

Nursing care of hospitalised patients receiving mechanical ventilation in intensive care units

Cuidados de enfermagem ao utente sob ventilação mecânica internado em unidade de terapia intensiva
Cuidados de enfermería al utente en ventilación mecánica internado en una unidad de cuidados intensivos

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Abstract

Theoretical framework: Mechanical ventilation (MV) is a widely used intervention for patients in Intensive Care Units (ICUs).

Aim: To assess the care provided by the nursing team to hospitalised patients receiving MV in the ICU.

Methodology: An exploratory descriptive study, with a quantitative approach, was conducted on a sample of 58 nurses at a public hospital in Fortaleza-Ceará. Data were collected from August to October 2012, organised using Microsoft Excel and statistically analysed. The project was approved by the Ethics Committee of the institution.

Results: 87.93% of participants washed their hands before procedures; 93.10% monitored fluid balance and breathing pattern; 37.93% performed oral hygiene every 12 hours; 87.93% performed tracheal suction at any time, and 68.97% used aseptic technique; 39.66% always checked cuff pressure; 82.76% always checked mechanical ventilator alarms, and 70.69% sought the cause of the problem; 65.52% always checked water level in the humidifier, and 48.28% examined the temperature. Tube fixation was replaced by 39.65% of participants every 12 hours, and 56.90% always changed the tube position. Main difficulties were: lack of knowledge, opportunity, time and safety while handling the mechanical ventilator.

Conclusion: Considering the importance of the abovementioned care, team qualification is essential, thus contributing to patients' clinical improvement.

Keywords: nursing care; artificial respiration; intensive care units.

Resumo

Enquadramento: a Ventilação Mecânica (VM) é um recurso geralmente utilizado em utentes de Unidades de Terapia Intensiva (UTI).

Objetivo: avaliar os cuidados realizados pela equipa de enfermagem ao utente em VM internado em UTI.

Metodologia: estudo exploratório descritivo, quantitativo, realizado num hospital público, em Fortaleza-Ceará, com 58 profissionais. Colheita de dados de agosto a outubro de 2012, organizados no Excel e submetidos à análise estatística. Projeto aprovado pelo Comitê de Ética da instituição.

Resultados: 87,93% higienizavam as mãos antes dos procedimentos; 93,10% monitorizavam o balanço hídrico e padrão respiratório; 37,93% realizavam higiene oral a cada 12 horas; 87,93% realizavam aspiração traqueal em qualquer momento e 68,97% usavam técnica asséptica; 39,66% conferiam sempre a pressão do *cuff*; 82,76% verificavam os alarmes do ventilador mecânico e 70,69% procuravam a causa do problema; 65,52% observavam a quantidade de água no humidificador e 48,28% examinavam a temperatura. A fixação do tubo foi trocada por 39,65% a cada 12 horas e 56,90% mudavam sempre a sua posição. Como dificuldades foram citadas: falta de conhecimento, de oportunidade, de tempo e de segurança a manipular o ventilador. **Conclusão:** considerando a importância dos cuidados supracitados, é fundamental a qualificação da equipa, contribuindo para a melhoria clínica do utente.

Palavras-chave: cuidados de enfermagem; respiração artificial; unidades de terapia intensiva.

Resumen

Marco contextual: la ventilación mecánica (VM) es un recurso generalmente utilizado en pacientes que se encuentran en una unidad de cuidados intensivos (UCI).

Objetivo: evaluar los cuidados realizados por el equipo de enfermería al paciente en VM internado en una UCI.

Metodología: estudio exploratorio descriptivo, cuantitativo, realizado en un hospital público, en Fortaleza-Ceará, con 58 profesionales. Datos recolectados de agosto a octubre de 2012, organizados en Excel y sometidos a análisis estadístico. Proyecto aprobado por el Comité de Ética de la Institución.

