

# CUIDADO É FUNDAMENTAL

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RESEARCH

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## Ventilator-Associated Pneumonia: the Knowledge of Health Professionals Towards Prevention and Educational Measures

Pneumonia Associada à Ventilação Mecânica: Conhecimento dos Profissionais de Saúde Acerca da Prevenção e Medidas Educativas

La Neumonía Asociada a la Ventilación Mecánica: el Conocimiento de los Profesionales de la Salud Acerca de las Medidas de Prevención y Educación

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### ABSTRACT

**Objective:** The study's purpose has been to assess the knowledge of health professionals with regards to the prevention of ventilator-associated pneumonia (VAP) in critically ill patients admitted to Intensive Care Units (ICUs), and also to promote Continuing Education (CE) for ICUs' professionals on VAP prevention.

**Methods:** It is a cross-sectional study with a both quantitative and qualitative approach. Data were collected from August to October 2015 through a questionnaire, and subsequently analyzed by the Microsoft Excel 2013 and the Epi Info 7 softwares. The study was carried out by 28 health professionals. **Results:** 43% reported being knowledgeable about prevention bundle; 36% mentioned that they had participated in some training on the topic; 96% showed some interest in receiving specific training; Only 25% gave the correct answer with regards to the ideal cuff pressure; 96% said they assessed daily withdrawal from sedation. After analysis, a CE was performed with the professionals. **Conclusion:** It was evidenced that there is some insubstantiality in the professionals' knowledge concerning the VAP prevention.

**Descriptors:** Ventilator-Associated Pneumonia, Intensive Care Unit, Hospital Infection, Continuing Education.

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## RESUMO

**Objetivo:** Avaliar o conhecimento dos profissionais de saúde sobre a prevenção da Pneumonia Associada à Ventilação Mecânica (PAVM) em pacientes críticos internados nas Unidades de Terapia Intensiva (UTIs) e, promover educação permanente (EP) para profissionais das UTIs sobre prevenção de PAVM. **Métodos:** Estudo transversal, quanti-qualitativo. Os dados foram coletados, entre agosto e outubro de 2015, através de um questionário e analisados através dos Softwares Microsoft Excel 2013 e Epi Info 7. Participaram da pesquisa 28 profissionais de saúde. **Resultados:** 43% afirmou ter conhecimento sobre bundle de prevenção; 36% citaram já terem participado de algum treinamento sobre a temática; 96% manifestou interesse em receber algum treinamento específico; apenas 25% responderam corretamente a pressão ideal do *cuff*; 96% afirmou avaliar, diariamente, a retirada da sedação. Após a análise, foi realizada uma EP com os profissionais. **Conclusão:** Evidenciou-se que existe uma fragilidade no conhecimento dos profissionais relativo à prevenção de PAVM.

**Descritores:** Pneumonia Associada à Ventilação Mecânica, Unidades de Terapia Intensiva, Infecção Hospitalar, Educação Permanente.

## RESUMEN

**Objetivo:** Evaluar los conocimientos de los profesionales sanitarios en la prevención de la neumonía asociada a la ventilación mecánica (NAV) en pacientes críticamente enfermos en unidades de cuidados intensivos (UCI) y promueven la formación permanente (EP) para los profesionales de la UCI sobre la prevención de la NAV. **Métodos:** Estudio transversal, cuantitativo y cualitativo. Los datos fueron recogidos entre agosto y octubre de 2015, mediante un cuestionario y analizados mediante el software de Microsoft Excel 2013 y Epi Info 7. Búsqueda de 28 profesionales de la salud participaron. **Resultados:** el 43% afirmó tener conocimiento sobre la prevención del haz; 36% informó haber participado en algún tipo de formación sobre el tema; 96% expresó su interés en recibir formación específica; sólo el 25% respondió correctamente la presión del manguito ideales; 96% dijo que evaluaban la eliminación diaria de la sedación. Después del análisis, EP se realizó con los profesionales. **Conclusión:** Se ha demostrado que existe una debilidad en el conocimiento de los profesionales en la prevención de la NAV.

