



Journal of Nursing

Revista de Enfermagem

UFPE On Line

ISSN: 1981-8963

ORIGINAL ARTICLE

ENDOTRACHEAL ASPIRATION: HEALTHCARE TEAM PRACTICES IN CARE FOR CRITICAL PATIENTS

ASPIRAÇÃO ENDOTRAQUEAL: PRÁTICAS DA EQUIPE DE SAÚDE NO CUIDADO AO PACIENTE CRÍTICO

ASPIRACIÓN ENDOTRAQUEAL: PRÁCTICAS DEL EQUIPO DE SALUD EN EL CUIDADO DE PACIENTES CRÍTICOS

Érida Zoé Lustosa Furtado¹, Ana Maria Ribeiro dos Santos², Maria Eliete Batista Moura³, Fernanda Valéria Silva Dantas Avelino⁴

ABSTRACT

Objective: to identify healthcare procedures adopted by the healthcare team during endotracheal aspiration in intensive care units. **Method:** descriptive and exploratory study with quantitative approach, carried out with 38 professionals from two intensive care units of a philanthropic hospital, through the technique of structured non-participant observation. The data were analyzed using the Statistical Product and Service Solutions (SPSS) program, version 17.0. This study was approved by the Research Ethics Committee, CAAE No. 0235.0.045.000-09. **Results:** with respect to the procedures, 71.1% had not been explained to patients; in 63.2% hands-washing had not been performed before aspiration; in 94.7% protective glasses had not been worn; in 89.5% the fraction of oxygen had not been increased; in 68.4% the time of aspiration had exceeded 15 seconds; in 78.9% there had not been oral decontamination with antiseptic solution; and 76.3% had not been recorded in the medical charts. **Conclusion:** the guidelines of the procedure were not always taken into account when performing the steps of this healthcare procedure. **Descriptors:** Intensive Care; Intensive Care Units; Endotracheal Intubation; Nursing.

RESUMO

Objetivo: identificar os cuidados adotados pela equipe de saúde durante a aspiração endotraqueal em unidades de terapia intensiva. **Método:** estudo exploratório descritivo com abordagem quantitativa, realizado com 38 profissionais de duas unidades de terapia intensiva de um hospital filantrópico, por meio da técnica de observação estruturada não participante. Os dados foram analisados pelo programa *Statistical Product and Service Solutions* (SPSS), versão 17.0. Este estudo foi aprovado pelo Comitê de Ética em Pesquisa, CAAE nº 0235.0.045.000-09. **Resultados:** quanto aos procedimentos, 71,1% não foram explicados aos pacientes; em 63,2% as mãos não foram higienizadas antes da aspiração; em 94,7% os óculos de proteção não foram utilizados; em 89,5% a fração de oxigênio não foi aumentada; em 68,4% o tempo de aspiração foi superior a 15 segundos; em 78,9% não houve descontaminação oral com antisséptico; e 76,3% não foram registrados nos prontuários. **Conclusão:** as diretrizes norteadoras do procedimento nem sempre foram levadas em consideração quando da realização dos passos desse cuidado. **Descritores:** Cuidados Intensivos; Unidades De Terapia Intensiva; Intubação Endotraqueal; Enfermagem.

RESUMEN

Objetivo: identificar los cuidados adoptados por el equipo de salud durante la aspiración endotraqueal en unidades de cuidados intensivos. **Método:** estudio exploratorio descriptivo con enfoque cuantitativo, llevado a cabo con 38 profesionales de dos unidades de cuidados intensivos de un hospital filantrópico, mediante la técnica de observación estructurada no participante. Los datos fueron analizados con el programa *Statistical Product and Service Solutions* (SPSS) versión 17.0. Este estudio fue aprobado por el Comité de Ética de Investigación, CAAE Nº 0235.0.045.000-09. **Resultados:** en cuanto a los procedimientos, 71,1% no habían sido explicados a los pacientes; en 63,2% las manos no habían sido desinfectadas antes de la aspiración; en 94,7% los anteojos de seguridad no habían sido utilizados; en 89,5% la fracción de oxígeno no había sido aumentada; en 68,4% el tiempo de aspiración había sido superior a 15 segundos; en 78,9% no había sido realizada la descontaminación oral con un antiséptico; y 76,3% no habían sido registrados en los prontuarios médicos. **Conclusión:** las directrices del procedimiento no se tomaron siempre en cuenta al realizar los pasos de este cuidado. **Descriptor:** Cuidados Intensivos; Unidades De Cuidados Intensivos; Intubación Endotraqueal; Enfermería.

