Cogitare Enfermagem

REVIEW

NURSING CARE IN THE OROTRACHEAL EXTUBATION PROCESS: INTEGRATIVE REVIEW

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ABSTRACT
Objective: To describe the nursing care in the process of orotracheal extubation of patients in an Intensive Care Unit.
Method: Integrative review with data collected between June 2017 and February 2018 through search to the following databases: Medline/PubMed, Literatura Latino-Americana e do Caribe em Ciências da Saúde (LILACS), Web of Science, Elsevier's Scopus Database, Banco de dados em enfermagem (BDENF), IBECS (Spanish Bibliographical Index in Health Sciences), and Portal of ANVISA (National Health Surveillance Agency of the Ministry of Health).
Results: In the 12 articles selected for meeting the inclusion criteria, 16 types of nursing care were identified, which are summarized in three moments: before, during and after extubation.
Conclusion: In the process of orotracheal extubation, the use of evidence-based nursing care is essential to ensure patient safety, prevent complications, and reduce hospitalization time and costs.

DESCRIPTORS: Nursing; Extubation; Patient safety; Intensive Care Units; Continuing Education.

HOW TO REFERENCE THIS ARTICLE:
Ezeagu TNM, Ribeiro ACG. Nursing care in the orotracheal extubation process: integrative review. Cogitare enferm. [Internet]. 2019 [access "insert day, monh and year"]; 24. Available at: http://dx.doi.org/10.5380/ce.v24i0.58144.

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REVISÃO / REVISIÓN

CUIDADOS DE ENFERMAGEM NO PROCESSO DE EXTUBAÇÃO OROTRAQUEAL: REVISÃO INTEGRATIVA

RESUMO

Objetivo: descrever quais os cuidados de enfermagem no processo de extubação orotraqueal de pacientes em Unidade de Terapia Intensiva.

Método: revisão integrativa com busca de dados entre junho de 2017 e fevereiro de 2018 nas seguintes bases: Medline/PubMed, Literatura Latino-Americana e do Caribe em Ciências da Saúde, Web of Science, Base referencial da Editora Elsevier, Banco de Dados em Enfermagem, Índice Bibliográfico Espanhol de Ciências da Saúde, e Portal da Agência Nacional de Vigilância Sanitária do Ministério da Saúde.

Resultados: nos 12 artigos eleitos por estarem em conformidade com os critérios de inclusão, foram identificados 16 cuidados de enfermagem que se resumem em três momentos: antes, durante e depois da extubação propriamente dita.

Conclusão: no processo de extubação orotraqueal, a aplicação de cuidados de enfermagem baseada em evidências é essencial para assegurar a segurança do paciente, prevenindo complicações, reduzindo tempo de internação e custos.

DESCRITORES: Enfermagem; Extubação; Segurança do Paciente; Unidades de Terapia Intensiva; Educação Continuada.

CUIDADOS DE ENFERMERÍA EN EL PROCESO DE EXTUBACIÓN OROTRAQUEAL: REVISIÓN INTEGRAL

RESUMEN

Objetivo: describir los cuidados de enfermería en el proceso de extubación orotraqueal de pacientes en Unidad de Terapia Intensiva.

Método: revisión integral con búsqueda de datos hecha entre junio de 2017 y febrero de 2018 en las siguientes bases: Medline/PubMed, Literatura Latinoamericana y del Caribe en Ciencias de la Salud, Web of Science, Base referencial del Editorial Elsevier, Banco de Datos en Enfermería, Índice Bibliográfico Español de Ciencias de la Salud, y Portal de la Agencia Nacional de Vigilancia Sanitaria del Ministerio de la Salud.

Resultados: en los 12 artículos seleccionados de acuerdo a la conformidad con los criterios de inclusión, se identificaron 16 cuidados de enfermería, lo cuales se resumen en tres momentos: antes, durante y después de la dicha extubación.

Conclusión: en el proceso de extubación orotraqueal, la aplicación de cuidados de enfermería basada en evidencias es esencial para garantizar la seguridad del paciente, previniendo complicaciones, reduciendo tiempo de ingreso y costos.

DESCRIPTORES: Enfermería; Extubación; Seguridad del Paciente; Unidades de Terapia Intensiva; Educación Continuada.

INTRODUCTION

Nursing practices can significantly reduce the incidence of complications associated with health interventions, such as health-care related infections (HCAI), which are associated with the orotracheal tube (OTT) used for mechanical ventilation[1-2].