**Descriptor:** Neumonía Asociada al Ventilador, Unidad de Cuidados Intensivos, Hospital Infection, Educación Permanente.

## INTRODUCTION

The risks of Health-Related Infections (HRI) exist in different hospital environments. Among these environments, we highlight the Intensive Care Unit (ICU), considered a scenario of high complexity, and must have material and human resources that allow effective assistance. This unit, because it is considered a high risk, is characterized by intensive care, in other words, it must be provided quickly, because it involves many procedures, produces a lot of information, and is carried out by a large team of professionals who, in the midst of patients must deal directly with life and death situations in which decisions must be made quickly.<sup>1</sup>

ICUs are recognized as sectors that are vulnerable to the occurrence of incidents and adverse events, since some factors contribute to this achievement, such as the complexity of the cases, the need for urgent high-risk decision-making,

the lack of prior information about the state of the variability of the training of professionals working in this area, and the greater frequency of diagnostic and therapeutic procedures in comparison with other hospital sectors.<sup>2</sup>

In this perspective it is necessary to implement risk management in hospital organizations, aiming to apply a set of measures to predict, identify and minimize the occurrence of unexpected and undesirable events that can cause physical or psychological harm to patients. Its purpose is the early detection of situations that may have consequences for people, institutions, and the environment.<sup>3</sup>

Studies show that the most frequent HRIs in the ICUs are mechanical Ventilator-Associated Pneumonia (VAP) with rates varying from 9% to 67% of patients submitted to mechanical ventilation, which, in addition to prolonging Mechanical Ventilation (MV) time, increasing the length of hospital stay implies high treatment costs and high mortality rates.<sup>4</sup>

VAP is an infection that occurs in the lung parenchyma, strikes bronchioles and respiratory alveoli, damaging gas exchange. This can develop in patients who use the mechanical ventilator in the ICU.<sup>5</sup> Being diagnosed after 48 hours of mechanical ventilation until their suspension.<sup>6</sup>

Prevention can reduce the number of patients affected by this infection and, consequently, reduce the use of drugs such as antibiotics, the permanence of these patients in the hospital and the mortality rates associated with this infectious complication.<sup>5</sup>

Healthcare professionals can contribute to the prevention of this infection. Thus, it is necessary that these professionals have specific knowledge related to prevention care so that effective measures are adopted.<sup>4</sup>

Given the aforementioned, it is noticed that the patient's care in mechanical ventilation is a priority since it is a population with high morbidity and mortality rates. In this perspective, the Institute for Healthcare Improvement (IHI) created a bundle (care package approach) related to ventilation where measures are established on the basis of scientific evidence for the prevention of VAP. The practice of these measures is related to the decrease in the incidence of VAP, and the implementation of the ventilation bundle during intensive care units is of great relevance.<sup>7</sup>

Bearing this in mind, the present study aimed to assess the knowledge of health professionals about the prevention of VAP in critically ill patients admitted to the Intensive Care Units and also to promote continuing education for ICU professionals about the VAP prevention.

It is believed that the monitoring of VAP indexes is important because it is one of the indicators that measure the quality of care provided by the health service. Furthermore, investigating the knowledge of professionals working in the Intensive Care Units on the prevention of VAP can contribute to the reduction of these indexes since

innumerable interventions can be planned together with the team based on the results of this study, seeking to improve the multi-professional practices of critical patient care.

## METHODS

It is a cross-sectional study with a both quantitative and qualitative approach. The research was performed at the *Santa Casa de Misericórdia* from Sobral city, Northern region of the *Ceará* State, in the Intensive Care Units (Adult ICUs 1 and 2, Pediatric ICU and Neonatal ICU).

Participants in this study were higher-level professionals (nurses, physicians, physiotherapists, and nursing residents) who were linked to the unit during the study period. The choice was made by the importance of these care professionals in the direct care of ICU patients.

A total of 28 health professionals were divided into 14 nurses (50%), 05 physiotherapists (18%), 06 physicians (21%) and 03 residents (11%). The adherence of the professionals divided by sectors of intensive care units were as follows: adult ICU 1 - 09 professionals (32%); Adult ICU 2 - 03 professionals (11%); Pediatric ICU - 07 professionals (25%); Neonatal ICU - 09 professionals (32%). Selected according to the following criteria: to have been in the service for more than six months and to agree to voluntarily participate in the research.

