DOI: 10.1590/1809-2950/13965623022016

ORIGINAL RESEARCH

Is there a difference in early mobilization between mechanically ventilated clinical and surgical patients in ICU?

Existe diferença na mobilização precoce entre os pacientes clínicos e cirúrgicos ventilados mecanicamente em UTI?

¿Hay diferencias en la movilización precoz entre pacientes clínicos y quirúrgicos ventilados mecánicamente en las UCI?

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ABSTRACT | The objective of this study was to conduct a survey of the practices related to the mobilization of patients admitted to a general ICU, comparing them by type of intervention (clinical or surgical). This is a retrospective study of medical records of patients admitted to the Intensive Care Unit of Hospital Ministro Costa Cavalcanti in the city of Foz do Iguaçu, state of Paraná, Brazil, of which the following information were obtained: time to sit out of the hospital bed for the first time, to perform active exercises, to wean mechanical ventilation, of ICU hospitalization; diagnosis; sex; and age. We included 105 patients in the research, being 44 (41.9%) surgical, and 61 (58.1%) males, with an average age of 61.1±18.5 for clinical patients and 60.4±14.9 for surgical patients. We observed statistical difference concerning time to sit out of the bed (3±4 days for clinical patients and 3.1±4.5 for surgical patients) (p=0.02). We did not observe any differences regarding active exercises when comparing clinical and surgical patients.

Keywords | Respiration, Artificial; Intensive Care Units; Physical Therapy Department, Hospital; Physical Therapy Modalities.

RESUMO | O objetivo deste estudo foi realizar um levantamento das práticas relacionadas à mobilização dos pacientes internados em uma UTI geral, comparando-os por tipo de intervenção (clínica ou cirúrgica). Trata-se de análise retrospectiva de prontuários de pacientes internados na Unidade de Terapia Intensiva do Hospital Ministro Costa Cavalcanti, na cidade de Foz do Iguaçu (PR), dos quais foram retiradas as seguintes informações: tempo decorrido para sentar fora do leito pela primeira vez, realização de exercícios ativos, desmame da ventilação mecânica, internação em UTI, diagnóstico, gênero e idade. Foram incluídos na pesquisa 105 participantes, sendo 44 (41,9%) pacientes cirúrgicos, 61 (58,1%) do gênero masculino, com média de 61,1 anos (±18,5) para pacientes clínicos e 60,4 (±14,9) para cirúrgicos. Foi observada diferença estatística em relação ao tempo decorrido para sentar fora do leito, transcorrendo 3±4 dias para os clínicos e 3,1±4,5 para os cirúrgicos (p=0,02). Não foram observadas diferenças entre pacientes clínicos e cirúrgicos na realização dos exercícios ativos.

Descritores | Respiração Artificial; Unidades de Terapia Intensiva; Serviço Hospitalar de Fisioterapia; Modalidades de Fisioterapia.

RESUMEN | En este estudio se hizo una búsqueda de prácticas relacionadas con la movilización de pacientes hospitalizados en una Unidad de Cuidados Intensivos (UCI), cuanto al tipo de intervención si clínica o quirúrgica. Se trata de un análisis de fichas médicas de pacientes hospitalizados en la UCI del Hospital Ministro Costa Cavalcanti, en la ciudad de Foz de Iguazú (PR, Brasil), de las cuales se sacaron las siguientes informaciones: tiempo transcurrido para sentarse fuera de la cama por primera vez; realización de ejercicios activos; retirada de la ventilación mecánica; hospitalización en la UCI;

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E-mail: criedi@unicentro.br – Financing source: Nothing to declare – Conflict of interest: Nothing to declare – Presentation: Aug. 2014 – Accepted for publication: May 2016
Approved by Ethics Committee: CEP/FAG protocol 042/2013.

