

Best practices for airway aspiration of intensive care patients

Boas práticas para aspiração de vias aéreas de pacientes em terapia intensiva

Buenas prácticas para la aspiración de las vías respiratorias de los pacientes de cuidados intensivos

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ABSTRACT

Objective: to identify best practices care for airway aspiration of adult patients, implemented by Intensive Care Unit Nursing professionals. **Method:** qualitative, exploratory-descriptive study, developed with 28 nursing professionals in an adult intensive care unit in southern Brazil, through semi-structured interview and thematic analysis of data. **Results:** best practices for airway aspiration were configured in five categories Criteria used to define the need for aspiration; Biosafety in airway aspiration; Care in aspiration procedure; Care after aspiration procedure; and Difficulties encountered by nursing professionals in the procedure. **Conclusions:** best practices for airway aspiration are related to patient assessment to identify the need for the procedure, monitor complications during and after the procedure, and ensure the best clinical outcome. Care is also taken to ensure biosafety, considering the risk to the patient and to the professional who operates the procedure.

Descriptors: Nursing; Nursing care; Suction; Intensive care units

RESUMO

Objetivo: identificar boas práticas de cuidados para aspiração das vias aéreas de pacientes adultos, implementadas por profissionais de Enfermagem em Unidade de Terapia Intensiva. **Método:** estudo qualitativo, do tipo exploratório-descritivo, desenvolvido com 28 profissionais de Enfermagem em

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unidade de terapia intensiva adulto no sul do Brasil, por meio de entrevista semiestruturada e análise temática dos dados. **Resultados:** as boas práticas para a aspiração das vias aéreas foram configuradas em cinco categorias Critérios utilizados para definir a necessidade de aspiração; Biossegurança na aspiração das vias aéreas; Cuidados no procedimento de aspiração; Cuidados após o procedimento de aspiração; e Dificuldades encontradas pelos profissionais de enfermagem no procedimento. **Conclusões:** as boas práticas para a aspiração de vias aéreas estão relacionadas com a avaliação do paciente para identificar a necessidade do procedimento, monitorar complicações durante e após o procedimento e garantir o melhor resultado clínico.

Descritores: Enfermagem; Cuidados de enfermagem; Sucção; Unidades de terapia intensiva

RESUMEN

Objetivo: identificar buenas prácticas de cuidado para aspiración de las vías respiratorias de pacientes adultos, implementadas por profesionales de enfermería de Unidad de Cuidados Intensivos.

Método: estudio cualitativo, exploratorio-descriptivo, desarrollado con 28 profesionales de enfermería en una unidad de cuidados intensivos para adultos en el sur del Brasil, mediante una entrevista semiestruturada y un análisis temático. **Resultados:** las buenas prácticas para la aspiración de las vías respiratorias se configuraron en cinco categorías Criterios utilizados para definir la necesidad de aspiración; Bioseguridad en la aspiración de las vías respiratorias; Cuidado en el procedimiento de aspiración; Cuidado después del procedimiento de aspiración; y Dificultades encontradas por los profesionales de enfermería en el procedimiento. **Conclusiones:** las buenas prácticas para la aspiración de las vías respiratorias están relacionadas con la evaluación del paciente para identificar la necesidad del procedimiento, vigilar las complicaciones durante y después del procedimiento y asegurar el mejor resultado clínico.

Descriptores: Enfermería; Atención de enfermería; Succión; Unidades de cuidados intensivos

INTRODUCTION

Airway aspiration procedure is part of the care set implemented in Intensive Care Units (ICU), a highly complex environment, and intended for critically ill and unstable patients. It is aimed at removing secretions from the respiratory tract, in order to keep airways clear and to prevent infections,¹ and is prescribed for patients who do not eliminate secretions effectively.

This is a complex intervention: airway aspiration demands knowledge about patients' clinical condition, which involves pathophysiological issues, ventilatory support and mechanical ventilation. Even though this procedure is shared with a physical therapist, the nursing team is responsible for assisting

the patient continuously, and must master the right aspiration technique.³⁻⁴

A randomized study, investigating physiological effects of endotracheal tube aspiration in adult patients, showed a significant drop in peripheral oxygen saturation and a significant increase in systolic blood pressure, diastolic blood pressure and arterial blood pressure.⁵ Considering these complicating factors, aspirating the endotracheal tube or the tracheostomy should not be a routine procedure, and should be determined based on criteria that define how necessary the procedure is.