Data collection was done through a questionnaire-semi-structured based on the bundle of prevention of pneumonia associated with mechanical ventilation.

Initially, the professionals were approached by the interviewers in service and invited to participate in the study, answering an instrument composed of 15 questions, being divided into 14 objective and 01 subjective, in order to evaluate their knowledge about VAP.

After data collection, the software Microsoft Excel 2013 and Epi Info 7 were used for analysis and tabulation of the results. In the answers to the subjective question, a content analysis was carried out, where we verified the terms most mentioned by the professionals and based on this listing, the moment of permanent education for the professionals was planned and carried out according to the needs indicated by them.

Aiming to better analyze the data and organize the results, we have use the categorization method. The data were grouped into eight categories: Knowledge about prevention of VAP, Hand hygiene, Head elevation, cuff pressure, Respiratory physiotherapy, Oral hygiene, Sedation withdrawal, Continuing Education.

The research was submitted to the Department of Education, Research and Extension of the *Santa Casa de Misericórdia* from Sobral city and to the Committee of Ethics in Research with Human Beings of the *Universidade Estadual Vale do Acaraú*, over the period from August to October 2015, after receiving favorable Legal Opinion (No. 1.737.196) and *Certificado de Apresentação para Apreciação Ética (CAAE)*

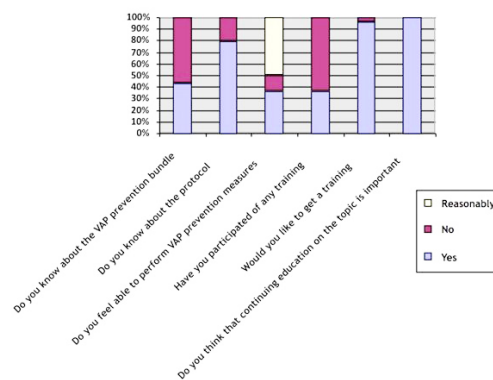
[Certificate of Presentation for Ethical Appraisal] No. 46465415.6.0000.5053.

All ethical and legal aspects according to the Resolution No. 466/12 from the National Health Council were respected.<sup>8</sup>

## RESULTS AND DISCUSSION

In the category of participants' knowledge about the VAP prevention, six questions were grouped in the questionnaire, described below (**Figure 1**). When asked about the VAP prevention bundle, 12 (43%) professionals claimed to be knowledgeable and 16 (57%) did not know it. Concerning the protocol for intubation, 22 (79%) professionals reported being knowledgeable, while 06 (21%) did not know about this protocol. Observing the training on VAP prevention measures, 10 (36%) stated that they felt empowered about such measures, 04 (14%) said they did not feel empowered about these preventive measures, while 14 (50%) said they felt reasonably trained, thus demonstrating insecurity in this regard. Considering the participation in some training/event/course/seminar/congress on VAP prevention: 10 (36%) professionals participated and 18 (64%) never participated in anything related. Concerning the participants' interest in receiving some specific training on the subject, 26 (96%) professionals would like to receive some training and 01 (04%) showed no interest. When asked about the importance of continuing education about preventive measures of VAP, the 28 (100%) professionals said they were important.

Hence, the concern of the professionals with their academic formation is notorious.

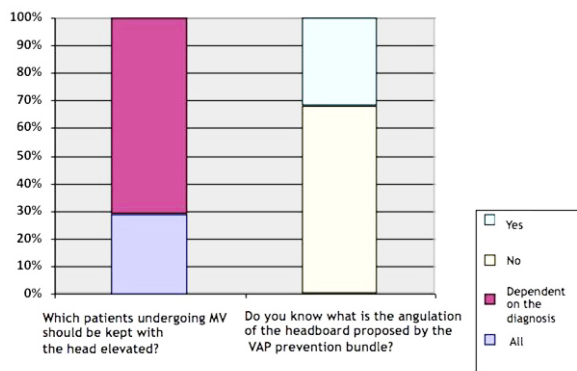


**Figure 1** – The health professionals' knowledge about the prevention of ventilator-associated pneumonia, Sobral – Ceará State, 2015.

