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REHABILITATION NURSING: EARLY MOBILIZATION IN PATIENTS WITH MECHANICAL VENTILATION

ENFERMAGEM DE REABILITAÇÃO: MOBILIZAÇÃO PRECOCE NO DOENTE COM VENTILAÇÃO MECÂNICA

IENFERMERÍA DE REHABILITACIÓN: MOVILIZACIÓN TEMPRANA EN PACIENTES CON VENTILACIÓN MECÁNICA

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ABSTRACT

Objective: To identify results of the mobility and functionality rehabilitation program in patients admitted to an intensive care unit.

Methodology: Quantitative, descriptive study. Scales for assessing agitation/sedation, mobility in the intensive care unit, strength, balance, goniometry for joint amplitudes and the Standardized five Questions were applied. Physiological variables were monitored to control risks. A mobilization program was implemented with support for the decision on safety criteria.

Results: Eight participants with an average age of 59.7 years-old (±16.92) were included. There were alterations in oximetry and pulmonary auscultation compatible with an improvement in the ventilation/oxygenation ratio. Regarding the motor pattern, the results are suggestive of benefits in muscle strength and joint amplitude, verified in its maintenance and/or increase, in all participants.

Conclusion: The study shows functional gains with progressive evolution in the different phases of the protocol, which are attributed to the precocity, specificity and systematization of the intervention. We suggest that the protocol be applied to a wider population, including the different phases of assistance, from intensive care to home.

Keywords: Artificial Respiration; Critical Care; Exercise Therapy; Rehabilitation Nursing.

RESUMO

Objetivo: Identificar resultados do programa de reabilitação da mobilidade e funcionalidade em doentes internados em unidade de cuidados intensivos.

Metodologia: Estudo quantitativo, descritivo. Foram aplicadas escalas de avaliação de agitação/sedação, mobilidade em unidade de cuidados intensivos, da força, do equilíbrio, goniometria para amplitudes articulares e a *Standartized Five Questions*. Variáveis fisiológicas foram monitorizadas para controlo dos riscos. Foi implementado um programa de mobilização com apoio da decisão em critérios de segurança.

Resultados: Foram incluídos oito participantes com idade média de 59,7 anos (±16,92). Verificaram-se alterações de oximetria e auscultação pulmonar compatíveis com uma melhoria da relação ventilação/oxigenação. Sobre o padrão motor, os resultados são sugestivos de benefícios na força muscular e amplitude articular, verificado na sua manutenção e ou aumento, em todos os participantes.

Conclusão: O estudo mostra ganhos funcionais com evolução progressiva nas diversas fases do protocolo, que se atribuem à precocidade, especificidade e sistematização da intervenção. Sugerimos que o protocolo seja aplicado a uma população mais alargada, incluindo as distintas fases de assistência, dos cuidados intensivos ao domicílio.
Palavras-chave: Cuidados Críticos; Enfermagem em Reabilitação; Respiração Artificial; Terapia por Exercício.

RESUMEN

Objetivo: Identificar los resultados del programa de rehabilitación de movilidad y funcionalidad en pacientes ingresados en una unidad de cuidados intensivos.
Metodología: Estudio cuantitativo, descriptivo. Se aplicaron escalas para evaluar la agitación/sedación, la movilidad en la UCI, la fuerza, el equilibrio, la goniometría para amplitudes articulares y los Cinco Cuestiones Estandarizados. Las variables fisiológicas fueron monitoreadas para controlar los riesgos. Se implementó un programa de movilización con apoyo para la decisión sobre criterios de seguridad.
Resultados: Se incluyeron ocho participantes con una edad media de 59,7 años (±16,92). Hubo alteraciones en la oximetría y auscultación pulmonar compatibles con una mejora en la relación ventilación/oxigenación. En cuanto al patrón motor, los resultados sugieren beneficios en la fuerza muscular y la amplitud articular, verificados en su mantenimiento y/o aumento, en todos los participantes.
Conclusión: El estudio muestra logros funcionales con evolución progresiva en las diferentes fases del protocolo, que se atribuyen a la precocidad, especificidad y sistematización de la intervención. Sugerimos que el protocolo se aplique a una población más amplia, incluidas las diferentes fases de asistencia, desde cuidados intensivos hasta el hogar.
Descriptores: Cuidados Críticos; Enfermería en Rehabilitatión; Respiración Artificial; Terapia por Ejercicio.