Resolution #557/2017 of the Brazilian Federal Nursing Council decides that critically ill patients,

whether or not submitted to orotracheal intubation or tracheostomy, should have their airways privatively aspirated by nursing professionals. However, in emergency situations, airway aspiration may be performed by a Nursing Technician.⁶ Even though technical nursing professionals are the ones who mostly perform this procedure, nurses are responsible for supervising and guiding nursing technicians on good care practices for airway aspiration.⁴

Studies evidenced the levels of knowledge required for practicing intensive nursing towards endotracheal aspiration.⁷⁻⁸ Most ICU nurses (69.9%) were familiar with procedural directions, and 77.7% of them knew how to respond when facing complications. Nurses with ICU training (57.3%) showed significantly higher knowledge than untrained nurses ($p < 0.005$), whereas other factors, such as professional expertise and level of specialty, had no influence.⁷

In view of the above, this study is justified as a contribution for producing knowledge on good care practices for endotracheal, oral, and nasal aspiration, based on the perception of nursing professionals who are experienced in intensive care. Few productions follow this approach, and it is extremely important to discuss the subject with nursing professionals, as well as to provide subsidies for project updating and systematizing assistance. This study aims at identifying good care practices for airway aspiration in adult patients, to be implemented by nursing professionals in an intensive care unit.

METHOD

This qualitative, exploratory-descriptive study was carried out in an adult ICU at a public hospital in southern Brazil. The research scenario provides 10 hospital beds for adult patients, for every clinical and surgical specialties. The hospital facilities are average in size, with installed capacity that meets local and regional demands of medium complexity, and high complexity in oncology and neurology. The staff is multidisciplinary: the nursing team consists of 28 nursing technicians and five nurses.

The 33 nursing professionals were invited to participate in the study. They directly assist adult patients admitted to the unit, which is described as an investigative setting. Professionals on health leave or on vacation did not take part in the study during data collection.

In total, 28 nursing professionals took part in the study. 25 of them were technicians and three had higher education, most of them were females (86.0%) between 24 and 55 years of age. Their education ranged from one to 30 years. Average professional time in the institution was of nine years, and average working time in the adult ICU was of six years. The nurses taking part in the study had graduate studies (specialization level) in intensive care. Most technical professionals (46.0%) have attended updating courses, and 18% of technicians are Nursing majors.

Data collection took place between March and April 2014. Participants were invited, and the research project was disclosed to the unit's nursing professionals, as the study objectives were presented. Data collection used

semi-structured interviews, with questions regarding good care practices adopted in endotracheal, oral and nasal aspiration. Professionals were asked: what is your main criterion to define how necessary it is to use airway aspiration? What precautions do you take before, during and after the procedure? What precautions do you consider essential for aspiration to be performed? The questions were previously analyzed in order to ascertain the scope of the objective, its time and limitations.

Interviews were conducted by two Nursing majors, both of them female, who were trained to perform data collection, under an advising professor, a researcher in charge of the study. Interviews were carried out during work shift, at the unit, in an adequate environment, thus guaranteeing participant's privacy. Interviews lasted an average of 20 minutes; they were recorded in an MP3 file and, later, transcribed, in order to keep participants' speeches in their entirety. No field notes were made during interviews.

The empirical material from the participants' interviews was peer-reviewed, including the researcher responsible for the study and another doctor in nursing who was involved in the study, in order to guarantee credibility. Theoretical saturation and thematic analysis were considered. During pre-analysis, interviews were immediately transcribed and read, in order to identify groups of meaning. Then, when exploring the material, themes identified in the statements were compiled – clusters of speech with the same groups of meaning, statement

naming and verification of theoretical saturation. Finally, the results obtained were treated and interpreted.⁹ In order to preserve anonymity, participants were identified by codes, such as "ENF" for nurses, and "TEC" for nursing technicians, followed by interview numbering, adhering to the ethical precepts of Resolution #466/2012 of the National Health Council, and approved by the Research Ethics Committee, under resolution #360.967/2013. Professionals were invited to take part of it, and acceptance was formalized by signing the Free and Informed Consent Form. Results were presented to the service coordination, as an attempt to help with assistance qualification.

RESULTS

Results are presented in five categories: criteria used to define whether aspiration is necessary; biosafety during airway aspiration; care during aspiration procedure; care after aspiration procedure; and difficulties encountered by nursing professionals during the aspiration procedure.

