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Incidence of ventilator-associated pneumonia in an intensive care unit

Incidência de pneumonia associada à ventilação mecânica em uma Unidade de Terapia Intensiva

Implicaciones de neumonía asociada al ventilador en un Unidad de Cuidados Intensivos

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ABSTRACT

Objective: To identify the incidence of Ventilator-Associated Pneumonia (VAP) in hospitalized patients in an intensive care unit. **Method:** This is a cross-sectional, documentary and retrospective study. Data were collected through research of the records of the Service of Infection Control Related to Health Care from August 2014 to March 2015 after approval by the Ethics Committee of the UFFS with CAEE 45124915100005564. It was tabulated in Excel and analyzed using descriptive and analytical statistics with the SPSS 20.0 software. **Results:** It was verified an incidence of 29% of VAP, especially the Staphylococcuss, in the tracheal aspirate and mortality of 44%. **Conclusion:** Indices consistent with data from other studies and the ones advocated by ANVISA were revealed. However, training for professionals involved in the care is suggested.

Descriptors: Intensive Care Unit (ICU); Nursing; Pneumonia Associated with Mechanical Ventilation.

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RESUMO

Objetivo: Identificar a incidência de pneumonia associada à ventilação mecânica (PAV) em usuários hospitalizados em uma Unidade de Terapia Intensiva (UTI). **Método:** Trata-se de um estudo transversal, documental e retrospectivo. Os dados foram coletados por meio de busca nas fichas do Serviço de Controle de Infecções Relacionadas à Assistência à Saúde no período de agosto de 2014 a março de 2015 após aprovação no Comitê de Ética em Pesquisa da Universidade Federal da Fronteira Sul (UFFS) com CAAE nº 45124915100005564. Tabulados no programa Excel e analisados por meio de estatística descritiva e analítica, com o auxílio do *software* SPSS 20.0. **Resultados:** Evidenciaram-se incidência de 29% de PAV, com destaque para o *Staphylococcuss* no aspirado traqueal e mortalidade de 44%. **Conclusão:** Revelaram-se índices compatíveis com dados de outros estudos e com o preconizado pela Agência Nacional de Vigilância Sanitária (Anvisa). No entanto, sugestiona-se capacitação aos profissionais envolvidos no cuidado.

Descritores: UTI, Enfermagem, Pneumonia associada à ventilação mecânica.

RESUMEN

Objetivo: Identificar laincidencia de neumonía asociada a laventilación mecánica (NAV) en pacientes hospitalizados en una unidad de cuidados intensivos. **Método:** Se trata de una sección transversal, documental y retrospectivo. Los datos fueron recolectados a través de La búsqueda de los registros Del Servicio de Control de Infecciones Relacionadas Cuidado de La Salud de agosto 2014 a marzo 2015, previa aprobación del Comité de Ética de La UFFS con CAEE 45124915100005564. En forma de tabla en Excel y se analizaron utilizando estadística descriptiva y analítica conel software SPSS 20.0. **Resultados:** La incidência Mostró del 29% de La Neumonía Asociada al Ventilador, especialmente El Staphylococcussen aspirado traqueal y lamortalidaddel 44%. **Conclusión:** Revelado índices consistentes com los datos de otros estudios y las recomendaciones de la Anvisa. Sin embargo, sugiere La formación de los profesionales implicados em La atención.

Descriptores: UTI, Enfermería, La neumonía asociada a la ventilación mecânica.

INTRODUCTION

The Intensive Care Unit (ICU) is the place to assist patients with systemic instability, risk of death and greater complexity, having adequate human and material resources to provide care to the individuals allocated.

In the context of intensive therapy, the various technologies employed, the highly invasive procedures, the health conditions of the individuals associated to the high manipulation of the patients by the nursing team and other health professionals can trigger adverse occurrences and serious damages to the physical integrity of the individual when proper monitoring is not performed.