¹Nurse, Master's degree candidate in Health Sciences, Federal University of Piauí (UFPI). Teresina, PI, Brazil. E-mail: eridazoe@hotmail.com; ²Nurse, Master's degree in Nursing, Doctoral candidate, Nursing School of Ribeirão Preto (EERP/USP). Teresina, PI, Brazil. E-mail: ana.mrsantos@gmail.com; ³Nurse, Post-doctor of the Nursing Department and the Graduate program in Nursing, Health Sciences Center, Federal University of Piauí (PPGMENF/CCS/UFPI). Teresina, PI, Brazil. E-mail: liapibic@yahoo.com.br; ⁴Nurse, PhD., Nursing Department, Federal University of Piauí, Head of the Division of Nursing, University Hospital, Federal University of Piauí (HU-UFPI). Teresina, PI, Brazil. E-mail: fvdavelino@gmail.com

INTRODUCTION

Endotracheal aspiration is widely performed in intensive care units (ICUs) in patients who are intubated whether undergoing artificial ventilation or not. This procedure aims to keep the airways pervious from the mechanical removal of lung secretions accumulated.¹ It constitutes an essential part of health care provided to critical patients and, therefore, it should be performed through judicious indication and based on scientific evidence so as not to cause damage to patients.^{2,3}

Among the complications caused by this procedure, the following stand out: bronchial trauma; bronchospasm; pain; discomfort; modification of the hemodynamic parameters and cerebral blood flow; and increased intracranial pressure, in addition to representing the main route of entry of bacteria in the lower respiratory tract, contributing greatly to the occurrence of respiratory infections.^{1,4,5}

Ventilator-associated pneumonia (VAP), in turn, is considered an infection related to health care and more recurrent in these specialized units, with significant morbimortality rates, causing potential damage to the health of individuals affected by this complication. In addition, its occurrence reflects a significant increase in the length of hospital stay and health care costs.^{6,7}

To minimize the risks to the patients' health, endotracheal aspiration should be undertaken on the basis of the best available evidence about techniques and care for aspiration of secretions. The most current recommendations include the need for: hands-washing and use of clean gloves not necessarily sterile; use of catheter that occludes less than half the inner lumen of the endotracheal tube; avoiding instillation of normal saline, due to increased risk of infections; duration of the aspiration not exceeding 15 seconds with pre-oxygenation for at least 30 seconds to prevent desaturation; and performing aspiration only if necessary, in cases of cough, visible or audible secretion, desaturation, or increased respiratory work.^{1,4}

In view of the high number of patients hospitalized in ICUs, who require aspiration routinely, it becomes of crucial importance that the health team is adequately trained to provide care inherent in this intervention aiming to minimize its adverse effects. What is observed, however, is that although there is

scientific evidence for safe and effective performance of endotracheal aspiration, many of these recommendations have not been observed in professionals' clinical practice, especially the nursing staff, due to the low knowledge about this procedure.^{1,8}

Based on the above considerations, this study is relevant and appropriate, since it proposes the improvement of discussion and reflection on the current health care provided to patients in ICUs with regard to endotracheal aspiration. This way, it will be possible to provide subsidies to health professionals for incorporating healthcare practice with scientific and technical support into their functions in order to foster patients' clinical improvement. In this sense, the goal of this study is to:

- identify the healthcare procedure adopted by the health team during endotracheal aspiration at intensive care units.

METHOD

This article was drawn from the monograph "Endotracheal aspiration procedure at the intensive care unit", presented to the Department of Nursing of the Health Sciences Center, Federal University of Piauí (UFPI) in 2010. It is an exploratory and descriptive study with quantitative approach conducted in two of the four ICUs of a philanthropic hospital in the city of Teresina, State of Piauí, Brazil, identified as ICU-II and ICU-III. Such units feature a predominance of older adult patients, who are more susceptible to physiological changes and invasive procedures, extending the length of hospital stay and increasing the risk of hospital-acquired infection.

The population of the study was composed of 38 professionals, including two nurses, 27 nursing technicians, and nine physiotherapists who performed endotracheal aspiration. With respect to the selection system, all individuals of the population were selected, i.e., a census study was used considering that the universe in question was relatively small in order to carry out the calculation of the sample.

