DOI 10.18471/rbe.v37.47614 Original Article

ROLE OF NURSING TECHNICIANS IN THE PREVENTION OF PNEUMONIA ASSOCIATED WITH MECHANICAL VENTILATION: QUALITATIVE STUDY

ATUAÇÃO DE TÉCNICOS DE ENFERMAGEM NA PREVENÇÃO DE PNEUMONIA ASSOCIADA À VENTILAÇÃO MECÂNICA: ESTUDO QUALITATIVO

ACTUACIÓN DE TÉCNICOS DE ENFERMERÍA EN PREVENCIÓN DE NEUMONÍA ASOCIADA A LA VENTILACIÓN MECÁNICA: ESTUDIO CUALITATIVO

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How to cite this article: Mota PT, Barilli SLS, Treviso P, Santos AAS. Role of nursing technicians in the prevention of pneumonia associated with mechanical ventilation: qualitative study. Rev. baiana enferm. 2023;37: e47614.

Objective: to describe the perception of the nursing technician regarding their performance in the bundle of prevention of pneumonia associated with mechanical ventilation in an Intensive Care Unit. Methodology: a descriptive, qualitative study conducted with nursing technicians from an Adult Intensive Care Unit in Porto Alegre. Data collection performed through recorded interviews, following a semi-structured script. Data analyzed from the perspective of thematic analysis of Minayo. Results: the participants were 40 nursing technicians. Four categories emerged: a) the role of the Nursing Technician in the bundle for the prevention of ventilator-associated pneumonia (VAP); b) items that make up the bundle for the prevention of VAP; c) weaknesses in the implementation of the bundle for the prevention of VAP; and d) continuing education on VAP. Final considerations: participants know the prevention measures, recognize their importance and execute them directly and indirectly. The team uses its own mnemonic to memorize the bundle items.

Descriptors: Nursing. Nursing Care. Intensive Care Unit. Pneumonia Associated with Mechanical Ventilation. Continuing Education.

Objetivo: descrever a percepção do técnico de enfermagem quanto à sua atuação no bundle de prevenção de pneumonia associada à ventilação mecânica em Unidade de Terapia Intensiva. Metodologia: estudo descritivo, qualitativo, realizado com técnicos de enfermagem de uma Unidade de Terapia Intensiva Adulto de Porto Alegre. Coleta dos dados realizada por meio de entrevistas gravadas, seguindo roteiro semiestruturado. Dados analisados sob a ótica da análise temática de Minayo. Resultados: participaram 40 técnicos de enfermagem. Emergiram quatro

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categorias: a) atuação do Técnico de Enfermagem no bundle de prevenção de pneumonia associada à ventilação mecânica (PAVM); b) itens que compõem o bundle de prevenção de PAVM; c) fragilidades na implantação do bundle de prevenção de PAVM; e d) educação continuada sobre PAVM. Considerações finais: participantes conhecem as medidas de prevenção, reconhecem sua importância e as executam direta e indiretamente. A equipe utiliza um mnemônico próprio para memorização dos itens do bundle.

Descritores: Enfermagem. Cuidado de Enfermagem. Unidade de Terapia Intensiva. Pneumonia Associada à Ventilação Mecânica. Educação Continuada.

Objetivo: describir la percepción del técnico de enfermería en cuanto a su actuación en el Bundle de prevención de neumonía asociada a la ventilación mecánica en Unidad de Terapia Intensiva. Metodología: estudio descriptivo, cualitativo, realizado con técnicos de enfermería de una Unidad de Terapia Intensiva Adulto de Porto Alegre. Recolección de datos realizada por medio de entrevistas grabadas, siguiendo guion semiestructurado. Datos analizados bajo la óptica del análisis temático de Minayo. Resultados: participaron 40 técnicos de enfermería. Surgieron cuatro categorías: a) actuación del Técnico de Enfermería en el bundle de prevención de neumonía asociada a la ventilación mecánica (NAVM); b) ítems que componen el bundle de prevención de NAVM; c) fragilidades en la implantación del bundle de prevención de NAVM; y d) educación continuada sobre NAVM. Consideraciones finales: los participantes conocen las medidas de prevención, reconocen su importancia y las ejecutan directa e indirectamente. El equipo utiliza un mnemotécnico propio para memorizar los elementos de bundle.

