



## EVALUATION OF KNOWLEDGE OF NURSES REGARDING COMPLICATIONS RELATED TO MECHANICAL VENTILATION

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### ABSTRACT

The aim of this study was to evaluate nurses' knowledge about complications related to mechanical ventilation. It is a descriptive, exploratory and quantitative approach, elaborated from the data collection structured by a questionnaire with nurses of a tertiary-level hospital in the city of Fortaleza / Ce, from February to July 2017. The results were submitted to simple regressive statistics using the Statistical Package for Social Sciences (SPSS) 20.0. Of the nurses interviewed, 86.36% reported not having enough information to care for a patient under mechanical ventilation during graduation, and 77.52% of the respondents claimed that they would not know the complications related to mechanical ventilation. It is concluded that nurses need to be trained and trained about ventilation-related complications, so that these professionals effectively participate in the construction of their evidence-based practice process, propagating a safe and holistic care to the patient.

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### INTRODUCTION

Mechanical ventilation (MV) consists of the use of a machine that intermittently inflates airways with air volumes, totally or

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partially replacing ventilatory activity, playing the role of physiological mechanisms, restoring balance between supply and demand of oxygen and reducing the respiratory workload (Guimarães et al., 2012). According to the Brazilian Guidelines for Mechanical Ventilation, VM is classified into two groups: invasive mechanical ventilation and non-invasive mechanical ventilation. In both, artificial ventilation is possible with the application of positive pressure in the airways,

differing only in the form of pressure release (Barbas *et al.*, 2014). The aim of MV is to allow ventilatory support in order to optimize some physiological and clinical aspects of the patient, such as sustaining pulmonary gas exchange, normalizing alveolar ventilation, obtaining an acceptable level of arterial oxygenation, reversing hypoxemia, treating respiratory acidosis, preventing and treat atelectasis, revert fatigue of respiratory muscles, prevent sedation or neuromuscular block, decrease systemic and myocardial consumption, reduce intracranial pressure, and stabilize the chest wall (Cintra, 2008). Because it involves many variables, the VM becomes complex and thus requires that the professionals who are involved in its manipulation have the competence and ability to provide a safe assistance (Rodrigues *et al.*, 2012). The presence of a critical patient in the use of the MV is part of the daily routine of a hospital, however, it is noticed that, in clinical practice, many professionals present a deficit of knowledge and experience in the management of this clientele (Guimarães *et al.*, 2012). According to Mendes, Tallo and Guimarães (2012), once the MV triggers a series of interventions inherent to the treatment, from the moment of orotracheal intubation to extubation or eventual tracheostomy. At each stage, complications can occur due to the direct effect of the MV itself, due to necessary and unavoidable procedures, such as the insertion of airway prostheses, the use of sedatives, the use of probes and enteral nutrition.

In this context, Amorim and Gomes (2012) emphasize that the effective training of nurses for the systematization of nursing care in the different moments of the MV is of paramount importance since the installation, handling, actions to control infection, care with equipment and in the prevention and control of complications. Patients receiving prolonged ventilatory support are exposed to a variety of complications such as pneumothorax, atelectasis, barotrauma, increased intracranial compression, abdominal distension, sodium and water retention, pressure injury, arrhythmia, hypotension and pneumonia, be avoided with interpersonal, technical and scientific competence (Tallo *et al.*, 2013). Lack of knowledge of the identification of complications during treatment with MV may lead to adverse events. The presence of competent professionals will contribute to the reduction of these patients' interurrences in the intensive care setting (Rodrigues *et al.*, 2012). The handling of the MV requires knowledge of the functioning of the equipment, its particularities and the various modalities of ventilatory support. With a better understanding of respiratory physiology, pathophysiology of pulmonary diseases and mechanical ventilators, it is possible to develop ventilatory support strategies that, in addition to reducing complications and even mortality, triggered by ventilator and oxygen toxicity (Camelo, 2012). The risks generated by the artificial ventilatory support are many, the chances of irreversible damages linked to VM are even greater, the damages caused by failure in risk management in order to prevent injuries can be irreparable. The knowledge, which is fundamental for the nursing team, should be appreciated when assisting a patient who requires MV care (Melo *et al.*, 2014). Thus, it is necessary the presence of a multiprofessional team, especially the nursing team because it is at the bedside, able to provide the necessary care in a holistic way to these users. Therefore, when we come across clinical practice, the lack of technical and scientific knowledge of nurses in relation to ventilatory support is notorious, both regarding the handling and assembly of this equipment and the care given to patients using MV. Faced with this reality, it is necessary to critically

