BRAZILIAN JOURNAL OF IMPLANTOLOGY AND HEALTH SCIENCES

ISSN 2674-8169

Avaliação dos índices de pneumonia associados à ventilação mecânica em unidade covid-19 após inserção do dentista na equipe multiprofissional

Pedryna Maria Oliveira Veras [1], Eliane Ferreira Sampaio[1], Edson Luiz Cetira Filho[1], Ylana Rosa Matos[1], Aristéa Ribeiro Carvalho[1], Isabela Freire Henrique[1], Tatiane Andrade Figueiredo Rojas Nottingham[1], Kalil de Castro Sousa[1]; Islla Ribeiro Pinheiro[1]; Francisco Rogério Rodrigues Costa[1]; Alinne Patierry Oliveira Pacífico Feitosa[1]

ARTIGO ORIGINAL

RESUMO

A pneumonia associada à ventilação mecânica (PAVM) é uma infecção pulmonar que se desenvolve em pelo menos 48 h ou mais após a admissão hospitalar em pacientes ventilados mecanicamente através de traqueostomia ou intubação orotraqueal. A higiene bucal tem sido considerada um componente essencial na prevenção da PAVM e, sendo realizada de forma padronizada, pode reduzir significativamente a taxa de infecções do trato respiratório devido à colonização microbiana. Este estudo iniciou com o objetivo de avaliar o impacto da inserção do Cirurgião-Dentista em uma UTI que fez atendimento à pacientes com COVID-19 e analisar se houve diferença nos parâmetros de PAVM, tempo de internação e mortalidade em relação ao período de ausência da atuação profissional do Cirurgião-Dentista neste ambiente. Após análise estatistica, os dados obtidos na coleta foram tabulados e analisados pelo software SAS 9.4 M7, SAS Inc. A taxa de internação aumentou no período em que o Cirurgião-Dentista estava inserido na unidade COVID-19, porém o valor de p não foi significativo nessa variante ($p > 0,062$). A porcentagem de PAVM no período antes e após a intervenção do Cirurgião-Dentista na unidade COVID-19 diminuiu com diferença significativa entre os períodos avaliados ($p < 0,0001$). Já em relação à mortalidade, verificou-se que houve um aumento no número de óbitos ao longo do tempo, entretanto sem significância estatística ($p > 0,2790$). A pandemia veio para confirmar a importância do atendimento da odontologia no ambiente hospitalar e a integração do profissional dentista na equipe de saúde contribuindo para a saúde bucal e a qualidade de vida dos pacientes críticos.

Palavras-Chave: COVID-19; Pneumonia Associada à Ventilação Mecânica; Cirurgião-Dentista.

Evaluation of pneumonia indexes associated with mechanical ventilation in a covid-19 unit after insertion of the dentist in the multiprofessional team

ABSTRACT

The aim of this research is to evaluate whether there was a difference after the insertion of the dental surgeon in an Intensive Care Unit (ICU) that cares for patients with COVID-19 in relation to ventilator-associated pneumonia (VAP) control, length of stay and mortality. The dentist was added to the multidisciplinary team for three months. A training session with the nurses and nursing technicians was held at the start of every month. The Hospital Infection Control Service gathered data on VAP, hospital stay length, and ICU mortality in the three months before and three months after the dentist joined the team. After statistical analysis, the hospitalization rate increased in the period in which the dentist was working in the COVID-19 unit, but the p value was not significant in this variant ($p > 0.062$). The percentage of VAP in the period before and after the dentist's intervention in the COVID-19 unit decreased with a significant difference between the evaluated periods ($p < 0.0001$). Regarding mortality, it was found that there was an increase in the number of deaths over time, however without statistical significance ($p > 0.2790$). The pandemic came to confirm the importance of dental care in the hospital environment and the integration of the professional dentist in the health team, contributing to the oral health and quality of life of critical patients.

Keywords: COVID-19; Pneumonia, Ventilator-Associated; Dentists.

