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Registry System for the Notification of Adverse Events Related To Mechanical Ventilation of Critically Ill Patients

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Abstract

Purpose: To search and describe adverse events associated with mechanical ventilation (MV) and artificial airway in the Intensive Care Unit.

Method: Prospective cohort study of the adverse events derived from MV or artificial airway, performed for 7 days (24/03/14 to 31/03/14) 24 h a day. Previous training sessions were held for medical and nursing staff; as well as the anonymous registration system was reviewed, for the proper coding. Adverse events were classified according to the World Health Organization following the degree of damage. The study was approved by the Centre's Clinical Research Ethics Committee.

Results: A total of 25 patients on MV were detected, with a mean of 96.64 h on MV/per patient; 16 adverse events were registered. At least one incident occurred in 48% of cases. 75% of the events were harm-free, with the need for intervention/review in 18.7% of the episodes. The complexity of the patient was the main factor contribution. They were more frequent in the morning shift 62.5% and preventability was observed in 37.5% of the notifications.

Conclusion: In our study, half of the patients in the sample presented some adverse events related to MV in the study period, the majority without damage. There is an increase in the frequency of events in the shifts of greater assistance activity, with the MV being a highly complex support. The detection of adverse events, with the implementation of protocols and a notification system, is an essential tool in order to enhance the safety culture, it´s research and learning. In this process they can contribute to prevent the incidents, due to improve the safety of the critically ill patients.

Keywords: Safety ICU; Adverse events; Registration system; Mechanical ventilation

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Introduction

Mechanical ventilation, whether invasive or non-invasive, is one of the most common procedures in an Intensive Care Unit (ICU). Endotracheal intubation and mechanical ventilation (MV) are procedures that carry a risk for the patient [1,2]. Studies have documented adverse events related to this complex supports in ICU [3,4]. Patient safety can be achieved with the use of the adequate equipment, specific protocols, trained staff and notification system [5,6].

The aim of this study was the detection of adverse events associated with MV and endotracheal intubation, through the effective use of an anonymous registry system, in order to increase safety in the Intensive Care Unit (ICU).

Method

A prospective cohort study of the adverse events and incidents arising from the use of MV or intubation was carried out for 7 days (24/03/2014 to 31/03/2014) in a polyvalent ICU with 26 beds. Previous training sessions were held for medical and nursing staff, including the anonymous registration system for appropriate coding; the nurse:patient ratio is 2:5. The sample consisted of all patients admitted to a multidisciplinary ICU, and who required respiratory support (invasive and non-invasive)

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and/or endotracheal intubation during the study period. Patients younger than 18 years and those without respiratory support were excluded. A data collection team, consisting of two nurses and four physicians was trained. The variables analyzed were: demographics, days with MV, hours of MV per patient, stage of the MV; adverse events and incidents, with the frequency, work shift and their preventability, and contributing factors according to the person that notified.

In order to classify adverse events, the International Classification of the World Health Organization was used according to the degree of damage: adverse events with no symptoms and no treatment required; incidents with mild symptoms and moderate damage minimal intervention required moderate and severe damage with loss of function or major intervention. In the descriptive statistics, the categorical variables were described as percentages and frequency distribution, and the quantitative variable as mean (and 95% CI).

In our ICU, we engage available protocols for: daily check intubation equipment and arrest cart review, weaning process, tracheostomy procedure, Pneumonia Zero, humidification, prone position ventilation, and a transferal checklist among others. The study was approved by the Clinical Research Ethics Committee of the Centre, complying with the bioethical principles. The participants in this study respected the principles of confidentiality and anonymity as regards the events registered.

Results

In a sample of 25 patients on MV, the mean age was 63.7 years, with 64% being male. There were 16 incidents registered in this period, with a mean of 96.64 h on MV. At least one incident occurred in 48% of cases. Of those, 81.2% occurred during MV, 38.3% were casual disconnections and 15.3% were accidental extubations (**Table 1**: Absolute indicators).

A regards the harm caused, 75% of the incidents were harm-free, with the need for intervention/review in 18.7% of the episodes. The complexity of the patient was the main factor contribution to their occurrence. They were more frequent in the morning shift (62.5%). Avoidability was observed in 37.5% of the notifications made (**Table 2**: Relative indicators).

Table 1 Adverse events during MV or endotracheal intubation.

	Absolute indicators (n=16)
Intubation	1 slight delay in intubation
During MV:	1 respirator malfunction 1 obstruction/desaturation 1 atelectasis 1 endotracheal cuff leak 1 displacement of right bronchial tube 5 accidental disconnections
Weaning:	2 accidental extubations 1 failed extubation 1 pharyngeal pain after weaning
Transfers	1 malfunction respirator

Table 2 Relative indicators, adverse events during MV or endotracheal intubation.

Adverse events during MV or endotracheal intubation	(%)
Incidents harm-free	75%
Incidents with mild- moderate damage	25%
Incidents with severe damage	0%
Need for intervention	18.7%
During the morning shift	62.5%
Avoid ability defined by the staff	37.5%
Nurse entry	70%
Medical entry	30%

Discussion and Conclusion

MV is a frequent procedure in our patients, and it is a support of elevated complexity, not free of risks and complications. From the results of this study, we observed half of the patients had an adverse event associated with MV in the period studied, with the majority causing no harm. There was an increase in the frequency of incidents in the shifts of higher care activity, compatible with data found in the literature; as the number of procedures increases, the risk of adverse events increases. The detection of the adverse events and implementing of protocols on this process can contribute to their prevention; in order to improve the safety of patients admitted to ICU. The anonymous declaration system is an essential tool in order to enhance the safety culture, stimulate the involvement of all of the staff, and enhance the research and learning. There are strengths limitations to consider in this project, due to a single center research, may reflect the local experience; and the limited period of the study.

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