

Ventilator-associated pneumonia: discourse of professionals about prevention

Pneumonia associada à ventilação mecânica: discursos de profissionais acerca da prevenção

Neumonía asociada a la ventilación: el discurso de los profesionales sobre la prevención

Sabrina Guterres da Silva¹

Eliane Regina Pereira do Nascimento¹

Raquel Kuerten de Salles¹

1. Universidade Federal de Santa Catarina.
Florianópolis - SC, Brazil.

ABSTRACT

Objective: This study aimed to identify the care that nurses and physiotherapists know and consider important for Prevention of Ventilator-associated Pneumonia (VAP) in an intensive care unit. **Methods:** This is a descriptive research with qualitative nature. Semi structured interview was carried out from May to September 2011, with 25 professionals in a public hospital of Santa Catarina. For the treatment of data we used the Collective Subject Discourse (CSD). **Results:** The reports led to four discourses related to prevention of VAP which had as central ideas: oral and hands hygiene; prevention of the pulmonary aspiration; cares with the aspiration of secretions and ventilator circuit and daily assessment of the possibility of extubation. **Conclusion:** CSD analysis suggests that professionals have a good theoretical knowledge about preventive actions for VAP; however, reveals the challenge to implement some care in routine assistance.

Keywords: Intensive Care; Ventilator-Associated Pneumonia; Cross Infection; Nursing care.

RESUMO

Objetivou-se identificar os cuidados que os profissionais de enfermagem e fisioterapia de uma Unidade de Terapia Intensiva conhecem e consideram importantes para prevenção da Pneumonia Associada à Ventilação Mecânica (PAV). **Métodos:** Trata-se de uma pesquisa descritiva de natureza qualitativa. Realizou-se entrevista semiestruturada de maio a setembro de 2011, com 25 profissionais de um hospital público de Santa Catarina. Para o tratamento dos dados utilizou-se o Discurso do Sujeito Coletivo (DSC). **Resultados:** Os relatos deram origem a quatro discursos relacionados à prevenção da PAV que tiveram como ideias centrais: higiene oral e das mãos; a prevenção da broncoaspiração; cuidados com a aspiração das secreções e circuito ventilatório, e avaliação diária da possibilidade de extubação. **Conclusão:** A análise dos DSC sugere que os profissionais têm um bom conhecimento teórico acerca de medidas preventivas da PAV; contudo, revela o desafio para implementação de alguns cuidados na rotina assistencial.

Palavras-chave: Terapia intensiva; Pneumonia associada à ventilação mecânica; Infecção hospitalar; Cuidados de enfermagem.

RESUMEN

Objetivo: Identificar los cuidados que los profesionales de Enfermería y Fisioterapia de una unidad de cuidados intensivos tiene ciencia y consideraron importantes para la prevención de la Neumonía Asociada a la Ventilación (NAV). **Métodos:** Estudio descriptivo de naturaleza cualitativa. Se realizaron entrevistas semiestructuradas en el período de mayo a septiembre de 2011, con 25 profesionales de un hospital público de Santa Catarina. Para el tratamiento de los datos se utilizó el Discurso del Sujeto Colectivo (DSC). **Resultados:** Los informes condujeron a cuatro discursos relacionados con la prevención de la NAV, que tenían como ideas centrales: higiene bucal y de las manos; prevención de la broncoaspiración; cuidado con la aspiración de secreciones y circuito ventilatorio; y evaluación diaria de la posibilidad de extubación. **Conclusión:** El análisis DSC sugiere que los profesionales tienen conocimiento teórico suficiente acerca de las medidas preventivas para NAV, sin embargo, revela el desafío de implementar algún tipo de atención en el cuidado de rutina.

Palabras-clave: Cuidados Intensivos; Neumonía Asociada al Ventilador; Infección Hospitalaria; Cuidados de enfermería.

