to period of hospitalization.

Table 4. Occurrence of infection and affected site. n. 42.

Site	Frequency of infections	
	n	%
With infection*		
Urinary tract	5	11,9
Integumentary	6	14,3
Pulmonary	6	14,3
Others	6	14,3
Communities		
Urinary tract	2	4,8
Integumentary	4	9,5
Pulmonary	3	7,1
Others	4	9,5
Hospitals		
Urinary tract	3	7,1
Integumentary	2	4,8
Pulmonary	3	7,1
Others	2	4,8
Without infection	**24**	**57,1**

Note: Teaching hospital in southern Brazil, 2017. *Some patients had more than one site of infection.

Debilitated patients require assistance in achievement of oral hygiene, however, this practice often ends up being neglected [4,5,14,15], nearly 67% of pneumonia in the elderly have the undetermined etiology and poor oral hygiene can result in increased anaerobic flora, extremely pathogenic, including important respiratory pathogens,

Table 5. Oral health conditions of patients who developed community pneumonia.

	Community Infection		
	Patient 1	Patient 2	Patient 3
Group	2	2	1
Oral mucosa	Integrate	Erosive	Biofilm
Via power supply	Oral	Oral	Nasoenterica
Use of prosthesis	Sim	Sim	No
Conditions of the prosthesis (1° evaluation)*	Bad	Regular	-
Conditions of the prosthesis (2° evaluation)*	Bad	Regular	-
Oral health conditions (1° evaluation)	Regular	Bad	Bad
Oral health conditions (2° evaluation)	Regular	Regular	Regular
Teeth in mouth	5	0	11
Decayed teeth	0	0	1
Who performed the oral hygiene	Patient	Patient	Caregiver

Note: Teaching hospital in southern Brazil, 2017. *Patients feel more comfortable to stay without the dental prosthetics.

Table 6. Oral health conditions of patients developed nosocomial pneumonia.

	Hospital Infection		
	Patient 1	Patient 2	Patient 3
Group	2	2	1
Oral mucosa	Integrate	Dry	Integrate
Via power supply	Oral	Oral	Oral
Use of prosthesis	Sim	Sim	Não
Conditions of the prosthesis (1° evaluation)*	Bad	Regular	-
Conditions of the prosthesis (2° evaluation)*	Regular	-	-
Oral health conditions (1° evaluation)	Regular	Regular	Bad
Oral health conditions (2° evaluation)	Regular	Regular	Regular
Teeth in mouth	5	6	14
Decayed teeth	0	0	3
Who performed the oral hygiene	Patient	Patient	Patient

Note: Teaching hospital in southern Brazil, 2017. *Patients feel more comfortable to stay without the dental prosthetics.

therefore, maintain a good oral health can reduce the risk of lung infections. Patients with oral health satisfactory rarely have colonization of gram-negative on orofaringe [4,5,14].

It was observed a predominance of relevance in partial or total edentulous, 100% of the patients had some degree of dental loss and 50% of the total edentulous matched sample, the average DMFT was 28,47, going against 27,53 index determined in National oral health survey of 2010 [9]. Only 16,7% of patients wore dentures. International rates are also high edentulous, estimated between 7% and 69% of the population, the trend is that the need for dentures will last even for several years, being associated with low income and education. The presence of bacterial biofilm on dental prosthesis has been associated with changes of mucosa and the systemic consequences as aspiration pneumonias [3,12,15-17], especially in dependent individuals. The pathogenesis of aspiration pneumonia includes several risk factors as: increasing contamination of the oropharynge by poor oral hygiene, swallowing reflex reduction, use of nutritional alternatives routes, impairment of immunity, advanced age, polimorbities and increasing the risk of aspiration of contaminated contents [2,3,6,18].

A condition that affects especially elderly patients is the reduction of salivary flow, which can disturb the natural protective mechanism of teeth and mucosa and facilitate the proliferation and retention of many microorganisms and accumulation of secretion. Dentures with poor conditions of storage, adaptation and serve as a reservoir of hygiene waste and pathogens that can be easily inhaled and cause unexpected respiratory infections [2,4,5,12].

There was no statistical difference in the time of hospitalization among groups, thus we can conclude that the guidelines of oral hygiene and care of dentures were as effective as the completion of daily care by the dental surgeon, going against the studies that say that the reduction of Bacterial colonization and the risk of oropharyngeal aspirativas pneumonia, should establish daily maintenance care protocols of oral health, both for patients and for caregivers and multidisciplinary staff [2,4-6]. Oral hygiene includes part of personal hygiene and should be performed by the team that makes up the front line of care for hospitalized patients. The dentist must be present in the multidisciplinary team to support and ensure the success of the control actions of oral health as well as promote continuous education activities with the team. The practice of proper oral hygiene can reduce the occurrence of pneumonia, hospitalization costs and increase the quality of life of patients with chronic degenerative diseases [2,4-6,19].

