

45 - NURSING STAFF MAINTENANCE OF MECHANICAL VENTILATION CIRCUITS AND DEVICES IN THE PREVENTION OF INFECTION

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INTRODUCTION

Technical and scientific advancements have allowed medicine to conquer, with the passing of time, knowledge on the biological body and the intervention techniques for its healing; it has, however, become imperative to maintain an adequate environment to care for critical patients that need a more effective vigilance. In this sense, Intensive-Care Units (ICUs) have been created with the purpose of providing these patients quality assistance (CINTRA; NISHIDE; NUNES, 2003).

With the installation of these units, there was a need for incorporating new technologies in the offering of services, bringing about an increase in the complexity level of patients hospitalized in these sectors. The use of this technological arsenal has however caused an important ethical debate on its risk/benefit, considering the frequent occurrence of iatrogenic events, leading to severe repercussions to patients, their relatives, and the State (PEREIRA et al., 2000).

In a current piece news, aired in the *Jornal Nacional* (2009) TV newscast, it was publicized that surgical centers and ICUs are high risk areas. Furthermore, Brazilian hospitals have, in average, three times as many hospital infections than the maximum tolerated by the World Health Organization (WHO). Complementing these data, Farias et al. (2009a), in their literature revision, show that the pulmonary focus is the main entry door for pathogens and cause for sepsis in ICUs.

In this reality, we find nosocomial pneumonia to be directly or indirectly responsible for over 300,000 deaths each year in the United States of America (USA). Lethality attributed to this infection is estimated between 14% to 43% in patients hospitalized in ICUs (CDC, 2004; APECIH, 2005; PRUITT; JACOBS, 2006).

These patients' mortality is attributed to the fact that oral-tracheal intubation for the use of mechanical ventilation (MV) stands out as one of the most important risk factors for hospital-related pneumonia, as it raises chance that the patient develops this hospital infection (HI) and dies to 3 or up to 21 times the normal rate. This occurs due to the close relationship between endotracheal intubation, the use of ventilator assistance devices and their interference on the patient's defenses (PRUITT; JACOBS, 2006; APECIH, 2005; CDC, 2004).

This aspect, added to the patient's debilitated state, shows the need for the adoption of care with cleansing, disinfection and sterilization of circuits and devices that compose the mechanical ventilator. Among these cares we emphasize: to discard the condensed matter from the circuits, to replace circuits, to use sterile water in the humidifier and not complete its filling when there is remaining liquid. The same care must be attributed when the ventilator is in use such as: daily changing of aspirator vials, rubber and ambu bad extension, use of sterile fluids in nebulization and changing of nebulizers.

In this context, we can understand cleansing as the removal of visible dirtiness, disinfection as the process of destroying spore microorganisms and the sterilization as the complete elimination of all microbial life forms (FREIRE, 2005).

Knowing how the nursing staff cares for this material through systematic observation is valid both in order to both prevent infection and the worsening of the patient's condition. Once a failure in this process is detected, it's possible to guarantee actions that will benefit, above all, the patient and his family, the institution and the professional.

All this care will be reverted into benefits for the patient and will be reflected on the quality of assistance, lowering tangible and intangible expenses related to the increase in hospitalization time, the consumption of antibiotics, isolation and laboratory exams, as well as guaranteeing the patient's return to society as soon as possible (ANDRADE; LEOPOLDO; HAAS, 2006).

With this view, we elaborated the following research questions: who are the nursing professionals that work in ICUs? How are these professionals maintaining the circuits and devices used on MV patient assistance?

Based on these questions, we established the following objectives: to characterize the nursing team working in the ICU in a hospital in Natal/RN; to identify how the maintenance of circuits and devices used in Mechanical Ventilation patient assistance is being performed.

With this comprehension, we believe that this study is extremely relevant given its challenging character, in its attempt to identify problems related with circuits and devices used in Mechanical Ventilation patient assistance, so actions can be taken in the pursuit of an improved quality of assistance.