Dados da publicação: Artigo recebido em 21 de Dezembro e publicado em 01 de Fevereiro de 2024.

DOI: https://doi.org/10.36557/2674-8169.2024v6n2p56-70

Autor correspondente*: Alinne Patierry Oliveira Pacifico Feitosa* alinne.patierry@hotmail.com

INTRODUCTION

In 2020, a new coronavirus was identified in China, the SARS-CoV2. This emerging virus began its manifestation in a Chinese province, Wuhan, specifically in a wild animal sales market. The first notification occurred on December 31, 2019, and the first death in China occurred on January 11, 2020.The disease caused by this virus became known as COVID-19, from English, coronavirus disease 2019 and the cases began to spread rapidly around the world, first to the Asian continent and then to other countries, being declared by the WHO in March 2020 a pandemic1.

The current outbreak of Coronavirus 2019 (COVID-19) constituted a public health emergency of global concern, due to its high virulence and power of dissemination in the population, influencing and changing the lives of billions of people, which led to a high demand for care. high complexity hospitals. Among the main signs and symptoms, the following stand out: fever, dry cough, apathy, myalgia, partial or total loss of smell (hyposmia/anosmia) and alteration or decrease or total loss of taste (dysgeusia/hypogeusia/ageusia), renal and acute respiratory disease requiring invasive mechanical ventilation2.

The transmission of the new coronavirus occurs predominantly through contaminated droplets of oropharyngeal secretions from an infected person to a person free of the infection. Something, in addition, concerns the fact that, although 80% of cases have respiratory infections and milder pneumonias, the severe forms affect more elderly people and those with underlying chronic diseases, which require hospitalization, intensive care and use of mechanical ventilators3.

In this context of invasive respiratory assistance, almost 9% to 40% of infections acquired in the Intensive Care Unit (ICU) are ventilator-associated pneumonia (VAP),being considered an adverse effect, since patients undergo invasive procedures and are related to increased length of stay in hospital, higher morbidity and mortality, which significantly affects hospital costs4.

Mechanical ventilation (MV) consists of a supportive method for the treatment of patients with acute or acute chronic respiratory failure. Ventilator-associated pneumonia is a lung infection that develops at least 48 hours or more after hospital

admission in patients who are mechanically ventilated through tracheostomy or orotracheal intubation5.

The incidence of VAP is high, varying between 6% and 52%, depending on the population studied, the type of ICU, even varying between different ICUs in the same hospital and the type of diagnosis used. When compared to other nosocomial infections, such as those of the urinary tract and skin, where mortality is between 1% and 4% respectively, VAP becomes an important predictor of mortality, since it varies between 24% and 50 %, reaching more than 70% when caused by multiresistant microorganisms6.

Oral hygiene has been considered an essential component in the prevention of VAP and, when performed in a standardized way, can significantly reduce the rate of respiratory tract infections due to microbial colonization5.

The multiprofessional performance in the ICU during the pandemic facilitated the process of developing health actions. There are still several challenges and difficulties that need to be reflected on and overcome, but through teamwork a collective relationship is possible, capable of allowing the exchange of knowledge and technical interventions, experiences, and information with the potential to facilitate the construction of an effective therapeutic plan and safe, thus establishing a reciprocal relationship, aiming at a common goal, which is the recovery of the patient7.

Dental care in the ICU is important for cost-efficiency and for controlling diseases, such as respiratory infections and even in immunocompromised patients, because oral health is directly linked to the general health of the body and, therefore, reduce harm to the patient. In most Brazilian hospitals, these oral hygiene procedures are performed by nurses or nursing technicians, who in some more complex cases may have difficulty in carrying out the same, which demands the need of the dentist8.

The oral condition, the frequency of performing oral hygiene and the degree of dependence of the patient in relation to performing this hygiene are significant factors for the occurrence of pneumonia, because in addition to the patient being more debilitated, the environment in which he is found is more contaminated by resistant pathogens. During the ICU stay, oral hygiene can often be neglected, leading to the accumulation of dental plaque9.

