CUIDADOS DE ENFERMAGEM: PREVENÇÃO DE PNEUMONIA ASSOCIADA À VENTILAÇÃO MECÂNICA

NURSING CARE: PREVENTION OF PNEUMONIA ASSOCIATED WITH MECHANICAL VENTILATION

ATENCIÓN DE ENFERMERÍA: PREVENCIÓN DE NEUMONÍA ASOCIADA A VENTILACIÓN MECÁNICA

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RESUMO

Objetivo: identificar os cuidados de Enfermagem na prevenção de pneumonia em pacientes sob o uso de ventilação mecânica invasiva. Método: trata-se de um estudo bibliográfico, descritivo, tipo revisão integrativa, de artigos publicados entre os anos de 2013 a 2018, nas bases de dados MEDLINE, LILACS e BDENF, publicados em português, inglês e espanhol. Realizou-se a leitura de títulos, resumos e texto completo que responderam ao objetivo e à pergunta condutora, e, seus resultados discutidos e apresentados em tabelas. Resultados: evidenciou-se, após a análise dos artigos encontrados, que a equipe de Enfermagem tem insigne participação na prevenção e cuidados à Pneumonia Associada à Ventilação Mecânica, todavia, são encontradas barreiras no cotidiano do profissional, impedindo-os de aplicar boas práticas a essa abordagem, como domínio insuficiente à falta de recursos necessários. Conclusão: evidenciou-se escassez de estudos publicados em português com relação direta com a temática e de acordo com observações feitas e, por meio de estudo, foi elencada a necessidade de educação continuada aos profissionais, além de mais implementações para o apoio ao serviço de Enfermagem.

Descritores: Educação Continuada; Cuidados de Enfermagem; Unidades de Terapia Intensiva; Respiração Artificial; Pneumonia; Enfermagem de Cuidados Críticos.

ABSTRACT

Objective: to identify nursing care in the prevention of pneumonia in patients under use of invasive mechanical ventilation. Method: this is a bibliographic, descriptive, integrative review-type study of articles published between 2013 and 2018 in the MEDLINE, LILACS and BDENF databases, published in Portuguese, English and Spanish. Titles, abstracts and full text were read, which answered the objective and the leading question, and their results discussed and presented in tables. Results: it was evident, after the analysis of the articles found, that the Nursing team has an outstanding participation in the prevention and care of Pneumonia Associated to Mechanical
Ventilation, however, barriers are found in the daily life of the professional, preventing them from applying good practices to this approach, as insufficient domain to the lack of necessary resources.

**Conclusion:** there was a scarcity of studies published in Portuguese with a direct relation to the subject and according to observations made and, by means of study, the need for continued education for professionals was listed, in addition to further implementations to support the Nursing service.

**Descriptors:** Continuing Education; Nursing Care; Intensive Care Units; Artificial Breathing; Pneumonia; Critical Care Nursing.

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**RESUMEN**

**Objetivo:** identificar la atención de Enfermería en la prevención de la neumonía en pacientes que utilizan ventilación mecánica invasiva. **Método:** se trata de un estudio tipo revisión bibliográfica, descriptiva, integradora de artículos publicados entre 2013 y 2018, en las bases de datos MEDLINE, LILACS y BDENF, publicados en portugués, inglés y español. Se leyeron títulos, resúmenes y texto completo, que respondieron al objetivo y a la pregunta principal, y sus resultados discutidos y presentados en tablas. **Resultados:** se evidenció, luego de analizar los artículos encontrados, que el equipo de Enfermería tiene una participación insignificante en la prevención y atención de la Neumonía Asociada a la Ventilación Mecánica, sin embargo, se encuentran barreras en la rutina diaria del profesional, impidiéndole aplicar buenas prácticas a este enfoque, como dominio insuficiente debido a la falta de recursos necesarios. **Conclusión:** hubo una escasez de estudios publicados en portugués en relación directa con el tema y de acuerdo con las observaciones realizadas y, mediante un estudio, se enumeró la necesidad de educación continua para los profesionales, además de más implementaciones para apoyar el servicio de Enfermería.

**Descriptores:** Educación Contínua; Atención de Enfermería; Unidades de Cuidados Intensivos; Respiración Artificial; Neumonía; Enfermería de Cuidados Críticos.