Correspondent Author:

Sabrina Guterres da Silva.
E-mail: sabrinaguterres@gmail.com

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INTRODUCTION

The endotracheal intubation and Mechanical Ventilation (MV) are therapeutic measures widely used in Intensive Care Units (ICU) and can save the life of critical patients. However, these interventions can also be deleterious to patients, being Ventilator-associated Pneumonia (VAP) one of the most common complications¹.

A study conducted recently pointed the VAP as a Healthcare Related Infections (HRI) more incident in Intensive Care Units, with fees that can range from 9% to 67% of all patients undergoing mechanical ventilation². Their occurrence in addition to prolong the time of MV and increase the days of hospitalization in the ICU implies that treatment costs can amount to € 31,000 and mortality exceeding 50% of the cases^{1,2}.

Given this panorama, it is critical that prevention of VAP being priority in health institutions in order to promote safety to patients requiring invasive ventilator assistance during his hospitalization in the ICU.

In the meantime, it becomes elementary the identification of the main risk factors for VAP, which are described in the literature as modifiable and non-modifiable arguments. The non-modifiable factors include age, severity score, neurological diseases, traumas and surgeries. Modifiable factors are referred to interventions that include periodic microbiological surveillance, establishment of protocols for prevention, reduction of inappropriate prescriptions of antimicrobials, among other³. It is reflected then, that to prevent the VAP it must be intervened in modifiable risk factors, from specific behaviors and with proven efficacy.

Nursing professionals, for maintaining direct and uninterrupted contact with patients play an important role in the development and implementation of prevention programs of HRI, including the VAP. Other professionals in the team, such as the physiotherapists, can also contribute to the prevention of the adverse event. However, to ensure that effective measures are adopted, it is essential that these professionals have expertise related to preventive care.

From this assertion, it is questioned: what prevention care of VAP are known and reported as important by professionals of nursing and physiotherapy of an ICU?

To answer this question the objective of the present study is to identify the care nursing and physiotherapy professionals operating in an ICU know and consider important to prevent the VAP.

The identification of prevention care VAP reported by nursing and physiotherapy professionals becomes important, as it allows to assess both the knowledge of the staff about how the presence of possible thematic gaps, which may be worked in educational spaces thus contributing to socialization and strengthening of prevention actions.

METHOD

It is a descriptive research of qualitative nature, carried out with professional nursing and physiotherapy in general ICU

of a hospital of Santa Catarina public which has 14 beds for hospitalization of adults. The Board of professional nursing and physiotherapy of this unit is composed of: 1 nursing leadership, 17 nursing assistance, 1 nurse resident (R2), 57 nursing technicians and 6 physiotherapists.

25 professionals participated in this study of which 13 were nursing technicians, 8 nurses and 4 physiotherapists. It was established as inclusion criteria: to be nursing and physiotherapy professional with at least six months experience in ICU.

To determine the number of participants, it was used the principle of saturation of data. The sample lock for data overrun occurs at the point where new information no longer is observed and reaches redundancy⁴.

The research was approved by the Committee of Ethics in Research with Humans at the Federal University of Santa Catarina under Protocol nº 1922/2011. All participants signed a Free and Clarified Consent Term.

The collection of the information took place in the period from May to September 2011, through semi-structured interview, from the following guiding question: what care do you know and consider it important for the prevention of Ventilator-associated Pneumonia?

The interviews were conducted individually, in the study room of the ICU, and recorded in MP3 format, being subsequently transcribed in full. To preserve the anonymity of the participants it was adopted for its identification, the initial "N" to nurse, "T" to nursing technician and "P" for physiotherapist, by assigning numbers according to the sequence of the interviews.

For data analysis we used the methodological procedure of the Collective Subject Discourse (CSD)⁵, which corresponds to a synthesis speech prepared with cutouts of individual speeches similar sense, using the first person singular. In this method four methodological figures are proposed: Key Expressions (KEs), Central ideas (CIs), Anchoring (AC) and the CSD itself⁶.

The KEs are excerpts from the speech which should be highlighted by the researcher, and that reveal the essence of the content of the speech or the underlying theory.