Resultados: el 87,93% se limpiaba las manos antes de los procedimientos; el 93,10% monitorizaba el balance hídrico y el patrón respiratorio; el 37,93% realizaba la higiene oral cada 12 horas; el 87,93% realizaba la aspiración traqueal en cualquier momento y el 68,97% usaba la técnica aséptica; el 39,66% siempre comprobaba la presión del *cuff*; el 82,76% verificaba las alarmas del ventilador y el 70,69% buscaba la causa del problema; el 65,52% observaba la cantidad de agua en el humidificador y el 48,28% examinaba la temperatura. La fijación del tubo era cambiada por el 39,65% cada 12 horas y el 56,90% siempre cambiaba su posición. Como dificultades fueron citadas: falta de conocimiento y oportunidad, tiempo insuficiente y falta de seguridad para manipular el ventilador.

Conclusión: considerando la importancia de los cuidados citados, es fundamental la cualificación del equipo, pues contribuye a la mejora clínica del paciente.

Palabras clave: atención de enfermería; respiración artificial; unidades de cuidados intensivos.

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Introduction

Some units are called special units because they have high-tech equipment and count with a multiprofessional and interdisciplinary team composed of trained professionals, who aim at restoring the hemodynamic balance and altered functions of critically ill patients.

The Intensive Care Unit (ICU) is a complex care unit that aims at providing safe and effective care to patients in need of special attention, so as to improve their clinical condition.

Intensive Care Units (ICUs) emerged as a response to treat severe patients. They are hospital areas intended for critical patients who need both highly complex care and strict control (Gomes, 2011). These patients undergo countless treatments, including invasive mechanical ventilation, so as to maintain the balance between oxygen demand and supply, among other purposes.

Mechanical Ventilation (MV) is a support, non-curative method, with specific indications, and potential hemodynamic and functional repercussions and possible complications (Guimarães, Falcão, & Orlando, 2008). This type of support is needed for patients with altered respiratory function, which prevents gas exchanges and oxygen supply from reaching tissue perfusion and the occurrence of cellular reactions.

Following the analysis of nursing care in the ICU, it should be noted that technical-scientific knowledge must keep up with modernity, given the continuous evolution of technology for life maintenance. In this way, it is necessary to enhance and update the knowledge of nursing professionals for an adequate care provision, oriented towards patients' needs and with minimal risks.

Experience with internships demonstrates that the provision of nursing care to the patient receiving MV requires further attention, because, if not provided properly, it can lead to complications and aggravation of the patient's clinical condition. This fact has instilled curiosity about the main type of care to be provided by nursing teams to patients receiving invasive MV.

This study was relevant because it allowed to identify difficulties, raising the team's awareness to the importance of this type of care to prevent possible iatrogenic complications caused by MV. These findings may guide the design of on-the-job training

programmes, not only for nursing professionals, but for the whole team operating in the ICU.

The general aim of the study was to assess the care provided by the nursing team to the patient receiving MV in the ICU; and its specific objectives were to identify the most common type of care provided by nursing professionals to patients; correlate the provision of this type of care with the recommendations of the specialised literature on the subject; and identify team difficulties during care provision.

Theoretical framework

The ICU is a hospitalisation ward intended for severe patients or patients with decompensation of one or more organ systems, which require permanent medical and nursing assistance. This unit provides intensive support and treatment, with continuous monitoring, and specific equipment and technologies intended for diagnosis and therapeutic treatment (Abrahao, 2010).

The multiprofessional team which operates in the ICU should be empowered to intervene in emergency situations to ensure the stability and lives of patients receiving care, for which it is essential to have constant and qualified medical and nursing assistance (Oliveira, Lima, Lacerda, & Nascimento, 2009).

Due to technical-scientific advances in the medical area, there are a variety of invasive life support devices available today, which are essential for assisting critically ill patients. However, many interfere and dismantle the body's natural defence mechanisms, requiring knowledge and skills from the teams to minimise damages (Padoveze, Dantas, & Almeida, 2010).