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It is understood that Ventilator Associated Pneumonia (VAP) is one of the most common complications in Intensive Care Units (ICUs) around the world,\textsuperscript{1} because about 27\% of patients in intubation develop VAP after 48 hours of endotracheal intubation,\textsuperscript{2} and the risk of contamination is 1\% to 3\% for each day in use of ventilatory support\textsuperscript{1}. VAP occurs as a result of pulmonary inflammation after intubation, and the mechanical process of intubation compromises the natural barrier between the oropharynx and the trachea, facilitating the entry of bacteria into the lungs.\textsuperscript{3}

This is seen as a complication that generates higher costs for the hospital, such as the estimated increase of almost forty thousand reais, because the patient will have to stay longer in support of mechanical ventilation and use of drugs, and this longer stay also increases mortality and morbidity.\textsuperscript{4}

According to the World Health Organization (WHO), pneumonia is defined as an acute inflammatory disease that affects the lungs and can be caused by microorganisms such as bacteria, viruses, fungi or the inhalation of some toxic products and can be acquired by air, saliva, secretions, blood transfusion and possibly climate change.\textsuperscript{5}

The ventilatory support is classified in two groups, being the Invasive Mechanical Ventilation (IMV) and Non Invasive (NIV), however, both types of ventilation are artificial and achieved through the application of positive pressure in the airways. It is explained that the difference between the two is in the form of pressure release: while in the IMV, an oro or nasotracheal tube is used, being this less common, or a tracheostomy cannula, in the NIV, a mask is used as interface between the patient and the artificial ventilator.\textsuperscript{6}

It is known that the ICU is a place that causes fear to most patients, as it is there where some more serious hospitalizations are found, which require specific care and routine monitoring. Some exclusive characteristics are brought to this place, such as, for instance, the daily coexistence of professionals with sick patients and considered in risk situations. Nursing is a profession that is very familiar with the unit, because it is an area where Nursing care is considered fundamental for the maintenance of the patients' health.\textsuperscript{7}

The ICU is elucidated as an environment of so many technological dependencies, multiple devices, discomfort and lack of privacy, which further influences the need for a not so biomedical model of assistance. Nursing care is given in the midst of this turbulent day by day, and it is
important to aim at an empathetic relationship in which dialogue, presence and the type of approach used to each patient are valued.  

This understanding shows how much Nursing provides service and accompanies patients in an ICU so intimately: what does not change when it comes to mechanical ventilation. It is a procedure that brings many benefits to those who need it; however, some complications can accompany this process, which requires, from the Nursing professional, a physiological and anatomical understanding for the quality to be achieved.

Some procedures for the prevention of VAP are exemplified, which contain some possible cares that are linked to the practice of Nursing, in accordance with the Resolution No. 639/2020 of the Federal Council of Nursing (COFEN), which provides on the competencies of the nurse in the care of patients on mechanical ventilation in the extra and intra-hospital environment.

It is evident, therefore, that the nurse has as competence some procedures entirely connected with the care, mainly, of the preventive care of the incidents associated to the contamination, as, for example, the monitoring of the cuff pressure, the accomplishment and the evaluation of the necessity of aspiration of the airways in the patients under mechanical ventilation, the accomplishment and/or prescription of oral hygiene. The Institute for Healthcare Improvement (IHI) created the Ventilation Bundle, in which measures for the prevention of VAP are instituted based on scientific evidence. The implementation of such measures is related to the reduction of VAP incidence, being of great relevance the implementation of the Ventilation Bundle during nursing assistance in ICUs.

To identify nursing care in the prevention of pneumonia in patients under use of invasive mechanical ventilation.

It is a bibliographic, descriptive, integrative literature review type study, which aims to gather and synthesize results of research already published, providing a deepening on the subject under study, in addition to pointing out gaps in knowledge that will be filled with the elaboration of new researches. The study was prepared based on the following steps: formulation of the research question; establishment of inclusion and exclusion criteria; definition of the information that will be extracted from the selected articles; evaluation of the articles for the analysis of the results; interpretation of the results and presentation of the integrative review. The research was based on the question: "What are the impacts of nursing care in preventing pneumonia in patients under mechanical ventilation?". The survey was conducted throughout the
month of May 2020. Initially, articles were selected through the following databases: Latin American and Caribbean Literature in Health Sciences (LILACS); Medical Literature Analysis and Retrieval System Online (MEDLINE) and Nursing Database (BDENF). The advanced search method was listed, categorized by title, abstract and subject, using the DeCS (Descriptors in Health Sciences) descriptors: Cuidados de Enfermagem; Pneumonia; Respiração Artificial; Nursing Care; Pneumonia; Artificial Respiration; Atención de Enfermería; Neumonía; Respiración Artificial, associated with the Boolean “AND” in the databases mentioned above.