The technique used for data collection was structured non-participant observation and the instrument used was a form consisting of two phases: the first included issues related to the characterization of the professionals under study and the second referred to a check list that included the main healthcare procedures to be adopted during the aspiration of the lower airways, based on the

foundations provided by the literature related to the subject, especially the Guidelines for Prevention of Nosocomial Pneumonia.² The instrument was pre-tested with 10% of the population at the ICU-I of the institution mentioned, in order to assess their comprehensibility and verify whether it featured all necessary healthcare procedures for endotracheal aspiration.

Considering that each patient was on average aspirated five times a day in these units, it was determined that the choice of aspiration procedures to be observed would be at random, choosing by drawing cards numbered from one to five. At first, we observed the aspiration procedure, because the merit of the research depended upon the restriction of information from observing the procedure performed to the subjects of the study. Secondly, this fact—as well as the objectives of the study—was communicated and justified to the professionals and, subsequently, their authorization and the signature of an informed consent form (ICF) were requested, so that the collected data could be disclosed.

Data collection was carried out from April to May 2010 during the three shifts, observing the procedure in intubated and tracheotomized patients undergoing mechanical ventilation or not. The data obtained were stored and submitted to descriptive statistical analysis using the Statistical Package for the Social Sciences (SPSS) program, version 17.0.

In order to comply with the ethical and legal aspects governing research involving human beings, we elaborated an ICF and a confidentiality agreement in order to preserve the privacy of data collected.⁹ At first, the project was forwarded to the Commission of Ethics in Research (CER) of the institution in which the study took place, and then it was submitted to the Research Ethics Committee of the UFPI. After the authorization for data collection by the teaching hospital and obtaining a favorable opinion by the CER-UFPI, as stated in the Protocol 0235.0.045.000-09, we started the data collection.

RESULTS

The data are presented in Tables 1 and 2.

Table 1. Characterization of the professionals that performed the procedure of endotracheal aspiration at the ICUs, according to socio-demographic variables. Teresina, PI, 2010.

Variables	n=38	%
Sex		
Male	17	44.7
Female	21	55.3
Age bracket (years)		
21 to 26	05	13.1
27 to 32	15	39.5
33 to 38	08	21.1
39 to 44	05	13.1
45 to 50	05	13.1
Professional category		
Nurse	02	5.3
Nurse technician	27	71
Physiotherapist	09	23.7
Time after graduation (years)		
Less than ten years	21	55.3
Ten years or more	17	44.7
Working time at ICUs (years)		
Less than one year	04	10.5
One to five years	18	47.4
Six to ten years	06	15.8
More than ten years	10	26.3
Participation in trainings		
Yes	11	29
No	27	71

Regarding the characterization of the 38 professionals who participated in this research, Table 1 shows that they were predominantly female (55.3%), aged between 27 and 32 years (39.5%), they had intermediate level of education (71%), time after graduation was less than 10 years

(55.3%), and they had worked at ICUs from one to five years (47.4%). With respect to participation in training concerning the prevention of VAP, 71% of the professionals informed that they had never participated in educational activities involving this theme.

Table 2. Distribution of health care adopted during endotracheal aspiration in ICUs. Teresina, PI, 2010.

Variables	Yes		No		Total	
	N	%	N	%	N	%
Performs of hands-washing prior to the procedure	14	36.8	24	63.2	38	100
Explains the procedure to the patients	11	28.9	27	71.1	38	100
Stops the enteral diet	13	81.2	3	18.8	16	100
Wears an apron	23	60.5	15	39.5	38	100
Wears a mask	36	94.7	2	5.3	38	100
Wears protective glasses	2	5.3	36	94.7	38	100
Doubles FiO ₂ or regulates it to 100%	4	10.5	34	89.5	38	100
Wears sterile gloves	38	100	-	-	38	100
Uses appropriate gauge catheter	38	100	-	-	38	100
Uses sterile aspiration catheter	38	100	-	-	38	100
Follows the tube, nose and mouth sequence	33	86.8	5	13.2	38	100
Performs aspiration in a maximum time of 15 seconds	12	31.6	26	68.4	38	100
Uses normal saline to fluidize secretions	12	31.6	26	68.4	38	100
Discards the catheter after the aspiration sequence	37	97.4	1	2.6	38	100
Restores initial FiO ₂	3	75	1	25	4	100
Performs oral decontamination with antiseptic solution	8	21.1	30	78.9	38	100
Performs hands-washing after the procedure	23	60.5	15	39.5	38	100
Records the procedure in the medical chart	9	23.7	29	76.3	38	100

Table 2 shows the frequency of health care adopted during endotracheal aspiration. It is worth noting that hands-washing before this procedure was not performed by 63.2% of the professionals; protective glasses were the less used equipment (94.7%); the increase in the fraction of oxygen supplied to the patients before starting the aspiration did not occur in 89.5% of the observations; in 68.4% of cases the aspiration time was over 15 seconds, and in 68.4% there was no fluidization of secretions.