Interventions to reduce bacterial colonization in the oral cavity of patients and their potential to reduce VAP have been investigated. The use of oral antiseptics and, more recently, the addition of mechanical oral hygiene – through swabs, foam sticks,

gauze, manual and electric toothbrushes – have been studied as possible VAP prevention strategies10.

According to the recommendations for coping with COVID-19 in dentistry, for patients with orotracheal intubation or tracheostomized, the AMIB (Brazilian Intensive Medicine Association), considering the duration of mechanical ventilation to which patients are submitted, one may prefer maintenance of oral hygiene routine with 0.12% chlorhexidine solution11.

The choice of this topic is justified by the pandemic scenario we are experiencing and the high rates of hospitalization over the last two years. The VAP worsened substantially in this period, confirming the need for the dentist in the multidisciplinary teams in the Intensive Care Units.

Therefore, this study began with the objective of evaluating the impact of the insertion of the dentist in an ICU that provided care to patients with COVID-19 and to analyze whether there was a difference in the VAP parameters, length of stay and mortality in relation to the period of absence from the professional performance of this professional in this environment. In addition, to identify dental needs, and to check whether oral hygiene training for nursing technicians and nurses was sufficient to improve the oral hygiene of patients in an ICU with patients diagnosed with COVID-19.

MATERIALS AND METHODS

The present study was submitted and approved by the Ethics Committee in Research involving Human Beings of Hospital de Messejana – Dr. Carlos Alberto Studart Gomes, with CAAE: 47817721.2.0000.5039. This is an observational, descriptive, and quantitative research, carried out in one of the Intensive Care Units, Unit IV, of the Hospital de Messejana - Dr. Carlos Alberto Studart Gomes.

This intensive care unit had, at the time of the pandemic, two wards and two ICUs (which were the locations of this research), each ICU with 8 beds, totaling 16 beds,

where a multidisciplinary team worked, consisting of 01 physician on duty, 04 nurses, 02 nursing technicians and 01 physiotherapist.

Twenty two patients were included in this study, 12 males and 10 females, who were assisted at unit IV, diagnosed with COVID-19, aged 18 years or older,

submitted to orotracheal intubation, who remained on mechanical ventilation (MV) for more than 48 hours and without evidence of pulmonary infection on admission. Patients who were not undergoing orotracheal intubation were also included immediately after starting MV.

Patients who had pneumonia at the time of admission, tracheostomized patients and those who were allergic to chlorhexidine were excluded from the study. Patients who interrupted VM or who died within the first 24 hours of VM due to orotracheal intubation were also excluded from the study.

The dentist was inserted for three months, from the 1st of July until September 30, 2021, during the “second wave” of the new coronavirus pandemic, in the multiprofessional team of unit IV (COVID-19 ICU), for three days a week, each day during a shift (6 hours).At the beginning of each month, training was given to nursing technicians and nurses from the two ICUs at unit IV on oral hygiene to qualify these professionals in providing the best care for these patients. The patients' oral hygiene was carried out with wooden sticks wrapped in gauze and 10 ml of 0.12% chlorhexidine digluconate three times a day (8/8 hours).

Oral care followed as follows: external lip cleaning with gauze and distilled water; aspiration of intraoral fluids; oral cleaning with gauze wrapped in a wooden stick soaked in 0.12% chlorhexidine digluconate on the buccal mucosa, hard palate, all sides of the teeth and tongue; external cleaning of the orotracheal tube and, finally, lip hydration with sunflower oil (AGE) or bepantol cream.

They were collected at the HICS (Hospital Infection Control Service) of the Hospital de Messejana - Dr. Carlos Alberto Studart Gomes the VAP indices, length of hospital stays and mortality in the ICUs of unit IV in the three months prior to the inclusion of the Dental Surgeon in the multidisciplinary team. These same data were collected three months after the inclusion of the dentist in the multidisciplinary team.