reflect on the lack of technical and scientific knowledge of nurses in the perception of these iatrogens, since if not analyzed previously can lead to irreparable damage in the lives of these users, devaluing the trinomio ser-saber- nurses, and the quality of the care provided to the subject. Therefore, this study is relevant for discussion and reflection on the need for nurses' empowerment in the care provided to patients using ventilatory support, in order to prevent each risk resulting from the use of MV, in order to achieve effective results in the care and in promoting the health of these patients. The present study aims to evaluate the knowledge of nurses regarding complications related to mechanical ventilation.

## MATERIALS AND METHODS

It is a descriptive, exploratory and quantitative approach. The study was carried out in a tertiary-level hospital in the city of Fortaleza-Ce, developed by the members of the Clinical Research Nucleus from February to July 2017. The study population consisted of all the nurses that make up the team of the referred institution. The inclusion criteria for the survey will be all nurses who have more than six months of experience. All substitute nurses or those who are away on leave and / or vacation leave will be excluded from the survey. Data collection was through a structured questionnaire, which included questions related to identification, professional training and specific knowledge regarding mechanical ventilation. It should be emphasized that the nurses answered the questionnaire in the unit itself and had up to two hours to complete, without the direct participation of the interviewer, not being able to make any bibliographic consultation. The questionnaires with answers above 70% were considered with knowledge. For the preparation of the questionnaire, the researchers were based on the recommendations of the Brazilian guidelines on mechanical ventilation. The data were organized in Microsoft Excel and submitted to simple regressive statistics using the Statistical Package for Social Sciences (SPSS) 20.0, the results being presented in tables and graphs. The study was approved by the Research Ethics Committee, and compliance with the recommendations of Resolution No. 466/12, referring to the research carried out with humans (Brazil, 2012), was approved, under the number of CAAE 68752317.4.0000.5034.

## RESULTS

Table 1 shows the nurses participating in the study, in which the variables gender, training time, professional and unit time, and work sector were distributed. Twenty-two professionals participated in the interview, in which all were nurses. The ages ranged from 22 to 38 years, with a mean of 29.57 years. Regarding gender, there was predominance of females with 20 (90%) over males with 2 (10%). The training time ranged from 1 year to 14 years, the time interval with the highest number of professionals was 1 to 3 years with 10 (45%), while the lowest number of professionals was 4 to 6 years (40%), 7 years or more (10%), and less than 1 year formed (5%), respectively. Regarding the time of professional performance, the time interval with the highest concentration of professionals was also 1 to 3 years (52.38%), followed by 4 to 6 years (28.57%) and (9.52%) were professionals under the age of 1 and 7 years or more equally. In terms of working time (in the institution), the time interval with the highest concentration of professionals was 1 to 3 years (45%), while the lowest number of professionals was 7 years or more (10%).

**Table 1. Distribution of the number of nurses, according to sex, length of training, time of professional activity and sector. Fortaleza, CE, Brazil, 2017**

Characteristics	N°	%
Sex		
Female	20	90
Male	2	10
Formation time		
<1 year	1	5
1 to 3 years	10	45
4 to 6 years	9	40
7 years and over	2	10
Time of operation		
<1 year	2	9,52
1 to 3 years	11	52,38
4 to 6 years	6	28,57
7 years and over	2	9,52
Time of operation (service)		
1 to 3 years	10	45
7 years and over	2	10
Sector		
Clinical Units	15	66,66
Intensive care unit	7	33,33
Emergency	1	4,76

**Table 2. Distribution of the number of professionals according to their knowledge about mechanical ventilation. Fortaleza, CE, Brazil, 2017**