DISCUSSION

The analysis of the results made it possible to characterize the health team that performs endotracheal aspiration in ICUs, as well as to identify the precautions taken during the execution of this procedure.

With respect to gender, it was observed that most of the workers were female (55.3%). This finding is justified in view of the greater frequency of nursing professionals in this research and the fact that this is a profession in which the number of women is predominant. This datum is historically built as a consequence of the charitable context present in the category since Florence Nightingale and the birth of nursing. This reality made that the action of caring were held by women, although care is a quality inherent to human beings and not just a female quality.¹⁰⁻¹

The age of the group, in turn, ranged from 21 to 50 years and the most frequent age bracket was 27 to 32 years, accounting for 39.5% of the professionals. As for the time after graduation in years, it was observed that the health team had little time, since 55.3% of the professionals had been graduated for less

than 10 years. This finding indicates that the institution hired professionals with little experience and they were trained in service.¹² Regarding the working time in the ICUs, it was found that 47.4% of the team had from one to five years of experience with critical patients, followed by professionals with more than 10 years of service (26.3%). This demonstrates that a predominantly young population worked together with workers who had many years of experience in service (over 10 years).

The group of nursing technicians constituted the main category of the study (71.0%) followed by the category of physiotherapists (23.7%) and, to a lesser extent, nurses (5.3%). It is worth mentioning that the small role of nurses in this activity is considered a point of the utmost relevance, considering that it is a high-complexity care unit. Thereby, it is observed that although the intermediate-level personnel are the least qualified, they perform most actions of direct health care provided to patients requiring intensive care.

It can be noted that nurses—even in units providing health care to critically ill patient—continue acting more in the administration of the unit than in direct health care provided to patients.¹³ A research that aimed to identify the professionals who performed this procedure in emergency units and ICUs in a hospital of the city of Natal, State of Rio Grande do Norte, Brazil, found that of the total of 334 aspirations performed, 162 (48.5%) were made by nursing technicians, 82 (24.5%) by nursing assistants, 75 (22.5%) by physiotherapists, 12 (3.6%) by nurses, and three (0.9%) by physicians.¹⁰

With respect to participation in training concerning the prevention of VAP, 71.0% had

never performed any educational activity involving this theme. In this sense, continuing training is considered of extreme importance for the team that provides health care in many health areas.²

According to Table 2, it can be seen that 63.2% of the professionals surveyed failed performing hands-washing before endotracheal aspiration and 39.5% after the procedure. These findings contradict what the literature advocates, i.e., that the hands-washing should be performed before and after any procedure, independent of wearing gloves, because hands are the main means of transmission of hospital-acquired infections.^{1,2,14}

Other studies that assessed the aspiration technique found similar results to the above mentioned.^{10,12} This fact is attributed to the still existing belief that wearing gloves represents a barrier against infection. However, this is a misconception; because it has already been proven that wearing gloves does not replace hands-washing.^{1,2,10,14}

Regarding the explanations provided to the patients before starting the aspiration, it was observed that most professionals had not carried out this procedure (71.1%). In accordance with the principle of autonomy, before starting the technique, the professional must inform the patients about the procedure to which they will be submitted, giving them the opportunity to choose and participate in their treatment.¹⁵ However, it is believed that the change in the level of awareness and the lesser degree of communication between nurses and patients with altered level of awareness lead them to not adopt this type of attitude in practice.^{10,16}

With regard to the interruption of enteral diet before the aspiration, from the 16 times that the diet was being administered at the time of aspiration, in 13 times (81.2%) it had been interrupted. In this context, studies point out that the interruption of the diet before starting the airway aspiration can help prevent vomiting and the aspiration of contents into the lungs.¹⁷