INTRODUCTION

With the technological and scientific advancement in the health area, the number of people who survive events of an adverse and serious nature, previously fatal, has been increasing. Among the available resources is the nurse with specialization in rehabilitation nursing (NSRN), able to minimize any disabilities installed and maximize the functional potential of the person suffering from acute or chronic illness. The process aims at maintaining and or recovering functional independence, visible in activities of daily living, reducing disabilities and restoring altered functions.

Intensive care units (ICU) allow the reception of patients who require: continuous surveillance, access to specific techniques, differentiated materials and monitoring, as well as specialized and uninterrupted care, both in the area of nursing and medicine[1].

People in critical condition show deleterious effects, arising from the clinical condition and immobility, which can be minimized with the performance of the NSRN. The harmful effects of immobility are associated with functional decline, with repercussions on the patient's quality of life, being naturally related to survival after clinical discharge[2].

Rehabilitation is generally a long process, involving technical components that are oriented towards organic and functional recovery and the psychosocial components contribute to reintegration and adaptation to the social, family and work context. In this sense, it is essential to promote the involvement of the patient and the family, motivating and stimulating them so that they become active members, participating in the entire rehabilitation process.

In the ICU, it is common for patients to remain restricted to bed[3], experiencing long periods of immobilization, associated with their critical condition and the administration of vasopressors, sedative and curative drugs. When the clinical approach associates restriction to the bed, during mechanical ventilation (MV), we are faced with conditions that trigger the immobility syndrome.

Immobility can compromise the functioning of several systems such as musculoskeletal, cardiovascular, respiratory, gastrointestinal, urinary, cutaneous and nervous systems[4]. It has influenced not only in the recovery of the critical situation, but also contributed to the deterioration of various functions, causing changes in functionality and disabilities, the most visible effects of which are shown at the muscular and respiratory level. In critically ill patients on MV, the joints most susceptible to the development of contractures are the shoulder, hip, knee, and ankle joints[5].

Muscle weakness acquired in intensive care (MWAIC) has frequently been observed in critically ill patients, thus increasing the rates of morbidity, mortality and a higher rate of functional complications with impaired quality of life[6]. This disorder affects between 25% and 90% of hospitalized people, having multifactorial characteristics, and appears after bed rest even in previously healthy people[7].

The existence of an adequate theoretical framework for understanding and analyzing complications resulting from immobility in critically ill patients is essential. When we talk about ICU and critical patient, the nursing model that best defends and represents the NSRN intervention is the General Theory of Self-Care Deficit developed by Dorothea Dellaripa (1952), already used in clinical practice by NSRN[8]. Functional assessment thus emerges as a support tool for the practice of nursing care, capable of objectively systematizing the individual's ability to perform a given task autonomously, or if he/she has limitations/disabilities, determine whether they require intervention/partial replacement or in nurses' performance[9]. This is because it highlights the importance of adequate nursing care planning, where mobility is promoted and emphasis is placed on independence in self-care, facts that assume a primary role in preventing and correction of changes resulting from immobility.

Mobilizations are a set of therapeutic actions, which begin with therapeutic positioning, followed by passive, active mobilizations, kinesiotherapeutic maneuvers, orthostatism, balance training, transfers, ambulation and other supporting means such as electrostimulation. The aspiration of secretions, supervision, adjustment and ventilatory removal are also integral parts of a rehabilitation and early intervention program. McFetridge[10] points out that EM should start right after hemodynamic and respiratory stabilization, usually between 24 and 48 hours after admission to the ICU. It must be progressive in the gradual pattern of activity and must take the forms of passive mobilization until walking.