Descriptores: Enfermería. Cuidado de Enfermería. Unidad de Terapia Intensiva. Neumonía Asociada a la Ventilación Mecánica. Educación Continua.

Introduction

Ventilator-associated pneumonia (VAP) is the most important and common infection affecting critically ventilated patients in the Intensive Care Units (ICU), due to the vulnerability of these patients[1,2].

According to the National Health Surveillance Agency (ANVISA - *Agência Nacional de Vigilância Sanitária*), global mortality in episodes of VAP ranges from 20 to 60%, largely reflecting the severity of the underlying disease of these patients, organ failure, the etiological agent involved and the specificities of the studied population. Mortality estimates attributed to this infection vary in different studies, but approximately 33% of patients with VAP progress to death as a direct result of infection[3].

In view of the magnitude of the problem, health institutions have been increasingly concerned with preventing VAP and, therefore, in addition to reducing lethality, also reducing length of stay and hospital costs[2].

The VAP prevention bundle is a set of measures based on scientific evidence that, performed simultaneously by the multiprofessional team, is able to reduce the incidence of infection[4,5]. Fundamentally, it is composed of simple and feasible measures in clinical practice, such as: hand hygiene, elevated bedside maintenance, checking the pressure of the endotracheal tube, maintenance of the fluid-free mechanical ventilation system, use of aseptic technique for device handling and tooth brushing[4].

By directly performing the care to these patients and most of the measures recommended in the bundle, the nursing teams needs to correctly develop its attributions to this problem and be aware of its role in the prevention of this infection[6,7]. Studies carried out both in Brazil[8,9] and in the international scenario[4,10] show the impact of the measures recommended by the bundles in reducing the incidence of VAP.

In order to effectively prevent VAP and because it is a bundle, measures must be performed simultaneously[5]. Although this theme is widely explored, there is still a lack of evidence regarding the most effective mechanisms to integrate the different practices[10] and thus increase the adherence of professionals. In this sense, understanding how nursing technicians, who are directly involved in bedside care,

perceive their performance can be an important resource for nurses as team leaders. Given this scenario, the following research question arose: what is the perception of the nursing technician regarding their performance in the Intensive Care Unit, in relation to the prevention of pneumonia associated with mechanical ventilation?

The results of this study contribute to the teaching and learning process of the nursing team, enabling the adoption of new strategies for continuing and permanent education, seeking improvements in quality of care.

Considering the above, the objective of the study was to describe the perception of the nursing technician regarding their performance in the bundle of prevention of pneumonia associated with mechanical ventilation in the Intensive Care Unit.

Methodology

This is a descriptive study with a qualitative approach, developed according to the guidelines proposed by the Consolidate Criteria for Reporting Qualitative Studies (COREQ)[11]. The research was conducted in the Adult ICU of a large public hospital located in southern Brazil. This ICU has 67 beds and assists adult patients of the public network. The nursing staff of the ICU is composed of 200 professionals.

Nursing technicians with more than three months of experience in the ICU were included and those who were on vacation, holiday or leave due to health problems during the data collection period were excluded. The sampling was determined by data saturation.

Data were collected between April and May 2018. Nursing technicians from all shifts (morning, afternoon and evening) were invited to participate in the study by convenience, according to availability during the work period. Only the technicians who, after clarifying their rights and the form of participation, signed the Informed Consent Form (ICF), which made clear the objectives and method of the study, participated in the study. Thus, when they agreed to participate, they were invited to go to a place reserved for the interview. The main researcher, a Nursing student at the time of data collection, used a semi-structured script, prepared by the authors themselves, considering the literature related to the bundle[8], containing questions related to sociodemographic data, and ten open questions, activities carried out with the bundle, educational actions on the theme and weaknesses in the application by the team. To conduct the interviews, the main researcher received guidance from the supervising professor on how to conduct an interview for research data collection purposes.