Criteria used to define whether aspiration is necessary

The nursing professionals interviewed said that they had previously assessed whether aspiration was needed, considering oxygen saturation decrease ($SPO_2 < 95\%$) the main indicator for using the procedure. Other signs were reported that define whether aspiration was necessary: cough, agitation, discomfort and respiratory effort, sweating, cyanosis and triangular tracing, asynchrony and high pressure on the mechanical ventilator.

Specifically, nurses reported that they also assess for the presence of snoring, based on respiratory auscultation. Even when there are no signs indicating the need for aspiration, the patient is aspirated at least once every shift.

Secretion, respiratory distress, tachypnea, low saturation (SPO₂<95%), sweating and cyanosis. (TEC03)

I pay much attention to the device waveforms. Because the respirator, it shows when the patient has secretion. (TEC15)

When there is a ventilator, we see the patient's effort. The patient also begins to struggle. Respiratory auscultation to identify snoring. The effort. And, besides all this, the routine of evaluating and aspirating, to check for clogging. (ENF 03)

Biosafety during aspiration

Before the procedure, hand washing, material organization and evaluation of probe caliber are performed. Then, the procedure is explained to the patient, for reassurance. The professionals affirm the need to position the patient and, if intubated, they observe the fixation and pressure of the tube cuff. Some professionals choose not to interrupt an enteral diet.

[...] patient positioning, whether the tube is fixed, whether or not it is safe [...], we do not stop the diet for aspiration. (TEC02)

[...] to see if the tube is well positioned, if the cuff is inflated, and if my cord is securely tied. (TEC07)

[...] explain the procedure to the patient. You have to guarantee the patient's safety [...] washing your hands, choosing the appropriate materials and stopping the TOT from being accidentally removed. (ENF01)

[...] It is important to wash your hands, and to have the most appropriate probe. The tube must be secure, tight, and the cuff must be at the right pressure. (ENF03)

Regarding personal protective equipment, all professionals reported the use of procedure gloves and sterile gloves. The use of Personal Protective Equipment (PPE) has also been reported.

Mask, glasses, procedure gloves and sterile gloves. (TEC04)

[...] You have to guarantee the patient's safety and your own safety, using PPEs (personal protective equipment) [...]. (ENF01)

Care during aspiration

During aspiration, the following precautions are followed: latex clamping at probe insertion, so as not to cause injury; partial probe insertion; unclamping the latex during probe removal, always in circular movements; fluidizing secretions with saline; and performing maneuvers with a self-inflating manual resuscitator (ambu) that is connected to oxygen. Regarding the steps in airway aspiration, one third

of the professionals reported following endotracheal first, then nasotracheal and, finally, orotracheal.

We introduce it with the clamped latex. We aspire and, when we pull, and clamp again [...] when the aspiration comes, it can injure and bleed a little. You only have to aspirate if you have secretion. (TEC14)

Main care is to follow the correct sequence, via endotracheal, nasal and oral. Use serum with caution. (ENF02)

I don't insert the whole probe. I try to make circular movements, soft and precise. (TEC01)

[...] If necessary, we maneuver with ambu. When secretion obstructs, especially when there are blood clots, it's easy to form a plug. (TEC12)

The probe cannot be used first in orogastric or nasogastric [aspiration]. First, it has to be endotracheal, because it is a sterile procedure [...] We can use saline to fluidize. (TEC03)

The professionals use the closed suction system when prescribed by the doctor or nurse, and in situations where the patient requires contact isolation and respiratory isolation. Patient hyperoxygenation, before procedure, is performed by almost all professionals.

The closed suction system is implemented by the nurse, or prescribed by the doctor. I think it's

more when the patient is in contact precaution, in respiratory isolation. (TEC01)

First squeeze on the window, we call it the window, which is the one to intensify the flow of O₂ in the patient's FiO₂. It goes to 100%, I think in about 2 minutes. The respirator itself has this; I press it there. (ENF01)

Respondents said that they assess the patients' vital signs, especially heart rate and oxygen saturation, during the procedure. They also reported that they connect Mechanical Ventilation (MV) between aspirations. Regarding control of aspiration time, average time of endotracheal aspiration reported by professionals was 6 to 15 seconds.

Care implemented after aspiration

Care implemented by the professionals after performing aspiration involves: connecting the patient to the MV again; patient positioning and guidance; discarding used material in contaminated waste bins; and monitoring the patient's vital signs.