With respect to the use of personal protective equipment (PPE), masks were worn in most occasions (94.7%) and an apron in 60.5% of the observations. However, in 94.7% cases, protective glasses had not been worn. Thus, the use of PPE is of fundamental importance for the prevention of accidents with biological material, as well as cross-transmission between patients and professionals. Considering the risk of contamination to patients and health teams during the aspiration of secretions, the use of

PPE during the technique—such as glasses, masks and aprons—is highly recommended.^{1,2,14}

With respect to wearing a gown, this equipment was used; however, the professionals dressed it at the beginning of the shift and just took it off at the end. Thus, the same gown was worn in all procedures performed in different patients, including those who were under special contact or respiratory precautions. This practice, in turn, contradicts the recommendations that the gown should be taken off immediately after use and in case of performing procedures in different patients. It should be replaced in order to prevent cross-infection.¹⁸

As for the recommendation to increase the fraction of oxygen supplied to patients before starting the aspiration, this procedure was not followed in 89.5% of cases. Hyper-oxygenation involves the administration of an inspiratory oxygen fraction (FiO₂) greater than that supplied prior to aspiration, in order to improve lung volume, promote ventilation, mobilize secretions and minimize the risks of complications related to the aspiration procedure. This hyper-oxygenation can be carried out by means of adjusting the concentration of FiO₂ in the mechanical ventilator or manually, although the latter is no longer recommended due to its ineffectiveness.^{19,20}

It is noteworthy that airways irritation occurs during this procedure, with consequent vagal stimulation causing bronchospasm, reduced oxygen supply to the lungs and microatelectasis. Thus, the increase in FiO₂ helps prevent these events during aspiration.¹⁶⁻⁷

With respect to wearing sterile gloves, we observed that 100% of the professionals had worn them. In this context, a study conducted with intensivists nurses in Spain obtained data similar to those found in this study. They observed that 100% of the professionals recognized the importance of wearing sterile gloves to perform this health care.¹⁶ In accordance with these findings, through systematic review of the literature on the technique of endotracheal aspiration, it was possible to conclude that the adoption of an aseptic technique minimizes the risk of introducing microorganisms in the lower airways, thus preventing VAP.²¹ However, most current recommendations consider wearing procedure gloves.^{1,4}

Regarding the use of sterile aspiration catheter, all the professionals (100%) had used this material properly. The study conducted in Natal corroborates the results found by

identifying that most professionals (97.3%) used sterile catheters during the procedure.¹⁰ It is worth mentioning that tracheal catheterization can introduce microorganisms in the lower respiratory tract, which justifies the use of sterile and single-use catheters.^{1,2,14}

Regarding the use of proper gauge catheter, this research found that in 100% of the observations this requirement had been fulfilled. A study conducted at Navarra Hospital in Pamplona, Spain, obtained similar data confirming that 100% of the nurses working in the ICU used proper gauge catheters, which must not exceed half of the inner diameter of the artificial airway.^{1,22} Still, it is relevant to highlight that the literature recommends that the catheter or probe should be soft, made of transparent material, with rounded tip and multiple counter-opening orifices at the distal end with a digital valve for vacuum pressure control.^{16,21}

With regard to the correct sequence of aspiration (tube, nose and mouth), the sequence adopted was correct in 86.8% of cases. Confirming these findings, similar studies found that most professionals studied (91.1 and 100%, respectively) performed the sequence of aspiration correctly.

With respect to the procedure of aspiration within the maximum time of 15 seconds, this requisite was not followed in 68.4% of cases. The time for the introduction of the probe must be as fast as possible and its withdrawal must be done with circular movements, performed with the thumbs and index fingers, allowing clearance of secretions with minimal damage to the tracheal wall. Thus, the time is a very important determinant and must not exceed 15 seconds, because the air content in the lungs is reduced and thus potentially leading to hypoxia, since air is aspired along with secretions.^{1,2,4}

Regarding the fluidization of secretions with sterile fluid, the professionals did not instill normal saline into the trachea during aspiration in 68.4% of the observations. Fluidization of secretions with sterile fluid is consistently questioned. There are recommendations to instill small amounts of normal saline intrabronchially to fluidize, mobilize secretions and stimulate cough. Corroborating this information, a study conducted in the United States confirmed that there were protocols of airways secretions fluidization using normal saline in 74% of 27 American hospitals surveyed.²³

Other studies present recommendations that contraindicate normal saline instillation except after evaluation of the real patient's

needs, because this procedure causes hypoxemia, besides infections, which may affect the psychological well-being of the patient, since the proper humidification of inspired gases and hydration of the patient avoids the formation of secretion.²¹ Considering that instillation may be harmful, it should not be performed routinely before endotracheal aspiration.²⁴⁻⁶

With regard to oral cleaning and decontamination with antiseptic solution, this procedure was not performed in 78.9% of cases. The microbiota of the oral cavity, however, represents a threat to critical patients. For this reason, the use of antiseptic solutions in sanitizing has been the subject of research as a measure of prevention against VAP.