The CIs are names or linguistic expressions that reveal synthetic and accurately as possible, the direction(s) present in each one of the replies analyzed and each homogenous set of KEs that will give rise to the CSD.

The ACs are generic statements used by subjects to "frame" particular situations, professing theories or ideologies. To be an AC in the statement, it is necessary to find, in the body, explicit discursive marks.

The CSD is the aggregate or mathematical sum of testimonials, in which each party will recognize as a constituent. It is a synthesis speech comprising by the "collage" of KEs that have the same CI or AC⁵.

The process of organizing the data according to the methodology of the CSD was in four phases: initially it was done the careful reading of the transcript of the interviews and grouping of reports from the subjects expressed by the participants; then it was excelled in italics the KEs groups of responses/individual

speeches related to each subject; then the KEs of similar issues were assembled and it was identified the CI extracted from each set of KEs; the fourth and final moment consisted of the construction of CSD. This construct consisted of KEs of the same sense, with each CSD understood a CI.

No AC was used in this study because this methodological figure was not found in the testimonials from professionals.

RESULTS

With respect to the characteristics of the participants, it was observed a predominance of females because of 25 professionals, 19 were women. The workers' age and length of service in the ICU had an average of 36 and 6.4 years, respectively.

Regarding education, the 13 mid-level professionals, five were graduated in nursing, three were nursing academic and two were master students. Of the eight nurses, seven had *lato sensu* post-graduation course in intensive care area, among them two attending *stricto sensu* post-graduation. With respect to the four physiotherapists, three were masters and specialists in ICU and one was doctoral student.

There is an interest in professional training, most seeking improvement in undergraduate and postgraduate studies. It is noteworthy that the institution itself is provided the admission in the course of professional master's and encouraged participation in other forms of education.

As for testimonials from professionals, these were organized into four CI: hand and oral hygiene in preventing VAP; the prevention of pulmonary aspiration; endotracheal aspiration care and ventilator circuit and daily evaluation of possibility of extubation. The first CI was identified in the KEs of 22 participants, the second in 18, the third in 19 and the fourth in four individual speeches. Each CI has resulted in a CSD as illustrated below:

CI1: Hand and oral hygiene in preventing VAP

CSD1: The main measure to prevent infections is hand washing. This is a basic care, but we see it frequently, people handling patients without washing their hands. There are people who think that the use of the glove replaces the washing of the hands. But it doesn't! That's a huge factor, because I don't know what they're bringing in the hands. Other care that also I think essential is the oral hygiene of patients as a dirty mouth can develop into an infection. Hygiene should be well made exploring the entire oral cavity, tongue and teeth to decrease the risk of colonization of bacteria. It has been recommended for prophylaxis the chlorhexidine gluconate 0.12% that we already use at the hospital. Another question is regarding the cuff when it will make oral hygiene, it is ideal to aspire to the oral cavity, check if the cuff is inflated enough to do the sealing, and then do the oral hygiene, always in that order, to prevent migration of contaminated secretions to the lung. I think this relationship between oral hygiene and

pneumonia associated to mechanical ventilator must be well understood and trained, because this care is sometimes trivialized. A lot of people don't know, they think it's just to clean the mouth. Of course that it gives comfort to the patient, but also prevents pneumonia (N1, N2, N3, N4, N6, N7, N8, T1, T2, T3, T4, T5, T6, T7, T9, T10, T11, T12, T13, P1, P2, P4).