Despite recognizing the importance of mobilizing critically ill patients, the idea is defended that to increase the benefit of early mobilization (EM) it is important to safeguard patient safety during the application of EMP[11]. In 2013, Engel and other authors point out that there must be the development of a previous set of cardiac, respiratory, neurological conditions, among others, so that rehabilitation programs can be carried out for critically ill patients, in safety[12]. In a consensus of experts in 2014, an extensive set of safety parameters were developed to mobilize mechanically ventilated critical patients[13].

In this context of action, the NSRN assumes a primary role, because it is able to identify any problems/needs of the critical patient, recognize the risks and complications of immobility, with possible major impairments in terms of motor and respiratory function, and

develop rehabilitation programs for critical patient. The study aims to identify results of the mobility and functionality rehabilitation program in patients admitted to an intensive care unit.

METHODOLOGY

Considering the theme of the study, we asked the question: "What is the contribution of an early mobility rehabilitation program for patients admitted to the ICU?" This suggests that we intend to: assess the functional capacity of people hospitalized in intensive care, implement a motor rehabilitation intervention plan and evaluate the results. This study is quantitative, and descriptive.

Participants are people hospitalized in the Level III Intensive Care Unit, of a Hospital on the coast, submitted to MV, target of rehabilitation nursing care. The inclusion criteria were: being under mechanical ventilation, having less than 24 hours hospitalization at the ICU at the time of the evaluation, being over 18 years old and being predictably subject to at least 2 intervention sessions in accordance with the EMP. Another criterion would be not to present disabilities or deficits prior to admission to the ICU. After ensuring that they meet the inclusion criteria, we proceed to check the Safety Criteria for Active Mobilization of Mechanically Ventilated Patients[13]. These were instrumental in deciding whether to start the EM program for patients admitted to the ICU. As a way of continuously assessing safety in patient mobilization, the criteria of Hodgson *et al*[13] were applied before all rehabilitation sessions, as long as the patient remains under MV. After the first rehabilitation session, if the patient is not mechanically ventilated, the safety criteria of Engel *et al*[12] are applied. The study was carried out between February and May 2019. The initial assessment happened in the first contact with the participant and the subsequent ones are carried out after carrying out the rehabilitation nursing care.

The variables under study include demographic data such as age and sex, medical diagnosis of hospitalization, as well as the state of consciousness, the level of agitation/sedation, the degree of cooperation of the patient, muscle strength, joint amplitude, static balance and dynamic and degree of felt/perceived dyspnea, pain felt/perceived and functional capacity, verified through the mobility scale in intensive care.

The Glasgow Coma Scale/Pupillary Response (GCS/PR)[14], the Richmond Agitation and Sedation Scale (RASS), validated for the Portuguese population[15], the Functional Evaluation Scale – Intensive Care Mobility Scale (ICMS)[16], the Medical Research Council Muscle Sca-

le (MRC)[17], Standardized Five Questions (S5Q), not validated for the Portuguese population, with evidence of level 4 in the recommendation of their application in ICUs subject to rehabilitation care[18-19] and the Berg Scale, tested for the Portuguese population, demonstrated high validity and reliability in the assessment of balance in the elderly individuals[20]. In the evaluation of joint amplitudes, a Goniometer was used.

The intervention program was applied based on the principles of freedom and human dignity, respecting the values of equality, responsible freedom, truth, and justice. The case study was guided by the guiding principles of the nurses' activity, acting with the inherent responsibility of the profession, respecting human rights in the relationship with the patient, paying attention to excellence in the provision of care. Informed consent was obtained from the individuals and/or family members involved, and data confidentiality and anonymity of sources were guaranteed. The study was approved by the Ethics Committee of the Hospital Center in which it was applied.

The implementation strategy took the following sequence: Identification of the participants, applying the inclusion criteria; initial assessment; Identification of rehabilitation nursing diagnoses, application of the intervention plan, which corresponds to the early mobilization program and lastly, evaluation of results after the intervention. All steps were performed by the same nurse and supervised by NSRN. The intervention program consists of 6 intervention phases (table 1).