Therefore, continuing education of the nursing team is one practice that can drive a change of behavior to ensure evidence-based health care [3].

Therefore, nurses should plan and organize interventions in a systematic way and stimulate nursing practices based on scientific knowledge in order to promote qualified nursing care, aimed to prevent or reduce the risks of such complications, as they contribute to increased morbidity, length of stay in the hospital bed, late recovery, high hospital costs and patient mortality in Intensive Care Unit (ICU) [4-7].

In such cases, knowledge of the care to be delivered to patients intubated with orotracheal tube (OTT) is essential for the prevention of ventilator-associated pneumonia (VAP), since this condition is facilitated by bacterial colonization caused by aspiration of contaminated secretions. Other complications that may be generated by the OTT are laryngeal and tracheal lesions caused by injury and ulceration due to excessive cuff inflation and premature accidental extubation, which can be caused by patient agitation, depression and anxiety, leading to reintubation and hence prolonged exposure to orotracheal intubation [8].

Therefore, ICU nursing care related to the withdrawal of the orotracheal tube (OTT), i.e. care provided during the orotracheal extubation process, should be based on the latest scientific evidence in order to become standard care in ICU routine[9,10]. Then, the following questions were posed: what nursing care should be provided to ensure a safe process of orotracheal extubation for ICU patients?

During nursing residency at a cardiac ICU, we realized that the absence of a routine for such care limited the correct planning of interventions. The absence of a nursing care routine that indicates the main care during the orotracheal extubation process of critically ill patients results in a slower recovery and other associated complications.

The purpose of this review was to describe the nursing care needed for the extubation process of ICU patients.

METHOD

The integrative review methodology was used here. This method gathers and synthesizes research results on a delimited topic, contributing to the deepening of the knowledge of the topic under investigation [11].

For the construction of the integrative review, the following steps were taken according to the Ganong methodological approach: identification of the theme and selection of a guiding question; establishment of criteria for inclusion and exclusion of studies and delimitation of the population in the literature; definition of information contained in the studies selected and their evaluation; interpretation of data, analysis of the literature and synthesis of the knowledge obtained [12].

For the construction of the guiding question of this study, the PICO strategy was used: P - population and problem; I - intervention; C - comparison and O - outcome. Thus, P: adult patients in an intensive care unit; I: nursing care during endotracheal extubation; C: does not apply because comparison between the types of care was not intended here; O: prevention of complications associated with extubation. In this regard, the question posed was: What nursing care is delivered at the time of patient extubation in an Intensive Care

Unit? [12].

The literature search was conducted from June 2017 to February 2018 in the following databases: The National Library of Medicine (NLM) in Medline/PubMed, Literatura Latino-Americana e do Caribe em Ciências da Saúde (LILACS), Web of Science, Elsevier's Scopus Database, Banco de dados em enfermagem (BDENF), IBECS (Spanish Bibliographical Index in Health Sciences), and at the Portal of ANVISA (National Health Surveillance Agency) of the Brazilian Ministry of Health. The descriptors "nursing" and "extubation", as well as their equivalents in the English and Spanish languages, were identified in Descritores em Ciências da Saúde (DeCS) and Medical Subject Headings (MeSH), associated with Boolean operator AND. In addition, a manual search of the cited references was carried out to confirm that the title and summary of the studies found were consistent with the theme of the present study.

The time frame comprised studies published between 2012 and 2018, available in full text in English, Portuguese and Spanish, which included a population or sample of patients older than 18 years hospitalized in ICUs and whose titles and abstracts were related to the theme of this study. Scientific studies of literature reviews and case studies were excluded. Figure 1 explains the search performed in the databases.