Collection Procedures

The patients' data were collected through a clinical form that was attached to the medical record and completed by the researcher herself. This form consists of the following information: patient identification, general health conditions, oral health

conditions observed in the clinical examination, follow-up, and dental procedures to be performed. If it was necessary to carry out any dental treatment (oral surgeries, restoration, scraping), the signature of the Free and Informed Consent Term was requested by the responsible person.

After three months of implantation of the dentist in the unit, the data collected by HICS were compared with the three months prior to the insertion of the dentist in the unit where the research was carried out and verified if there was an improvement in the VAP indices, hospitalization rate and mortality.

Statistical analysis

The data collected through the HICS, and the clinical record were analyzed for their normality. The categorical quantitative results were presented in the form of percentages and counts and the numerical ones in the form of measures of central tendency and dispersion. Kolmogorov-Smirnov normality tests were performed for numeric variables. For categorical variables, the chi-square test was used to verify association and Kruskal-Wallis for numerical ones. P-values less than 0.05 were considered significant. The data obtained in the collection were tabulated and analyzed using the SAS 9.4 M7 software, SAS Inc.

RESULTS

In the present study, we identified the profile of patients according to the data filled in the clinical form. We had a mean age of 67.1 years, showing patients in a higher age group.36 patients were included in the period that preceded the presence of the dentist and 22 patients in the interval in which the professional was inserted in the COVID-19 unit, of which 10 (45.5%) were female and 12 (54, 5%) male.

As for the oral condition of the patients who were included in the research, it was observed that in the upper arch, 10 patients (45.5%) were partially dentate, and 12 patients (54.5%) were completely edentulous. In the lower arch, 1 patient (4.5%) was

completely dentate, while 11 patients (45.5%) had this partially dentate arch and 10 patients (45.5%) were completely edentulous.

Regarding the oral clinical findings of the patients, the most common was tongue coating with 72.7%, totaling 16 patients, followed by dry lips with 13 patients (59.1%), crusts and dental calculus, each representing 31.8 % of findings (7 patients each).Bacterial plaque was found in 5 patients, representing 22.7% of the cases. Bleeding in the oral cavity and the need for extractions each represented 18.2% of the findings, with 4 patients each. Whitish plaques on the tongue represented 9.1% of the clinical findings, with 2 patients. And finally, representing 4.5% of the cases each, we have caries, laceration on the tongue, tooth mobility, laceration on the mucosa, laceration on the ridge and laceration on the upper lip, each with 1 patient.

Table 1 – Evaluation of Hospitalization Days, Mortality and VAP in the COVID-19 ICU without Dentist intervention and after intervention.

	ICU	ICU+Dentist	p	Significance
Days of Hospitalization (Average)	14,9	19,4	> 0,2860	No
Mortality % (DE° Patients)	44,4% (36)	59,1% (13)	> 0,2790	No
VAP % (No. of Patients)	100% (36)	9,1% (2)	<0,0001	Yes

ICU – Period without Dentist intervention; ICU+Dentist – Period with intervention; VAP – Ventilator-associated pneumonia.

In table 1, we can observe the main objective of this work, showing the indicators before and after the dentist's intervention in the multidisciplinary team in a COVID-19 unit. The average number of hospitalization days, before the dentist enters the COVID-19 unit, is represented by 14.9 days. With the dentist's intervention, the average had an increase of 19.4 days, but without statistical significance ($p > 0.2860$).The number of deaths represented, before the dentist's intervention, 44.4% (16 patients out of 36 in total). After the intervention, even with a lower number of patients, the percentage of deaths was 59.1% (13 patients out of 22 in total), increasing during this period. However, the p value was not significant ($p > 0.2790$). Finally, we have the percentage of VAP in the two periods to be compared (Figure 1). From April to June, cases of VAP totaled 100% of the 36 patients with COVID-19 in that unit, from July to September, with the presence of the dentist, the percentage was reduced to 9.1%, representing 2 patients of

the 22 inserted research during this period. In this case, statistical significance was observed ($p < 0.0001$).