Among the main risks to which users are exposed, there are the Health Care Associated Infections (HAI), currently representing a concern that does not only preoccupies the competent bodies, but a social, ethical and legal problem in the face of implications on the users' lives and the risks to which they are subjected. According to the Ordinance of the Ministry of Health number 2616 of 1998, HAI are those acquired after the admission of a user, manifesting during hospitalization or after discharge, as long as they can be related to the hospitalization or hospital procedures.[1-2]

Among these infections, we can mention the mechanical Ventilation- Associated Pneumonia (VAP), which is attributed to the effects of ventilation and pulmonary inflammation that does not exist or is not incubated at the time of hospitalization. It occurs after 48 hours of mechanical ventilation or is diagnosed within 72 hours after extubation.[3]

VAP affects approximately 8% to 28% of users in invasive ventilatory support, and the associated mortality can exceed 50%. We can divide the VAP into two categories, early onset and late onset, usually affecting users already colonized by microorganisms acquired at the hospital, which are sometimes multiresistant.[4-5]

In view of the above, this study aimed to identify the incidence of Pneumonia Associated with Mechanical Ventilation in a general Intensive Care Unit.

METHOD

This is a cross-sectional, documentary retrospective-collection survey, since it involved collecting data in a single period of time.[6]

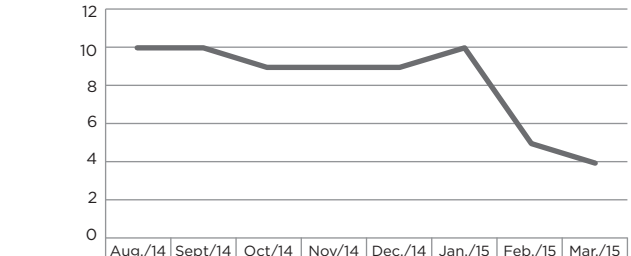
The study site was a general ICU. The sample comprised 100% of the records of the Service of Infection Control Related to HealthCare (SICRH) related to the control of the VAP from August 2014 to March 2015, in accordance with the inclusion criterion: complete record and without erasure. The data collection was performed by the researcher and comprised the month of July 2015, totalizing a quantitative of N-333 active search files analyzed.

For analysis, the data contained in the indicators forms were tabulated in the Excel program to obtain frequencies and percentages. We also used the IBM SPSS software (StatisticalPackage for the Social Sciences) version 20.0 for analytical treatment. Statistical tests were performed using Pearson's correlation and Bivariate analysis to determine the significance of the variables. A significance level of 95% was determined, with a margin of error of 5%.

For the execution of this study, the legal and ethical requirements were fulfilled. Therefore, the project was sent to the UFFS Research Ethics Committee for assessment and opinion and was approved under the opinion number 1,098,313.

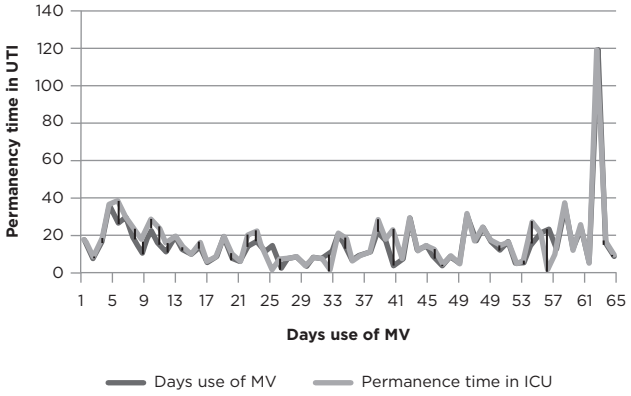
RESULTS AND DISCUSSION

Figure 1 – VAP incidence in hospitalized users in an adult ICU from August 2014 to March 2015.



