

Application of the ICU Mobility Scale in patients submitted to cardiac surgery

Aplicação da ICU Mobility Scale em pacientes submetidos à cirurgia cardíaca


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Abstract

Introduction: Early mobilization is an alternative used in the Intensive Care Unit (ICU) to reduce the effects of immobility. The Intensive Care Unit Mobility Score (IMS) is applied to assess mobility status. **Objective:** To determine the functional level of ICU patients submitted to cardiac surgery using the IMS scale. **Methods:** This is an analytical observational study carried out with adult ICU patients submitted to cardiac surgery. Data on the use of vasoactive drugs, functional level through IMS, duration of mechanical ventilation and length of ICU stay were collected from the physiotherapy routine form and recorded on a specific instrument developed for the study. The data obtained from the IMS scale score on the postoperative days in the ICU were used to classify the patients' mobility during the hospitalization period. Descriptive statistics were used to present the data. **Results:** A total of 69 patients were evaluated, 43% of whom were men, and all had an SMI of 0 on the first postoperative day. Classification on the scale increased over the course of hospitalization (IMS between 7 and 10), despite the use of vasoactive drugs in 54.6% of the individuals. **Conclusion:** Patients submitted to cardiac surgery admitted to the ICU had moderate-to-high mobility levels throughout their stay and at discharge from the ICU.

Keywords: Functionality. Immobilization. Intensive Care Unit. Mobilization. Surgery.

Resumo

Introdução: A mobilização precoce é uma alternativa utilizada em Unidades de Terapia Intensiva (UTIs) na tentativa de reduzir os efeitos decorrentes do imobilismo. A escala de mobilidade em UTIs ou Intensive Care Unit Mobility Score (IMS) é aplicada para avaliar o nível de mobilidade. **Objetivo:** Verificar por meio da escala IMS o nível de funcionalidade de pacientes submetidos à cirurgia cardíaca internados em uma UTI. **Métodos:** Trata-se de um estudo observacional analítico realizado em UTI com pacientes adultos submetidos à cirurgia cardíaca. Foram coletados da ficha de rotina da fisioterapia informações quanto ao uso de drogas vasoativas, nível funcional por meio da IMS, tempo de ventilação mecânica e de internação na UTI, e registrados em instrumento específico desenvolvido para o estudo. Os dados obtidos do escore da escala IMS nos dias de pós-operatório na UTI foram utilizados para classificar a mobilidade dos pacientes durante o período de internação. Utilizou-se estatística descritiva para a apresentação dos dados. **Resultados:** Foram avaliados 69 pacientes, 43% eram do sexo masculino e todos apresentavam IMS 0 no primeiro dia de pós-operatório. A classificação na escala aumentou com o decorrer do período de internação (IMS entre 7 e 10), apesar do uso de drogas vasoativas em 54,6%. **Conclusão:** Os pacientes submetidos à cirurgia cardíaca internados na UTI apresentaram níveis de mobilidade de moderado a alto ao longo da internação e na alta da UTI.

Palavras-chave: Funcionalidade. Imobilização. Unidade de Terapia Intensiva. Mobilização. Cirurgia.

Introduction

The length of hospitalization, prolonged rest, and being bedridden are directly related to muscle weakness, skin lesions, declining mobility, cardiovascular and respiratory impairment, and increased mortality rates. Improving mobility and early mobilization in patients admitted to the Intensive Care Unit (ICU) can minimize the negative effects of serious illnesses.^{1,2}

Early mobilization is an approach used in ICUs to reduce the consequences of immobility, enhancing muscle strength and function, reducing complications, and improving patient quality of life.^{1,3} Early mobilization is associated with reduced mechanical ventilation (MV) time, incidence of ventilator-associated pneumonia,

length of hospital stays, and improved function upon hospital discharge.¹ Despite professionals' awareness of the importance of early mobilization and minimal adverse events, barriers to mobilization still prevent its implementation in the intensive care environment.⁴⁻⁶

The use of scales to assess mobility level, the impact of mobilization, and long-term function after hospital discharge is quite common in ICUs. Among the instruments specifically developed for the ICU, the Intensive Care Unit Mobility Score (IMS) stands out.⁷ Translated into Portuguese as *Escala de Mobilidade em UTI*, the IMS is a scale that scores patient capabilities from 0 to 10, ranging from the inability to perform any activity to independent walking without gait aids.³

The IMS assesses the patient's highest daily mobilization level in the ICU quickly, simply, and reliably, taking less than one minute to complete and can be used by the multidisciplinary team. Patients with a higher level of physical function at ICU discharge are known to have a shorter hospital stay and better functional capacity.⁸

The implementation of scales in the hospital environment has been a strategy to enhance physiotherapeutic care regarding the progression of exercises performed, while also alerting the multidisciplinary team to the mobility milestones achieved by the individual.³ As such, this study aimed to assess the level of functionality in patients submitted to cardiac surgery admitted to an ICU using the IMS.

Methods

This is an analytical observational study conducted in the Surgical Intensive Care Unit (SICU) of the University Hospital of the Federal University of Maranhão (HUUFMA) and approved by the institution's Research Ethics Committee (protocol no. 3,694,076). Adult patients submitted to cardiac surgery from February to December 2020 were included.