The following were defined as inclusion criteria: full texts available; original studies in Portuguese, English and Spanish; which were published in the years 2013-2018, choosing the time span of six years, in order to have a more reliable scientific rigor. Articles that, after reading the title and abstract, did not include the subject of the study in question, repeated publications in the databases, review articles, theses and repetition of titles were excluded (Figure 1).
The results were compared after the development of the criteria, by two researchers, independently, in order to verify the adequacy to the eligibility criteria. After reading the full text, studies were selected that corresponded to the objective and answered the guiding question to support the construction of this integrative review.

The evidence for the studies was classified considering the hierarchy of evidence for intervention studies into: Level I - systematic review or meta-analysis; Level II - controlled and randomized studies; Level III - controlled studies without randomization; Level IV - case-control or cohort studies; Level V - systematic review of qualitative or descriptive studies; Level VI - qualitative or descriptive studies and Level VII - opinions or consensus.\(^\text{14}\)

The discussion was correlated from the results of the studies, providing the creation of proposals for the problems listed through the critical analysis of the studies, which are: continuing education for professionals in the management of mechanical ventilation; implementing nursing care prevention of VAP; conducting evaluation after the implementation of interventions.

From the crossing of the descriptors of the listed bases, 559 articles were raised and, after the application of the inclusion criteria, 91 articles remained. 75 articles were excluded after the application of the exclusion criteria, and 16 publications remained. Eleven articles were also excluded after the full reading, because they did not comply with the objective of the study or did not answer the guiding question, remaining five, which were support for the construction of this integrative review.

It is revealed that 80% (n=4) of the articles explored were published in American journals and 20% (n=1) were published in Brazilian journals, with no publications being found in Spanish. It is detailed that all the studies used in the construction were of the qualitative type, because they always sought to analyze the actions developed, as well as to describe if there was improvement in the implementation.

The analysis and the final synthesis of the studies were organized in a validated instrument that evaluated authors, year of publication, country and type of study (Figure 2), and the second included title, objective, level of evidence and synthesis of the results of the studies (Figure 3), in order to answer the guiding question and the objective of the study, containing bibliographical references and fulfilling the ethical aspects to solidify the truthfulness of this review.
Figura 2. Resultados encontrados nos estudos de acordo com o autor, o ano de publicação, o país e o tipo de estudo. Caruaru (PE), Brasil, 2020.