Table 1 – Early mobility program at the ICU.

Phase 0	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
– No criteria for active mobilizations	S5Q < 3 RASS = -5 a -3 or +4 a +3 ECG ≤ 7 MRC < 36 Inclusion criteria OK	S5Q = 3 RASS = -1 and + 1 ECG = 8-12 MRC < 36 BBS = 0 Inclusion criteria OK	S5Q = 4/5 RASS = -1 a +1 ECG ≥ 12 MRC ≥ 36 BBS orthostatic = 0 Inclusion criteria OK	S5Q = 5 RASS = 0 ECG = 15 MRC ≥ 48 BBS orthostatic = 0 Inclusion criteria OK	S5Q =5 RASS = 0 ECG = 15 MRC ≥ 48 BBS orthostatic ≥1 BBS seated ≥ 3 Inclusion criteria OK
– Therapeutic positioning every 2 h – Headboard between 30 to 45°	– Therapeutic positioning every 2 h – Headboard between 30 to 45° – Passive musculoskeletal mobilization – Functional Respiratory Rehabilitation Techniques (FRR)	– Therapeutic positioning every 2 h – Headboard between 30 to 45° – Passive, active-assisted musculoskeletal mobilizations – Isometric exercises – Therapeutic activities (rolling, controlled hip rotation – RCA) – FRR	– Therapeutic positioning every 2 h – Headboard between 30 to 45° – Active-assisted muscle--articular mobilizations, active – Isometric and isotonic exercises – Exercise of self--mobilization – Therapeutic activities (rolling, RCA, bridge) – Balance training sitting on the bed – Passive transfer to chair – FRR	– Therapeutic positioning every 2 h – Headboard between 30 to 45° – Active, active-resisted musculoskeletal mobilizations – Isometric and isotonic exercises – Exercise of self--mobilization – Therapeutic activities (rolling, RCA bridge, elbow load – CC) – Supported orthostatism – Balance training sitting on the bed – Assisted transfer – FRR	– Therapeutic positioning every 2 h – Headboard between 30 to 45° – Active and active--resisted musculoskeletal mobilizations. – Isometric and isotonic exercises – Exercise of self-mobilization – Therapeutic activities (rolling, RCA, bridge, CC) – Orthostatism with / without support – Seated balance training – Assisted / unsupported transfer – Walking and DLA Training – FRR

RESULTS

In the period between February 18 and May 3, 2019, 56 participants were admitted to the ICU, from them 38 were excluded for not meeting the inclusion criteria. Another 10 participants were also excluded, as they did not meet the criteria for security and stability. Eight participants were found, who reconciled the inclusion criteria and those of security and stability, and who integrated the study. A percentage of 75% of the sample is male. Age is between 28 and 77 years-old, with an average age of 59.7 years-old ± 16.92 years-old.

Two main diagnoses of ICU admission are highlighted, cardiorespiratory arrest and respiratory failure.

Regarding comorbidities and personal antecedents, it appears that all participants had at least one pathological condition or habit of consuming toxics.

Since one of the criteria for selecting participants was to be on MV, it is important to highlight the number of days that they remained on this support therapy. Thus, the variation was between 1 to 11 days of MV, with an average of 4.63 days ± 3.62. The length of stay in the ICU was between 2 to 18 days, with an average of 8.13 days ± 5.89. The critically ill patient is often subjected to several invasive procedures, and in the sample evaluated it was found that all elements were subjected to at least five invasive procedures.

In the first rehabilitation session, all participants were under MV, sedoanalgesia, and or under neuromuscular block therapy (NMB), soon all started to evaluate the stability and safety criteria by the inclusion and exclusion criteria of Hodgson *et al*[13]. This first session took place in the first 24 hours after admission to the ICU. Although all participants have been subjected to MP sessions, thus making an early assessment of their clinical, physical, and psychological characteristics, the last assessment of each participant does not always correspond to the last day of admission to the ICU.