Data collection was carried out daily during the morning shift while the patient was hospitalized in the SICU. Demographic and anthropometric data were collected upon patient admission, along with information about the surgery performed and preoperative ejection fraction. Throughout hospitalization, information on invasive devices used, number of drains, use of vasoactive drugs such as norepinephrine, dobutamine, adrenaline, vasopressin, and sodium nitroprusside, functional level

according to the IMS scale score, duration of mechanical ventilation, and ICU stay were recorded. The IMS scale score obtained on postoperative days in the ICU was used to classify patient mobility during the hospitalization period.^{8,9} Information about mortality was recorded.

Descriptive statistics were applied to analyze the data, expressing quantitative variables as mean and standard deviation, and qualitative variables as absolute and relative values.

Results

A total of 320 assessments were conducted in 69 patients submitted to cardiovascular surgery, 43% of whom were men, with an average age of 51 years. The most frequent comorbidity was high blood pressure (36%). Most of the patients were submitted to valve replacement surgery, requiring up to two drains and vasoactive drugs at SICU admission, in addition to having stayed less than 24 hours under mechanical ventilation. Average hospitalization time in the SICU was 5.9 days (Table 1).

At SICU admission, all the patients presented with IMS 0, that is, no mobility, which was expected given the anesthetic effect. On the first postoperative day, most (71%) evolved to IMS from 1 to 3 (low mobility level). Moderate to high mobility levels were achieved from the first and second postoperative day onwards, respectively (Figure 1). Considering only patients who were discharged from the SICU up to the seventh postoperative day ($n = 51$), 86.2% exhibited a high mobility level (IMS 7-10).

Even patients using vasoactive drugs exhibited some mobility, that is, were actively mobile. In 54.6% of the assessments, patients used vasoactive drugs (175 of 320). It was observed that in 53.1% of the assessments, patients obtained IMS between 1-3, 13.2% between 4-6 and 12.6% greater than or equal to 7 (Figure 2).

Discussion

The present study assessed the functionality level of patients submitted to cardiac surgery hospitalized in an ICU using the IMS scale, observing moderate-to-high mobility levels during hospitalization and at discharge. In addition, patients exhibited active mobility even when using vasoactive drugs.

Table 1 - Clinical and demographic data by group of patients submitted to cardiac surgery

Variables	n = 69
Sex (n)	
Male	43 (62)
Female	26 (38)
Age (years)	51 (15)
Body mass index (kg/m²)	25,3 (4)
Ejection fraction (%)	58 (14)
Comorbidities (n)	
High blood pressure	36 (52)
Smoking	16 (23)
Diabetes mellitus	8 (12)
Dyslipidemia	6 (9)
Previous surgery	17 (25)
Acute myocardial infection	13 (19)
Chronic kidney disease	3 (4)
Stroke	4 (6)
Type of surgery	
Myocardial revascularization	24 (34)
Valve	35 (51)
Myocardial revascularization + valve	6 (9)
Congenital	4 (6)
Number of drains	
< 2	8 (12)
3 or more	
Vasopressor at ICU admission	
Yes	6 (9)
No	
Mechanical ventilation duration	
< 24 hours	55 (80)
> 24 hours	14 (20)
Length of ICU stay (days)	5,9 (5,1)

Note: Categorical data presented as absolute value (relative value) and numerical value as mean (standard deviation). ICU = intensive care unit.

Cardiac surgery is a complex procedure with changes in physiological mechanisms that imposes organic stress. Thus, intense postoperative care is needed to guarantee good patient recovery. Pre, intra and postoperative characteristics, such as age, type of surgery, anesthesia, extracorporeal circulation, surgery duration, mechanical ventilation duration and neurological, pulmonary, and circulatory complications, have a direct influence on the functionality and mobility of patients submitted to cardiac surgery.¹⁰

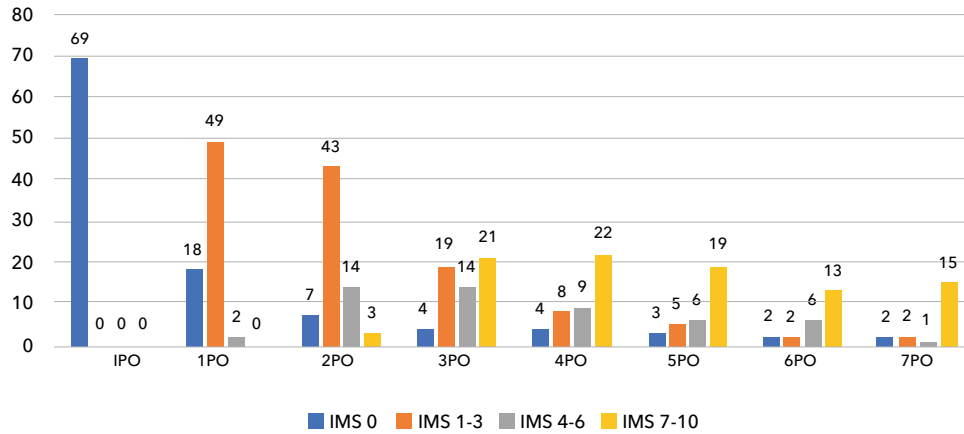


Figure 1 - Mobility level reached on the Intensive Care Unit Mobility Score (IMS) scale during hospitalization in the intensive care unit in the immediate postoperative (IPO) and on postoperative (PO) days.