diagnóstico; género y edad. Participaron del estudio 105 personas, de las cuales 44 (41,9%) eran pacientes quirúrgicos, 61 (58,1%) varones, con un promedio de edad de los pacientes clínicos de 61,1 años (±18,5) y el de los quirúrgicos 60,4 años (±14,9). Se observó significativa diferencia en cuanto al tiempo transcurrido para sentarse fuera de la cama, con 3±4 días para los clínicos y 3,1±4,5 para los quirúrgicos (p=0,02). Mientras no se observaron diferencias significativas entre los pacientes de ambos grupos en cuanto a la realización de ejercicios activos.
Palabras clave | Respiración Artificial; Unidades de Cuidados Intensivos; Servicio de Fisioterapia Hospitalaria; Modalidades de Fisioterapia.

INTRODUCTION

Mortality rates have decreased with the improvement of practices in intensive care units (ICUs), thus increasing survival rates. However, due to extended hospital stay, many individuals develop neuromuscular and respiratory disorders, which impact negatively on functional independence[1].

The mechanical ventilation required to reverse respiratory dysfunction contributes to physical deconditioning as a result of the need for sedation and movement restraining. In addition, mechanical ventilation associated with the use of corticosteroids and neuromuscular blockers can exacerbate this deconditioning[2,3].

Early mobilization plays an important role in the recovery process of these individuals, as a way to minimize or reverse neuromuscular dysfunction of patients under MV. Processes involved in functional mobility as rolling, sitting, standing, and walking should be reinforced during the practice of ICU mobilization[4].

For this practice, it is necessary for the activities of prevention and management of motor changes acquired in the ICU to be carried out in an organized way[4]. Thus, the development of safe and feasible early mobilization protocols are needed to improve the functional condition of patients[5]. However, little is known about the mobilization routines established in ICUs.

Thus, this study aimed to verify if there is a difference in parameters and outcomes of a protocol of early mobilization among patients admitted to the ICU for clinical and surgical reasons.

METHODOLOGY

Study outline

This is a retrospective study that investigated the practices of mobilization in hospitalized patients in the general ICU of Hospital Ministro Costa Cavalcanti in Foz do Iguaçu, state of Paraná, Brazil. The study was approved by the Ethics Committee of the Assis Gurgacz Faculty (CEP/FAG), protocol 042/2013.

Participants

Individuals of both sexes were included, with aged over 18 years, regardless of clinical diagnosis, admitted to the general ICU, from January to July 2013 and which made use of invasive mechanical ventilation some time during the hospitalization. Medical records with incomplete data (<5% of the total), patients with less than 72 hours of hospitalization or over 30 days were excluded.

Procedures

The general ICU of Hospital Ministro Costa Cavalcanti has 10 beds. All physical therapists undergo periodic training courses that address completion of forms of control of MV, physiotherapeutic conducts, evolutions, and all physiotherapeutic assistance protocols, making the team homogeneous concerning the filling of the data.

Therefore, all the patients admitted were cared for by physical therapists who followed an assistance mobilization protocol according to the patient's clinical situation. Based on this protocol, the prescription to sit out of the bed should be individualized, performed by a physical therapist taking into account the patient's clinical stability.

After defining the records to be included, the following data were collected: age; sex; anthropometric assessment; diagnosis; time to sit out of bed for the first time, to withdrawal sedation, to perform active exercises, to wean the MV, of total MV and hospitalization in the ICU; comorbidities; Acute Physiology and Chronic Health Disease Classification System II (APACHE II);

cause of orotracheal intubation (OTI); and outcome of hospitalization for each patient.

Outcomes

As primary outcome, the times to sit out of the bed and to perform active exercises were observed. As secondary outcome, we evaluated the time to withdrawal of sedation, mechanical ventilation, weaning of the MV, total MV, and the outcome of the hospitalization in the ICU. As tertiary outcome, comorbidities, APACHE II, and anthropometric data were considered to verify the characteristics of the sample.