MV is a life support resource used in ICUs. It consists of a method which assists or replaces spontaneous breathing through a "respirator or ventilator" which is artificially attached to the patient, i.e. an Orotracheal Tube (OTT) or Tracheostomy Tube (TT) (Guimarães et al., 2008).

Monitoring patients receiving ventilatory support is a factor of primary importance. Drawing on data collected from functional tests with continuous clinical observation, one can act accordingly, thus preventing fatal complications and increasing the likelihood of success in treating these patients (Bernal, Silva, & Pereira, 2006).

Patients receiving MV require accurate nursing care, such as tracheal suction; control of the balloon (cuff) pressure of the OTT or TT; change of decubitus; safe transportation to other hospital units; actions to prevent complications such as aspiration pneumonia or ventilator-associated pneumonia, pressure ulcers, unplanned extubation, barotrauma, and pneumothorax (Smeltzer & Bare, 2009).

Methodology

This exploratory descriptive study with a quantitative approach was carried out in three ICUs of a public hospital, located in Fortaleza-Ceará, Brazil. The population was composed of the nursing team of these units, including nurses, nursing technicians and auxiliaries, and was based on the inclusion criteria: being part of the staff establishment plan of the ward; providing care; and having worked for at least two months at the ICU. The exclusion criteria consisted of participants with no direct contact with the patient receiving MV; and not showing interest in participating in the study. Thus, the sample was composed of 58 nursing professionals. Data were collected between August and October 2012, using a semi-structured interview script, which included identification data and the most common nursing care provided to the patient receiving MV. The participant was contacted during his/her shift and completed the interview script in the researcher's presence for clarification of possible doubts. Data

were organised in Excel and submitted to descriptive statistical analysis, focusing on absolute and relative frequencies. The results were displayed in tables and graphs. The project was approved by the Ethics Committee of the institution through Opinion no. 54955. Participation in the study was voluntary, with freedom to withdraw and guarantee of anonymity.

Results

Most participants were female (81.03%), aged between 22 and 32 years (68.97%). Concerning professional category, 46.55% were nursing technicians, 46.55% were nurses and 3.45% were nursing auxiliaries. The mean years of professional training was 5.1 years and the mean years of work in the ICU was 3 years; 62.07% of participants had no specialisation or course in the area of ICU, unlike 37.93% who had. Regarding the care provided by health professionals to the patient receiving MV, 51 (87.93%) participants washed their hands before performing any procedure on the patient; and nearly all of the professionals, 54 (93.10%), checked the fluid balance and breathing pattern. Change of decubitus was mentioned by all professionals, with emphasis on the intervals of every 2 and every 3 hours, both reported by 22 professionals (37.93%). In relation to oral hygiene, 22 (37.93%) performed it every 12 hours, 21 (36.21%) performed it every 8 hours and 7 (12.07%) performed it when necessary (Table 1).

TABLE 1 – Distribution of general care performed by professionals to the patient receiving MV.

Care	N	%
Washing hands before procedures		
Always	51	87.93
Sometimes	05	8.62
When necessary	02	3.45
Checking fluid balance		
Always	54	93.10
Sometimes	03	5.18
Never	01	1.72
Checking breathing pattern		
Always	54	93.10
Sometimes	04	6.90
Change of decubitus		
Every 2h	22	37.93
Every 3h	22	37.93

Every 4h	11	18.97
Every 6h	02	3.45
Every 12h	01	1.72
Oral hygiene		
Every 24h	06	10.34
Every 12h	22	37.93
Every 8h	21	36.21
When necessary	07	12.07
Never	02	3.45
Total	58	100

It is worth highlighting that 33 professionals (56.80%) considered that the oral hygiene of the patient receiving MV was important to avoid the proliferation of micro-organisms, 5 (8.62%) professionals considered it was important to prevent halitosis, and 5 (8.62%) others agreed that it was important to observe secretion. Other reasons, which were mentioned by 4 professionals (6.90%), included the patient's comfort/well-being and maintenance of good oral hygiene. With regard to the frequency of tracheal suction, most professionals, 51 (87.93%), reported that they

performed it at any time; 5 (8.62%) performed it sometimes; and 2 (3.45%) performed it when necessary. Most participants, 40 (68.97%), used the aseptic technique. As for the cuff pressure, 23 professionals (39.66%) always checked it, 22 (37.93%) checked it sometimes and 12 (20.69%) never checked it. Regarding the frequency with which they checked cuff pressure, 13 professionals (22.41%) checked it every 12 hours, 11 (18.97%) checked it every 6 hours and 9 (15.52%) checked it every 8 hours (Table 2).