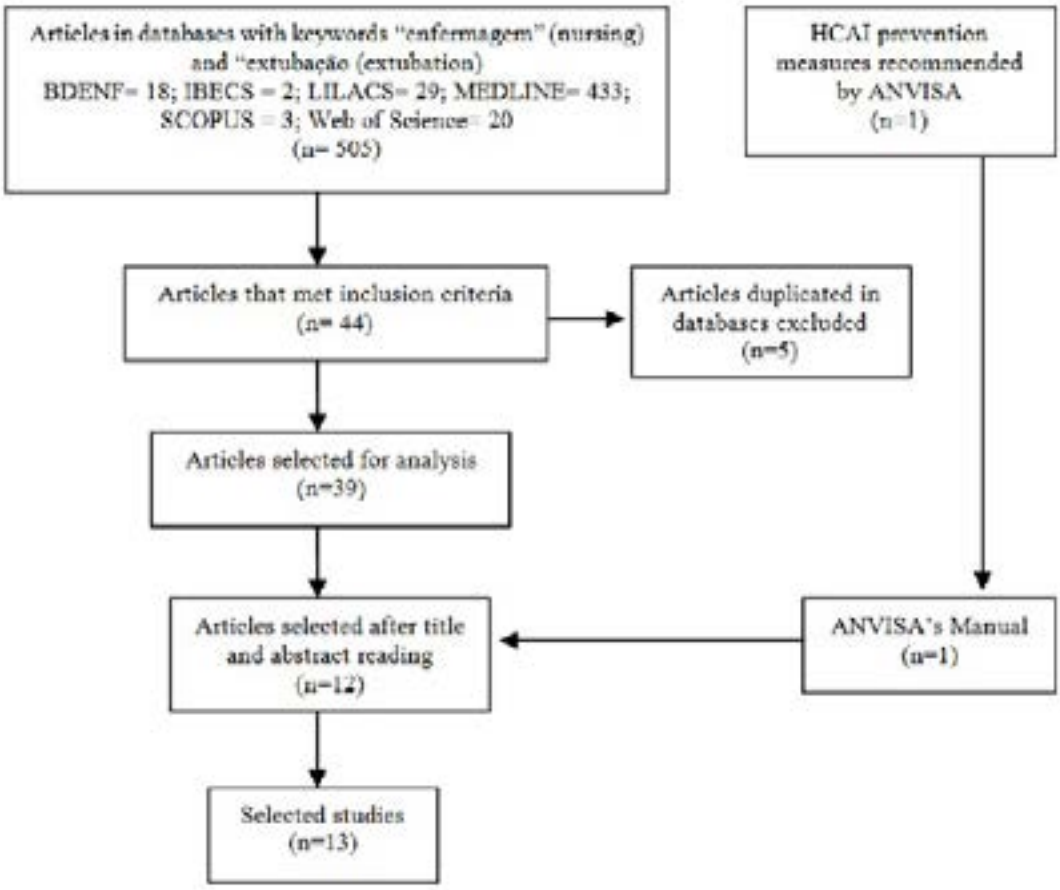

Figure 1 - Selection of scientific articles in databases. Curitiba, Paraná, Brazil, 2018

The initial search yielded 505 articles. Of these, 44 articles that met the inclusion criteria were selected. Five duplicated articles in two or more databases were excluded, totaling 39 articles. Subsequently, after the reading of the titles and/or abstracts, 12 articles were selected to compose the final sample.

In the data analysis process, two reviewers read the full text of the articles selected,

in order to determine if they contained data relevant to the theme or to the purpose of the study. Subsequently, a table summarizing the methodology, outcomes and conclusion of these studies was elaborated.

RESULTS

Table 1 includes the studies that meet all the eligibility criteria.

Table 1 – Studies on nursing care in the orotracheal extubation process that were selected. Curitiba, Paraná, Brasil, 2018 (continues)

IDENTIFICATION Author/Year/Title	METHODOLOGY	RESULTS AND CONSIDERATIONS
Wang, Ma e Fang (2013) Extubation with or without spontaneous breathing trial[13]	Prospective randomized double-blinded study in which patients admitted to a general ICU of a school hospital who were going to be liberated from mechanical ventilation were observed. The patients were separated into two groups during the mechanical ventilation weaning period. One underwent spontaneous breathing trial and the other did not.	During the extubation of patients on mechanical ventilation there was no significant difference between the groups. The spontaneous breathing trial was included in the weaning protocol of patients on mechanical ventilation of the ICU of this hospital. Decision making is made jointly by the physicians and nurses.
Fonseca, Azzolin e Vieira (2014) *Fatores associados ao tempo de ventilação mecânica nos pós-operatórios de cirurgia cardíaca*[14]	Retrospective longitudinal study that analyzed the medical records of patients undergoing surgery between 2012 and 2013 in the ICU of a general hospital.	Some factors were found to be associated with a prolonged intubation of patients under mechanical ventilation such as length of surgery, use of drugs for sedation, analgesia or vasoconstriction.
Rodrigues e colaboradores (2012) *Ventilação mecânica: evidências para o cuidado de enfermagem*[15]	Cross-sectional study with a quantitative approach in which questionnaires on mechanical ventilation were administered to nurses from 3 ICUs of a hospital.	In their answers, most nurses said they did not participate in the extubation process or performed tracheal aspiration.
Villa, Manara e Palese (2012) Nurses' near-decision-making process of postoperative patients' cardiosurgical weaning and extubation in an Italian environment[16]	A qualitative ethnographic study observed nurses in their work and interviewed them about the extubation process in patients of a cardiac ICU.	The nurses in patient care activities suggested extubation according to the criteria of state of consciousness by the Glasgow scale, body temperature, hemodynamic stability, respiratory parameters stability (respiratory rate - FR, positive expiratory pressure - PEEP, inspired oxygen fraction - FiO 2) and time elapsed after surgery, because the clinical factors are important in these processes.