CI2: Prevention of pulmonary aspiration

CSD2: Most of our patients receive probe diet, and at risk of pulmonary aspiration gastric contents and develop pneumonia. So it is important to keep the head elevated between 30°-45° if there is not contraindication, as well as to prevent pulmonary aspiration that this care favors the chest expansion and alveolar muscle strengthening. It makes a difference a high headboard! But we see in our practice that we don't have this caution because there is the excuse that the patient slips into bed and is heavy for raise him. This issue of high headboard should be better worked. On some occasions we have to lower the headboard to facilitate the mobilization of the patient, so in those moments I think that diet should be paused because the patient may end up pulmonary aspirating. We have to be careful also with the nasogastric probes. I know there's something on the nasal probing and increases sinusitis and pneumonia. We could study whether it would be better to do probes orally. Another very important thing is the effective control of the pressure of the cuff. If it kept in a suitable pressure the cuff makes a barrier preventing secretions such as saliva or the diet down to the lung. So I have to keep the pressure between 20 to 30 cm H₂O, because the very high pressure can injure the trachea and very low can produce air exhaust (N1, N2, N4, N5, N6, N7, N8, T1, T5, T6, T7, T8, T12, T13, P1, P2, P3, P4).

IC3: Endotracheal aspiration and care ventilator circuit

DSC3: The upper airway suctioning by the endotracheal tube of patients in MV is very important, but not the routine aspiration done but do it whenever necessary, with prior auscultation and avoiding instill serum. It has to be careful to don't do any contamination at that moment. We have used a lot more the closed system of aspiration, but I read a few studies that show no difference in preventing the VAP in relation to open aspiration. We don't change the closed system every 24 hours, but it is evaluated daily if it is dirty and if it is aspirating properly. The ideal would be to use the tube with sub-glottis continuous aspiration, some studies recommend for prevention of VAP, but we still do not have this device. Another important issue is regarding the ventilator circuit. It is no longer advocated the routine exchange like we used to do it in the old days, now it is

indicated only when it's dirty, failing or when the patient receives discharge. But it has to avoid condensation of water on the trachea, because if that water stays there it will make a colonization that can affect the patient and cause a VAP (N1, N2, N4, N6, N7, N8, T1, T2, T3, T4, T5, T6, T9, T10, T12, T13, P1, P2, P3).

IC4: Daily Evaluation possibility of extubation

CSD4: I realize that our patients take too long to leave the endotracheal tube. I think we should do an integrated work to predict and anticipate extubation and to avoid unnecessary sedation because the sooner the patient has the extubation less risk the patient to develop a pneumonia associated to mechanical ventilator. Another issue that I think is important is the realization of early tracheostomy. I don't know if that is described in the literature, but I think that care also helps to prevent the VAP (N3, N6, T8, T11).

DISCUSSION

Hands and oral hygiene is mentioned on CSD1 as important measure to prevent the VAP. The care related to hygiene of the hands is recognized worldwide when it comes to prevention and control of infections. However, putting this measure into practice consists of a difficult and complex task⁶.

As the speech of participants, the practice of hand hygiene is a sometimes overlooked and underappreciated by some professionals, being such attitudes "careless" considered a serious factor concerning the assistance provided.

Studies on the subject show that achieving proper hygiene of the hands is still short and suggest training of health professionals, focusing on the importance and the necessity of adherence to this practice apparently simple, but that requires changes in habits to guarantee its effectiveness⁷.

Another issue raised in CSD1 refers to the use of gloves to the detriment of hand hygiene. In line with the recommendations described in the literature, the professionals claim in their speech that the use of gloves does not replace hygiene of hands⁶. The gloves can contribute in preventing contamination of hands and help reducing the transmission of pathogens. However, they can have small holes or lose its integrity without the professionals know it, allowing contamination of hands⁶.

Regarding the oral hygiene of patients submitted to MV, its importance is unquestionable for prevention of VAP, because the precarious or missing oral hygiene leads to formation of bacterial plaque and colonization by pathogenic microorganisms^{8,9}. The evidence about this care shows that the most appropriate antiseptic to prevent VAP is the chlorhexidine gluconate, due to its great potential antibacterial including resistant germs^{3,8,9}.

Still on that speech professionals suggest that the oral cavity is aspirated, then immediately checked the pressure in the cuff,

and after, to perform oral hygiene with chlorhexidine gluconate 0.12%. Although this sequence of care is for the prevention of pulmonary aspiration, there are no studies proving its effectiveness.