In the second session, 5 of the 8 participants were evaluated by the exclusion criteria of Engel[12], as they were no longer under MV, but in spontaneous breathing.

Given that the minimum number of rehabilitation sessions carried out corresponds to two, it was decided, as a way of comparing the clinical evolution of the participants, to present the clinical data related to the evaluation of RASS, S5Q and ECG/RP. These data helped to carry out an initial screening of the participants, allowing according to the data obtained, to fit them in a certain phase of the EM protocol (table 2).

In the first rehabilitation session, all participants were sedated with RASS values between -3 to -5, which corresponds to moderate to deep sedation, respectively. In this scope of sedation, it is also verified that the participants' collaboration scores are null in 7 of the 8 participants, therefore not collaborating. Only participant 3, who had moderate sedation, had a low collaboration score (score 1 on a scale of 5). Thus, we assume that all participants had characteristics that fit them in Phase 1 of the EM protocol. Although sedated, the approach to rehabilitation care was part of the fully compensatory system for which care was provided by nurses.

In the last evaluation, we were able to verify a positive evolution and found that 25% of the participants were in phase 2 and another 25% in phase 4 of the EM protocol, with 50% of the participants in this last session being in phase 3.

Table 2 – Initial and final clinical data of the participants.

	First session			Last session		
	RASS	S5Q	ECG	RASS	S5Q	ECG
Pa.1	-5	0	-----	0	2	(04/V3/M6) + RP0=13
Pa.2	-5	0	-----	-1	5	(03/V4/M6) + RP0=13
Pa.3	-3	1	-----	0	4	(04/V4/M6) + RP0=14
Pa.4	-5	0	-----	1	3	(O4/V1/M5) + RP0=10
Pa.5	-4	0	-----	0	3	(O4/V1/M5) + RP0=10*
Pa.6	-4	0	-----	0	5	(04/V5/M6) + RP0=15
Pa.7	-5	0	-----	0	5	(04/V5/M6) + RP0 =15
Pa.8	-5	0	-----	-1	4	(04/V4/M6) + RP0=14

UCI Level III 2019.

As a way of evaluating the effectiveness of the EM protocol, the evaluation of some parameters of the respiratory and motor aspects was decisive.

In the respiratory area, the results of peripheral oxygen saturation (SaO_2) and pulmonary auscultation were considered before and after each rehabilitation session.

It was found that there was an overall increase from the initial value (pre-session) to the final evaluation value (post-session) in all participants in relation to SaO_2 (figure 1).