A study highlighted the importance of the topical use of chlorhexidine for oral hygiene of patients under mechanical ventilation to reduce the incidence of VAP. In addition, this procedure is safe and tolerable, since side effects have not been demonstrated in studies. Still, pondering the rising cost of hospital stay due to an episode of hospital-acquired infection, it may be regarded as a measure of low cost.²⁷

The continuous use of prophylactic antibiotics is not recommended, because they increase the risk of induction and selection of resistant microorganisms. Thus, the use of antiseptic solutions in preventing pneumonia is considered as category II evidence. This is a recommendation based on clinical or suggestive epidemiological studies, or theoretical models, just being suggested for implementation and not strongly recommended.²

When we observed the notes relating to airways aspiration recorded in the medical charts and how they were carried out, it was possible to confirm that in 76.3% of the cases the data were not recorded. In addition to being a document, medical charts represent a means of communication between the professionals of the health team, assisting in the continuity of planning and health care to be provided in the future.²⁸

CONCLUSION

This study allowed identifying health care adopted by the health team during endotracheal aspiration, as well as characterizing the professionals who performed such intervention in two ICUs of a philanthropic hospital in the city of Teresina, State of Piauí, Brazil.

When considering the professionals that performed this procedure, distancing of nurses in the provision of that health care was observed, either due to lack of knowledge or by delegation of care to another professional. Thus, it was observed that other professional categories currently perform functions previously undertaken by nurses, which induces reflection about paradigm shifts, because nurses continue to be holistically responsible for the well-being of patients, especially when health care is provided to critical patients.

Another aspect which deserved attention was the low frequency of professionals who participated in training on VAP. This fact demonstrates the necessity of deploying strategies focused on deepening theoretical-practical and scientific health care provided to patients at risk.

With respect to the guidelines contained in the check list, we observed that the professionals who participated in this study did not adopt the necessary care for the safe performance of endotracheal aspiration, since the main guidelines of the procedure were not always taken into account. The non-observance of the main measure to reduce hospital-acquired infections, i.e., hands-washing, on the part of some professionals deserved particular attention. In addition, the use of PPE was not always performed as it should and protective glasses, despite being available at the ICUs under study, were the equipment less used by professionals (5.3%),.

The findings suggest that, often, hoping to relieve hypersecretive patients, some measures of the endotracheal aspiration technique were ignored. In this sense, it is important to highlight that the level of training by itself does not guarantee the use of knowledge in healthcare routine, as this also requires awareness and responsibility of the professionals providing this health care.

Still, this study allowed confirming that, although the institution had a protocol for performing the aspiration procedure prepared by the Commission of Hospital-Acquired Infection Control of the hospital, it was not available for consultation in the units surveyed, making it difficult for professionals to access the information contained.

Based on the above considerations, it is possible to infer that, for the provision of quality health care, it is necessary that the health team has valid scientific evidence-based knowledge about the different aspects of endotracheal aspiration in order to minimize its complications. To this end, the application of well-established standards and

facilitated access of professionals to the protocols that govern the procedures performed in the service are indispensable for changing this reality. Therefore, it is urgent to draw up an educational proposal that guide the activities of health professionals at ICUs, covering the strategies necessary for the implementation of routine procedures for critical patients. Among them, the aspiration of secretions based on the awareness, commitment and continuing education stands out, since they are considered fundamental factors so that health professionals can achieve the best results in these patients.