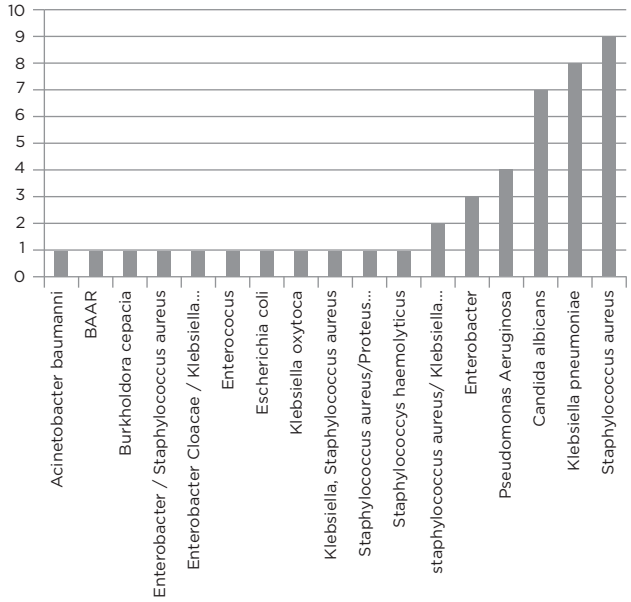
Source: SOUZA, Gabriela de Nardi. Data collection, Chapecó, 2015.

Figure 2 – Relation between MV and permanence time in the ICU of patients hospitalized in an adult ICU from August 2014 to March 2015.



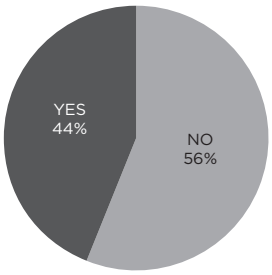
Source: SOUZA, Gabriela de Nardi. Data collection, Chapecó, 2015.

Figure 3 – Prevalent microorganisms in the tracheal aspirate of patients hospitalized in an adult ICU from August 2014 to March 2015.



Source: SOUZA, Gabriela de Nardi. Data collection, Chapecó, 2015.

Figure 4 – VAP-associated mortality of users hospitalized in an adult ICU from August 2014 to March 2015.



Source: SOUZA, Gabriela de Nardi. Data collection, Chapecó, 2015.

From the total number of users who used mechanical ventilation and contracted VAP, an average of 15.34 days in VM with ICU permanence time of 17.28 days was obtained.

VAP is the most common nosocomial infection in the Intensive Care setting. Its prevalence is variable, ranging from 6 to 50 cases per 100 admissions in the ICU. Its development has significant morbidity, which prolongs the user time in mechanical ventilation, as well as the permanence time in the unit and all the costs related to this period of hospitalization.[7]

VAP has incidence rates ranging from 9% to 67%, in addition to prolonging the duration of MV and increasing the days of ICU permanence time, implying in treatment costs and mortality over 50% of the cases.[8]

VAP is directly related to ICU permanence time and mechanical ventilation, with a risk of developing 1 to 3% for each day of ventilator stay.[9]

Authors have pointed out significant indices of this clinical condition in the most diverse hospital institutions. A study carried out in 2011, in the state of Santa Catarina, with 29 users, presented an incidence of 25.4% of VAP.[10]

A survey conducted in a public hospital in Rio de Janeiro, between 2006 and 2007, with 233 users, also showed an incidence of 25% of VAP throughout the follow-up of the study.[11]

A study carried out in 2006 with evaluation of 462 users on mechanical ventilation showed an incidence of VAP in 18.8% (n-87) with mortality of 46%.[12]

The incidence of VAP can vary according to the population and available diagnostic methods, establishing as attack rate 3% per day in the first 5 days and 2% for each subsequent day.[13]

The present study showed better results than those suggested by ANVISA and close to the standards presented in other hospital institutions.

The monitoring of this index is important because it is one of the indicators of the care quality provided by the health service, being associated with the longer periods of hospitalization in the Intensive Care Units, increased costs and the appearance of other nosocomial complications and mortality.

The impact of this infection is the prolongation of the hospitalization time in about 12 days and the cost increase around 40,000 dollars per episode.[13]

These data emphasize the need for qualified health teams that excel in the quality of care offered since the establishment of the criteria for the establishment of the MV, permanence time, and the management and use of bundles to avoid VAP.

