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Original article

Assessment of prevalence and risk factors for early mobilization in an emergency hospital

Avaliação da prevalência e fatores de risco para mobilização precoce em um hospital de urgências

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ABSTRACT

Introduction: An intensive care unit receives critically ill patients, which includes specific and comprehensive care. These users commonly remain confined to bed for a prolonged period of time, causing inactivity, immobility and severe osteomyoarticular dysfunction. **Aim:** To analyze the prevalence, degree of mobility and risk factors for early mobilization in patients that occurred on the seventh to the tenth day of hospitalization in the evaluated units. **Methods:** This is a cross-sectional analytical descriptive study. To carry out the research, a safety assessment, and the Johns Hopkins mobility scale were carried out, ending with the analysis of the mobility conduct carried out on the day of the assessment, both via medical records. **Results:** 100 patients were included (age: 58±18 years, sex: 65 male). Regarding the performance of early mobilization, only 27% could be described as such. Participants who were on external ventilation had a higher percentage of mobilization (63%), when compared to patients who were on invasive mechanical ventilation (33.3%). 73% of patients were classified as 1 (lying down) on the Johns Hopkins scale. The greater the number of risks, including sedation and orotracheal tube, the lower the mobilization rate. **Conclusion:** A significant percentage of patients were not mobilized. The greater the number of risks, the lower the mobilization rate. There was no difference in mobility rates, considering the different diagnoses. Therefore, a greater commitment to health education for rehabilitation professionals is necessary.

Keywords: early ambulation; hospitalization; limitation of mobility.

RESUMO

Introdução: A unidade de terapia intensiva recebe pacientes criticamente doentes, que necessitam de cuidados especializados e integrais. Comumente estes usuários permanecem restritos ao leito por tempo prolongado, ocasionando inatividade, imobilidade e disfunções osteomioarticulares severas. **Objetivo:** Analisar a prevalência, o grau de mobilidade e os fatores de risco para mobilização precoce em pacientes que estivessem do sétimo ao décimo dia de internação das unidades avaliadas. **Métodos:** Trata-se de um estudo descritivo analítico de característica transversal. Para a execução da pesquisa, foi realizada a avaliação de segurança, e escala de mobilidade de Johns Hopkins, finalizando com a análise de condutas de mobilidade realizadas no dia da avaliação, ambos via prontuário. **Resultados:** 100 pacientes foram incluídos (idade: 58±18 anos, sexo: 65 masc). Com relação à realização de mobilização precoce, apenas 27% pôde ser caracterizada como tal. Os participantes que estavam em ventilação espontânea apresentaram percentual maior de mobilização (63%), quando comparados aos pacientes que estavam em ventilação mecânica invasiva (33,3%). 73% dos pacientes apresentavam classificação 1 (deitado) na escala de Johns Hopkins. Quanto maior o número de riscos, entre eles, sedação e tubo orotraqueal, menor o índice de mobilização. **Conclusão:** Uma porcentagem significativa dos pacientes não eram mobilizados. Quanto maior o número de riscos, menor o índice de mobilização. Não houve diferença nas taxas de mobilidade, considerando os diferentes diagnósticos. Logo, faz-se necessário um maior empenho em educação em saúde para os profissionais de reabilitação.

Palavras-chave: deambulação precoce; hospitalização; limitação da mobilidade.

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Introduction

The intensive care unit (ICU) receives critically ill patients who require specialized and comprehensive care. These users commonly remain confined to bed for a prolonged period, causing inactivity, immobility and severe musculoskeletal disorders; This long stay also promotes physical deconditioning, muscle weakness, increased days of mechanical ventilation (MV) and prolonged weaning [1].

Early mobilization is directly related to greater life expectancy and hospital discharge, as well as increased functional capacity and reduced damage secondary to hospitalization [2]. When performed correctly and cohesively, mobility can prevent muscle weakness, pressure injuries, atelectasis, pneumonia, thromboembolic diseases, delirium and others [3].