METHODOLOGY

The study is of the descriptive exploratory type, with quantitative approach and prospective data, performed in the Hospital do Coração de Natal (HCN), located in the city of Natal/RN.

The population was composed of 25 health professionals, who accepted to take part in the study, 22 of which were nursing technicians and 03 nurses.

After the approval by the Comitê de Ética (ethics committee), Parecer 206/2007, we pre-tested the instrument on ICU 1 in the studied institution, with 10% of the population in order to evaluate its applicability and the need for adjustments. Before initiating data collection, we held a meeting with the nursing professionals on ICU 2, in which we discussed the study's purposes and asked for their full participation and cooperation.

We then requested those who accepted to take part in the research to read and sign a term of free and clear consent (Termo de Consentimento Livre e Esclarecido – TCLE), since the procedures took place under no set schedule. At this moment, we made it clear that their participation would be voluntary and they could leave the research if they so deemed fit, according to the principles in Resolução N° 196/96 from the CNS of Ministério da Saúde (BRASIL, 1996).

The data were collected in the period of November 5th to December 20th 2007, in all work shifts, whence we observed all procedures performed by professionals that accepted to take part in the research, taking notes of the data in the instrument.

The data were categorized and processed through the Microsoft Excel 2000 XP and Statistica 6.0 software and analyzed by descriptive statistics.

RESULTS AND DISCUSSION

Social-demographic characterization of the studied population

Regarding the age group, professionals aged 20 to 30 were predominant, accounting for 16 (64%) participants. Similar data were found by Moura (2004) and Farias et al. (2009b) in studies with professionals working in an ICU, in which the age group of 20 to 35 was predominant.

The female gender corresponded to 20 (80%) of the professionals, a similar fact to the findings in Napolis et al. (2006), who, in a study with 191 health professionals in 15 hospitals in São Paulo (SP), identified the female gender was predominant among nurses (85.9%) and physical therapists (69.6%).

Regarding the instruction level, most had middle level with 21 (67.8%), a fact justified by the presence of nursing technicians, which is the minimum requisite for this professional category. When comparing our results with the Brazilian reality, we observe that, according to basic indications and data for health published by the Brazilian Ministry of Health (Ministério da Saúde – MS) in 2006, less than half (49.0%) of the general population had over eight years of study. In the State of Rio Grande do Norte (RN), according to the same source, only 40.2% of the population has this level of study (BRASIL, 2006).

Regarding the time of service in the profession, the period of 05 to 09 years was predominant (48%). Followed by 01 to 04 years (3.41%).

Some authors confirm the data found in our research, identifying in their studies a prevalence of professionals whose ICU work time is of 05 to 09 years (PEDUZZI et al., 2003; FREIRE; FARIAS; RAMOS, 2006).

Maintenance of respiratory circuits and devices used during patient MV activity

Regarding the daily changing of the aspirator vial and the rubber or silicone extension, it was performed on 15.4% and 6.4%, respectively, in the opportunities in which they were observed.

It's important to stress that vials used in tracheal aspiration, in which the oral-pharyngeal secretions are temporarily deposited and the extensions used as an interlinking piece between the vials and the aspiration probe must be submitted to high-level disinfection and replaced daily when in use in the same patient and among different patients (HINRICHSSEN, 2004; BRASIL, 2005).

Regarding the ambu bag replacement in the presence of visible dirtiness, and/or when unprotected, this recommendation was followed 50% of the time.

On this issue, Oliveira; Armond; Tedesco (2001) and Hinrichsen (2004) recommend that after use, the ambu bad should be submitted to high level disinfection and sterilization, before the next use in the patient, remaining in use as long as it's kept visually clean and protected by a plastic envelope.

Regarding the use of sterile fluids during nebulization and aseptic manipulation, these procedures were taken on 34.8% of the cases. In this sense, CDC (2004) suggests that between sessions of medicine delivery via nebulization, cleansing, disinfection and sterile water washing of these items should be performed, and that the fluids used in nebulization should be sterile and manipulated aseptically. These recommendations, as seen in the previous paragraph, were not followed in most the evaluated opportunities.