Considering the mortality of the surveyed users who developed VAP, 44% died, with a statistical significance of $p = 0.01$ between these two factors.[13]Mortality associated with MV ranges between 20 and 60%, reflecting the severity of the underlying diseases, organ failure and the etiological agent involved. If it is related to VAP, it is considered the leading cause of death from hospital acquired infections with mortality rates of up to 76%.[14]

Other studies have shown the mortality related to VAP between 20 and 70% according to the studied population.[9]A study carried out, evaluating 439 users in 361 ICUs from 20 countries, including Brazil, revealed a mortality rate of 38%.[12]

Research developed in the city of Fortaleza, in 2011, with 74 users, presented an incidence of VAP of 60% and associated mortality of 32.6%.[15]

Statistically correlating the cases of VAP with the incidence of mortality in a study conducted in the University Hospital of Londrina in the period from 2009 to 2011, an associated mortality of 68.5% was obtained.[16]

In the study in focus, the mortality rate associated with VAP is compatible with ANVISA records, however, the inquiry files provided by SICRH suggest underreporting of VAP due to lack of diagnostic criteria, masking its incidence. Such context reveals that mortality associated with VAP may also have an incidence higher than the 44% described above due to such factors.

In relation to microbial agents, they are caused by bacteria, which vary according to the type of user, the hospitalization permanence time, the diagnostic method and the use of previous antibiotic therapy.

Several studies have reported aerobic gram negative bacilli as responsible for approximately 60% of the cases, among them *Pseudomonasaeruginosa*, *Escherichia coli*, *Klebsiellapenumoniae*, *Enterobacter* and some species of the genus *Acinetobacter*. Of the gram positive group, *Staphylococcus aureus* affects 20% of the cases.[8]

The main causes of VAP are: *Staphylococcus aureus*, *Pseudomonasaeruginosa* and *Enterobactercloacae*, differing according to the type of user, permanence time in the unit and antimicrobial therapy.[17]

Colonization of the oral cavity is one of the intervening factors for the establishment of VAP because, in critical users, the oral microbiota becomes predominantly occupied by gram-negative organisms. Bacteria usually responsible for establishing VAP, such as *P. aeruginosa, S. aureus* methicillin resistant, *Acinetobacter spp.,Escherichia coli, Klebsiellapneumoniae,* e*S. pneumoniae*, are not commonly found in the oral cavity, but colonize this region in some situations, such as during hospitalization in the ICU.[18]

According to other studies, the obtained data show that in 20% of VAP cases, the etiological agent is the *Staphylococcus aureus*, followed by *Klebsiellapneumoniae* and *Candidaalbicans*, in addition to the occurrence of colonization by more than one microorganism.

In a study carried out in Rio de Janeiro, in a private hospital ICU, the most frequently isolated germs were *Acinetobacter baumanni* (28%), *Pseudomonasaeruginosa* (19%) and *Staphylococcus aureus* (20%); And 16% of the washes presented negative culture.[11]

Research developed in Uberlândia, in the year 2013, revealed that, among the studied users who developed VAP, 12.3% had polymicrobial etiology and 87.7% was caused by a single microorganism. It should also be considered that the evolution for VAP in individuals previously colonized by S. *aureus* was 5.5%, rather than 1.8% for those not colonized.[9]

The three microorganisms prevalent, except *Klebsiellapneumoniae*, are microorganisms that reside in the human microbiota that, due to the clinical situation, became pathogenic, according to the results of this study. It is also convenient to establish the relationship that neither is a resident microorganism of the respiratory tract, that is, they were inoculated at this site or even colonized it due to the user immunosuppression.

Regarding treatment, antimicrobial use should not wait for culture results, but should be based on clinical-laboratory and radiological data, and the culture result should be used to adjust empirically initiated treatment.[14]

Due to its severity, the treatment of VAP should be initiated as early as possible, using broad spectrum antimicrobials until the results of the culture are available, as they may be several bacterial agents or even multi-resistant bacteria.[9]

CONCLUSION

Regarding the incidence of VAP, the results show that the parameters obtained in this study are close to the standards mentioned by other studies that deal with this subject and by the one advocated by ANVISA.

The study reveals the absence of collection routines for the scientific and cultural tests in the intensive care unit, also considered as a cause of underreporting of infections.

In addition, it provides the institution and professionals who work in care with data related to infection control in the intensive care setting, making it possible to rethink the assistance offered in regard to the factors that favor the appearance of this type of infection and the appearance in the cultural and oligermes.

It is emphasized that teams must establish effective control measures to reduce the incidence of VAPs, adding value to the qualification of the assistance offered.

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