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Country</th>
<th>Type of study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aloush</td>
<td>2017</td>
<td>Jordan</td>
<td>Observational, of the descriptive type</td>
</tr>
<tr>
<td>Aloush</td>
<td>2017</td>
<td>Jordan</td>
<td>Controlled randomized clinical trial</td>
</tr>
<tr>
<td>E Akikorhan, Peru; G Hakverdio; S Parlar Kılıç.</td>
<td>2013</td>
<td>Turkey</td>
<td>Cross-sectional, qualitative type study</td>
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<tr>
<td>Sabrina Gutieres da Silva; Eliane Regina Pereira do Nascimento;</td>
<td>2014</td>
<td>Brazil</td>
<td>Descriptive study, qualitative type study</td>
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<tr>
<td>Raquel Kuerten de Salles</td>
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<tr>
<td>Miia M. Jansson; Tero I. Ala-Kokko; Pasi P. Ohtonen; Merja H.</td>
<td>2014</td>
<td>Finland</td>
<td>A controlled randomized clinical trial</td>
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<tr>
<td>Meriläinen; Dr. Hannu P. Syrjälä; Helvi A. Kyngäs.</td>
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| Title                                                                 | Objective                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Level of evidence | Summary of Results                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|-----------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nurses’ implementation of ventilator-associated pneumonia guidelines:   | Evaluate nurses’ adherence to VAP prevention guidelines and the factors that influence their adherence.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | VI               | The main nursing care addressed in the article, standardized by the guidelines, are: hand hygiene; oral hygiene; endotracheal tube aspiration; patient position and team training and education. This study found that the adherence of nurses to the VAP prevention guidelines is low, and may be related to the lack of continued education and training for nurses. In this study, 42% of nurses reported never having received continuing education on VAP and 41% never having received continuing education on mechanical ventilator management. |
| an observational study in Jordan                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Does educating nurses with ventilator-associated pneumonia guidelines  | Compare compliance with VAP prevention guidelines between nurses who have undergone an intensive educational program and those who have not, and investigate other factors that influence nurse compliance.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | II              | Lack of resources, insufficient compliance with infection control standards, and inadequate knowledge about VAP among health professionals are factors that help in the incidence of this infection. Some institutions have applied guidelines for treatment/prevention of these infections and studies show that, when correctly applied, they have reduced VAP, however, the application of these guidelines by nurses is still uncertain due to a gap in the knowledge of nursing professionals about VAP care associated with fatigue due to excessive workload, bringing the importance of training, through the implementation of continuing education.                                                                                                                                                                                                 |
| improve their compliance                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Knowledge levels of intensive care nurses on prevention of VAP         | Assess the knowledge of nurses working in ICUs in general about evidence-based measures for VAP prevention.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | VI              | The study points out the following methods that are being implemented to prevent and manage VAP: unnecessary non-intubation; careful aspiration of subglottic secretions; keeping the head above 30º and respiratory physiotherapy. The study brings critical reflection on the awareness of nurses and the importance of their care to prevent VAP, pointing out in them a deficiency in knowledge at theoretical and practical levels before these cares and, as a solution, a continued education, providing a higher level of knowledge for professionals in the area and thus the improvement in service and for patients who are in the ICU using mechanical ventilation.                                                                                                                                                                                                 |
It was recognized, in the analysis of the studies, the responsibility that Nursing has for being in direct and continuous contact with the patient. Its assistance is important in the prevention of VAP, with hospital infection being the most common complication in ICU patients. The physically and psychologically affected patient can remain in the hospital for a long time, causing his/her dissatisfaction, besides increasing his/her mortality risk and generating additional costs for the institution.4

Analyzing the studies included in the survey, unanimous results were identified, such as the incidence rate of VAP in ICU patients, which is high (27%) in those who used mechanical ventilation, demonstrating its appearance commonly 48 to 72 hours after installation of the ventilator. It was reported, by most publications, that nurses did not perform the nursing care that are recommended by the guidelines, such as prevention of VAP, demonstrating a gap in knowledge on the part of professionals regarding these cares, and all studies brought, as a proposal, continued education.

Based on this premise, it is detailed that the studies brought interventions to achieve positive results in the fight against VAP, which are detailed below.

**Continued education for professionals in the management of mechanical ventilation**

It is pointed out that, in a uniform way, the studied articles brought, as a proposal, the implementation of continued education, because most of the studies reported that the nurses do not perform the VAP prevention care, which are scientifically recommended, due to lack of knowledge, showing insecurity in their professional performance.15

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**Table:**

<table>
<thead>
<tr>
<th>Human patient simulation education in the nursing management of patients requiring mechanical ventilation: a randomized, controlled trial</th>
<th>Assess the effectiveness of human patient simulation (HPS) education in nursing management of patients requiring mechanical ventilation.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Due to the low compliance and knowledge of intensive care unit nurses regarding VAP care, a study was conducted to evaluate their knowledge before and after continuing education, with the support of a human patient simulator, where an evidence-based package of interventions was used to prevent VAP, demonstrating significant improvement in knowledge and better compliance in the applicability of nursing care guidelines to VAP.</td>
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**DISCUSSION**

Figure 3: Results found in the studies according to the title, objective, level of evidence and synthesis of the studies results. Caruaru (PE), Brazil, 2020.
The significance of health institutions applying the continuing education method to intensive care nurses is evident, since the ICU is a place where critical patients who need intensive care are submitted and, most of the time, they need ventilatory support and continuous monitoring, thus demonstrating the importance of safely performing the whole technique.

It is known that continuing education is an educational process that goes beyond the formation of an individual, therefore, in concept; it means always updating the technique and scientific understanding in specific themes, informing oneself about the new discoveries of science and their consequences for the daily action in their profession.