The interviews, lasting between 30 and 45 minutes, were conducted in a room with privacy (only the main researcher and one participant at a time) and recorded with the consent of the professionals, in order to ensure greater fluency in the data collection process, interaction between interviewer and interviewee. In order to ensure the anonymity of the participants, the names were replaced by codes (T01 to T40). Data analysis was performed in three stages: a) pre-analysis: in-depth reading of the material, constitution of the corpus and formulation and reformulation of hypotheses; b) exploration of the material: categorization and treatment of the results obtained; c) interpretation: codification and performance of data classification and aggregation, determining theoretical or empirical categories and thus proposing interpretations[12]. The themes evidenced from the speeches were identified and analyzed with subsidy of the literature and the experience of the authors in relation to the object of the study, in order to achieve the research proposals.

The project followed all the recommendations and ethical precepts of Resolution N. 466/2012 of the National Health Council[13], and was approved by the Research Ethics Committee of the institutions involved, proponent (CAAE 81122017.4.0000.5308) and co-participant (CAAE 81122017.4.30001.5530), starting only after approval.

Results

Forty-four nursing technicians were invited to participate in the study. Of these, two refused, and two others gave up due to care demands at the time of data collection. The study included 40 nursing technicians, and the professional with less time in the sector had one year and the professionals with more time worked in the sector for 20 years.

From the data analysis, four categories emerged: a) the role of the Nursing Technician in the bundle for prevention of pneumonia associated with mechanical ventilation; b) items that make up the bundle for VAP prevention; c) weaknesses in the implementation of the VAP bundle; and d) continuing education on VAP, presented below.

The role of the Nursing Technician in the bundle for prevention of pneumonia associated with mechanical ventilation

When questioned about the role they play, although some participants have demonstrated difficulty in explaining specifically, most recognize the importance of their performance in direct care to the patient, particularly through compliance with preventive measures:

> *Our participation is not direct, but indirect, because we assist the patient and we must know the possible causes of pneumonia associated with mechanical ventilation.* (T5)

> *I think I participate observing these factors, taking care, verifying, taking note, recording on the flowsheet, I think.* (T6)

> *I think I participate because we learn, but this issue isn't that discussed; we do, but without knowing why, without understanding.* (T12)

> *Well, I do my part. I get here, check if it everything is ok; if not, I clean it up at the beginning of the shift, I take the necessary care and try to do my part.* [...] *the coworkers, the [sic] nurse is responsible for them.* (T22)

> *My role is to follow the rules of VAP*[...], *unless that patient that cannot stay in the 30º position when the bed is damaged, which is impossible to do, but other than that, I follow the rules as much as possible.* (T24)

> *I aspirate the patient first, check if the head is right, if the tube is well positioned, if the filter is valid,* [...] *I aspire in a sterile way, with gloves, saline solution. After aspiration, I always do oral hygiene after checking the cuff, always with brushing... I think that's it!* (T39)

Items that make up the bundle for VAP prevention

In order to facilitate the memorization of the prevention bundle items, the mnemonic HCAERT has been established, which means: **H**eadboard raised to at least 30°; **C**uff correctly measured; **A**spiration of airways with aseptic technique; **E**levated and fluid-free filter; **R**espiratory physiotherapy; and **T**ooth brushing. Participants report the existence of the mnemonic, which assists in the memorization of the items that make up the bundle and, based on it, the professionals perform the necessary care, which they report being part of their daily work routine:

> [...] *directly in the handling at the moment, mainly in several processes, we have the acronym used, HCAERT, which are letters that help us remember each item of the process.* (T16)

> [...] *concerning the bed, washing hands, wearing gloves, an apron when it's isolation, doing the basic standard measures you have, that's it.* (T28)

> *I believe this is part of our routine, coming in and this vision [sic] of coming in and taking care...* (T30)

> [...] *performance would be developing the procedures carried out daily, what HCAERT that would be.* (T38)

The speeches show that the mnemonic technique helped nursing technicians to remember the items that make up the bundle, although they have often not been cited in order, which does not interfere with the procedures. The measures most recalled were those carried out by themselves and nurses, as can be seen:

> *When we arrive, we check the headboard, if it's 30-45°, if the filter is elevated, if there is no water accumulated in the filter, oral hygiene with brushing, careful aspiration, using sterile gloves, which we didn't use in the past used and now it's protocol.* (T26)

