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RESEARCH ARTICLE

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ORAL CAVITY REPERCUSSIONS IN PATIENTS WITH MECHANICAL VENTILATION RELATED TO INDEPENDENT NURSING INTERVENTIONS IN ORAL HYGIENE

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ABSTRACT

This study evaluated the impact of the oral cavity in patients with ventilatory support by endotracheal cannula in the intensive care unit, carrying out some microbiological techniques to analyze the existence of bacteria that can be found in the oral cavity and evaluate the oral conditions in the care of oral hygiene, by the way this allows to strengthen the interdependent strategies and interventions of nursing. Taking 100% of the total sample, it was extracted from 3 patients during 2 working week for the assessment, taking samples of pharyngeal swab and performing the oral hygiene technique. The Oral Assessment Guide (OAG) study instrument was used, after taking the initial samples and assessment, the oral hygiene technique was applied for one week using antiseptics for oral cleaning. The results revealed the presence of two types of bacteria belonging to the types Staphylococcus or Streptococcus; This highlights the importance of oral hygiene care, allowing us to strengthen the strategies of interdependent nursing interventions for the care of the oral cavity.

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INTRODUCTION

The intensive care unit (ICU) is "a specialized area within a hospital that is dedicated to the care and treatment of patients with serious, life-threatening illnesses or those that require constant and close medical supervision and care." (Aguilar, C. 2017). The oral cavity of intubated patients within the ICU can become a reservoir of bacteria due to the invasion of the endotracheal cannula, since users tend to have disrepair oral mobility due to the state of sedation, as well as due to the lack of aspiration of secretions. These bacteria can migrate to the lungs and cause serious infections such as nosocomial pneumonia, which is one of the main causes of complications in critically ill patients. (Limachi, M. 2020). In accordance with the nursing code of ethics, it's based on the Mexican Official Standard NOM-019-SSA3-2013, mentions about nursing practice in the National Health System and, together with the Care Model (2023), demonstrates that nursing professionals can perform independent interventions, such as those that do not require a prior prescription and are legally authorized according to academic training and professional experience. Therefore, the main objective of interdependent nursing interventions is to provide specific care, maintain patient safety, as well as reduce the risks of unnecessary harm during hospital care. According to the NANDA 2023 taxonomy, it allows us to select nursing interventions to evaluate the oral cavity where we can find the diagnoses such as:

00261 Risk of dry mouth, 00045 Deterioration of the oral mucosa, 00247 Risk of deterioration of the mucosa oral and thus be able to apply different interventions, to avoid or reduce the complications that may exist in the oral cavity. Franco, A. (2023), highlights in his article that "In Mexico, there is a range incidence, between 10% and 65% of patients experiencing significant deterioration of the oral cavity due to the presence of infectious microorganisms." Currently there aren't instruments to evaluate oral hygiene in patients who have ventilation support by endotracheal cannula, but there are those that evaluate the conditions of the oral cavity, one of them is the assessment instrument: ORAL ASSESSMENT GUIDE (OAG), used successfully to assess the problems of the oral mucosa specifically in patients with cancer, to such a level that the results could be taken as a basis for the implementation of a specific treatment (Carvajal, A., 2015). According to Tarina R. in 2022, who conducted a survey of 213 patients to assess whether oral hygiene through tooth brushing and the use of 0.12% chlorhexidine gel reduces the incidence of ventilator-associated complications, mechanical ventilation time, hospital stay, and mortality rate in the ICU. The results showed a lower incidence of these complications during the follow-up period. These health complications related to wrong oral hygiene can be prevented through interdependent nursing care, these are essential to reduce the risk of infections added to the patient's condition. The main objective of this research is to evaluate the repercussions of the oral cavity on patients who have ventilatory support by endotracheal

cannula in the intensive care unit, applying microbiological techniques to strengthen independent oral hygiene nursing interventions and it also seeks to provide a vision general about the importance of carrying out specific nursing interventions related to oral hygiene care within the intensive care unit, with the aim of minimizing the reduction of infections and complications associated with deficient technique.