Regardless of the technique adopted for oral hygiene of patients in MV it is imperative that the team is prepared to play this caution. The implementation of an oral hygiene Protocol associated with a program of continuous training of professionals is crucial to reducing the rates of VAP, because the lack of clarification about the importance of this care echoes in a low adhesion by the nursing staff⁹.

This issue is mentioned by professionals when they suggest that the team is trained and informed about the importance of oral hygiene as a preventive care of VAP, noting that many professionals associate this practice only to the comfort of the patient.

The CSD 2 reveals related precautions prevention of pulmonary aspiration. Patients in intensive therapy have potential risk for pulmonary aspiration of secretions, especially if exposed to manipulation of the air ways and/or digestive tract, including the use of endotracheal tubes and gastrointestinal probes³.

Recommendations to prevent this complication are present in this speech, which exposes several cares whose goal is to prevent contaminated secretions to migrate to the lungs mechanically ventilated patients.

The first point raised in CSD2 relates the administration of the diet by probe as a predisposing factor for the VAP, at risk of aspiration of gastric contents. Care to observe the presence of gastric distension and check the positioning of the probe can be adopted to prevent pulmonary aspiration^{3,10}.

In addition, the elevation of the headboard of the bed to 30°-45° as mentioned by the participants is a highly recommended care, except in cases where there is some contraindication^{3,8,10}. This measure also prevent pulmonary aspiration, contributes to an improvement in current volume ventilation, and decrease cases of atelectasis⁸. However, the participants' reports show that there are difficulties for the maintenance of high headboard, suggesting that the importance of this care has to be worked with the team.

Regarding the suggestion made by professionals to stop the diet in times of lower headboard, it did not direct association of this care with the prevention of VAP, although there is a strong relationship between the administration of the diet in the supine position (0°) and the risk of pulmonary aspiration^{3,10}.

As for via tracheal intubation and/or gastrointestinal probes, in accordance with what was reported in the speech, studies recommend that the oral route is preferred to the nose, because the latter favors the occurrence of sinusitis which can lead to increased risk for VAP³.

Another relevant issue mentioned is the monitoring of endotracheal tube cuff pressure. Studies associate this care with the prevention of VAP and recommend maintenance of pressures between 20 to 30 cm H₂O^{3,11}. These pressure values promote to seal the trachea to prevent pulmonary aspirations and at the same

time to avoid the commitment of tracheal perfusion. The hyperinflation of the cuff above 30 cm H₂O can cause mucosal ischemia, cartilage injury, stenosis and tracheoesophageal fistula^{11,12}.

In CSD 3 are reported cares about of endotracheal aspiration and ventilator circuit and its implications for prevention of VAP. Tracheal secretions aspiration is essential care for patients in MV, because the presence of an artificial area interferes with the cough reflex which culminates with an accumulation of secretions which may lead to impaired ventilation¹³.

However, as reported by the professionals the suction procedure requires a careful evaluation of its necessity, because if done with predetermined intervals can trigger complications such as hypoxemia, cardiovascular instability, increased intracranial pressure, tracheal mucosal lesions and infections¹³.

The professionals suggest in the pulmonary auscultation CSD3 to precede the aspiration for certifying the presence of secretions and advise against the instillation of saline during the procedure for the risk of contamination.

Regarding the use of the closed system *versus* open aspiration system for prevention of VAP, studies show that although the first reduces risk of atelectasis and promote greater security for the worker, there's no evidence they point benefits in terms of prevention of infections when compared to the open system^{3,10,13,14}.

This issue appears when the collectivity reveals to use more often the closed system, although aware that this system does not present advantages for prevention of VAP. It is also mentioned the use of closed system, being the exchange held from daily assessment about the conditions of the catheter, the presence of dirt and aspiration capacity, being this a best practice in the literature¹⁰.

Another caution for prevention of alluded VAP refers to use of aspiration tubes sub-glottis continuous. The participants revealed never have used this device due to the absence at work, but they consider that it could be a good alternative to prevent VAP.