> *Elevated filter with date, paying attention not accumulate fluid in the trachea, lift the tube, the nurse measures the cuff, elevated headboard as well. First, we wait for the nurse to measure the cuff, we start with oral hygiene, with brushing, we have a product to do this hygiene, we first aspirate the tube and the oropharynx, use the plastic glove for aspiration.* (T10)

> [...] *care with the water in the reservoir, oral hygiene, hand hygiene, the nurse sees the cuff, care with the trachea, height of the filter, elevated head* [...] *these are the ones that come to mind.* (T35)

> *The measures, the HCAERT issue, headboard elevated above 30º, except in other situations, filter always above the tube, avoiding accumulation of liquid in the reservoir, aspiration, physical therapy regularly and the cuff checked by the nurse once per shift.* (T36)

> [...] *HCAERT, right? Come on, let's see if I know it by heart: the issue of headboard at 30º; the cuff issue, which is checked by the nurse; correct and sterile aspiration of the airways; what else? Filter, right? Hum, there is the question of the hydrophobic filter, changed every seven days, check for dirt and changes, the way the tube and filter are positioned, they can't be below the commissure, oral hygiene with brushing with Clorex, tooth brushing and oral cavity. .. I think that's it.* (T39)

Weaknesses in the implementation of the VAP bundle

Success and adherence to the bundle depend, in addition to human resources, on material inputs available in the ICU. The major weaknesses and difficulties reported by the participants are due to the lack of preventive maintenance of the equipment and, sometimes, the lack of materials for the implementation of the measures, which are limiting factors for the success of the bundle and consequently, for the reduction of VAP rates.

Other weaknesses pointed out were the critical state of the patient, which sometimes hindering the performance of the techniques recommended, and the commitment of each professional:

> *Frailty is the state of the patient, right? The patient is often thrombocytopenic, so brushing is not adequate, as well as changing the position.* (T40)

> *I think that sometimes it's not done due to lack of knowledge, lack of conditions, because there was a time when there was a broken bed, a respirator without an arm, there was a lack of a brush for hygiene* [...], *many people don't do because they lack sources.* [...] *and that percentage: I won't do it, it's just a low headboard...* (T18)

> *We have several respirators with broken arms, so it's very difficult having to tie them, improvise, sometimes the bed is also broken... these are the main ones.* (T29)

The participation of the leader in this scenario – the nurse – is believed to greatly influence the adherence to preventive measures. The lack of daily supervision contributes to the fragility of the work process. Clarifying doubts at the bedside, bringing questions and discussions to the daily work, performing the return of indicators to the team and replanning actions when necessary are essential points for the effectiveness and success of the bundle. Interpersonal relationships are a key part of care and improving the quality of care in Intensive Care; moreover, they contribute to a better work process as follows:

> *It would be the non-demand. The non-preparation of the professional. The professional doesn't do because he wants, he does it out of unawareness, or [sic] non-demand from the management, which facilitates errors.* (T25)

> *Perhaps control, demand was the right word... The team's nurses lack demand, ask the technicians a little more about this, a little more mobilization on the part of the nurses.* (T32)

> *A weakness that interferes with the application of the protocol is the lack of disclosure: people are not so aware of it, so much so that I didn't remember all the steps.* (T11)

The poor distribution of time can compromise the assistance, as well as the work overload, especially when related to complications in the critical patient. Professionals report that sometimes these factors contribute to the failure or inadequate implementation of preventive measures:

> [...] *time... you* [sic] *leave things aside, you can't handle it. You start [sic] to mechanize your work, but there is also that thing where you have* [sic] *to do it quickly, because otherwise you won't win* [sic] *your work.* [...] *So, you* [sic] *quickly, without hand hygiene, without gloves, the contamination occurs; nut, otherwise, you don't win the work in a six-hour shift.* (T27)

> *Weakness is overwork, little time to take care of an ICU patient... You work [sic] too much with him, sometimes you stay [sic] with one and you work [sic] so much with him that it begins to be immediate; or is he too severe, either occurs an intercurrence, you end up [sic] doing it fast and the steps are lost.* (T40)

> [...] *time, time to go in and have that look and follow all the steps, especially the sterile glove: open it aseptically, put it on without touching anything. For me, the only factor that interferes is time.* (T34)