Do not leave the probe connected to the latex, to avoid contamination. I disconnect it, discard the glove, put it in the contaminated waste bin, and the patient immediately goes back to ventilation or O₂; one of the first things is to return the patient. (TEC07)

[...] Talking to them, reassuring them. Because, most of the time, they

get tachypneic, the saturation drops, or they get tachycardic. (TEC01)

I check the patient's general status, raise the headboard so they can ventilate better. Alternate decubitus, if possible. Because, sometimes, we aspire and alternate the patient's decubitus, and the saturation drops. We have to turn them around again. I discard the material, and leave it all organized. (ENF01)

Besides, all professionals reported washing the latex with distilled water, protecting the tip of the latex with clean and dry packaging, performing hand sanitation, and changing the suction system every 24 hours. They emphasize that nurses evaluate the patient, after aspiration, by performing respiratory auscultation.

I wash the latex with distilled water, and protect the tip with the packaging of the probe itself. (TEC25)

It is routine here to change the suction system every 24 hours, usually at bathing time [...] (TEC10)

I usually do not perform auscultation at the end; the nurse does it. (TEC17)

Regarding procedural registry in medical charts, the professionals also said that they describe the number of times the patient was aspirated, the aspect of secretions, color, amount, and any changes that the patient presents during aspiration.

We try to register the number of times the patient was aspirated, the aspect of the secretion and some changes that the patient might experience during aspiration. (TEC23)

At the end of the shift, you count how many times aspiration was performed. The amount of secretion, whether it is small, medium or large, whether it is purulent, whether it has blood, whether it is thick, whether it smells, and the color. (TEC21)

Difficulties encountered by professionals during aspiration

Lack of both materials and professional interaction, and work overload, were pointed out as the main factors that interfere with the quality of care and thus hinder damage reduction to the patient during aspiration. The difficulties associated with the lack of improvement can be evidenced in statements that signal insecurity when performing aspiration.

I, myself, get very afraid, when changing laces. (TEC19)

When the patients bite, it's very difficult, because they hold the probe with their teeth. (TEC 22)

We lack materials, sometimes there is no probe for the most suitable caliber. The aspiration system doesn't work. (TEC 12)

We could be more in touch with the physical therapist and the doctor. We lack training. We rush when on

duty, so it's difficult to get close to them. (ENF 01)

DISCUSSION

Considering the way, the study participants perceive good airway aspiration practices, one can see that the Nursing Technicians talked more, especially regarding care during procedures, thus representing their respective knowledge on such a complex care. Legally, a nurse or a physical therapist must perform aspiration. However, during an emergency, technicians are allowed to perform this procedure to ensure airway permeability.^{4,6} In the context of intensive care, due to patient clinical instability and complications, nurses are sometimes involved in a number of demands, and may not always be able to perform airway aspiration on patients who need it.

However, lack of training and consequent insecurity, when it comes to airway aspiration, shows in the speech of mid-level professionals. In this sense, the authors take the chance to point out how important it is that the nurse advise and oversee nursing technicians when they perform more complex acts of care and procedures, which demand knowledge on goals and complications, in order to avoid adverse events. It is also of the essence that the nursing team be prepared,¹⁰ by training and education that are grounded on protocols and directives that govern endotracheal aspiration practices and ICU care.

Aspiration is a necessary procedure to maintain patient airway permeability,² which must be performed based on

scientific evidence, while avoiding the risk of failure and complications such as mucosal lesions,¹⁰ hemodynamic instability, hypoxemia, infections and sepsis.^{3-4,11} This should be performed depending on the needs of each patient rather than as a pre-established routine,² and it is important that the nurse evaluates the patient before, during and after the procedure, in order to safely perform aspiration, making the right clinical decision, optimizing the procedure and meeting the patient's needs.

The above criteria for assessing whether aspiration is needed include desaturation of O₂ below 90%; visible secretion; pulmonary auscultation with adventitious sounds; restlessness; respiratory effort or competition with the MV; reduction in tidal volume; saw-like waveforms of respiratory dynamics in the mechanical ventilator.² Even though pulmonary auscultation is not widely used by professionals to assess whether aspiration is necessary, it is used as a fundamental criterion, as it determines the presence of secretions or mucous plugs in the airways.^{3,10}

When aspiration is necessary, it must always be kept sterile, which includes washing hands before and after the procedure, wearing gloves and using sterile probe, as well as personal protective equipment: apron, mask and goggles. The probe size for open system aspiration should be chosen so as not to exceed 50% of the endotracheal tube's diameter; the suction pressure must not be kept until negative 150 mmHg, and the patient must be hyperoxygenated, with an inspired fraction of oxygen at 100% on the fan.²