REFERENCES

1. American Association of Respiratory Care. AARC clinical practice guideline: endotracheal suctioning of mechanically ventilated patients with artificial airways 2010. *Respir Care* [Internet]. 2010 June [cited 2013 Mar 28];55(6):758-64. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/20507660>
2. Tablan OC, Anderson LJ, Besser R, Bridges C, Hajjeh. Guidelines for preventing health-care-associated pneumonia, 2003: recommendations of Centers for Disease Control and Prevention (CDC) and the Healthcare Infection Control Practices Advisory Committee [Internet]. 2004 [cited 2009 Oct 23];53(RR-3):1-36. Available from: <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr%20htm%205303a1>
3. Sociedade Brasileira de Pneumologia e Tisiologia. Diretrizes Brasileiras para o tratamento das pneumonias adquiridas no hospital e das pneumonias associadas à ventilação mecânica. *J bras pneumol* [Internet]. 2007 Apr [cited 2012 Nov 16];33(suppl 1):S1-30. Available from: http://www.scielo.br/scielo.php?pid=S1806-37132007000700001&script=sci_arttext
4. Pedersen CM, Rosendahl-Nielsen M, Hjerminde J, Egerod I. Endotracheal suctioning of the adult intubated patient. What is the evidence? *Intensive Crit Care Nurs* [Internet]. 2009 Feb [cited 2013 June 26];25(1):21-30. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/18632271>
5. Lorente L, Lecuona M, Jimenez A, Mora ML, Sierra A. Tracheal suction by closed system without daily change versus open system. *Intensive Care Med*. *Intensive Care Med* [Internet]. 2006 Apr [cited 2013 July 05];32(4):538-44. Available from: <https://www.ncbi.nlm.nih.gov/m/pubmed/16511633/>

6. Gomes AM, Silva RCL. Blunde de prevenção da pneumonia associada à ventilação mecânica: o que sabem os enfermeiros a esse respeito? Rev enferm UFPE online [Internet]. 2010 Apr/June [cited 2013 July 17];4(2):605-14. Available from: <http://www.revista.ufpe.br/revistaenfermage/index.php/revista>
7. American Thoracic Society. Guidelines for the management of adults with hospital-acquired, ventilator-associated, and healthcare-associated pneumonia. Am J Respir Crit Care Med. [Internet] 2005 Feb; [cited 2013 May 07];171(4):388-416. Available from: <http://www.thoracic.org/statements/resources/tb-opi/guide1-29.pdf>
8. Santos YC, Studart RMB, Andrade IRC, Citó MCO, Melo EM, Barbosa IV. Ventilação mecânica: evidências para o cuidado em enfermagem. Esc Anna Nery Rev Enferm [Internet]. 2012 Oct/Dec [cited 2013 June 20];16(4):789-95. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1414-81452012000400021
9. Brasil. Ministério da Saúde. Manual Operacional para Comitês de Ética em Pesquisa. Brasília: Ministério da Saúde; 2002.
10. Farias GM, Freire ILS, Ramos CS. Aspiração endotraqueal: estudo com pacientes em uma unidade de urgência e terapia intensiva de um hospital da região metropolitana de Natal - RN. Rev eletrônica enferm [Internet]. 2006 [cited 2010 Jan 08];8(1):63-9. Available from: http://www.fen.ufg.br/revista/revista8_1/original_08.htm
11. Guerrer FJL, Bianchi ERF. Caracterização do estresse nos enfermeiros de unidades de terapia intensiva. Rev Esc Enferm USP [Internet]. 2008 [cited 2013 May 20]42(2):355-62. Available from: <http://www.scielo.br/pdf/reeusp/v42n2/a19.pdf>
12. Farias GM, Freitas MCS, Rocha KMM, Costa IKF. Pacientes sob ventilação mecânica: cuidados prestados durante a aspiração endotraqueal. Inter Science Place [Internet]. 2009 Sep/Oct [cited 2013 Mar 25];8(1):63-9. Available from: <http://www.interscienceplace.org/index.php/interscienceplace/article/viewArticle/109>
13. Ribeiro MILC, Pedrão JL. O ensino de enfermagem no Brasil: enfoque na formação de nível médio. Rev Nursing. 2005; 82(8):125-28.
14. Siegel JD, Rhinehart E, Jackson M, Chiarello L. Centers for Disease Control and Prevention, Healthcare Infection Control Practices Advisory Committee. Guidelines for isolation precautions: preventing transmission of infectious agent in health setting 2007. [Internet]. 2007 [cited 2011 Feb 15]; Available from: <http://www.cdc.gov/ncidod/dhqp/pdf/guidelines/isolation2007.pdf>
15. Brasil. Ministério da Saúde. Organização Pan-americana de Saúde. Secretaria Executiva. Departamento de Informática do Sistema Único de Saúde. Periódico anual, de circulação dirigida ao setor saúde, da rede interagencial de informações para a saúde (Ripsa). Rio de Janeiro; 2006.
16. González NA, Amparo MM, Sagardoy ME, Coscojuela MAM, Erro MCA. Evaluación de la competencia práctica y de los conocimientos científicos de enfermeras de UCI en la aspiración endotraqueal de secreciones. Enferm Intensiva [Internet]. 2004 [cited 2012 June 8];15(3):101-11. Available from: <http://www.elsevier.es/es/revistas/enfermeria-intensiva-142/evaluacion-competencia-practica-los-conocimientos-cientificos-enfermeras-13065773-articulos-originales-2004>
17. Dreyer E, Zuñiga QGP. Ventilação mecânica. In: Cintra E. de A, Nishide VM, Nunes WA, editors. Assistência de enfermagem ao paciente gravemente enfermo. São Paulo: Atheneu; 2003. p. 351-66.
18. Gomes DL de C. Precauções e isolamento de pacientes. In: Infecção hospitalar e outras complicações não-infecciosas da doença: epidemiologia, controle e tratamento. Rio de Janeiro: Medsi; 2003. p. 469-79.
19. Choi JSP, Jones AYM. Effects of manual hyperinflation and suctioning in respiratory mechanics in mechanically ventilated patients with ventilator-associated pneumonia. Aust J Physioter [Internet]. 2005 [cited 2012 Apr 27];51(1):25-30. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/15748122>
20. Taylor JE, Hawley G, Flenady V, Woodgate PG. Tracheal suctioning without disconnection in intubated ventilated neonates. Cochrane Database Syst Rev [Internet]. 2011 Dec [cited 2012 Apr 13];(12):CD003065. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/22161374>
21. Thompson L. Suctioning adults with an artificial airway: a systematic review. Best Practice [Internet]. 2000 [cited 2012 May 12];4(4):6p. Available from: <http://www.joannabriggs.edu.au/>
22. Vanner R, Bick E. Tracheal pressures during open suctioning. Anaesthesia [Internet]. 2008 Mar [cited 2013 Apr 19];63(3):313-15. Available from:

<http://www.ncbi.nlm.nih.gov/pubmed/18289240>

23. Byers CNAA, Jeffery E, Ludy EdD, Ying Z, Christine M, Brummel K. A multisite survey of suctioning techniques and airway management practices. *Am J Crit Care* [Internet]. 2003 May [cited 2013 May 27];12(3):220-30. Available from:

<http://www.ncbi.nlm.nih.gov/pubmed/12751396>

24. Branson RD. Secretion management in the mechanically ventilated patient. *Respir Care* [Internet]. 2007 Oct [cited 2013 Mar 03];52(10):1328-47. Available from:

<http://www.ncbi.nlm.nih.gov/pubmed/17894902>

25. Celik SA, Kanan N. A current conflict: use of isotonic sodium chloride solution on endotracheal suctioning in critically ill patients. *Dimens Crit Care Nurs* [Internet]. 2006 Jan/Feb [cited 2013 Feb 25];25(1):11-4. Available from:

<http://www.ncbi.nlm.nih.gov/pubmed/16501363>

26. Ridling DA, Martin LD, Bratton SL. Endotracheal suctioning with or without instillation of isotonic sodium chloride solution in critically ill children. *Am J Crit Care* [Internet]. 2003 May [cited 2013 Apr 15];12(3):212-19. Available from:

<http://www.ncbi.nlm.nih.gov/pubmed/12751395>

27. Beraldo CC, Andrade D. Higiene bucal com clorexidina na prevenção de pneumonia associada à ventilação mecânica. *J bras pneumol* [Internet]. 2008 Sept [cited 2013 Apr 04];34(9):707-14. Available from:

<http://www.scielo.br/pdf/jbpneu/v34n9/v34n9a12.pdf>

28. Matsuda LM, Silva DMP, Évora YDM, Coimbra JAH. Anotações/registros de enfermagem: um instrumento de comunicação para a qualidade do cuidado? *Rev eletrônica enferm* [Internet]. 2006 [cited 2012 May 10];8(3):415-21. Available from:

http://www.fen.ufg.br/revista/revista8_3/v8n3a12.htm

Submission: 2013/08/29

Accepted: 2013/11/13

Published: 2013/12/15

Correspondence Address

Érida Zoé Lustosa Furtado
Condomínio Village Jóquei
Bloco 8, Ap. 301
Rua Valdemar Martins
Bairro Morada do Sol
CEP: 64055-280 – Teresina (PI), Brazil