Continuing education on VAP

The process of continuing education on the subject, according to the speech of the participants, occurs both in theory (through presentations on the content) and in practice (at bedside and among co-workers), as evidenced by the statements:

> [...] *performed in presentations in the ICU room. It's past, shown everything step by step, how to prevent; there is a very big banner for us to remember.* (T13)

> *Several trainings, bedside trainings are held here, in general.* (T15)

> *I didn't participate this year... I always participate whenever I can. The trainings are theoretical, with blades and conversations.* (T2)

> *We pass on to new coworkers what we have learned, they learn about day-to-day things directly.* (T17)

Participants recognize the educational activities promoted by the nursing team. However,

there seems to be disparity in the provision of training in the different shifts. The main difficulty evidenced by the workers is to attend the shift at different times, especially those who work at night, as evidenced by the statements:

> *Yeah, I don't know, so I've never even attended a course, sincerely. There are courses, managed during the day, but not at night, they don't offer at night anymore, only during the day.* (T3)

> *The night shift have few actions, so people end up not doing it because it's on another shift.* (T1)

> *I haven't attended training for a long time, just a few at the bedside, when we receive some information about what will change. I don't participate.* (T21)

On how they understand the pathology, participants recognize that infection results from the use of MV and how non-adherence to preventive measures influences the incidence:

> *Several factors influence, such as the duration of mechanical ventilation, tooth brushing, which is always demanded.* [...] *The time the patient is intubated, that he has to stay in the ICU, the time of intubation, the reinfections he suffers.* (T7)

> *My understanding of ventilator-associated pneumonia is that pathology that the patient develops after a few days of mechanical ventilation when not taking some care.* (T9)

> [...] *disease acquired due to the work process and handling we have with mechanical ventilation.* (T16)

Discussion

Nursing technicians work directly in patient care, performing various activities such as drug administration, mobilization in bed, hygiene and comfort, dressing exchange, among others. And, in this process, their performance requires knowledge and mastery, in order to provide safe and quality assistance. In this context, the study participants recognize the importance of their role in direct patient care, especially in the prevention of infections. The implementation of nursing care packages has shown better efficiency in care, contributing to the reduction of the incidence of VAP, and the performance of the nursing team is crucial for the objectives to be achieved[14,15].

The findings show that nursing technicians know and understand the care that must be performed for the prevention of VAP and know what is their responsibility, also recognizing that the infection is due to the use of mechanical ventilation and that adherence to the recommended measures influences the outcomes of patients. In fact, the nursing team is responsible for performing most bedside procedures in ICUs, thus playing an important role in the application of VAP prevention protocols, being the adherence to preventive measures a direct contributor to safe care[16].

A recent study conducted in an adult ICU with 154 patients on mechanical ventilation showed the importance of continuous team reinforcement regarding preventive measures of VAP. After this intervention, the adherence to oral hygiene measures, head elevation, cuff pressure and filter position remained above 77%, resulting in a decrease in VAP rates[8].

The institution researched follows a previously established route, in the form of mnemonic (HCAERT), in order to facilitate the memorization of the measures that must be performed. The use of this strategy as an aid in the practice of health professionals gained notoriety with the mnemonic FAST HUG, initially proposed by the doctor Jean-Louis Vincent. It is a checklist composed of seven items that should be applied daily to the bedside, aiming to optimize the care to the critical patient and to advise the practices of health professionals[17]. Although FAST HUG is not focused on the prevention of VAP, older studies show that its implementation reduced its incidence[18-21]. In the literature, to date, there is no other mnemonic specifically aimed at the prevention of VAP.

The items most remembered by the participants were those performed by the nursing team, that is, more present in their care practice. In a qualitative study with 25 professionals from a public hospital in Santa Catarina, of which 13 were nursing technicians, the participants' reports had as central ideas the measures of oral and hand hygiene and care with the aspiration of secretions, with ventilation circuits and related to the prevention of bronchoaspiration, in addition to the daily evaluation of the possibility of extubation[16]. Keeping the headboard elevated

- the item considered simpler - is usually among the measures most adhered to in the studies[8,22].