For good practice in a critical environment, criteria that permeate patient eligibility and safety are necessary. The expert consensus of Hodgson *et al.* [4] brings concepts and safety parameters that increase protection, reducing the risk of adverse events, including cardiovascular, neurological, and surgical conditions. A good tool to achieve adequate results is the Johns Hopkins activity and mobility promotion (JH-AMP) scale, which implements a common, interprofessional mobility language, in addition to systematizing and establishing daily goals as a therapeutic plan [5].

The use of scales to measure, adapt and classify early mobilization is increasingly important and present in the hospital environment. The physiotherapist is qualified and responsible for evaluating and identifying which patients have hemodynamic and functional conditions for the safe execution of activities, classifying them according to their individualities [6].

In view of the issues presented, the need to implement early mobilization safely and effectively in a hospital environment is evident, also bringing a common language among professionals of all classes, with standardization and correct and pertinent evolution for each case.

The aim of this study was to analyze the prevalence of early mobilization in patients who were on the seventh to tenth day of hospitalization in two ICUs of an emergency hospital in Goiás, analyze the degree of mobility using the JH-AMP scale, analyze which risk factors are present, in addition to comparing whether there is a difference in mobility according to the patients' diagnosis.

Methods

This is a descriptive, cross-sectional analytical study, carried out in two ICUs of an emergency hospital in Goiás, which is a public unit linked to the Goiás State Secretariat, with authorization from the research ethics committee from HUGO (CAAE: 61739122.5.0000.0033). Patients admitted to two ICUs at the hospital in question participated in the study.

The inclusion criteria for the study were: being admitted to one of the ICUs evaluated; ≥18 years old, of both sexes, who were on the seventh to tenth day of hospitalization, regardless of the diagnosis; a responsible family member to sign the informed consent form (ICF). Patients who had an incomplete electronic medical record, making it impossible to fill out the assessment form, were excluded from the research.

Data collection was carried out by a single properly trained evaluator, lasted four months (January-April) and was divided into four moments. Initially, patients at the research site were screened through the electronic medical records system to identify those who fit the inclusion criteria. Soon after, the patient able to participate in the research was invited to explain the research, read the ICF, clarify the assessments to be carried out and sign the ICF. For patients who did not meet the necessary requirements to understand the term, the research was explained to the person responsible.

After signing the ICF, the patient's personal and clinical data were collected via medical records and transferred to the evaluation form created by the researchers, followed by a safety assessment and the JH-AMP scale, ending with an analysis of conduct carried out in the day of evaluation to check compatibility and whether or not early mobilization occurred in them, both via medical records.

The evaluation form contained acronym, medical record number, sex, date of birth, age, lifestyle habits, hospitalization data (day on which he was admitted to the hospital, total days of hospitalization and others), data related to the trauma (mechanism trauma, associated factors and others) and clinical data (peripheral O_2 saturation, heart rate and others).

The safety assessment consists of specific tables, in which the risk factors for early mobilization present at the time of the approach were evaluated. These tables come from the study by Hodgson *et al.* [4], and enable the execution of appropriate mobilization, based on respiratory, cardiovascular, neurological, medical, surgical and other safety considerations.

The JH-AMP scale is easy to execute, and its purpose is to assess mobility and establish a common language for different professionals, systematizing daily goals. Your score is determined according to the activities performed. It is made up of the following classifications: 1 = just lying down, 2 = activities in bed, 3 = sitting on the edge of the bed, 4 = transferring out of bed, 5 = standing for more than or equal to one minute, 6 = walking ten or more steps, 7 = walking approximately 7.5 m or more (25 feet or more) and 8 = walking approximately 75 m or more (250 feet or more) [5].