Silva, Nascimento e Salles (2014) *Pneumonia associada à ventilação mecânica: discursos de profissionais acerca da prevenção*[17]	Descriptive qualitative study interviewed the nursing team and the physiotherapists of a general ICU about knowledge about the prevention of pneumonia associated with mechanical ventilation.	Nursing care to patients in mechanical ventilation weaning include hand hygiene, oral hygiene with antiseptic, aspiration of the oral and tracheal cavity preceded by pulmonary auscultation, verification of the positioning of the gastric tube and pre-extubation fasting, elevation of the head of bed at 30 to 45 degrees before and after the procedure, unless contraindicated, agreement between the members of the multidisciplinary team of the ICU to predict and anticipate extubation.
Preisig e colaboradores (2014) *Ventilação não invasiva após cirurgia cardiovascular: um Ensaio Clínico Randomizado*[18]	Study with patients in the immediate postoperative period of cardiovascular surgery after extubation. Extubation was performed according to level of consciousness, body temperature, hemodynamic stability, active bleeding requiring a new surgical intervention and tolerance to the spontaneous breathing trial.	The study showed that the oxygenation applied in the extubated patient in the postoperative period of cardiac surgery improved with the use of non-invasive ventilation.
Jeon e colaboradores (2016) Impact of delirium on weaning from mechanical ventilation in medical patients[19]	Prospective study with analysis of the records of patients in the weaning process of mechanical ventilation in an ICU and who were diagnosed with Delirium.	Delirium is directly associated with weaning difficulties, resulting in prolonged mechanical ventilation and failure of extubation, showing the importance of evaluating Delirium during weaning.
Duan e colaboradores (2015) Semiquantitative cough strength score for predicting reintubation after planned extubation[20]	Experimental study with patients with OTT in the ICU of a university hospital in the weaning process, to test the correlation between cough strength and peak cough flow. These patients were extubated according to the protocol of the referred hospital, with the head of bed elevated at 30 to 45 degrees during the procedure, hand hygiene of the professionals involved, oral hygiene of the patient, verification of the level of sedation by the Ramsey scale and orotracheal aspiration.	There is a strong correlation between cough strength and peak cough flow, showing that both methods have high sensitivity to predict and prevent reintubation of these patients.
Jiang e colaboradores (2014) Predicting weaning and extubation outcomes in long-term mechanically ventilated patients using the modified Burns Wean Assessment Program scores[21]	Retrospective cohort study with clinical data collection of patients diagnosed with respiratory failure in the weaning process. Patients on prolonged mechanical ventilation were evaluated with modified Burns protocol, used to predict the appropriate time for extubation.	The use of a protocol or routine for the weaning and orotracheal extubation process is efficient and should be considered for the prediction of this process in patients on prolonged mechanical ventilation.