Variables	N°	%
Very good	0	0
Good	4	19,09
Regular	11	51,14
Bad	7	23,80

With respect to the institution's work sector, 14 (66.66%) worked in the clinical units, 7 (33.33%) in the Intensive Care Unit and 1 (4.76%) worked in the Emergency Medicine Unit. As for academic training, 11 (50%) of the professionals interviewed received specialization. It was verified that none of the professionals had masters and or doctorates. Regarding the level of knowledge about mechanical ventilation, none of the professionals interviewed chose the concept VERY GOOD, 4 (19.09%) classified as BOM, and a significant amount was observed in the worst REGULAR concepts with 12 (51.14%) and RUIM with 6 (23.80%) professionals, revealing the disinformation of these nurses on a primordial issue in all sectors of a hospital institution. Of the 22 professionals interviewed, 12 (55.55%) performed some training regarding mechanical ventilation, and it was found that 19 (86.36%) reported not having received enough information during the gym to care for a patient under mechanical ventilatory support. Regarding the development of articles on mechanical ventilation only 1 (4.76%) professional has already written some work on the subject. In relation to having participated in any research group 19 (85%) responded that they had participated. About participation in events, 17 (77.27%) participated in congresses, 16 (72.72%) in lectures and only 5 (54.54%) attended a seminar. Regarding whether the respondents would know the complications related to mechanical ventilation in their professional life, 17 (77.52%) of the nurses answered that they did not. All 22 (100%) of the nurses interviewed agreed that it is incumbent on nurses to continue their education with their team, in order to highlight the importance of prevention measures in the manifestation of these diseases. Regarding whether the respondents would like to receive specific training on mechanical ventilation, the percentage was extremely significant 22 (100%) showed an

interest in training and improving their knowledge on the subject in question. Regarding the assignments of each professional in the mechanical ventilatory support, related to aspiration 22 (100%) attached this function to the physiotherapist, 20 (90.90%) to the nurse and 1 (4.54) the medical staff. In question at weaning, the great majority also related the function to the physiotherapist 17 (77.27%) and only 5 (22.72%) to nursing.

**Table 3. Distribution of the number of professionals, according to their attributions in the handling of Mechanical ventilation. Fortaleza, CE, Brazil, 2017**

Atribuições	N°	%
Aspiration		
Physiotherapist	22	100
Nurse	20	90,90
Medical team	1	4,54
Weaning		
Physiotherapist	17	77,27
Nurse	5	22,72
Extubation		
Physiotherapist	15	68,18
Nurse	7	31,81
Medical team	20	90,90
Featured in the performance		
Physiotherapist	18	81,81
Nurse	21	95,45
Medical team	21	95,45

Regarding extubation, the medical team was highlighted with 20 (90.90%), physiotherapists 15 (68.18%) and the nursing team with 7 (31.81%). And, regarding the perception of which professional was predominantly active in mechanical ventilation, there was concomitance between nursing and medical staff, with 21 (95.45%) and physiotherapists 18 (81.81%). Concerning infectious complications related to mechanical ventilation, 15 (70%) were able to identify paranasal sinusitis, tracheobronchitis, VAP, ischemic labial lesions, bronchopleural fistula, hemodynamic changes, alterations in central nervous system level, tracheal lesions, distension abdominal, barotrauma and volutrauma as complications and 7 (30%) could not identify all of them. Regarding the factors related to accidental extubation, expressive 20 (89.9%) considered as the change of tube fixation, measurement of the cuff because of the weight of the device that can draw the tube, the transfer of the patient from bed to bed by mobility headache, change of position and bathing in the bed as risk factors and only 2 (10.1%) could not identify. Concerning the nursing assignments to the patient in mechanical ventilation, all 22 (100%) of the respondents agreed that care with the circuit, filters and humidifiers, cleaning and maintenance of the equipment, bathing in the bed, oral hygiene, oral feeding and enteral and care in the change of decubitus are attributions of nursing.