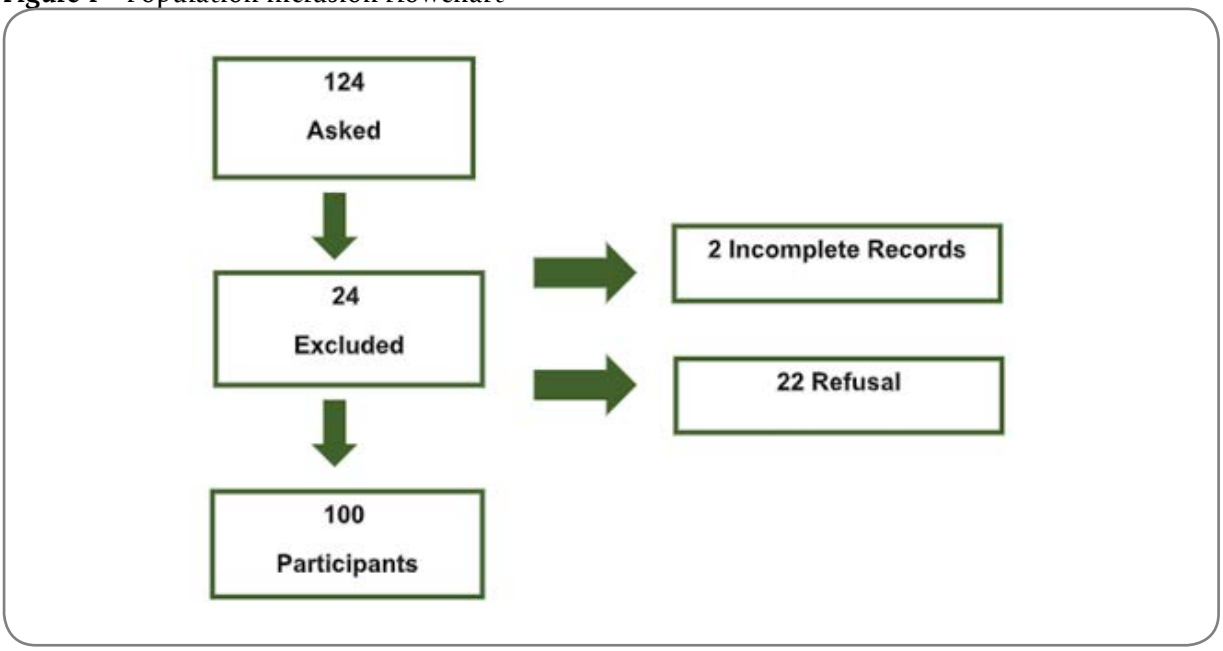
The data were categorized and tabulated in an electronic spreadsheet using the Microsoft Excel 2016 software. The characterization of the patients' demographic, clinical profile, ventilation parameters, vital signs and mobilization risks was performed using absolute frequency, relative frequency, mean and standard deviation. Data normality was checked using the Shapiro-Wilk test. The association between the presence of mobilization and the patients' profile was carried out using Pearson's

chi-square test and Student's t test. Data were analyzed using the Statistical Package for Social Science, (IBM Corporation, Armonk, USA) version 26.0. The significance level adopted was 5% ($p < 0.05$).

Resultados

Figure 1 presents the inclusion flowchart of the population in this study.

Figure 1 – Population inclusion flowchart



Source: Own authorship

Table I shows the patients' profile and association with the presence of mobilization. It was found that the average age of the participants was 58.39 ± 18.62 years, with no statistical difference in the different age groups in relation to mobilization ($p = 0.61$). Of the participants, 65% ($n = 65$) were male (p: 0.46) and 50% ($n = 50$) of the total sample were on the 7th day of hospitalization ($p = 0.71$). There was no significant difference in mobility in the sectors evaluated ($p = 0.07$). A mobilization percentage of 27% ($n = 27$) was found in the ICUs analyzed, against a scenario in which approximately three quarters of patients were not mobilized.

Table II demonstrates the characterization of the patients' clinical profile and association with the presence of mobilization. A higher profile of neurological patients was found, 67% ($n = 67$), followed by 14% ($n = 14$) clinical, 7% ($n = 7$) surgical and 12% ($n = 12$) others. There was no statistical significance in relation to diagnosis and mobilization (p: 0.49), nor related to the use of neuromuscular blocker (NMB) (p: 0.16) and vasoactive drug (VAD) (p: 0.23). On the other hand, significance was found in relation to previous comorbidities, surprisingly, for those who had comorbidities, they also showed a higher level of mobilization (p: 0.03). Of these, 67% ($n = 31$) had systemic arterial hypertension (SAH) as comorbidities, followed by 21% ($n = 10$) with diabetes mellitus (DM).