In the category on hand hygiene, professionals were asked if they hygienized their hands according to the World Health Organization (WHO) recommendations, 22 (79%) professionals stated that they always hand hygiene before contact with the patient and 06 (21%) mentioned doing this action sporadically.

In the category concerning the head elevation, the results of two questions of the questionnaire, described below (**Figure 2**), were grouped together. When questioned about which of the patients on mechanical ventilation should be maintained

with the headboard elevated, 08 (29%) professionals answered that all patients should be maintained with elevated head, while 20 (71%) answered that head elevation would depend on the diagnosis. Nonetheless, when questioned about the bedside angulation proposed by the VAP prevention bundle, only 9 (32%) professionals answered correctly, 19 (68%) of them did not know the correct angulation or ignored the question.



**Figure 2** – The health professionals' knowledge with regards to both the elevation and angulation of the headboard of the patient undergoing Mechanical Ventilation, *Sobral – Ceará State, 2015.*

In the cuff pressure category, the guiding question evaluated the professionals' knowledge about adequate cuff pressure in the orotracheal tube/tracheostome. The results related to this category were as follows: 07 (25%) responded that the appropriate pressure should be 15 to 19 mmHg, 07 (25%) responded 20 to 25 mmHg, 05 (18%) responded 30 to 35 mmHg and 09 (32%) ignored the issue.

In the same category, when asked about the frequency in cuff pressure check-ups, 03 (11%) answered that this monitoring should be performed every 3 hours, 14 (50%) answered that it should be 6 in (04%) answered that it should be every 8 hours, 04 (14%) answered that it should be every 12 hours, and 06 (21%) ignored the question.

In the category of the need for respiratory physiotherapy in 100% of patients in MV, 23 (82%) professionals affirmed that yes and 05 (18%) answered that there was no need.

In the oral hygiene category, 20 (71%) professionals said that all patients in MV need oral hygiene with chlorhexidine (0.12%) daily, while 08 (29%) said that daily practice was not necessary.

In the category on sedation withdrawal, we sought to evaluate the frequency of patient monitoring by professionals regarding the need to withdraw sedation, 27 (96%) said to evaluate daily, only 01 (04%) said to evaluate weekly.

The results of the category of lifelong education were identified from a content analysis of the participants' list of topics on what they considered important to discuss with the team on the prevention of ventilator-associated pneumonia. The following are the most cited: Infection control, care and aspiration techniques of the orotracheal tube and tracheostome, ventilatory parameters, etiologies associated

with VAP, protocol of prevention of VAP and protocol in intubation sequence.

The hospital infections identified in ICUs are related to failures in disease prevention and diagnosis, to the monitoring system, as well as to failures during indication, placement, maintenance and removal of tubular devices. Considering that the care provided in an ICU is expected to guarantee effective care within the clinical conditions and the severity of the patients, and that the quality of this assistance requires adequacy and control of the processes and structure of the service, there is a need to investigate the perception of the multi-professional team that provides critical patient care.<sup>9</sup>

Regarding the importance of the hygienization of the hands of the health professionals before the contact with the patient in MV, this issue evidenced the participants' fragility related to biosafety. Many studies recommend implementing and maintaining strategies for better adherence to this practice, strengthening the concepts of periodicity as well as technique. It is a strong recommendation to use liquid soap with antiseptics such as chlorhexidine in places where multiresistant bacteria are frequently present as a practice of decreasing cross-transmission. However, it should be emphasized that the use of alcohol preparation for the hands should be stimulated in all areas of health service.<sup>10</sup>

In the bedside elevation category, most participants were uncertain about correct angulation. According to the Institute for Healthcare Improvement (IHI) ventilation-associated pneumonia prevention care components, head elevation has also been correlated with a reduction in the VAP rate, and the recommendation ranges from 30 to 45 degrees. Another reason for the inclusion of this category in the study was based on studies that show improvement in ventilation of patients implementing this intervention. For example, patients with horizontal dorsal decubitus present lower tidal volumes when ventilated with supportive pressure than those in a seated position. In pediatrics, 15 to 30 degrees for neonates and 30 to 45 degrees for infants are recommended.<sup>11</sup>