Regarding the replacement of nebulizers after use, on 34.8% of the occasions the professionals performed this action. It's worth emphasizing that, in both steps, the middle-level nursing technicians were the only professionals to perform this task in the data collection period. In this context and according to CDC directives (2004), the changing of nebulizers is recommended after its use in the patient.

Regarding the discarding of condensed matter in the MV circuits, this measure was followed on 55.0% of the observations.

On this aspect, it's important to remember that, with the thermal shock that occurs when the heated air contacts the circuit walls (usually cold since the ICUs are air-conditioned environments), the production of liquid occurs. This liquid (condensed) is colonized by bacteria, which can accidentally reach the patient's lungs in case they remain in this circuits; in order to avoid that, it must thus be periodically removed (CDC, 2004; BRASIL, 2005b).

Regarding the use of gloves when discarding the condensed matter, on 63.1% of the occasions professionals made use of this personal protection equipment. According to CDC recommendations (2004), health professionals should use gloves when discarding and/or handling fluids (condensed) in the MV circuits, due to the high risk of self-contamination.

Regarding the use of sterile water for humidifying the air produced by the mechanical ventilator, in 92.6% of the evaluated situations this recommendation was followed, and on the attitude of not filling up the mechanical ventilator humidifier, this attitude was taken on 78.4% of the observations. According to Passos; Castilho (2000), water in the mechanical ventilator humidifier must be sterile and kept at a sufficient level so as to promote the humidification of air to be inhaled by the patient. It's recommended, however, that the humidifier should not be filled up when there is remaining water, since this liquid may become a culture environment for microorganisms (CDC, 2004; BRASIL, 2005b; FREIRE; FARIAS; RAMOS, 2006).

Regarding MV circuit replacement when dirtiness was detected or when defective, this was performed on 97.0% of the observations.

Studies demonstrated that the frequent replacement of MV circuits, not only fails to prevent mechanical ventilation-associated pneumonia, but also increases the risks for its occurrence due to the increase in handling which increases the risks of inhaling contaminated contents (SOBECC, 2007; APECIH, 2005).

CONCLUSION

This study allowed us to characterize the ICU professionals population as mainly young, aged 20 to 30 (51.60%), female (64.5%) and with middle level instruction (67.8%), working for 01 to 04 years (51.6%) in this sector.

Furthermore, regarding the maintenance of respiratory circuits, humidifiers and devices used in the assistance of MV patients, on 84.6% of the opportunities the daily aspirator vial replacement was not done; on 93.6% of the times the latex extension was not replaced after each 24 hour period; on 50.0% of the observations the ambu bag was not replaced even though it was dirty and/or unprotected; on most occasions (65.2%), nebulization was prepared with non-sterile fluids and/or inadequately manipulated; on 65.2% nebulizers were not replaced; on 55.0% of the time the condensed matter formed in the MV circuits was discarded; on 63.1% of the observations, the professionals were wearing gloves when discarding; in most occasions (92.6%), the water used for humidifying the air generated for MV was sterile; on 78.4% of the observations, professionals did not fill up the humidifier, in case the was remaining liquid; on 97.0% of the opportunities, the MV circuits were replaced when there was visible dirtiness or when they were defective.

We found in this study that there is a deficit in care given to MV patients, which may lead to the development of HI and especially VAP, with consequent worsening of their prognosis.

This reinforces the need for supervision by the professionals in charge, effective action by the institution's infection

control commission and the permanent training of professionals working in ICUs. These actions are indispensable for avoiding patient death as well as physical and emotional sequels.

We stress that epidemiologic data on nosocomial infections should be kept in mind, as they can function as parameters for measuring assistance quality in health institutions.

KEYWORDS: Mechanical Ventilation-Associated Pneumonia (VAP), Intensive Care Units, Nursing Care.

