Physical Therapy/Mobilization

Early mobilization practice in a single Brazilian intensive care unit☆,☆☆

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ABSTRACT

Objectives: To characterize the provision of early mobilization therapy in critically ill patients in a Brazilian medical intensive care unit (ICU) and to investigate the relationship between physical activity level and clinical outcomes.
Methods: Intensive care unit and physiotherapy data were collected retrospectively from 275 consecutive patients. Here we report on the subset of patients (n = 120) who were mechanically ventilated during their ICU stay (age, 49 ± 18 years; Simplified Acute Physiology Score 3, 45 [25]).
Results: Median (interquartile range) time of mechanical ventilation and ICU length of stay were 3 (4) and 8 (10) days, respectively. Intensive care unit and 1-year mortality were 31% and 50%, respectively. During the ICU stay, these patients all received respiratory physiotherapy and 90% (n = 108) received mobilization therapy. When intubated and ventilated, mobilization therapy was performed in 76% (n = 92) of the patients with no adverse events. The most common activity was in-bed exercises (55%), and the number of out-of-bed activities (sitting out of bed, standing, or walking) was small (29%) and more prevalent in patients with tracheostomy than with an endotracheal tube (27% × 2%, respectively).
Conclusion: In our Brazilian ICU, mobilization therapy in critically ill patients was safe and feasible; however, similar to other countries, in-bed exercises were the most prevalent activity. During mechanical ventilation, only a small percentage of activities involved standing or mobilizing away from the bed.

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1. Introduction

Early rehabilitation in mechanically ventilated critically ill patients is feasible and safe [1–7] and can decrease duration of mechanical ventilation (MV) and intensive care unit (ICU) length of stay (LOS) [8,9]. It is also associated with a shorter duration of delirium, a better functional outcome at hospital discharge, and lower 1-year mortality [9,10].

Several surveys reporting mobilization therapy practice are published worldwide, and despite all of the reported benefits, the prevalence of early mobilization in ICU patients is still low [11]. Moreover, most of the prevalence studies and self-reporting practices come from Australia and New Zealand [11,12], the United States [13], and Europe [14,15].

Currently, there is a paucity of ICU mobility therapy practice data from low- and middle-income countries. Thus, the primary aim of the present study was to characterize the provision of early mobilization therapy in mechanically ventilated critical care patients in a medical ICU in Sao Paulo, Brazil. Secondary aims were to record adverse events during treatment; verify and compare the provision of mobilization therapy in patients with long and short ICU LOS; and investigate if there is a relationship between the activity level performed in the ICU and ICU mortality rate, mortality 1 year after hospital discharge, discharge destination, and number of hospital readmissions.

2. Methods

This study was approved by the review board for human studies of the São Paulo University Medical School (Comissão de Ética para Análise de Projetos de Pesquisa (CAPPesq)–Faculdade de Medicina da Universidade de São Paulo), and because of the nature of the study, a waiver of consent was granted.

Data for this study were retrospectively collected from the records of a 6-bed medical ICU in the Instituto Central do Hospital das Clínicas de Sao Paulo (Faculdade de Medicina da Universidade de São Paulo), a tertiary public hospital. We collected ICU and physiotherapy data from all consecutive patients admitted in the ICU from December 2009 to April 2011 using a physician demographic and clinical database as well as a specifically designed physiotherapy case report sheet introduced earlier for daily use by physiotherapists.

The routine physiotherapy care in this ICU includes both respiratory and mobilization therapy. Respiratory therapy includes airway clearance maneuvers (including suctioning), lung expansion techniques, and oxygen and bronchodilator therapy (as prescribed by a physician). In addition, if the patient is intubated and mechanically ventilated, physiotherapists are also responsible for adjusting the ventilator settings, participating in the weaning process (including extubation) and artificial airway care. Mobilization therapy included patient positioning, general limb (passive, active, or resistive) and trunk exercises, sit on the edge of bed (SOEOB), sit out of bed (SOOB), standing up, and walking away from the bed, according to the physiotherapists discretion. The staff ratios in this unit are 1:6 registered nurse/patient, 1:2 nurse assistant/patient, 1:6 resident junior physiotherapist/patient, and 1:10 senior physiotherapist/patient, and there are only 2 chairs available in the unit for patients to SOOB. Finally, physiotherapy treatment was available for a daily 12-hour shift (from 7:00 AM to 7:00 PM).

Data collection included demographic characteristics and clinical data including age, sex, ICU LOS, medical diagnosis, Simplified Acute Physiology Score 3 (SAPS3), source of admission, discharge location, and mortality rate during ICU LOS. Discharge location, number of readmissions, and 1-year mortality rate were accessed through the hospital register database and/or by telephone call. Furthermore, we collected data regarding duration of MV and patients who underwent tracheostomy (TT). The mobility therapy data (frequency and level of activity) were collected using a hierarchical descriptive mobility scale which included no mobility activity, only respiratory therapy provided, in-bed exercises (including passive range-of-motion, stretching, and active and resistive exercises), SOEOB, SOOB, stand up, and walking away from the bed. These data were recorded for each patient on each day during all their ICU stay (ie, before or during MV and after weaning/extubation while still in the ICU). In addition, the highest level of function achieved was recorded for each day and at ICU discharge.