This study shows that most professionals clean their hands and use sterile and procedural gloves, but they do not always wear aprons, masks and goggles. Most of them also said they hyperoxygenate the patients. In addition, placing the patient on a fowler or semi-fowler promotes improvement in ventilatory tidal volume and reduces the chances of bronchoaspiration.¹³ Interrupting enteral feeding before aspiration may prevent both vomits and contents going into the patient's lungs.⁴ It may also enable testing the cuff so as to avoid insufficient pressure to seal the airways and prevent bronchoaspiration,¹¹ as well as using a cuff manometer for precise measuring.¹⁴

As for the aspiration sequence, most professionals follow it like this: tube or tracheostomy, nasogastric and orogastric cavity, using the same tube to aspirate from a sterile area to a clean area. However, one alternative is to aspirate mouth and nose using a clean technique, then aspirate the endotracheal tube using a sterile technique, changing probes and gloves. This sequence, which opts for the initial aspiration of the upper airways, is justified by the fact that the tracheal movement in tube aspiration can displace the cuff and allow subglottic secretions to slip into the bronchi.⁴

During aspiration, professionals must adhere to the following actions: introduce the probe with caution, keeping the latex clamped; unclamp the latex and remove the probe in a circular motion.¹ Suction time must not exceed 15 seconds.¹² In intervals between aspirations, the patient must be reconnected to the MV, if applicable, to

recover hemodynamic parameters.¹ By adopting the necessary care when aspirating the patient's airways, it is possible to prevent laryngotracheal lesions (perceived by the presence of bleeding), pain on palpation in the tracheal region, dysphagia, painful swallowing, dysphonia and stridor.¹⁵ More than half of professionals exceed aspiration time, which can harm patients' health.

The bolus instillation of 5-10mL of sterile saline is usually instilled in the endotracheal or the tracheostomy tube before suction. There is no scientific evidence that the benefits outweigh the damage and, despite widespread use,¹⁶ routine instillation before aspiration is not recommended.¹⁷

The professionals are in line with the literature when it comes to protecting the latex with the probe packaging, reconnecting the patient to the VM with FiO₂ and the initial parameters, assessing the vital signs as well as the breathing pattern, positioning the patient comfortably and safely, discarding used materials in the contaminated garbage, washing hands meticulously and recording procedures in the medical charts.² Pulmonary auscultation remained little used in evaluation after procedure. In addition, all professionals reported washing the latex with distilled water, a practice that maintains circuit cleanliness, avoiding secretion permeation.

Professionals reported using a closed suction system when prescribed by the doctor, and in situations where the patient requires respiratory isolation. When comparing open and closed

suction systems, there is no dissimilarity towards the incidence of MV-associated pneumonia. However, the closed system minimizes periods of hypoxemia caused by airway depressurization when the patient is disconnected from the ventilator, and reduces the risk of contamination for both health care professionals and the environment, in addition to reducing costs. It must be replaced every 72 hours, or when there is dirt or malfunction.^{11,18-19}

Regarding procedure recording in medical charts, important pieces of information are the number of times the patient was aspirated, the aspect of the secretion, its color, amount, and whether there are complications during aspiration.² Even though nursing records have advanced in quality over the years, they are often still incomplete. Using complete, objective, clear and chronological information, one provides communication between the nursing and multiprofessional teams, as well as the continuity of care.²⁰ The professionals interviewed claim to be in compliance with this practice.

CONCLUSIONS

Good practices for airway aspiration are related to patient assessment for identifying criteria that signal the need for the procedure, monitoring complications during and after the procedure, and ensuring best clinical outcomes. Also noteworthy are the precautions to ensure biosafety, considering risks for both patients and professionals who performs the procedure.

Considering that aspiration is a frequent care in intensive care unit, professionals must have satisfactory technical knowledge regarding the procedure, since this is reflected in quality of care, and in iatrogenesis prevention. However, the professionals interviewed highlighted difficulties for implementing aspiration. In this sense, the importance of continuing and permanent education is reinforced, based on assistance protocols that reduce insecurity and perfecting technique execution.

Even though the number of participants was limited, the present study is relevant, given the small number of studies that address the issue. In this sense, it is extremely important to rescue perception and knowledge of Nursing professionals regarding good aspiration practices, for the results of the present study have practical applicability and may subsidize assistance protocols and professional updating programs, thus contributing to the systematization, quality and safety of nursing care for patients in critical life situations. Future research is suggested that covers different assistance scenarios.

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