TABLE 2 – Distribution of care associated with tracheal suction performed by professionals.

Care	N	%
Frequency of suction		
At any time	51	87.93
Sometimes	05	8.62
When necessary	02	3.45
Technique used in suctioning		
Aseptic	40	68.97
Clean	10	17.24
Other	08	13.79
Always	25	43.10
Sometimes	16	27.59
Never	10	17.24
Unknown	07	12.07
Checking cuff pressure		
Always	23	39.66
Sometimes	22	37.93
Never	12	20.69
Unknown	01	1.72
Frequency for checking cuff pressure		
Every 6h	11	18.97
Every 8h	09	15.52
Every 12h	13	22.41
Every 24h	06	10.34
Never	12	20.69
Other	07	12.07
Total	58	100

It was noted that 48 professionals (82.76%) always checked the ventilator alarms, 9 (15.52%) only checked them sometimes and 1 (1.72%) never checked them. In case of alarm activation, 41 professionals (70.69%) used to ascertain the cause of the alarm, 12 (20.69%) sought help from another professional, and 5 (8.62%) did not answer. With regard to the level of distilled water in the humidifier, 38 professionals (65.52%)

always checked the maximum amount, while 20 (34.48%) only did it sometimes. As for the humidifier heating, 28 professionals (48.28%) always checked the temperature, 24 (41.38%) sometimes and 5 (8.62%) never checked it. Concerning ventilator weaning, 24 professionals (41.38%) reported that they always checked this process and 29 (50.0%) only sometimes checked this process (Table 3).

TABLE 3 – Distribution of mechanical ventilator-associated care performed by professionals.

Care	N	%
Observation of alarms		
Always	48	82.76
Sometimes	09	15.52
Never	01	1.72
Behaviour in case of alarm activation		
Checks it	41	70.69
Seeks help from a physician/nurse/physiotherapist	12	20.69
No answer	05	8.62
Checking the level of distilled water in the humidifier		
Always	38	65.52
Sometimes	20	34.48
Checking the humidifier heating		
Always	28	48.28
Sometimes	24	41.38
Never	05	8.62
Unknown	01	1.72
Checking ventilator weaning		
Always	24	41.38
Sometimes	29	50.0
Never	04	6.90
Unknown	01	1.72
Total	58	100

One aspect which was discussed during the study concerned the interval for the replacement of the tube fixation. Most replaced it every 12 hours, corresponding to 23 participants (39.65%), followed by every 24 hours, which corresponded to 22 participants (37.93%). With regard to tube position, more than half of the professionals, 33 (56.9%), changed it sometimes, 12 (20.69%) never changed it and 3 (5.17%) were unaware of the importance of changing it. The difficulties reported by health professionals who were involved in caring for the patient receiving MV included lack of knowledge related to care (mentioned by 20 professionals); lack of time to complete care (15); lack of safety while handling

the mechanical ventilator (7); and lack of opportunity to perform such care (4).

Discussion

Most professionals were female, which was in line with the study of Lopes and Leal (2005) on the persistent feminisation of professional qualification in nursing. A significant proportion of professionals were in the age range of 22 to 32 years, which was also in line with another study conducted with nursing professionals from an ICU, in which there was a predominance of professionals under 40 years old. This corresponds to the profile expected for this sector, as young people

feel more motivated at the start of their career to care for critical patients (Guerrer & Bianch, 2008).