A lower degree of mobilization was also observed in those who used sedation/analgesia (p: 0.001). Regarding the main drugs used, the sedation of choice, in 60% (n = 30) of patients, was the association between fentanyl and midazolam, followed by 34% (n = 17) fentanyl alone. Regarding the use of DVA, of those who used the therapy, 65% (n = 15) used norepinephrine.

Table I - Characterization of the patient profile and association with the presence of mobilization (n = 100)

	Mobilization n (%)		Total n = 100	P
	No 73 (73.0)	Yes 27 (27.0)		
Sector				
UTI I	36 (49.3)	8 (29.6)	44 (44.0)	0.078*
UTI II	37 (50.7)	19 (70.4)	56 (56.0)	
Gender				
Female	24 (32.9)	11 (40.7)	35 (35.0)	0.464*
Male	49 (67.1)	16 (59.3)	65 (65.0)	
Days of hospitalization				
7th day	34 (46.6)	16 (59.3)	50 (50.0)	0.711*
8th day	19 (26.0)	5 (18.5)	24 (24.0)	
9th day	8 (11.0)	2 (7.4)	10 (10.0)	
10th day	12 (16.4)	4 (14.8)	16 (16.0)	

*qui-quadrado; n = frequência absoluta; % = frequência relativa; UTI = unidade de terapia intensiva

Table II- Characterization of the patients' clinical profile and association with the presence of mobilization (n = 100)

	Mobilization n (%)		Total n = 100	P
	No 73 (73.0)	Yes 27 (27.0)		
Previous comorbidities				
No	44 (60.3)	10 (37.0)	54 (54.0)	**0.038***
Yes	29 (39.7)	17 (63.0)	46 (46.0)	
Sedation				
No	29 (39.7)	21 (77.8)	50 (50.0)	**0.001***
Yes	44 (60.3)	6 (22.2)	50 (50.0)	
NMB				
No	68 (93.2)	27 (100.0)	95 (95.0)	0.163*
Yes	5 (6.8)	0 (0.0)	5 (5.0)	
VAD				
No	54 (74.0)	23 (85.2)	77 (77.0)	0.237*
Yes	19 (26.0)	4 (14.8)	23 (23.0)	

*chi-square; n = absolute frequency; % = relative frequency; NMB = neuromuscular blockade; VAD - vasoactive drug

Table III represents the ventilation and mobilization parameters. Participants who were on spontaneous breathing (SB) had a higher percentage of mobilization, 63% (n = 17), when compared to patients who were on IMV (p < 0.001), corroborating

the following finding, where 86% (n = 63) of those who used IMV were not mobilized (p < 0.001). Of the individuals who were mobilized, 66% (n = 18) performed bedside procedures, while 29% (n = 8) performed bedside mobilizations (p < 0.001). No association was found between mobilization and ventilation parameters.

Table III - Characterization of the profile of ventilatory parameters and association with the presence of mobilization (n = 100)