**Implementation of Nursing Care**

The implementation of measures during nursing care in ICUs has demonstrated a decrease in the incidence of VAP in patients under mechanical ventilation and, when implemented together, these have resulted in substantial improvements in health care in the institutions brought about by the studies. The following are measures of intervention in the studies:

- **Oral hygiene with 0.12% chlorhexidine** - developing adequate oral hygiene using 0.12% chlorhexidine gluconate, three times a day, there is a decrease in salivary production and impossibility of chewing, favoring the appearance of dental biofilm, which can be an important reservoir for pathogens that, if bronchospirates, can cause VAP.

- **Headboard elevation between 30-45°** - is evidenced as an intervention to avoid bronchoaspiration, especially in patients who are receiving enteral nutrition, also contributing to an improvement in the ventilatory tidal volume, decreasing, even, the cases of atelectasis.

- **Cuff pressure between 20-30 cm H₂O** - maintaining the adequate cuff pressure, the trachea should be sealed to prevent microaspiration of subglottic secretions to the lower respiratory tract, which are potentially causing VAP; at the same time, the pressure should not be high, since hyperinflation can cause local ischemia, which can evolve with stenosis, fistulas and tracheomalacia.

- **Care of secretion aspiration** - Patients submitted to MV, when they are sedated, are deprived of the cough reflex, accumulating secretions above the cuff of the endotracheal cannula; aspiration serves to reduce the accumulation of these secretions, maintain the patent airways and reduce the risk of consolidation and atelectasis, which can lead to inadequate ventilation.

- **Hand sanitizing** - the hygienization of hands following the correct technique is recommended, because it is characterized as the simplest and most effective method when
referring to prevention and control of dissemination; it should be performed by the professional before and after any handling on the patient.\textsuperscript{22}

**Carry out evaluation after the implementation of the interventions**

In order to obtain the expected indicators of VAP improvement after the implementation of the interventions, it is necessary to be sure that all the prevention measures were, in fact, carried out by the professionals. It is added that the awareness about the magnitude of actions and their influence on health outcomes have potential to motivate behavior change among professionals, with impact on process and outcome indicators.\textsuperscript{20}

It is believed that it is important to have the VAP indicators before implementing interventions, so that it is possible to make a comparative improvement and evaluate the reduction in incidence, after the implementation of prevention interventions in patients with invasive mechanical ventilation in the ICU.\textsuperscript{23} The team registers all the prevention measures that have been carried out on the patients properly as established. An indicator of the percentage of cases that did not have the VAP after the implementation of interventions was generated, making a comparison with the cases that did not have these implementations of the measures recommended for data generation.

It is evaluated that, after performing this evaluation of the results after implementing the prevention strategies, it was noted a significant improvement in the assistance provided, as well as in the adherence by professionals in the practice of these cares, and a drop in the incidence of VAP in patients with the use of the mechanical ventilator, reducing their length of stay, ensuring quality assistance in the institutions studied.

**CONCLUSION**

From the ideas reflected in this study, it is inferred that the actions of Nursing for the control of VAP are of extreme importance within the therapeutic and care context in the hospital. It is added that continued education and the adoption of measures based on scientific evidence, as well as health protocols, correspond to improvements in the aspects in question. It is also evident that the implementation of the interventions listed to support the Nursing service is a concrete act that can be performed by the teams within the hospital dynamics, taking into consideration methods to avoid VAP, according to most of the publications obtained.

It is clear, then, that the study corroborates the future implementation of good practices in Nursing, associated with initiatives to implement improvements to combat VAP, bringing desired effect to the reality of critical care patients, as well as corroborating an assistance based on scientific knowledge and technical skills that relate to Nursing as an essence: the care.

With the idea of the study, it is possible to propose follow-up research on the prevention of pneumonia related to mechanical ventilation, involving Nursing as a craftsman and the starting
point for the proposed unveiling, as well as on the performance of Nursing and its interventions by
nomenclatures and protocols of the Ministry of Health, giving, finally, more emphasis to the
Portuguese language, in which the studies were scarce for the theme.

CONTRIBUTIONS

It is informed that all authors contributed equally in the conception of the research project,
collection, analysis and discussion of the data, as well as in the writing and critical review of the
content with intellectual contribution and in the approval of the final version of the study.

CONFLICT OF INTERESTS

Nothing to declare.

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