MATERIAL AND METHOD

A quantitative, descriptive and cross-sectional study was carried out with patients who have ventilatory support by endotracheal cannula in the intensive care unit (ICU) in a tertiary hospital. Taking in 100% of the total sample, it was extracted from 3 patients during 2 working week for the assessment, it was taken sample and treatment (performing the oral hygiene technique) with 3 types of antiseptics (chlorhexidine 0.12%, Electroborial, Triclosan). The variables that were used for the selection of users were: age, sex, type of diet and current illness. The assessment instrument used in the present study was the ORAL ASSESSMENT GUIDE (OAG), where eight aspects of the mouth are assessed: voice, swallowing, saliva, lips, tongue, mucous membranes, gums and teeth or prosthesis. Each aspect is evaluated on a scale of 1 to 3 points, with 1 = normal, 2 = alteration and 3 = severe alteration. A total score of 8 points indicates "normality" of the state of the oral cavity and a score of 24 points indicates "severe oral problems." (Carvajal, A., Soteras, M., Beortegui, E. & Aznárez, A. 2015). In this study, various staining and analysis tests were carry out to characterize the bacteria found in the samples. Specific tests were carried out such as the catalase test, Gram stain, capsule test and description of bacterial colonies. (Garza, R., 2012). The analysis consisted of sowing the samples in culture media, specifically in Bio-Chems Nutrient Agar. However, due to facility limitations, it was not possible to do additional testing that would have allowed more detailed identification and classification of the bacterial communities. These additional tests included: lactose, glucose, maltose, sucrose and fructose, coagulase, novobiocin, mannitol and hemolysis testing. Even with these limitations, the morphology of the microorganisms was observed with an Iroscope MG-11T microscope with a 40X objective.

RESULTS

The total sample was composite of 3 users, of which 66.7% (2 users) were female and 33.3% (1 user) were male.

Case 1

40-year-old female patient, she is in the ICU service with a diagnosis of high-risk pregnancy, accompanied by preeclampsia, hypothyroidism and type 1 diabetes mellitus. During the study, she is on ventilatory support in CPAP mode through endotracheal cannula and has a score of 12 on the FOUR scale (E4, M4, B4, R0). She is fed through a nasogastric tube with an artisanal diet, according to the instructions on the nutrition sheet. The evaluation with the OAG instrument gave a result of 18 points, which indicates the existence of severe oral problems, considered as a risk factor in conjunction with the accumulation of bacteria.

Case 2

30-year-old female patient, she is in the ICU service due to chronic peripheral venous insufficiency. During the study, the patient is with an endotracheal tube and sedated, with a score of -5 on the RASS scale. He is on therapeutic fasting, without a nasogastric or orogastric tube in place. The evaluation with the OAG instrument showed a result of 14 points, which indicates an alteration in the ability to swallow, in addition to the presence of the endotracheal cannula.

Case 3

45-year-old male patient admitted to the ICU for trauma due to a car accident. During the study, he is with an endotracheal tube and




sedated, with a score of -5 on the RASS scale. He receives gastroclysis with an artisanal diet of 450 kcal divided into five portions. The patient doesn't have teeth. The evaluation with the OAG instrument gave a result of 22 points, which indicates severe problems due to lack of teeth, gingivorrhagia and the endotracheal cannula. According to the analysis of bacterial cultures in the three cases studied, the results obtained are shown in Table 1, the presence of possible bacteria in the oral cavity is identified. Analyzing the image of the bacterial cultures of cases one, two and three, as shown in Table 2 on the growth of colonies, a possible contamination in the users with two types of bacteria such as Staphylococcus or Streptococcus is inferred. Well-defined cocci of blue-violet color were observed, to which the defining test "the catalase test" was applied, resulting positive and concluding that it is Staphylococcus spp.

Table 1. Initial results of identification of microorganisms existing in the oral cavity

SAMPLE	PROOF	STREPTOCOCCUS	STAPHYLOCOCCUS
1	CATALASE	-	+
	CAPSULE	-	-
	GRAM STAIN	-	+
2	CATALASE	-	+
	CAPSULE	-	-
	GRAM STAIN	-	+
3	CATALASE	-	+
	CAPSULE	-	-
	GRAM STAIN	-	+

Note: This table shows the results obtained for each of the users studied. Source: Own.