	Mobilization n (%)		Total n = 100	P
	No 73 (73.0)	Yes 27 (27.0)		
SB				
No	64 (87.7)	10 (37.0)	74 (74.0)	**<0.001***
Yes	9 (12.3)	17 (63.0)	26 (26.0)	
Oxygen therapy				
No	7 (77.8)	11 (64.7)	18 (69.2)	0.492*
Yes	2 (22.2)	6 (35.3)	8 (30.8)	
NIV				
No	73 (100.0)	27 (100.0)	100 (100.0)	1.000*
Yes	0 (0.0)	0 (0.0)	0 (0.0)	
IMV				
No	10 (13.7)	18 (66.7)	28 (28.0)	**<0.001***
Yes	63 (86.3)	9 (33.3)	72 (72.0)	
Device				
OTT	61 (95.3)	10 (100.0)	71 (96.0)	0.504*
TCT	3 (4.7)	0 (0.0)	3 (4.0)	
Mode				
PCV	30 (47.6)	6 (66.7)	36 (50.0)	0.386*
PSV	24 (38.1)	3 (33.3)	27 (37.5)	
VCV	9 (14.3)	0 (0.0)	9 (12.5)	
Motor procedures				
Sit by the bed	0 (0.0)	8 (29.6)	8 (8.0)	**<0.001***
Out of bed	0 (0.0)	1 (3.7)	1 (1.0)	
Bed	73 (100.0)	18 (66.7)	91 (91.0)	
Vent parameters.				
Mean ± SD				
IP (cmH2O)	12.20 ± 3.06	11.89 ± 2.89	12.16 ± 3.02	0.775**
TV (ml)	452.90 ± 111.78	418.56 ± 123.82	448.61 ± 113.00	0.397**
PEEP (cmH2O)	7.08 ± 2.34	7.00 ± 1.32	7.07 ± 2.23	0.921**
FiO_2 (%)	31.90 ± 12.05	27.33 ± 7.40	31.33 ± 11.63	0.273**

*chi-square; **Student's t-test; n = absolute frequency; % = relative frequency; SD = standard deviation; SB = spontaneous breathing; NIV = non-invasive ventilation; IMV = invasive mechanical ventilation; OTT = orotracheal tube; TCT = tracheostomy; PCV = pressure controlled volume; PSV = support pressure; VCV = controlled volume; IP = inspiratory pressure; TV = tidal volume; PEEP = positive pressure at the end of expiration; FiO_2 – fraction of inspired oxygen

Table IV provides a characterization between the risks of mobilization and its execution, where the number of mild risks in bed and outside the bed ($p < 0.001$), potential in bed ($p = 0.03$) and significant potential outside the bed ($p = 0.002$) was inversely proportional to mobilization; the greater the number of risks, the lower the mobilization rate.

Table IV - Characterization of the profile of vital signs and risks of mobilization and comparison with the presence of mobilization (n = 100). Expert consensus by Hodgson *et al.* [4] 2014

	Mobilization (mean ± sd)		Total	P*
	No	Yes		
Mobilization risks				
N-rl-mild	6.32 ± 1.13	4.93 ± 1.66	5.94 ± 1.43	**<0.001**
N-rfl-mild	6.10 ± 1.13	4.74 ± 1.68	5.73 ± 1.43	**<0.001**
N-rl-potential	1.05 ± 1.00	0.59 ± 0.75	0.93 ± 0.96	**0.031**
N-rfl-potential	0.73 ± 0.92	0.52 ± 0.75	0.67 ± 0.88	0.296
N-rl-potential-significant	0.07 ± 0.25	0.00 ± 0.00	0.05 ± 0.22	0.166
N_rfl_potential-significant	0.66 ± 0.69	0.19 ± 0.48	0.53 ± 0.67	**0.002**

*Student's t-test; sd= standard deviation; N-rl-light = number of mild risks on the bed; N-rfl-potential = number of potential risks outside the bed; N-rl-significant-potential = number of significant potential risks in the bed; N_rfl_significant-potential = number of significant potential risks outside the bed.

In the JH-AMP scale classification, 73% (n = 73) of patients had classification 1 (lying down), followed by 18% (n = 18) 2 (transfers/activities in bed), 8% (n = 8) 3 (sitting at the bedside) and only 1% (n = 1) classification 4 (transfer outside the bed). None of the patients were in categories from 5 (1 min in standing position) to 8 (ambulation for 75 meters or more).

Discussion

We observed through this study that sedation, IMV and number of risks were directly associated with lower mobilization rates, and that previous comorbidities and SB were associated with greater mobilization. Furthermore, the mobilization rate was found to be 27%, which in the authors' opinion is considered extremely low.