The integration of the multidisciplinary team dentistry aims to approach the patient as a whole, acting in reducing outbreaks of food-borne infections that can bring systemic aggravations. This caution reflects directly on improvement of survival rate, reducing the time and costs of hospitalization and indiscriminate use of antibiotics [20]. The resolution CFO 162/2015 regulates the exercise of the Hospital Dentistry, the dental surgeon should be prepared for the dental care of patients within the hospital, as are specific and different from the clinic routine [20,21].

Observed improvement in oral health conditions of both groups, but not completely by dental needs considered electives, forwarded to treatment after discharge. In this context, aspects related to social issues yet, because many patients claim to have science of need for replacement of prostheses already precarious but not having the financial resources to do so. The dental surgeon's intervention at that time is crucial in order to guide about the risk of using poor prosthesis and the need for improvement of oral health. Among the 12 dentulous, there was a predominance of generalised periodontal disease, and according to studies that say many compromises of oral health in the elderly result from previous problems as low-frequency search by service dental care and negligence oral hygiene [2-4,22]. Low socioeconomic status and low oral hygiene habits contribute to a precarious oral health [2,4,11,22,23], pointing also to a public health problem [18].

Previous studies have demonstrated the association between periodontal disease and systemic infections, indicate that most patients who develop aspiration pneumonia are toothed, especially those with periodontal disease [3,13-15,18]. The patients included in the survey, 42.9% showed some kind of infection, these, 14.3% of cases were respiratory infections, with 7.1% of the cases were considered hospital infection. As literature, poor oral hygiene, bring devastating consequences such as: local abscesses formation, rapid spread of infection by facial plans, infective endocarditis, however, the most common sequel of poor oral hygiene in elderly patients Unable to maintain proper oral hygiene is the aspiration pneumonia [5,14,22,24]. The buccal cavity may constitute an important source of infection due to your ability to produce biofilms may result in persistence of these pathogens in periodontal bag after antimicrobial therapy [25].

The record of the oral health conditions of patients who developed respiratory infection shows that of these, 3 were community infections and 3 were hospitals. Three patients had some type of change in the oral mucosa, among these, the presence of bacterial biofilm and food residue, erosion and dryness; All patients had multiple dental loss, and no patient presented good oral health or good condition of conservation of dentures. The literature says that poor conditions of oral health and hygiene of patients dependent on stents is a reservoir for respiratory pathogens [24]. A study with 524 seniors living in geriatric clinic concluded that patients who slept with the dentures were most at risk of developing aspiration pneumonia [12].

Of the patients who developed hospital pneumonia, 2 belonged to group 2, without the daily visit the dentist and 1 patient of the group 1, which remained locked up for 42 days, waiting for a neurological surgical procedure, being exposed to various risk factors for the development of hospital-acquired infections. From a case-control study with 211 individuals admitted to a General Hospital in Feira de Santana, it was observed that several factors are involved in the development of respiratory

infections, such as: neurological factors that compromise the swallowing and breathing, favoring the aspiration of bacteria or orofaríngeos contente [1]. An observational study with elderly people with dysphagia, pointed to high risk of aspiration pneumonia, patients presented updates to swallowing, oral health conditions, high prevalence of periodontal disease, tooth decay and complications due to Comorbidities and polimedication [6].

The World Health Organization has recommended improving the oral health of seniors. The contaminated contents oropharyngeal aspiration has been recognized as an important etiological factor on the route for the development of aspiration pneumonia in elderly patients and recommends the implementation of comprehensive programmes of hygiene promotion as a way to prevent infection and respiratory morbidity and mortality [6].

It has not been possible to infer whether there has been reduction in the occurrence of nosocomial pneumonia, reduction in length of stay or of the use of antimicrobials with the intervention of dentistry, do not known the prevalence of pneumonia, the hospital length of stay and the profile of antimicrobial schema for that new studies are needed with groups of intervention and control groups.

CONCLUSION

The low content of search for dental treatments and neglect of oral hygiene care influences directly in oral health conditions and the storage conditions of the dentures.

The role of the surgeon-dentist promoted improvements in oral health of patients, with no statistical difference between the group that received daily tracking and guidance group, showing that the guidelines and basic oral health care can be assigned to a multidisciplinary team. Dentistry should be in sync with the team and to intervene when the dental changes interfere with the outcome of the clinical condition of the patient. Elective demands should be treated after hospital discharge.

Dentistry should concentrate efforts on training and support to the multidisciplinary team that is on the first line of care, acting as multipliers and expanding the scope of the actions of oral health for all hospitalized patients.

New studies are needed to verify the performance of dentistry in hospitals reduces the occurrence of pneumonia, the length of stay and the use of antimicrobials.

Collaborators

RFT GOMES, study design, submission to the committee of ethics in research, literature review, data collection and analysis and discussion of the results. EF CASTELO, advice on study design, data analysis and discussion of the results.

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