The weaknesses pointed out by the participants regarding the material inputs, sometimes unavailable, and the lack of preventive maintenance of the equipment brings to the team difficulties in performance, which may generate repercussions on the quality of care, since the performance of protocol measures without failures requires specific materials. The absence of periodic maintenance of the equipment is considered as a critical aspect of the structure and recognized as one of the elements that may compromise the quality of services[23]. Moreover, equipment problems commonly generate frustration in nurses, not only because of the impossibility of performing actions in a problem-solving manner, but also because of the wear and tear they cause in the collection of responses to requests for their maintenance and/or replacement[23].

The study participants recognize the importance of nurses and their leadership position when it comes to VAP prevention. Similarly, a recently published integrative review points out that the performance of this professional is vital in the care of critical patients who require ventilatory support[24]. To this end, nurses should always remain updated to provide qualified assistance.

The methodology for the elaboration of the protocol is believed to involve the professionals in all its process, being, thus, a favorable point to the team to assume not only the condition of informers, but also to act in the application and construction of the protocol, highlighting their facilities and difficulties. The use of the protocol does not increase the workload or generate costs to the institution. In addition, it is important to reduce VAP rates, promoting quality and safety in patient care under invasive ventilatory care[16].

An essential aspect when it comes to infection prevention measures is the importance of continuing education of the multiprofessional team. It is essential that those responsible for care are trained and sensitized in order to understand the importance of carrying out preventive measures and how much adherence affects the quality of care, generating better results for patients[3,25]. As for the approaches adopted, in the institution where this study was conducted, carrying out training that involves theoretical and practical activities. This data is corroborated by the literature, which guides that the strategies are preferably multimodal, that is, involving varied methodologies, citing face-to-face classes, practical classes and classes with simulations, as well as discussions of bedside practice and feedback of indicators, as examples[3].

As for the disparity in relation to training in the different work shifts, the importance of all employees being uniformly trained on VAP prevention measures should be reiterated with the teams so that there are no failures in the execution of the protocol to obtain the expected results. The literature shows that low adherence of the care team to preventive measures can occur when new professionals are admitted and have not had the opportunity to be trained – both in relation to care and the importance of adequate registration[18] – and when there is high turnover of the team of nursing technicians[8], which reinforces the need for periodicity of training. Moreover, it is important to promote the return of VAP indicators to the team in a systematic way, so that, together, new strategies can be drawn up[3].

The study allowed to describe the contribution of the nursing technician and the perception of their role with the bundle of VAP, besides highlighting the importance of the performance of these professionals in the assistance and prevention of this type of infection. Since adherence to the measures recommended by the bundle depends on the multidisciplinary team and, essentially, the Nursing technician, for acting directly at the bedside of the critical patient, performing several of the activities present in the care package, understanding their perception can help guide the strategies of continuing education carried out by nurses in the search for improvement of care.

The study is limited as it was conducted in only one institution, which reflects the reality

of a sample and a specific context. Thus, new studies covering other institutions are suggested.

Final Considerations

The participants recognize the importance of the actions performed by them and consider that the correct performance of care results in benefits for the patient. These professionals know the measures taken to prevent the pathology and use their own method to memorize the items that make up the protocol used in the institution. By means of the mnemonic HCAERT– which represents **H**eadboard elevated to at least 30º; **C**uff properly measured, **A**irway suction with aseptic technique, **E**levated and fluid-free filter, **R**espiratory physiotherapy and **T**ooth brushing – professionals more easily recall the stages of the process simultaneously throughout their shift.

Importantly, sometimes, there is still a gap between the training of the technical-level professional and the intensive care scenario. Therefore, the role of nurses stands out, both as educators and as care managers, seeking to reduce indicators from the best practices.

Nursing technical professionals, who play a peculiar role in care, need to recognize the importance of their role in preventing VAP, and understand that best practices result in better quality care.

Collaborations:

1 – Conception and planning of the project: Adriana Alves dos Santos and Patriny Thuana Lopes Mota;

2 – Analysis and interpretation of data: Adriana Alves dos Santos and Patriny Thuana Lopes Mota;

3 – Writing and/or critical review: Patriny Thuana Lopes Mota, Sofia Louise Santin Barilli, Patrícia Treviso and Adriana Alves dos Santos;

4 – Approval of the final version: Patrícia Treviso, Sofia Louise Santin Barilli and Adriana Alves dos Santos.