Most of the sample was made up of males, 65% (n = 65), which corroborates similar studies found in the literature [7,8]. This fact can be explained due to behavioral and social habits, such as alcohol consumption, smoking, sedentary lifestyle and low demand for health promotion and prevention services [9]. It is also a research hospital, a reference in trauma.

Fontela *et al.* [10] found the use of sedation among the main risk factors for mobilization. Of our patients, 50% (n = 50) used this therapy, and of these, only 22% (n = 6) were mobilized, therefore, sedation also presented a strong barrier in our study.

As previously presented, early mobilization has numerous benefits and should be applied routinely, reducing the harmful effects caused by immobility. Therefore,

as soon as possible, sedation should be reduced to facilitate the implementation of early mobilization [11]. Still, it is worth remembering that, according to the expert consensus of Hodgson *et al*. [4], sedation, at its different levels, does not present an absolute risk for mobilization, and the risks and benefits must be analyzed.

There is a low level of mobilization in ICUs, and when this occurs, exercises are mostly performed in bed [1]. In our study, a percentage of 66% (n = 18) exercised in bed, classification number 2 on the JH-AMP scale, was found, followed by 29% (n = 8) at the bedside. Fontela *et al*. [10] showed a similar result, in which 60% of their mobilized patients also received only bed exercises. In a previous study, our group discussed exercises in the ICU, reinforcing their importance in minimizing complications during immobilization and the safety of their execution, even in patients with risk factors such as the use of VAD, invasive monitoring and high cardiovascular lability [12].

IMV proved to be an important barrier to mobilization. In our study, 86% (n = 63) of those who used this therapy were not mobilized and of those who were mobilized, 63% (n = 17) did not receive this support. Similar data was presented in the study by Jolley *et al*. [13], in which 48% of SB patients were mobilized vs 26% of mobilization in the mechanically ventilated ones. In this same study, they also pointed out as the main explanation for the higher level of mobilization in patients with tracheostomy (TCT), or without an artificial airway, the smaller amount of equipment and the lower risk of complications during execution. However, Nydahl *et al*. [14], in their systematic review, revealed a minimal proportion of adverse events in patients with an artificial airway, reaffirming the safety of mobilization in these patients. It is also worth highlighting that according to Hodgson *et al*. [4], the presence of an orotracheal tube (OTT) constitutes a mild risk for exercises in bed and outside the bed.

It is essential to consider the importance of the participation of a trained and qualified team to carry out the mobilization, as discussed in the study by Curtis *et al*. [15], presenting that the experience of the activity must be kept in mind and developed by a competent team, and this competence is developed through training, protocols and tireless hours of practice.

This study has limitations that must be highlighted. All data presented were obtained via medical records and may suffer interference from those responsible for the records. Regarding those who used VAD's, the doses used were not quantified, which could also generate changes in the results.

Conclusion

The present study made it possible to analyze the prevalence of mobilization, as well as the degree of mobility and risks present in ICU patients. From the data presented, it is possible to conclude that a significant percentage of patients were not mobilized. The greater the number of risks, including sedation and OTT, the lower the mobilization rate. There was no difference in mobility rates, considering

the different diagnoses. Therefore, greater commitment to health education for rehabilitation professionals is necessary, so that there is a more effective, early and safe mobilization, even in patients who present risks. It is suggested that new studies be carried out that evaluate this same profile of individuals in situ and at the bedside, with the aim of discovering new outcomes.

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Potential conflict of interest
The authors declare that they have no conflicts of interest in publishing this study.

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Authors' contributions
Conception and design of the study: Campos MLS, Nunes ELG, Souza lP, Gardenghi G; **Data collection: Campos MLS; Statistical analysis:** Campos MLS, Nunes ELG, Souza lP, Gardenghi G; **Data interpretation:** Campos MLS, Nunes ELG, , Gardenghi G; **Text composition:** Campos MLS, Nunes ELG, Souza lP, Gardenghi G; **Approval of the final version to be published:** Campos MLS, Ferreira BK, Barbosa IOF, Nunes ELG, Souza lP, Gardenghi G, Petto J.

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