In relation to professional category, more than half of the participants were mid-level professionals, namely nursing technicians and auxiliaries. Nurse staffing was also high given the complexity of the interventions carried out at ICUs.

Regarding the period of time between the completion of the professional qualification course (degree or medium level course) and the implementation of the study, there was a predominance of a period shorter than three years, with a mean of 5.1 years of professional qualification. Regarding the years of work in the ICU, the mean was 3 years of experience. Most professionals had no training courses in this area.

The variables related to the healthcare provided to patients receiving invasive MV were the main focus of this study, and they were intensively explored. In this respect, it is important to note that the type of care which was most highlighted were the rigorous checking of the fluid balance and respiratory rate, as well as the washing of hands before performing procedures on the patient and the change of decubitus. The latter technique was performed at varying intervals, often different from the ones recommended by the literature. Hence, it was observed that most professionals performed this procedure every 2 or 3 hours. However, some professionals took longer to change patients' positions due to both the severity of their condition and the use of equipment, which could contraindicate their mobilisation.

The ICU is among the units at higher risk of developing Pressure Ulcers (PU) because it deals with patients in critical condition associated with complex therapies. Thus, it is essential to pay more attention to the prevention of injuries in these patients, focusing on the change of decubitus and continuous observation of skin integrity.

The critically ill patient has a very small capillary closing pressure, which favours the development of ulcers (Louro, Ferreira, & Póvoa, 2007). Adding to this fact, there are the patients' hemodynamic instability, use of respiratory prosthesis and continuous monitoring, which end up hindering the frequent change of decubitus or even their mobilisation during hygiene care.

Regarding the importance of oral hygiene in the patient receiving MV, it was found that the

recommended frequency was not always followed, as only 36.21% performed it every 8 hours. Several reasons inherent to the importance of oral hygiene were mentioned by the participants, including the prevention of microorganism proliferation, prevention of halitosis, observation of secretions in the oral cavity, and preservation of patients' comfort and well-being.

Oral hygiene is essential for the patient receiving invasive MV, taking into account that the colonisation of the oral cavity can lead to ventilator-associated pneumonia (VAP). The results of the study by Beraldo and Andrade (2008) pointed out that decontamination of the oral cavity had reduced the incidence of VAP, thus reinforcing the importance of topical antiseptics in oral hygiene.

Another aspect examined in the study refers to essential healthcare during tracheal suction, with emphasis on the frequency of the procedure. It was observed that most professionals performed suction at any time, with no situation being specified. Most of them also mentioned that they used the aseptic technique during the procedure.

Patients receiving invasive MV have a tendency to accumulate respiratory secretions due to ineffective cough, at the expense of the non-closure of the glottis and impaired transportation of mucus given the presence of the tube. Retaining secretions contributes to hypoxemia, atelectasis and VAP (Rosa, Roese, Savi, Dias, & Monteiro, 2007).

From this perspective, nursing care must focus on airway permeability. This is because, when patients are receiving MV, they are unable to effectively expectorate secretions in the upper and lower airways. However, tracheal suction should be supported by a theoretical framework and prioritise aspects related to aseptic techniques. An essential aspect of the care provided to patients receiving MV using invasive prostheses (OTT or TT) concerns checking cuff pressure. It was observed that 39.66% of professionals always checked the pressure and that 37.93% only checked it sometimes.

The III Brazilian Consensus on Mechanical Ventilation recommends a 12-hour interval as the optimal frequency for cuff checking, since the inflated balloon may cause tracheal necrosis or tracheoesophageal fistula (Carvalho, Toufen Júnior, & Franca, 2007). Regarding the frequency for checking cuff pressure, it is worth highlighting that 22.41% of

professionals checked the balloon every 12 hours; 18.97% every 6 hours; 15.52% every 8 hours; 10.34% every 24 hours; and 20.69% never checked it.

When participants were asked about the observation of mechanical ventilator alarms, it was observed that 82.76% of professionals always checked them. As for their response in case the alarm was activated, most respondents (87.69%) used to ascertain the cause of the alarm, 20.69% sought assistance from another professional, and 8.62% did not answer to this question.