Conflicts of interest

There are no conflicts of interests

References

1. Timsit JF, Esaied W, Neuville M, Bouadma L, Mourvllier B. Update on ventilator-associated pneumonia. F1000Res. 2017;6:2061. DOI:10.12688/f1000research.12222.1
2. Papazian L, Klompas M, Luyt CE. Ventilator associated pneumonia in adults: a narrative review. Intensive Care Med. 2020;46:888-906. DOI: 10.1007/s00134-020-05980-0
3. Brasil. Agência Nacional de Vigilância Sanitária. Medidas de prevenção de infecção relacionada à assistência à saúde. Brasília, DF: Anvisa; 2017. [cited 20 Sep 2018]. Available from: http://www.riocomsaude.rj.gov.br/Publico/MostrarArquivo.aspx?C=pCiWUy84%2BR0%3D
4. Álvarez-Lerma F, Palomar-Martínez M, Sánchez-García M, Martínez-Alonso M, Álvarez-Rodríguez J, Lorente L, et al. Prevention of ventilator-associated pneumonia: the multimodal approach of the Spanish ICU "Pneumonia Zero" Program. Crit. Care Med. 2018; 46(2):181-188. DOI: 10.1097/CCM.0000000000002736
5. Maran E, Spigolon DN, Matsuda LM, Teston EF, Oliveira JLC, Souza VS, et al. Efeitos da utilização do bundle na prevenção de pneumonia associada à ventilação mecânica: revisão integrativa. Rev. Cuid. 2021;12(1):e1110. DOI: 10.15649/cuidarte.1110
6. Rodrigues AP, Vieira C, Pasetti L, Silva GE, Silva SDF, Barilli SLSB. Pneumonia associada à ventilação mecânica. In: Azeredo NSG, Aquim EE, Santos AA. Assistência ao paciente crítico: uma abordagem multidisciplinar. Rio de Janeiro: Atheneu; 2019.
7. Serra EB, Rolim ILTP, Ramos ASMB, Fontenele RM. Bundle de prevenção da pneumonia associada à ventilação mecânica: revisão integrativa. Rev.

Recien. 2020;10(29):48-57. DOI: 10.24276/rrecien2358-3088.2020.10.29.48-57

8. Lourençone EMS, Branco A, Monteiro AB, Fonseca JP, Caregnato RCA. Adesão às medidas preventivas versus incidência de pneumonia associada à ventilação mecânica. Rev. Epidemiol. Controle Infecç. 2019;9(2):142-8. DOI: 10.17058/reci.v9i2.12596

9. Fortaleza CMCB, Filho SPF, Silva MO, Queiroz SM, Cavalcante RS. Sustained reduction of healthcare-associated infections after the introduction of a bundle for prevention of ventilator-associated pneumonia in medical-surgical intensive care units. Braz J Infect Dis. 2020;24(5):373-79. DOI: 10.1016/j.bjid.2020.08.004

10. Mogyoródi B, Skultéti D, Mezőcsáti M, Dunai E, Magyar P, Hermann C, et al. Effect of an educational intervention on compliance with care bundle items to prevent ventilator-associated pneumonia. Intensive Crit Care Nurs. 2023;75:103342. DOI: 10.1016/j.iccn.2022.10334.

11. Souza VR, Marziale MH, Silva GT, Nascimento PL. Tradução e validação para a língua portuguesa e avaliação do guia COREQ. Acta Paul Enferm. 2021;34:eAPE02631. DOI: 10.37689/acta-ape/2021ao02631

12. Minayo, MCS. O desafio do conhecimento: pesquisa qualitativa em saúde. 14 ed. São Paulo: Hucitec, 2014

13. Brasil. Ministério da Saúde. Resolução n. 466, de 12 de dezembro de 2012. Aprova diretrizes e normas regulamentadoras de pesquisas envolvendo seres humanos. Available from: https://bvsms.saude.gov.br/bvs/saudelegis/cns/2013/res0466_12_12_2012.html