Statistical analysis

For statistical analysis, we used the statistical program InStat GraphPad, considering as the significance level $p \leq 0.05$. After the evaluation of normality by Kolmogorov-Smirnov test, we opted for t-test for non-paired samples to compare the variables age, weight and BMI. For the other comparisons, the non-parametric Mann-Whitney test was employed. The comparison between the distribution of specialties and the type of procedure between clinical and surgical groups was performed by Chi-square test. To better visualization, the data are presented as mean, standard deviation, and frequency distribution.

RESULTS

Figure 1 illustrates the flowchart of inclusion and exclusion of medical records.

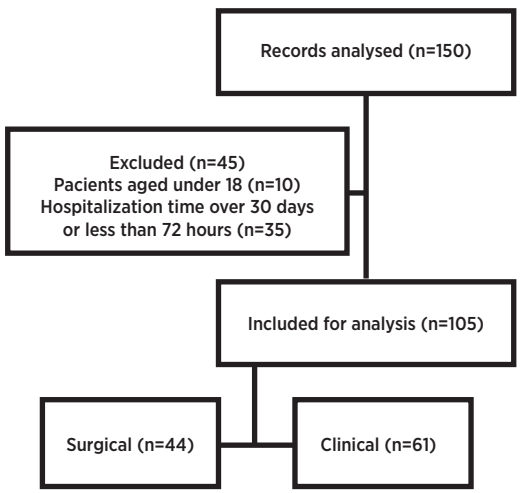

Figure 1. Flowchart of the number of medical records included and excluded in the study

The characteristics of individuals according to the procedures are presented in Table 1. We observed that the groups were different regarding the variables weight and height, cause of orotracheal intubation (OTI), specialty in which they were hospitalized, and diagnosis of sepsis.

Table 1. Characterisitics of the studied individuals divided by type of procedure

	Clinical	Surgical	p-value
Age (years)	61.1±18.5	60.4±14.9	0.83
Weight (kg)	70.9±19.5	66.6±31.9	0.0003
Height (cm)	164.4±8.9	161.2±25.9	0.0001
BMI (kg/m^2)	26.1±7.4	26.9±8.9	0.5
Cause of OTI			
ARpF	38 (36.1%)	4 (3.8%)	
Coma	13 (12.4%)	5 (4.7%)	0.001
Surgical procedure	-	32 (30.5%)	
Hemodynamic instability	10 (9.5%)	3 (2.9%)	
APACHE II	15.5 ± 11.9	15.9 ± 11.9	0.17
APACHE %	28.6 ± 26.6	27.4 ± 27.3	0.15
Sex			
Male	26 (25%)	27 (26%)	0.62
Female	29 (27%)	23 (22%)	
Specialty			
Neurology	9 (8.6%)	9 (8.6%)	
Gastroenterology	3 (3.0%)	18 (17.0%)	
Pulmonology	11 (10.5%)	2 (1.9%)	0.001
Oncology	23 (21.9%)	8 (7.6%)	
Medical Clinic	13 (12.38%)	1 (1.0%)	
Other	5 (4.8%)	3 (2.8%)	
Medication			
Corticosteroid	15 (14.3%)	6 (5.7%)	0.18
Neuromuscular blocker	1 (1.9%)	-	0.67
ICU outcome			
High	37 (35.2%)	29 (27.6%)	
Death	3 (2.9%)	13 (12.4%)	0.48
Transferred	-	-	
Admitted	11 (10.5%)	2 (1.9%)	
Sepsis	11 (10.5%)	2 (1.9%)	0.07

ARpF: acute respiratory failure; BMI: body mass index; TOI: orotracheal intubation; APACHE II: acute physiology and chronic health evaluation II; ICU: intensive care unit

Table 2 shows the comparison of studied times with clinical and surgical procedures. We observed statistically significant difference only regarding time to sit out of the hospital bed, with clinical patients being able to sit earlier ($p = 0.02$).