Mechanical ventilators require previous technical-scientific knowledge from their users (physicians, physiotherapists and nurses). This knowledge is deemed necessary to solve problems that may appear while handling them until the equipment's representative solves the problem (Carvalho et al., 2007).

Another aspect addressed in this study included the attention paid by professionals to the level of water in the humidifier, as well as its heating. In this way, it was observed that most professionals checked the water level. However, with regard to the temperature, less than half of the participants checked it regularly.

It should be pointed out that, when the patient is subjected to an artificial airway, it is necessary to add a system to the ventilation circuit that humidifies and heats the inhaled gas (Silvério, Tavares, Lacerda, & Carneiro, 2008).

Taking into account that weaning from MV is a vital process for extubation, it was noted that 41.38% of professionals always checked the process and 50.0% only checked it sometimes. Ventilator weaning is MV discontinuation associated with the removal of the artificial airway. There may be a need to maintain the mechanical ventilatory support without the artificial airway or maintain the artificial airway without the support (Vaz, Maia, Castro and Melo, & Rocha, 2011). For an effective weaning, a multiprofessional work, including the nursing team, is essential, as well as the satisfactory clinical condition of the patient.

As for replacing tube fixation, it was observed that it was mostly replaced every 12 or every 24 hours. Concerning the change of position, more than half of the professionals changed it, although irregularly. According to Jerre et al. (2007), securing the OTT adequately and checking its position are important aspects in caring for the airway, and they should be carried out systematically by the assistant team.

When questioned about the difficulties in providing care to the patient receiving MV, participants mentioned the lack of knowledge concerning care; lack of time to complete care; lack of safety while handling the mechanical ventilator; and lack of opportunity to perform such care. This confirms the continuous need for advanced training courses for the team members who provide care to critically ill patients.

Conclusion

When receiving invasive ventilation, the patient hospitalised in the ICU requires qualified assistance. By providing continuous care, the nursing team requires technical-scientific knowledge to carry out their interventions efficiently, thus contributing to the clinical improvement of the patient.

The key care provided to the patient receiving MV included rigorous monitoring of fluid balance, respiratory frequency and hand hygiene before procedures, in addition to the change of decubitus, which was performed at varying intervals, sometimes different from that which is advocated in the literature. This factor may be related to patients severe medical condition, which often limits their mobilisation.

Although it was less rigorously observed, another important type of care was oral hygiene. The main reason to perform this procedure had to do with the prevention of microorganism proliferation.

Tracheal suction was performed by most interviewees at any time, with no specification being made, and it usually included an aseptic technique. It is important to draw attention to the right moment and use of a sterile technique, as this is an invasive procedure and, if not properly done, it may bring about complications to the patient.

Another aspect that should be highlighted is checking the cuff pressure to reduce the risk of complications in the trachea. However, a significant proportion of professionals were not aware of the need for this intervention.

Most professionals observed the ventilator alarms to identify its cause for activation, and sought help from another professional when they could not solve the problem. Checking the humidification and heating of the inhaled gas is also essential, and it was observed that a high percentage of professionals checked

the level of water in the humidifier. However, as for the temperature, less than half of the professionals checked it frequently.

For ventilator weaning to be successful, it should be monitored by the multiprofessional team. However, some professionals had never checked the process or were unaware of the need to check it.

The analysis of the replacement of tube fixation showed that more than half of the professionals had changed it every 12 or every 24 hours. However, its change of position was irregular.

The difficulties that were identified by professionals in caring for the patient receiving MV were the lack of knowledge and safety, lack of time to learn, and lack of opportunity.

This study reinforces the need for professionals who care for critically ill patients to enhance their knowledge in order to provide qualified assistance. On-the-job continuous training is also essential. In this way, studies using larger samples should be carried out to generate comprehensive scientific evidence and extend the knowledge on this subject, thus reducing risks and aggravations in patients receiving invasive ventilatory support.

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