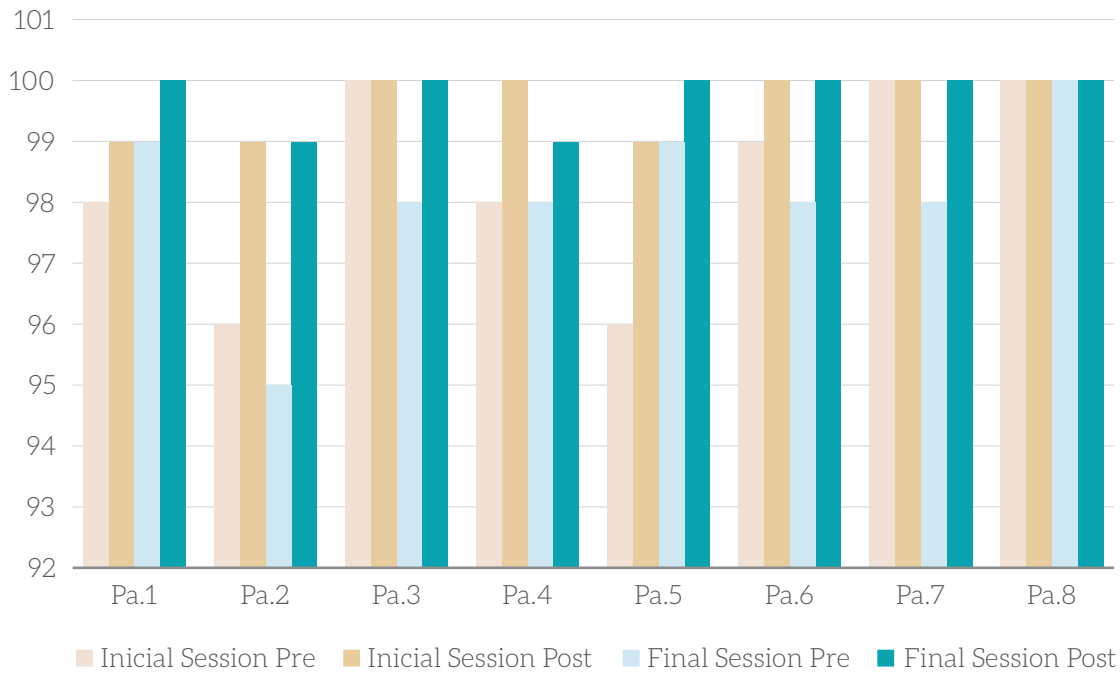

Figure 1 – Oximetry data of participants before and after the intervention program.
UCI Nível III 2019

As for pulmonary auscultation, it was found that seven of the eight participants had some type of changes in pulmonary auscultation. We verified in the final auscultation, that in 89% of the sessions where there were changes in the breath sounds, this situation was successfully reversed. As for adventitious noises, it was found that all participants had at some point the presence of pathological noises, except for participant 8. In all participants there was an improvement, with total resolution in 6 of the affected participants. It was found that only the participants with an initial diagnosis of the respiratory forum were affected by an episode of respiratory difficulty during the rehabilitation sessions, however, not impeding the continuation of the session (figure 2).

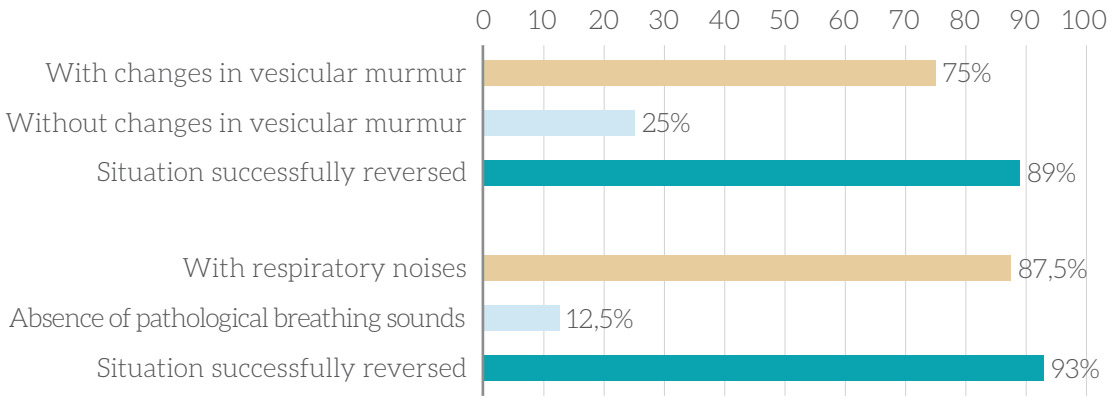

Figure 2 – Pulmonary auscultation data before and after the intervention program.
UCI Level III 2019

Regarding the motor parameters, the evaluation of the effectiveness of the EM protocol was decisive, considering the evaluation of joint amplitude and muscle strength. The joint amplitudes evaluated were those related to shoulder abduction, elbow flexion, wrist extension, hip flexion, knee flexion and dorsal flexion or dorsiflexion. In the final evaluation, all participants showed gains in the range of joint movements evaluated and were subjected to mobilization exercises. Figure 3 illustrates the gains verified in degree and by articulation. Still in the same figure, it can be seen that in participants 6 and 7, evaluation or mobilization in hip flexion and knee extension was not possible. The knee extension movement showed the greatest gain in amplitude in most cases. The exception to this assertion is patient 2 who had the greatest gain in the wrist extension movement. It is important to emphasize the importance of knee extension for standing and gait.