A systematic review and meta-analysis showed that the use of endotracheal tubes with sub-glottis secretion drainage is effective for the prevention of pneumonia associated to mechanical ventilator and may be associated with the decrease in use of mechanical ventilation and days of hospitalization in intensive care¹⁵.

With respect to the care of the ventilator circuit, in accordance with recommendations of other studies, participants suggest the conservation of respirator tracheas free of water or condensation and the circuit maintenance throughout a patient's stay in MV, being nominated exchange only in cases of failures, dirt or high ICU¹⁰.

The relationship between the time of MV and incidence of VAP was reported in CSD4, when the collective suggests a cohesive work carried out among the professionals who are part of the multidisciplinary team working in intensive care, in order to predict and anticipate extubation of patients, avoiding unnecessary sedation and thus decreasing the risks to VAP.

Patients often require invasive MV in some type of sedation for comfort and ventilator pattern optimization. However, deep sedation hinders the ventilator weaning and it can culminate in greater risk for VAP^{8,16}.

A recently published study recommends levels of mild sedation and daily interruption of sedation. These two strategies are safe and reduce the time of mechanical ventilation, as well as the days of hospitalization in intensive care. In addition, it was observed that the daily interruption of sedation is associated with greater survival of patients undergoing MV¹⁶.

However, patients with superficial sedation may present a risk for auto-extubation, anxiety, pain, asynchrony with the ventilator and desaturation⁸. Therefore, the interruption of sedation and ventilator weaning must be guided by well-founded protocols in order to avoid misleading and reextubations need that represent factor Predictor for VAP^{3,10}.

The use of non-invasive mechanical ventilation has been indicated as part of weaning and as a good strategy to avoid reintubations. There is however, concerns that its use can actually delay a required intubation, increasing mortality³. Thus, the realization of the ventilator weaning and extubation should be performed by trained professionals, so that this practice does not bring harm to patients.

It is also present in CD4 to achieve early tracheostomy for preventing VAP, in cases where there is a need for prolonged MV. However, the ideal time to perform the tracheotomy is still a controversial subject. A recent study suggests that this practice can contribute to greater patient comfort and facilitate ventilator weaning but the relationship with occurrence of VAP remains undefined¹⁷.

Before care mentioned in the four CSD it is noted that most have evidence as to its applicability to prevention of VAP, suggesting that the professionals have knowledge about the subject. However, it is explicit in the speeches the challenge for the implementation of some care into routine care.

It is believed that the use of educational practices can be an effective tool to effective this healthcare. A study conducted recently showed satisfactory results after conducting workshops with the nursing staff about preventive measures of VAP, showing greater adherence of healthcare staff after interventions¹⁸.

CONCLUSION

As preventive measures of pneumonia associated to mechanical ventilator, the participants mentioned: hand and oral hygiene; the prevention of pulmonary aspiration of secretions with the elevation of the headboard of 30 to 45°, cuff pressure control; care with the aspiration of secretions and ventilator circuit, aspiration of secretion only when necessary, not conducting the periodic exchange of ventilator circuit, to avoid water condensation on the circuit and to daily evaluate the possibility of extubation of the patient.

The analysis of the Collective Subject Discourse suggests that nursing and physiotherapy professionals possess knowledge about care for prevention of VAP, because a large part of care mentioned has evidence as to its use. This fact may have association with the academic degree of the participants and with the pursuit of them by technical and scientific improvement.

Although it has been evidenced a good level of theoretical knowledge, it is not possible to say that the same can be applied in its entirety in the everyday practice of the professionals. This fact is configured as a limitation of the study and the need for other research to investigate the conformity between speech and practice.

From the perspective of the authors, the results of this research can contribute to the elaboration of guidelines and clinical protocols to reduce the rates of VAP in the studied context and/or who keep similarities, thus promoting quality care and patient safety submitted to mechanical ventilation.

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