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NURSING STAFF MAINTENANCE OF MECHANICAL VENTILATION CIRCUITS AND DEVICES IN THE PREVENTION OF INFECTION

ABSTRACT

Introduction: the relative risk of mechanical ventilation-associated pneumonia (VAP) can be related to patient characteristics and the preventive care used by the health team, especially regarding circuits and devices used in this type of care. **Objective:** to characterize the nursing team working in the ICU in a hospital in Natal/RN; to identify how the maintenance of circuits and devices used in Mechanical Ventilation patient assistance is being performed. **Methodology:** descriptive exploratory study, with quantitative approach and prospective data, performed between November 2007 and March 2008, with 25 nursing professionals. **Results:** we detected a young population, female mostly, nursing technicians and never having been through VAP prevention training; regarding the circuits and devices care: in 84.6% the daily aspirator vial replacing was not done; 50.05% of the observations the ambu was not replaced; on most occasions (65.2%), nebulization was inadequately manipulated; on 55.0% of the times the condensed matter formed in the MV circuits was discarded; on most observations (92.6%), water used for humidifying the air generated by the MV was sterile; on 78.4% of the observations, professionals did not fill up the humidifier, on 97.0% the MV circuits were replaced when there was dirtiness or defect. **Conclusion:** Many of the maintenance procedures were not correctly performed, so there is a considerable exposure of the patient to infections that may worsen the prognosis and increase hospitalization time.

KEYWORDS: Mechanical Ventilation-Associated Pneumonia (VAP), Intensive Care Units, Nursing Care.

ENTRETIEN DES CIRCUITS ET DES DISPOSITIFS UTILISÉS PAR L'ÉQUIPE DES INFIRMIERS AVEC LE PATIENT SOIGNÉ À L'AIDE DU VENTILATEUR MÉCANIQUE À NATAL/RN

RÉSUMÉ

Introduction: le risque relatif d'une pneumonie associée à la ventilation mécanique (PAV) peut être lié aux caractéristiques du patient et aux soins préventifs donnés par l'équipe de santé, notamment en ce qui concerne les circuits et les dispositifs utilisés pour ces soins. Objectifs: caractérisent le personnel infirmier dans l'unité de soins intensifs d'un hôpital dans le Natal/RN, identifier comme étant faites par ces professionnels de la prise en charge des circuits et des dispositifs utilisés dans les soins aux patients dans la ventilation mécanique. Méthodologie: étude exploratoire descriptive, avec une approche quantitative et des données prospectives, réalisée entre novembre 2007 et mars 2008, avec 25 professionnels infirmiers. Résultats: nous avons recensé une population jeune, du sexe féminin, pour la plupart, de techniciens infirmiers qui n'avaient jamais reçu de formation relative à la prévention de la PAV; quant à l'entretien des circuits et des dispositifs: dans 84,6 des cas, le changement journalier des flacons aspirateurs n'a pas été réalisé; dans 93,6 % des cas, le changement toutes les 24 heures de l'extension de latex n'a pas été effectué; dans 50,0 % des observations, le ventilateur manuel n'a pas été changé; très souvent (65,2 %), la nébulisation a été réalisée de façon inappropriée; dans 55 % des cas, le condensé qui s'est formé dans les circuits du VM a été écarté; dans la plupart des observations (92 %), l'eau utilisée pour l'humidification de l'air généré par le VM était stérile; dans 78,4 % des cas, les professionnels ne remplissaient pas l'humidificateur; dans 97 % des cas, les circuits de VM ont été changés quand il y avait de la saleté ou un défaut. Conclusion: Bien souvent, l'entretien n'a pas été effectué correctement, ce qui a entraîné une exposition considérable du patient à des infections qui peuvent aggraver le pronostic et augmenter la durée de l'hospitalisation.

MOTS CLÉS: Pneumonie associée à la Ventilation Mécanique (PAV); Unités de Soins Intensifs; Soins donnés par les infirmiers.