Sedwick e colaboradores (2012) Using evidence-based practice to prevent ventilator-associated Pneumonia[22]	A qualitative and quantitative descriptive study with a structured protocol to expand existing care for patients in mechanical ventilation, adding to the existing protocol measures such as oral care, hand hygiene, bedside alarms, airway aspiration, and other tools that provided compliance feedback to reduce hospital costs with ventilator-associated pneumonia.	The interdisciplinary group formed by a nurse, a doctor and a physiotherapist implemented this project and noticed that there was an increase in the adherence of the professionals to the practices of the existing protocol (prophylaxis for vascular diseases, daily interruption of sedation for monitoring of possible extubation and elevation of the head of the bed).
Tanios e colaboradores (2014) Influence of sedation estrategies on unplanned extubation in a mixed intensive care unit[23]	A retrospective study evaluated cases of unplanned extubation of patients in mechanical ventilation, associated with the multidisciplinary ICU sedation strategy of a school hospital using a Richmond agitation sedation scale (RASS).	The number of unplanned extubations was different according to the sedation strategy. Extubation monitoring and / or planning should be part of the care of the multidisciplinary team in order to limit the occurrence of patient agitation.
Nassar Junior [tese doutorado] (2015) *Impacto da sedação intermitente ou interrupção diária da sedação em pacientes sob ventilação mecânica*[24]	A prospective randomized study evaluated patients hospitalized in ICUs, sedated for mechanical ventilation and submitted to discontinuation of sedatives divided into two groups: intermittent or daily interruption.	No difference was observed between the two groups. However, daily discontinuation of sedation was effective in reducing mechanical ventilation time.

For analysis of interventions recommended by the Ministry of Health in Brazil, the ANVISA manual containing measures aimed at improving patient safety and quality of health services and some care during mechanical ventilation weaning and endotracheal extubation(25). The nursing care found in the document is: hand hygiene; evaluate possibility of extubation and interruption of sedative medication daily; neurological evaluation; assessment of body temperature; assessment of hemodynamic stability; monitoring of respiratory parameters; keep the patient fasted; perform enteral probing in gastric or pyloric position when necessary; keep bed head elevated at 30 to 45 degrees; perform oral hygiene with chlorhexidine or other oral antiseptic; aspiration of the oral cavity and upper airways; check cuff pressure 0 for removal of the OTT; observe the moment of withdrawal of the OTT; use non-invasive mechanical ventilation after extubation; humidification of airways with inhalation and nebulization.

According to the aforementioned data, there is a series of care procedures in the orotracheal extubation process, which can be performed before, during or after the extubation that are required in the routine of the ICUs, as described in Table 2.

Table 2 – Nursing care in the process of orotracheal extubation. Curitiba, Paraná, Brazil, 2018 (continues)

Nursing care	**Objective**	**Moment of extubation**		
		Before	**During**	**After**
Evaluate and discuss with the multidisciplinary team the appropriate moment for extubation	Predict the best time for extubation according to the protocols of the institution	X		

Observe the administration of analgesic and sedative medication	Confirm the suspension of sedative and analgesic medications	X		
For surgical patients, observe the length of surgery and the time elapsed after surgery	Prevent early extubation of post-surgical patients	X		
Clean the hands and emphasize the need for hand hygiene to the nursing team	To prevent health care related infections caused by the transmission of microorganisms by nursing professionals	X		
Assess the level of consciousness with the Glasgow scale and Ramsey scale or RASS scale	Observe the degree of behavioral alertness and neurological reflexes	X	X	X
Assess body temperature	Identify signs of respiratory infections, such as high body temperature, that may result in difficult spontaneous breathing	X	X	
Assess hemodynamic stability	Check for physiological signs (vital signs, diuresis, O2 saturation, electrocardiogram, mean arterial pressure and other signs	X	X	
Evaluate respiratory stability through pulmonary auscultation, spontaneous breathing and cough test and monitoring of respiratory parameters (FR, FiO^2 and PEEP)	Ensure that the patient is able to breathe spontaneously and check if aspiration of the airways is necessary	X		
Keep patient fasted	Prevent pulmonary aspiration of stomach waste	X	X	
Perform enteral probing in gastric or pyloric position when necessary	Maintain nutrient supply if patient has difficulty swallowing	X		
Keep head of bed elevated at 30 to 45 degrees	Avoid pulmonary aspiration and facilitate pulmonary gas exchange		X	X
Perform oral hygiene with chlorhexidine or other oral antiseptic	Avoid respiratory tract infection due to oral residues	X		X
Aspirate oral cavity and upper airway through the OTT	Avoid infection and remove secretions from the upper respiratory tract that make gas exchange difficult	X		
Check cuff pressure 0 for OTT withdrawal	Facilitate cuff removal and avoid pharyngeal and/or laryngeal trauma	X		
Assist the moment of OTT withdrawal	The presence of the nurse can reduce complications by observing breathing parameters and performing orotracheal aspiration	X	X	X
Humidify the airways through inhalation and nebulization (use noninvasive ventilation)	Provide the humidification and O2 required to maintain minimal O2 saturation			X

DISCUSSION

The use of OTT allows the opening and permeability of the airways, besides providing specific care as the control of respiratory parameters through mechanical ventilation. The

complexity of this treatment involves intubation and orotracheal extubation, and both procedures may present complications [26].