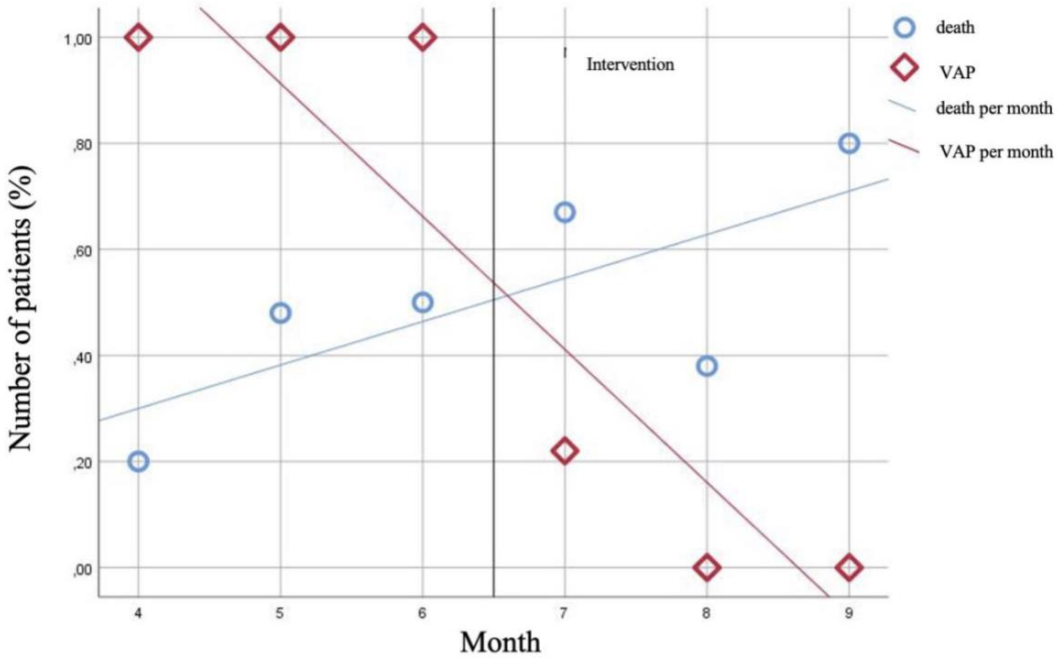

Fig. 01: Correlation of the number of patients (%) per month in relation to the VAP death rate.

DISCUSSION

The present study sought to evaluate the presence of the dentist within a COVID-19 unit, during three months of the pandemic and compare it with three months where he was not included in the multiprofessional team, evaluating the VAP indices, days of hospitalization and mortality rate. The previously raised null hypothesis was partially rejected, because was a significant reduction in VAP rates in the ICU with the presence of the dentist during the three months. However, the variables: days of hospitalization and the mortality rate did not have significant results with the presence of the professional in the COVID-19 unit.

Regarding the inclusion and exclusion criteria of our research, we recommend including patients with orotracheal intubation, who had remained on VM for more than 48 hours, with a diagnosis of COVID-19, without VAP at the time of admission1,9, but we also found studies in the literature that found it relevant to include patients who

were tracheostomized, since these patients underwent at least two weeks of orotracheal intubation4.

Addressing the hygiene protocol used in the study, our research worked only with patients on VM, where hygiene was performed with distilled water, chlorhexidine 0.12% and gauze, however, the literature shows other protocols in which mechanical brushing is used with 0.12% chlorhexidine, where it better eliminates debris and bacterial plaque, due to the mechanical action of the toothbrush4,5. However, studies show similarity in cleaning both in the use of brushing (manual/electric brushes) and with swab/gauze using chlorhexidine 0.12% in patients undergoing mechanical ventilation12.