Note: IPO (n = 69), 1PO (n = 69), 2PO (n = 67), 3PO (n = 58), 4PO (n = 43), 5PO (n = 33), 6PO (n = 23), 7PO (n = 20).

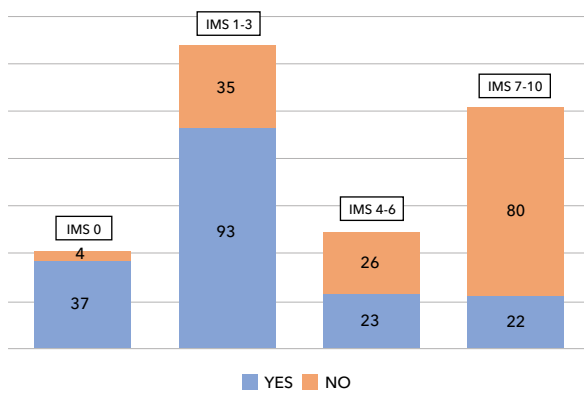


Figure 2 - Mobility level (IMS scale) and vasoactive drug use per assessment

Note: IMS = Intensive Care Unit Mobility Score; YES = patients using vasoactive drugs; NO = patients not using vasoactive drugs. Data presented as absolute frequency.

Early mobilization, one of the important interventions used in ICUs, is part of the rehabilitation process and is associated with a decline in ICU-acquired muscle weakness and improved functional recovery, thereby contributing to shortening hospitalization and mechanical ventilation duration, in addition to enhancing the functional independence of these patients.¹¹ Mobilization in postoperative cardiac patients contributed to the harmful effects of bed immobility during hospitalization and post-surgery through functional care.¹²

Invasive mechanical ventilation (IMV) and its duration contributed to longer bedridden times and consequently, to the effects of immobility.¹³ Cordeiro et al.¹⁴ assessed the correlation between IMV time and peripheral muscle strength in 69 patients submitted to cardiac surgery, most involving myocardial revascularization and an average of 7.3 hours on IMV, and found a negative correlation between MV time and the peripheral muscle strength of these patients, which may be associated with the effects of immobility and the use of sedatives. Most of the patients in the present study (55%) spent less than 24 hours on IMV, which may have contributed to the better functional outcome.

Interventions that stimulate greater out-of-bed mobility during hospitalization are necessary and should be encouraged to prevent negative functional outcomes and clinical complications.^{1,15} According to Bailey et al.¹⁶ and Morris et al.,¹⁷ of all the patients discharged from the ICU, those submitted to early mobilization exhibited fewer complications and better functionality. This is consistent with the findings of the present study, whereby patients were discharged from the ICU with moderate-to-high mobility levels, resulting in functional improvements.

According to the IMS scale, the mobility levels of patients in the present study increased from admission to discharge. Camargo et al.¹⁸ the IMS of critical ICU patients and observed that the clinical functionality of patients did not improve from ICU admission to discharge, despite the statistical improvement. Wilkemann et al.¹² assessed

a cardiac rehabilitation protocol in postoperative cardiac surgery patients, observing an average ICU stay of five days, which demonstrates the importance of patient mobilization during ICU hospitalization. In the present study, patients were hospitalized for an average of 5.9 days, corroborating previous findings.

Vasoactive drugs are used by most postoperative cardiac surgery patients during their ICU stay and are one of the aspects that interferes in adherence to mobilization regimes. The use of these drugs is considered one of the three most common barriers related to non-mobilized patients.¹¹ In this study, although most patients using vasoactive drugs displayed low mobility levels, they were actively mobilized.

Rebel et al.,¹⁹ described patient mobilization in the ICU and found that 119 patients were prescribed vasoactive drugs and that in 195 mobilization episodes, 61% were mobilized on at least one day of vasoactive drug use. The mobility level achieved was moderate on 51% and high on 18% of the days where vasoactive drugs were used, with no serious mobilization-related adverse events. Moreover, it was found that vasoactive drugs should not be considered an absolute contraindication for mobilization.¹⁹

Thus, early intervention in patients submitted to cardiac surgery has a significant impact on mobility status, which can be measured by the IMS scale in ICU patients.

Conclusion

Patients submitted to cardiac surgery hospitalized in the ICU exhibited moderate-to-high mobility levels during hospitalization and ICU discharge. Thus, it is important to note that early mobilization is extremely important in the improvement and functional independence of these patients after hospitalization, as measured by the IMS scale.

Authors' contributions

LSSL and DLB designed the study, conducted analysis, and interpreted the data. LSSL, DLB, RAMC and NPS developed the manuscript and LSSL, DLB, MGBB and BFAS wrote it. All the authors approved the final version.

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