In the category of cuff pressure of the orotracheal tube or the tracheostomy, a great divergence of responses was evidenced by the participants, thus demonstrating insecurity in the given data. Regarding this care, the cuff pressure should be sufficient to prevent air leakage and the secretion (microaspiration) passageway above the cuff. So, it is recommended that this pressure be between 20 and 25 mmHg. Values greater than these present a risk of ischemia and tracheal stenosis.<sup>10</sup>

According to the III Brazilian Consensus on Mechanical Ventilation, cuff pressure should be monitored three times a day for follow-up to be adequate for injury prevention. That way, checking should occur every 8 hours.<sup>12</sup>

Respiratory physiotherapy is indicated for the rehabilitation or cure of the patient on mechanical ventilation. It is also indicated for the prevention of pulmonary complications, since in working the pulmonary function the reduction of pulmonary infection is also worked, the length

of stay is reduced using mechanical ventilation and it eliminates the risk of tracheostomy. Therefore, all patients using a mechanical ventilator should receive such care. This measure reduces the patient's hospitalization time and also reduces the hospital cost.<sup>13</sup>

According to the bureau of the Institute for Healthcare Improvement (IHI), another important component for the prevention of VAP is oral hygiene.<sup>11</sup> Nevertheless, it is noticed that the oral hygiene of patients undergoing mechanical ventilation is very compromised due to lack of chewing (especially hard and fibrous foods), which is what promotes the natural cleansing of the mouth. Consequently, there is an increase in oral colonization of resistant pathogens. Then, professional cleaning is necessary, using 0.12% chlorhexidine at least twice daily.<sup>14</sup>

Chlorhexidine has an antimicrobial effect, being effective on aerobic and anaerobic bacteria. It has the capacity to be absorbed by the buccal mucosa and by the teeth and released in up to 12 hours. It acts by reducing the accumulation of dental plaque, without the need for dental brushing.<sup>11</sup>

Another factor that interferes with the occurrence of VAP is the indiscriminate use of sedatives. Therefore, the level of sedation should be monitored through scales or monitors of brain activity and the daily interruption of sedation should be carried out when the clinical condition allows. In addition, it is recommended that the level of sedation must remain moderate to moderate in most cases.<sup>15</sup>

From the analysis of the data, the permanent education was planned and realized. The following topics were addressed: Infection control (hygiene, assembly and sterilization of the ventilator circuit), Care and techniques of aspiration of the orotracheal tube and tracheostome, Multidisciplinary Care to the patient undergoing Mechanical Ventilation, this session was divided into four subtopics: Ventilatory parameters, Incidence of VAP and associated etiologies, Protocol of prevention of VAP and Protocol in intubation sequence. The Continuing Education (CE) occurred in May 2016 and reached 93 participants. The facilitators of this moment were doctors, nurses, and physiotherapists of the hospital, as well as external professionals.

This moment generated discussions about the work processes in the ICUs. There were discussions about the implementation of necessary protocols to improve care, which besides offering organization in the practices, its adoption by the team promotes a noticeable reduction in hospital infection rates.

Through this CE, it was possible to perceive the enthusiasm of the participants in training and contributing to the implementation of interventions aimed at reducing the rates of pneumonia associated with mechanical ventilation through preventive measures based on scientific evidence.

Through this research, it was possible to grasp that preventing ventilator-associated pneumonia is a daily and complex intention, which requires trained professionals willing to be in constant learning on the subject in order to better adjust preventive measures according to the service that they are inserted.

The adherence of the processes of permanent education by professionals is one of the focus of teaching hospitals, as it is a way of assisting in risk management, improving care and, consequently, reducing rates of hospital infections.

Hence, ICU teams need to be connected and willing to build and adhere to care protocols or bundles (care package approach) in order to prevent ventilator-associated pneumonia.

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## CONCLUSIONS

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