Still on the material for oral hygiene of patients, we used a gauze sequence with distilled water and later with 0.12% chlorhexidine, as they are non-toxic materials that do not harm the oral mucosa of patients. However, studies were carried out with 1% hydrogen peroxide for oral hygiene1, which was not included in our research, however, despite the recommendation to use 1% hydrogen peroxide in the oral cleaning of intubated patients with COVID-19 at the beginning of the pandemic, protocols were rectified on oral hygiene, which mentions only chlorhexidine 0.12%, as studies have shown the appearance of lesions in the mouth due to the use of hydrogen peroxide, thus corroborating the methodology of our study11.

Regarding the clinical findings of the research, several oral alterations were identified, the most common being lingual coating and dry lips, which can be explained by the refrigerated environment, the VM itself that dries out the mucosa, decreasing salivation, facilitating dryness and the appearance of crusts; the lingual coating can be explained by the professional's difficulty in handling the oral tissues with the presence of the orotracheal tube in the region2,9.

Regarding training in oral hygiene in intubated patients held at the beginning of each month for technical nursing professionals and nurses, where they are respon

for oral hygiene in the daily routine of the hospital environment, we found this same methodological proposal as an important criterion for studies, in view of the importance of the multidisciplinary team in the oral hygiene of the patient, thus constantly training the various professionals on the subject1,9,10.

Referring to the results obtained in the research, in relation to the presence of the dentist in the ICU, the number of deaths and days of hospitalization were not statistically significant, making it possible to understand these data by the severity of the systemic diseases present in these patients, aggravated by the presence of the diagnosis of severe acute respiratory syndrome caused by the coronavirus, as the literature reports that the complications arising from it mainly involve the lungs, kidneys and conditions of preexisting diseases, a fact that justifies the non-intervention of invasive dental procedures, due to the severity of these patients1,13.

With regard to VAP, we had an important and significant reduction during the period of insertion of the dentist in the multidisciplinary team, where we can observe the contribution of good oral hygiene with the reduction of VAP rates4,9. Our research and several studies reinforce the idea of including the dentist in the ICU team to improve oral health in critically ill patients and effectively prevent respiratory tract infections, thus aiming at a more effective recovery of the patient, thus interfering in their state of general health and even in the reduction of days of hospitalization and in the number of deaths14.

Therefore, strengthening the importance of the dentist's presence in the multidisciplinary team, it has already been seen that oral health directly implies the general health of the patient, taking into account that many pneumonias can be avoided with adequate oral hygiene, considering that the patient is in an environment with a lot of pathogens, leaving you more immunocompromised8,9,14. In this way, the lack of a fixed dentist in the multiprofessional team of the ICU was configured as a point to be considered in this research, since he was only in the ICU three times a week, during a shift, the ideal would be for this professional to be there every day, throughout the shift, supporting the team. Thus, it is suggested as future studies the presence of the dentist for a longer time in the ICU, as well as jointly evaluating their performance with physiotherapy and nursing in the prevention of VAP.

As a contribution to clinical practice, our study shows that the increase in the number of dentists in the multidisciplinary teams, providing training and support to the team with oral care in critically ill patients, together with the fixed protocol on hygiene in intubated patients passed on to the team at the beginning of each month,

added to her interest in learning correctly, contributed significantly to the reduction of VAP.

CONCLUSION

It can be concluded that, in relation to the VAP indexes, there was a significant difference in the decrease of this with the presence of the dentist in the ICU, as well as the performance in the oral cleaning of the patients together with the training of the professionals of the unit with the protocol of oral hygiene for intubated patients was essential to reduce this rate, which is an important cause of mortality.The pandemic came to confirm the importance of dental care in the hospital environment and the integration of the professional dentist in the health team, modifying the oral health and quality of life of critical patients. In relation to mortality rates and days of hospitalization, there was no significant difference.