Studies show that the establishment of protocols and routines for the moment of orotracheal extubation are of paramount importance, as they clarify the main care needed to organize nursing care and prevent complications [21-23].

The studies addressed in this review provide guidance on nursing care targeted to the reduction of HCAI, such as hand hygiene, patient oral hygiene with chlorhexidine gluconate 0.12%, orotracheal aspiration and upper airway suctioning, elevation of the head of bed, control of OTT cuff pressure, avoid unnecessary sedation during mechanical ventilation weaning, provide ventilation weaning at the moment of extubation. It can be seen that these care procedures reflect a permanent concern with the reduction of local microbiota that has the potential to generate infections and pulmonary aspiration [3,22,26].

The essential measures for the prevention of HCAI include an extensive range of specific care procedures, mostly related to the process of mechanical ventilation weaning. To increase patient safety at the time of withdrawal of the orotracheal tube (OTT), these interventions involve both the nursing staff and other health professionals [26].

A neurological assessment, as well as an assessment of patient consciousness level was considered important, since patients may have difficulty maintaining spontaneous breathing without the use of an OTT because of the prolonged effect of sedative medications at the time of extubation [19,24].

Criteria for extubation should include neurological assessment, body temperature, hemodynamic and respiratory stability with spontaneous breathing trial to determine the patient's pathophysiological conditions[16,18]. These tests aim to reduce the risks of extubation failure, such as delirium, which is a state of acute mental confusion, and which is directly associated with the difficulty of mechanical ventilation weaning and the need to re-intubate ICU patients [19].

One study diverged in the item related to the need for spontaneous breathing trial, suggesting that the nursing team and physicians should decide the best time for extubation in a more subjective way [13]. However, another study suggests that a cough test in the extubation process is crucial for extubation [20].

Regarding restriction of sedatives and analgesics, several authors agree that a daily assessment of medication should be performed when a possible extubation is considered [13-14,19-20,22-24].

Immediate oxygenation by inhalable mist ensures a minimum oxygen support, fasting associated with check of nasogastric or nasoenteral tube are also indicated to prevent pulmonary aspiration of gastric contents [17].

Besides addressing direct nursing care, the authors also discussed the interdisciplinary character of the multidisciplinary team at the time of extubation when these health workers must reach an agreement through open dialogue[13,15,17,22].

One study reported a lower participation of nurses in these discussions, suggesting that few nurses perform care procedures associated with this process, despite being capable of assessing ventilation parameters and participate in the discussions of the multidisciplinary team, because of the high demand of these sectors [15].

For this reason, the first point of Table 2, which concerns the planning of the multidisciplinary team to define the most appropriate moment for orotracheal extubation is justified. This point defines the beginning of a nursing care routine during the process of orotracheal extubation, in order to guarantee patient safety and allow the quality of nursing team services.

The present study has some limitations. One of them is the heterogeneity of the selected studies, as the research objects varied significantly. Also, in order to meet the objective of this study, it was necessary to search the terms that most closely described the orotracheal extubation process in order to identify the nursing care required in this process. Another limitation was the complex data analysis to extract nursing care targeted specifically to the process of orotracheal extubation.

CONCLUSION

The involvement of nurses and their staff in the extubation process contributes to patient integrity, prevent complications, and reduce length of hospital stay costs associated with ICU stay. Therefore, establishing protocols to improve nursing care helps clarify the duties and responsibilities of nurses. With the systematization of these practices, nurses become indispensable to the planning of high-quality care.

Nursing professionals must be updated on the latest advancements and be able to perform their actions in the best possible way. This study also aims to clarify the importance of nurses' performance in critical patient care.

Other studies that address nurses' perception of activities related to the multidisciplinary process of orotracheal extubation at the time of mechanical ventilation weaning and orotracheal extubation and verification of the impact of such care on the reduction of HCAI are recommended.

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Received: 27/02/2018
Finalized: 13/03/2019

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Role of Authors:
Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work - TNME
Final approval of the version to be published - ACGR