Because Brazilian physiotherapists are also responsible for assembling and adjusting MV and performing artificial airway care, the case report form also included data regarding respiratory physiotherapy, artificial airway care, and MV management. All the available information was entered into a database and cross-checked by 2 resident physiotherapists (N.P.L. and G.M.C.S.).

The statistical analyses were performed using the software SPSS, v.15.0 for Windows (SPSS, Chicago, Ill). Descriptive analysis of the categorical and continuous variables is presented as percentage, number of events, mean (SD), or median (interquartile range [IQR]), where appropriate.

We also grouped the patients according to ICU LOS (>5 or ≤5 days) and presence of walking activity. For this analysis, we performed the Mann-Whitney test and the Fisher exact test, where appropriate, to compare differences between groups. For all the analyses, we adopted a level of significance of 5% ($P \le .05$).

3. Results

From December 2009 to April 2011, 275 patients were admitted to the clinical medical emergency ICU and 120 required MV assistance during their ICU stay, and only data for this subset are presented in this article. The clinical data are given in Table 1. Patients were aged 49 ± 18 years, 52% male with a median (IQR) SAPS3 score of 45 (25), which corresponds with a mild-moderately unwell population, and 30% (n = 36) were diagnosed as having sepsis. Most of the patients were medical and admitted from the emergency department (52%; n = 62), followed by ward patients due to clinical deterioration (23%; n = 28). Median (IQR) MV duration was 3 (4) days. Of the 120 patients, 17 patients (14%) underwent TT after 7 (8) days. Intensive care unit mortality was (n = 37; 31%) and hospital mortality was (n = 43; 35%). Most patients were discharged home (n = 53; 69%), followed by inpatient rehabilitation (n = 13; 17%). One-year readmission and 1-year mortality in this group were 38% (n = 29/77) and 50% (n = 60/120), respectively. For patients who were alive at 12 months, we had a 7% dropout for readmission data (Table 1).

Table 1
Demographic characteristics and clinical data of the 120 patients who were MV during their ICU stay

Variable	Patients (n = 120)
Age (y)	49 ± 18
Sex, male (%)	52
SAPS3, median (IQR)	45 (25)
Diagnosis, n (%)	
Medical	98 (82)
Surgical	22 (18)
Sepsis, n (%)	82 (30)
ICU LOS (d), median (IQR)	8 (10)
MV (d), median (IQR)	3 (4)
ICU mortality, n (%)	37 (31)
Hospital mortality, n (%)	43 (35)
Discharge destination, n (%)	
Home	53 (69)
In-patient rehabilitation	13 (17)
Other institution	11 (14)
1-y hospital readmission, n (%)[a]	29 (38)
1-y mortality, n (%)[a]	60 (50)

SAPS 3 corrected for development country.
[a] Variable contains missing data (n = 5 for 1-year readmission and n = 8 for 1-year mortality).

During their entire ICU stay, a total of 3096 physiotherapy sessions were provided in the 120 critical ill patients. Mobility therapy was performed (at least once) in 90% (n = 108) of patients, whereas respiratory therapy (at least once) was performed in all patients (n = 120; 100%). Fig. 1 shows the frequency of each mobility activity performed in this population during all ICU stays including before, during MV (endotracheal tube [ETT] or tracheostomized) and after weaning/extubation. The most common activity provided in 3096 physiotherapy sessions in this group of patients was respiratory assistance (n = 2962; 95%) including airway clearance maneuvers, suctioning, lung expansion exercises, and weaning from MV (>1 activity of mobility or respiratory therapy could be performed in 1 session). Mobility therapy was provided in 65% of the sessions (n = 2032), and the most prevalent activity was in-bed exercise (n = 1530; 49%) including passive range-of-motion and active and resistive exercises. During 1064 physiotherapy sessions (34%), only respiratory assistance was provided and patients remained lying in bed without any mobility therapy. In addition, during 1140 sessions of mobility therapy (37%), the highest level of activity achieved was in-bed exercise. Of these 1140 sessions, in 675 sessions (60%), only passive range-of-motion and stretching exercises were performed, which represents 22% of all 3096 sessions. In 731 sessions (24%), mobility therapy consisted of more active tasks such as SOOB, standing, and walking. During ICU LOS, 57 patients (47%) sat out of the bed, 53 patients (44%) stood up, and 33 patients (27%) walked away from the bed till ICU discharge. Median time for the first walking away from bed activity was 3 (12) days. Physiotherapy data from the case report form recorded no serious adverse safety events during the physiotherapy treatment sessions.

Considering the activities provided only during intubation and MV (number of sessions = 1426), mobility therapy was performed at least once in 76% (n = 92) of the patients, whereas respiratory therapy (at least once) was performed in all patients (n = 120; 100%). The most prevalent treatment was respiratory assistance (n = 1394; 98%), followed by in-bed exercises (n = 794; 55%). In addition, out-of-bed exercises during MV were more prevalent if the patient had a TT (n = 387; 27%) compared with an ETT (n = 26; 2%) (Fig. 1). Standing up and walking away from the bed were performed by only 12 patients (10%; ETT: n = 5; TT: n = 7) during MV. Fig. 2 shows the frequency of the highest level of daily activity achieved for the first 3 days of MV, and it can be seen that the most prevalent activities provided are respiratory assistance and in-bed exercises.

Table 2 gives the percentage of days that each mobility therapy was provided in patients during their ICU stay. Respiratory assistance was provided on 100% of all days during ICU LOS, whereas mobility therapy was provided on only 70% of the days. In addition, although not