REFERENCES

1. Kurian N, Gandhi S, Thomas AM. COVID-19 and multidisciplinary dentistry. British Dental Journal. 2021, 231, 534-534. https://doi. org/10.1038/s41415-021-3628-1

2. Ren Y, Feng C, Rasubala L, Malmstrom H, & Eliav E. Risk for dental healthcare professionals during the COVID-19 global pandemic: An evidence-based assessment. Journal of dentistry. 2020, 101, 103434. https://doi.org/10.1016/j.jdent.2020.103434

3. Suryasa IW, Rodríguez-Gámez M, Koldoris T. The COVID-19 pandemic. International Journal of Health Science. 2021, 5. https://doi.org/10.53730/ijhs.v5n2.2937

4. de Lacerda Vidal CF, Vidal AKDL, Monteiro JGDM, Cavalcanti A, Henriques APDC, Oliveira M, et at. Impact of oral hygiene involving toothbrushing versus chlorhexidine in the prevention of ventilator-associated pneumonia: a randomized study. BMC infectious diseases. 2017, 17, 1-9. https://doi.org/10.1186/s12879-017-2188-0

5. Haghighat S, Mahjobipoor H, Gavarti SG. Comparative study of the effect of three oral care protocols on ventilator-associated pneumonia in critically ill patients: A clinical trial.

Iranian Journal of Nursing and Midwifery Research. 2022, 27, 99. https://doi.org/10.4103/ijnmr.ijnmr_243_20

6. Vacheron CH, Lepape A, Savey A, Machut A, Timsit JF, Comparot S, et al. Attributable mortality of ventilator-associated pneumonia among patients with COVID-19. American Journal of Respiratory and Critical Care Medicine. 2022, 206, 161-169. https://doi.org/10.1164/rccm.202202-0357OC

7. Zangrillo A, Belletti A, Palumbo D, Calvi MR, Guzzo F, Fominskiy EV, et al. One-year multidisciplinary follow-up of patients with COVID-19 requiring invasive mechanical ventilation. Journal of Cardiothoracic and Vascular Anesthesia. 2022, 36, 1354-1363. https://doi.org/10.1053/j.jvca.2021.11.032

8. Silveira MGDS, Fernandez MDS, Tillmann TFF, Danigno JF, Echeverria MS, Silva AER. Changes in dental practice in times of COVID-19: review and recommendations for dental health care. RGO-Revista Gaúcha de Odontologia. 2021, 69. https://doi.org/10.1590/1981-86372021000120200073

9. Franco JB, Jales SMDCP, Zamboni CE et al. Oral hygiene for intubated patients assisted with mechanical ventilation in intensive care unit: proposal protocol. Arquivos Médicos dos Hospitais e da Faculdade de Ciências Médicas da Santa Casa de São Paulo. 2014, 126-131.

10. Alja'afreh MA, Mosleh SM, Habashneh SS. The effects of oral care protocol on the incidence of ventilation-associated pneumonia in selected intensive care units in Jordan. Dimensions of Critical Care Nursing. 2019, 38, 5-12. https://doi.org/10.1097/DCC.0000000000000334

11. Comitê de Odontologia AMIB/CFO de enfrentamento ao COVID-19, Conselho Federal de Odontologia. Recomendações AMIB para atendimento odontológico COVID. Departamento de Odontologia AMIB–3. Atualização 22/06/2020.

12. de Camargo L, da Silva SN, Chambrone L. Efficacy of toothbrushing procedures performed in intensive care units in reducing the risk of ventilator-associated pneumonia: a systematic review. Journal of Periodontal Research. 2019, 54, 601-611. https://doi.org/10.1111/jre.12668

13. Reyes LF, Bastidas A, Narváez PO, Parra-Tanoux D, Fuentes YV, Serrano-Mayorga CC, et al. Clinical characteristics, systemic complications, and in-hospital outcomes for patients with COVID-19 in Latin America. LIVEN-Covid-19 study: A prospective, multicenter, multinational, cohort study. PloS one. 2022, 17, e0265529. https://doi.org/10.1371/journal.pone.0265529

14. Bellissimo-Rodrigues WT, Menegueti MG, Gaspar GG, de Souza HCC, Auxiliadora-Martins M, Basile-Filho A, et al. Is it necessary to have a dentist within an intensive care unit team? Report of a randomised clinical trial. International dental jornal. 2018, 68, 420-427. https://doi.org/10.1111/idj.12397