## DISCUSSION

According to the data, there was a predominance of females with 20 (90%) over males, with 2 (10%) coinciding with the profile of Brazilian nurses (Guerrer *et al.*, 2008). Concerning the time of professional performance, the time interval with the highest concentration of professionals was also 1 to 3 years with 52.38%, followed by 4 to 6 years with 28.57% and 9.52% professionals under the age of 1 and 7 years or more equally. Indicating that this institution hires professionals with little experience and that they are trained in the services. Coinciding with the reality of other ICUs in the city of Fortaleza that has a

frame with 48.8% of professionals with less than 5 years of training (Rodrigues *et al.*, 2012). It was found that 19 (86.36%) reported not having received sufficient information during the academy to care for a patient under mechanical ventilation, demonstrating that in relation to the mechanical ventilator, the lack of knowledge accompanies these professionals since graduation to practice professional. Thus, we deduce that for the formation of a general nurse all aspects involving the management of a serious patient as basic life support, emergency-related diseases in the respiratory tract, basic acids disorders, respiratory failure, call the CRA and so many others, should be addressed and discussed further during the academy. Massaroli *et al.* (2015) affirm that in the daily life of the hospitals, the nurse is frequently confronted with the criticality of the health status of the users, requiring the continuous development of highly complex technical procedures. The dynamics among the professionals, the critical condition of the patients and the use of numerous technologies require the nursing of different orders and if we take this factor into account, the MV is indispensable in the management of these patients.

When questioned whether they feared for the safety of a VM patient being cared for by them, there was a predominance in both responses, with half of those responding to SIM. The Federal Nursing Council (2011) was emphatic in determining, through Law n. 7.498 / 86, which is the responsibility of nurses to perform direct nursing care for critically ill patients at risk of death, as well as nursing care of greater technical complexity, requiring scientifically based knowledge and decision-making capacity. Likewise, as a member of the health team, it is incumbent upon nurses to systematically prevent and control damages that may be caused to clients during nursing care (Brazil, 2012). When analyzing the data in table 3, we noticed that nurses are getting more and more distant from the ventilatory support, transferring this responsibility to other professionals of the team, in principal we verify the physiotherapist. According to Rodrigues *et al.* (2009), the previously specific nursing practices, such as ventilator assembly, definition of initial parameters, airway aspiration, gasometric monitoring, ventilatory weaning, among others, are being practiced by professionals from other areas. However, this reality, of distancing the ventilator nurse, does not occur only in the hospitals of the city of Fortaleza. A study carried out in a clinical and surgical center of intensive care in the South Zone of Rio de Janeiro identified that the nursing team, perhaps due to accumulation and overload of activities, together with the lack of ideal team design, has been increasingly left for the physiotherapy team the responsibility for providing patient care in mechanical ventilation (Massaroli *et al.*, 2015).

We assume that this distancing occurs due to the numerous attributions that are dismissed to the nurse or the deficiency in their knowledge. MV is a multiprofessional and interdisciplinary activity in which the unifying focus is the patient. Each team member has specific features and functions that interact and complement each other. It is worth mentioning that, when nurses do not participate or become distant from the care related to the needs of patients on mechanical ventilation, they become vulnerable to complications such as accidental extubation, infections, tracheal stenosis, hypoxemia, respiratory and cardiac arrhythmias, thus making the environment of intensive care unsafe for them (Guerrer *et al.*, 2008). It was observed in this

study that almost half of those surveyed, 10 (46.1%) had some knowledge deficit about the complications about the MV. Thus, these results could lead to the promotion of inadequate care for these users, since, in our study, the nurses did not present the set of knowledge necessary for their execution. In this context, about the insecurity of these professionals in caring for a patient with MV, we emphasize that insecure care increases the gap between possible and achieved outcomes. Unsafe care is expressed by the increased risk of unnecessary harm to the patient, which may have a negative impact on health care outcomes, showing the importance of periodic assessment of knowledge through standardized instruments and continuing education with training on key updates about the subject.

### Final thoughts

Through the study, it was observed the importance of the education and orientation for the professionals on the nursing care to the patient with mechanical ventilatory support, it was verified that 100% of the professionals considered the idea of receiving training and qualification about this subject. This percentage was extremely significant, since it shows that most of the nurses of the institution show an interest in training and improving their knowledge about the subject in question. In view of the above, it is concluded that there is a need for constant training and training of nursing professionals about complications related to mechanical ventilation, so that nurses can effectively participate in the construction of their evidence-based practice process, propagating a safe and holistic care to the patient.

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