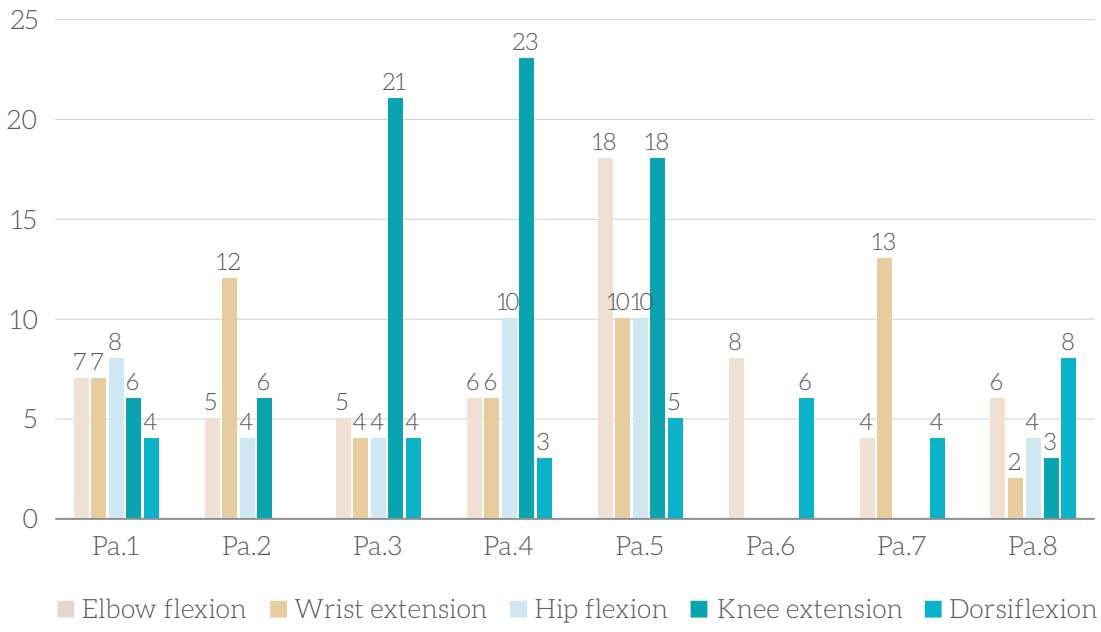

Figure 3 – Evolution in degrees of joint amplitude.
UCI Level III 2019

With regard to muscle strength, in the first rehabilitation session, it was not possible to measure values, since all participants were under deep sedation, with a rating of zero. The exception is participant 3, who presented moderate sedation; however, this level of sedation may not correspond to a reliable value on the participant's real muscle strength. The MRC evaluates muscle strength in a score from 0 to 5, with 0 corresponding to the absence of muscle contraction and 5 to normal strength. However, to obtain a more accurate measure of the MRC, a minimum level of cooperation on the part of the patient is necessary. Muscle strength was assessed in shoulder abduction movements, elbow flexion, wrist hyperextension, hip flexion, knee flexion, and dorsal flexion or dorsiflexion.

After suspending sedation, we verified 5 participants with a score less than or equal to 48, which is a suggestive indicator of muscle weakness acquired in the critically ill patient. However, it is important to note that two of these participants were subjected to surgical intervention at the abdominal level, which influenced the reliable assessment of muscle groups related to hip flexion and knee flexion. In this way, the total values related to the MRC assessment of these participants may not correspond to a deficit in muscle strength. In general, all participants evolved from the first assessment without sedation to the last assessment performed (table 3). Muscle strength assessment data refer to the initial assessment (i.e. 1st assessment) and subsequent assessments, performed after each session of the program.

Table 3 – Muscle strength assessment – MRC pre and post intervention protocol.