14. Santos LSC, Barros SD, Ferreira MFDC, Barros BDT, Barros RLM, Souza BRB, et al. A enfermagem na prevenção e cuidados relacionados à pneumonia associada à ventilação mecânica: uma revisão integrativa. Res. Soc. Dev. 2021;10(7):e58210716935-e58210716935. DOI: 10.33448/rsd-v10i7.16935

15. França VGC, Lins AGA, Santos CL, Ferreira LGA, Silva RM, Almeida TCS, et al. Cuidados de enfermagem: prevenção de pneumonia associada à ventilação mecânica. Rev. Enferm. UFPE on line. 2021;15(1):1-14. DOI: 10.5205/1981-8963.2021.246221

16. Silva GS, Nascimento ERP, Salles RK. Pneumonia associada à ventilação mecânica: discursos de profissionais acerca da prevenção. Esc. Anna Nery. 2014;18(2):290-5. DOI: 10.5935/1414-8145.20140042

17. Vincent J. Give your patient a fast hug (at least) once a day. Crit. Care Med. 2005;33(6):1225-9. DOI: 10.1097/01.ccm.0000165962.16682.46

18. Ferreira CR, Souza DF, Cunha TM, Tavares M, Reis SSA, Pedroso RS, et al. The effectiveness of a bundle in the prevention of ventilator-associated pneumonia. Braz. J. Infect. Dis. 2016;20(3):267-71. DOI: 10.1016/j.bjid.2016.03.004

19. Papadimos TJ, Hensley SJ, Duggan JM, Khuder SA, Borst MJ, Fath JJ, et al. Implementation of the "FASTHUG" concept decreases the incidence of ventilator-associated pneumonia in a surgical intensive care unit. Patient Saf. Surg. 2008;2:3. DOI: 10.1186/1754-9493-2-3

20. O'Keefe-McCarthy S, Santiago C, Lau G. Ventilator-associated pneumonia bundled strategies: an evidence-based practice. Worldviews Evid. Based Nurs. 2008;5(4):193-204. DOI: 10.1111/j.1741-6787.2008.00140.x

21. Bonello RS, Fletcher CE, Becker WK, Clutter KL, Arjes SL, Cook JJ, et al. An intensive care unit quality improvement collaborative in nine Department of Veterans Affairs hospitals: reducing ventilator-associated pneumonia and catheter-related bloodstream infections rates. Jt. Comm. J. Qual. Patient Saf. 2008;34(11):639-45. DOI: 10.1016/s1553-7250(08)34081-1

22. Zigart JAA, Contrin LM, Frutuoso IS, Silveira AMR, Beccaria LM, Werneck AL. Adesão ao protocolo de pneumonia associado à ventilação mecânica. Rev. Enferm. UFPE on line. 2019;13(3):655-63. DOI: 10.5205/1981-8963-v13i3a234873p655-663-2019

23. Franco JB, Jales SMCP, Zambon CE, Fujarra FJC, Ortegosa MV, Guardiero PFR, et al. Higiene bucal para pacientes entubados sob ventilação mecânica assistida na unidade de terapia intensiva: proposta de protocolo. Arq. Med. Hosp. Fac. Cienc. Med. 2014;59(3):126-31. [cited 25 Sep 2018]. Available from: https://arquivosmedicos.fcmsantacasasp.edu.br/index.php/AMSCSP/article/view/196/206

24. Oliveira AC, Rocha ASC, Silva CD, Matos DS, Lima EACR, Anjos EP, et al. Pneumonia associada à ventilação mecânica: o cuidar da enfermagem. Braz. J. Surg. Clin. 2020;29(3):37-41. [cited 27 Apr 2018]. Available from: https://www.mastereditora.com.br/periodico/20200209_174535.pdf

25. Oliveira MLL, Nunes RD. Bundles de prevenção da pneumonia associada à ventilação mecânica em Unidade de Terapia Intensiva. Amazônia: Science & Health. 2015;3(2):36-43. [cited 9 May 2018]. Available from: http://ojs.unirg.edu.br/index.php/2/article/view/906/351

Received: January 08, 2022

Approved: June 26, 2023

Published: September 27, 2023