Table 2. Comparison between the procedures regarding the time related to hospitalization in the ICU

	Clinical	Surgical	p-value
Hospitalization time (days)	7.8±5.5	6.9±5.4	0.22
MV total time (days)	6.5±5.5	4.8±4.3	0.08
Weaning time (days)	2.5±4.7	1.0±1.4	0.3
Time to sit out of bed (days)	3.0±4.0	3.1±4.5	0.02
Time for sedation withdrawal (days)	2.8±2.4	2.6±2.3	0.57
Time to begin active exercises (days)	3.5±4.8	4.8±5.2	0.17

ICU: intensive care unit; MV: mechanical ventilation

DISCUSSION

Physical and functional deficiencies are common sequelae in patients admitted to ICUs[6] due to bed rest, which favors reduction of muscle mass and decrease of muscle efficiency and force[7]. These musculoskeletal changes also involve the vascular system (with decrease of venous return) and the respiratory system (due to respiratory muscle weakness), thus hindering the withdrawal of the MV[3,8].

Much has been discussed about the impact of neuromuscular dysfunction in critical patients admitted to an ICU. This dysfunction presents different behaviors depending on the severity and can become persistent, directly impacting the quality of life of the admitted individuals. One of the strategies for preventing these disorders is physiotherapeutical action, with the goal of functional improvement through early mobilization, which consists of the removal of the patient from the bed, active exercises and even walking inside the ICU environment[9]. This intervention reflects better functional outcome for hospital discharge, decrease of delirium and increase of days without mechanical ventilation[10].

However, the scarcity of studies that base or that standardize this intervention limit its practice. Balas et al.[11] defend the implementation of early mobilization protocols, because when applying such protocol, they found that patients left the bed a greater number of times than before the implementation (OR 2.1). In this study, 78% of patients got out of bed and remained sitting in the chair, and, despite clinical patients leaving the bed earlier than surgical patients, they remained hospitalized and on mechanical ventilation a longer time.

The study by Jolley et al.[7] analyzed factors that influenced the performance of physiotherapy in patients on prolonged MV, and found that the septic shock did not interfere in the evolution of physiotherapy. We believe that the same has occurred in our study because, despite clinical patients having presented greater incidence of sepsis, this condition did not change the physiotherapeutic conduct with patients sitting as early than the surgical ones.

Another study on the early mobilization in the ICU[12] showed that 76% of patients presented free mobility in bed, 33% remained standing, 33% sat in the chair, and 15% walked, with reduction of the time of mechanical ventilation in approximately 50%. Promising results have also been reported by Needham et al.[1]. However neither one of these studies[1,12] compared the effect of mobilization between clinical and surgical patients.

The study by Nydahl et al.[5], with methodology similar to ours but that did not follow a protocol of mobilization in the ICU, showed that despite the importance of early mobilization, only 24% of the mechanically ventilated patients and 8% of those with artificial airway were mobilized out of the bed. In our study, 61.4% of surgical patients and 80.3% of clinical patients sat outside the bed after 3 days of MV.

Surgical patients were usually older, however, stayed for less time in the ICU and in the hospital[13]. However, our results showed no difference between clinical and surgical patients, as well as in the APACHE gravity score. We believe that this happened because of the difference in the profile of patients regarding the causes of intubation ($p<0.001$) and specialties in which they were hospitalized ($p<0.001$).

Significant differences also occurred in frequency of sepsis with more impact in surgical patients[13], while we observed a higher rate in clinical patients, but without significant differences.

As limitation of this study, we can highlight the lack of studies on the practice of early mobilization in ICUs, which hinders the comparison of results, and its retrospective aspect, based on medical records, therefore subject to variations in these records.

CONCLUSION

In a general ICU with early mobilization protocol, we did not observe any differences in active exercises when comparing clinical and surgical patients, despite clinical patients being able to sit earlier, this did not impact in mortality or hospitalization time in the ICU. Daily ICU practices showed a tendency to remove the patients undergoing mechanical ventilation from the bed earlier and to keep them more active.

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