Table 2. Colony growth

CASE 1	CASE 2	CASE 3
		
Colony characteristics: size punctiform, circular shape, elevation convex, edge whole, dull, white color, texture smooth, soft consistency.	Colony characteristics: punctate shape, circular shape, flat elevation, edge wavy, dull, white color, rough texture, soft consistency.	Colony characteristics: punctate shape, circular shape, flat elevation, edge wavy, dull, white color, rough texture, soft consistency.

Note. Characteristics of the colony by morphology. Own source.

After taking the initial samples, the oral hygiene technique was applied for a week in the three different shifts using three types of antiseptics: Chlorhexidine 0.12% in case 1, Electroborial in case 2 and Triclosan in case 3. This with the objective of reducing the microbial load in the oral cavity to later determine the existence of microorganisms after having realized the oral hygiene technique; The 3 antiseptics used individually were effective in reducing the microbial load, showing a significant change in the final results. To bacteria count, the Colony Forming Units (CFU) technique would have been used.



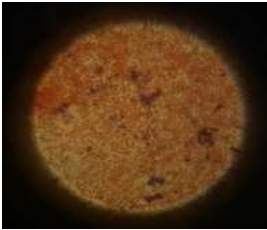
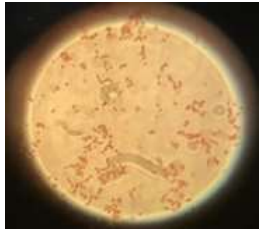
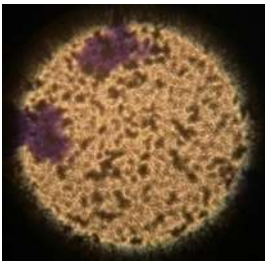
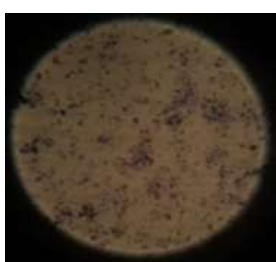
Table 3. Comparison of the microbial load in cultures before and after oral hygiene technique

PRE-ORAL HYGIENE CULTURE	POST ORAL HYGIENE CULTURE
	

Note. Bacteriological culture in a Petri dish. Own source.

However, due to facility limitations, it was not possible to do so. Even so, when visually comparing bacterial growth on agar, a decrease in colony formation was observed, as shown in Table 3. The comparison of the cultures shows a low growth of Colony Forming Units (CFU) after the application of antiseptics in the users. Table 4 shows a before and after application of the antiseptics, indicating that there was no cross contamination, since no different microorganisms were detected in the initial cultures before the oral hygiene technique. The results show a positive catalase test in both cases, the presence of cocci, consistent results in the Gram stain and the absence of capsule growth characteristic of this species.

Table 4. Comparison of the results obtained after the application of antiseptics

PRE-ORAL SAMPLE	HYGIENE	POST ORAL SAMPLE	HYGIENE
Catalase test			
			
Gram stain test			
			
Capsule test			
			

Note. Results of analysis of samples taken from the oral cavity of patients on ventilatory support in the ICU, pre and post oral hygiene technique observed under a microscope. Own source.

DISCUSSION

Based on the evidence analyzed, it can be said that oral hygiene in intubated patients is relevant for the prevention of complications. That is why several authors emphasize the commitment required by nursing staff to improve oral hygiene practices in this type of patient, however, from the perspective of Cantón and Garnacho (2012), "the basic oral hygiene measures that are aligned with the Zero Pneumonia Project are usually sufficient and include the use of chlorhexidine (0.12-0.2%) every 6-8 hours". This project is a proposal for a multifactorial intervention based on the simultaneous application of a package of measures for the prevention of ventilator-related pneumonia (MVN) with the intention of reducing this infectious complication at the national level, highly related to interventions implemented in daily nursing practice. It was found in the article "Bacterial biofilms and infection" (2020), that these complications are particularly problematic in hospital settings, and that, in addition, they delay the recovery period of patients by increasing the days of hospitalization, which leads to a socioeconomic expense for the

health system, despite the advances in medicine in recent years.

It is important to note that the results obtained in this case study are subject to the limitation of a small sample, which may affect the generalizability of the findings. Nevertheless, these results provide a valuable basis for future studies that could establish educational programs focused on prevention strategies for health complications associated with inadequate oral hygiene. This includes regular oral cleaning, the use of oral antiseptics, and ongoing staff training to ensure effectiveness in interdependent nursing care.

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