CUIDADOS DEL EQUIPO DE ENFERMERÍA CON CIRCUITOS Y DISPOSITIVOS UTILIZADOS EN LOS PACIENTES EN UTILIZACIÓN DE VENTILADOR MECÁNICO EN NATAL/RN

RESUMEN

Introducción: el riesgo relativo de la neumonía asociada a la ventilación mecánica (NAV) puede estar relacionada con las características del paciente y la atención preventiva utilizados por el personal de salud, especialmente en los circuitos y dispositivos utilizados en esta atención. Objetivos: caracterizar el personal de enfermería en la unidad de cuidados intensivos de un hospital en Natal / RN, identificar como realizadas por los profesionales del cuidado de los circuitos y dispositivos utilizados en el cuidado del paciente en la ventilación mecánica. Métodos: los datos exploratorio, descriptivo y cuantitativo y prospectivo, realizado entre noviembre de 2007 y marzo de 2008, con 25 profesionales da equipo de enfermería. Resultados: se encontró una población de mujeres jóvenes, en su mayoría técnicos, y nunca ha tenido la formación sobre la prevención de la NAV, y atención en materia de circuitos y dispositivos: en 84,6% el cambio diario de las botellas de vacío no se han hecho; 93,6% de las veces el cambio a cada 24 horas, de extensión látex no se realizó, 50,0% de las veces el ambu no se ha cambiado, en la mayoría de los casos (65,2%), nebulización fue manejado de manera inapropiada, en el 55,0% del tiempo que el condensado formado en los circuitos del ventilador mecánico han sido eliminados, la mayoría de las observaciones (92,6%), el agua utilizada para la humidificación del aire generado por la máquina virtual, era estéril en el 78,4% de las observaciones, profesionales han completado el humidificador, en el 97,0% de los circuitos de VM se cambiaron cuando se produjo la suciedad o defecto. Conclusión: Muchos de los cuidados no se llevaron a cabo correctamente, así que hay una exposición considerable de los pacientes a infecciones que pueden promover el empeoramiento del pronóstico aumentando la duración de la estancia hospitalaria.

PALABRAS CLAVE: Neumonía Asociada al Ventilador, Unidades de Terapia Intensiva, Cuidados de Enfermería

CUIDADOS DA EQUIPE DE ENFERMAGEM COM CIRCUITOS E DISPOSITIVOS UTILIZADOS NO PACIENTE EM USO DE VENTILADOR MECANICO EM NATAL/RN

RESUMO

Introdução: o risco relativo de pneumonia associada à ventilação mecânica (PAV) pode estar relacionada às características do paciente e aos cuidados preventivos utilizados pela equipe de saúde, especialmente quanto aos circuitos e dispositivos utilizados nesses cuidados. Objetivos: caracterizar a equipe de enfermagem atuante em na Unidade de Terapia Intensiva de um hospital de Natal/RN; identificar como estão sendo realizados por esses profissionais os cuidados com circuitos e dispositivos utilizados na assistência ao paciente em Ventilação Mecânica. Metodologia: estudo exploratório descritivo, com abordagem quantitativa e dados prospectivos, realizado entre novembro de 2007 e março 2008, com 25 profissionais de enfermagem. Resultados: detectamos uma população jovem, sexo feminino, na maioria, técnicos de enfermagem e nunca realizou treinamento acerca da prevenção de PAV; quanto aos cuidados relacionados aos circuitos e dispositivos: em 84,6% a troca diária dos frascos aspiradores não foi feita; 93,6% das vezes a troca a cada 24hs da extensão de látex não foi realizada; 50,0% das observações o ambu não foi trocado; na maioria das ocasiões (65,2%), a nebulização foi manipulada inadequadamente; em 55,0% das vezes o condensado que se formou nos circuitos do VM foi descartado; na maioria das observações (92,6%), a água usada para umidificação do ar gerado pelo VM, estava estéril; em 78,4% das observações, os profissionais não completavam o umidificador; em 97,0% os circuitos de VM foram trocados quando havia sujidade ou defeito. Conclusão: muitos dos cuidados não foram realizados de maneira correta, de modo que há uma exposição considerável do paciente a infecções que podem promover a piora do prognóstico e aumentar o tempo de internação hospitalar.

PALAVRAS CHAVE: Pneumonia Associada à Ventilação Mecânica (PAV), Unidades de Terapia Intensiva, Cuidados de Enfermagem

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