Pa	1st Ass.	2nd Ass.	3rd Ass.	4th Ass.	5th Ass.
1	0	52	56	–	–
2	0	12	24	52	–
3	12	44	–	–	–
4	0	0	0	48	51
5	0	22	22	22	22
6	0	42	50	–	–
7	0	48	50	54	–
8	0	50	–	–	–

UCI Level III 2019; Pa. – Participant; Ass. – Assessment.

Regarding body balance, due to constraints related to the short period of stay in the ICU, this assessment was only able to be carried out in 4 of the eight participants. Two of the participants reached only phase 3 of the EM protocol, so only static and dynamic balance in the sitting position was assessed. We conclude that, although there is a progression between the 3 and 4 phases of the protocol, the values obtained are still below 20, classifying these participants with compromised balance.

In assessing mobility, it appears that in the initial phase all participants have zero mobility capacity, since all were under MV and sedative therapy, being highly dependent on third parties in the performance of all DLAs. In the last evaluation, we verified a gradual generalist evolution; however still presenting very low mobility scores. It appears that 50% of the participants have a score of 1 (on a scale of 0-10), 25% with a score of 2 and 25% with a score of 5. This translates into a still high functional dependence.

DISCUSSION

Although medical diagnoses are prevalent in ICU admissions, this paradigm has been changing. In the sample in question, there is an admission to the ICU in the immediate postoperative period. At the Critical Participating Forum, it is mentioned that currently in developed countries, patients undergoing high-risk surgical procedures and in need of more differentiated care in the immediate postoperative period, represents an increasing number of hospitalizations in the ICU[21]. It should be noted that the prognosis and the incidence of comorbidities developed during hospitalization are influenced by a set of previous intrinsic characteristics of an acute or chronic nature[10].

The presence of numerous invasive medical devices and permanent monitoring are also contributing factors to immobilism[22], with this risk factor being present in all participants.

One of the criteria for selecting participants was to be under MV. It was found that the average time was 4.63 days of invasive ventilatory support and 4.25 days of sedative, analgesic or NMB therapy. This fact had an impact on the average length of stay in the ICU, which was 8.13 days. This value is lower than that indicated in a study that reports an average hospitalization value of 10.7 days[23].

Studies demonstrate that EM in the ICU is viable and safe, contributing to the reduction of the time of mechanical ventilation, interfering in the length of stay in the ICU and in the subsequent time in another unit in the ICU[11]. We consider that the offer of regular rehabilitation care indicates that it influences the shorter length of stay in the ICU.

Considering that in the first session of the intervention plan, all participants were under sedation, the effects of drug therapy may have influenced the appearance of muscle weakness, as is the case with corticosteroids or NMB agents[10]. In the situation of sedation, the degree of participation and awareness of the patients, led the participants to phase 1 of the EM protocol. The improvement in the state of consciousness, allowed a gradual progression to the phases of the protocol 2, 3 and phase 4, and in the last evaluation this could be verified. This evolution is also referred to in another study, pointing out that a higher degree of awareness, allows greater interaction and participation in the rehabilitation process, which favors their functional recovery[10].

Oxygen saturation (SaO_2) portrays a positive change, despite the modest values, approaching the physiological values, which are identified in other studies[24].

Since the adverse effects did not result in incidents such as extubating or clinical complications that required additional treatment, it can be confirmed that EM is safe and viable in critically ill patients connected to ventilatory prosthesis, with positive effects on recovery from respiratory failure since that safety conditions in care are guaranteed.

In assessing joint amplitude, participants were positioned in the supine position without inclination of the trunk, thus positioned at zero degrees (0°), as recommended[25]. We found a gradual improvement in joint amplitudes, in all movements assessed by all participants, which does not correspond to the data published by the authors previously referenced[25].

In a study where a EM program with assessment of respiratory muscle strength through the MRC was established, it showed gains in peripheral strength, with 50% of participants reaching a functional level of 5 at discharge from the ICU[26]. The gains in peripheral muscle strength are also corroborated by a comparative study in which one of the control groups was subjected to a EM program[3].

We found evidence that one of our participants has MWAIC, a situation mentioned in another study in which MWAIC occurs in the first days of hospitalization, but has an incidence rate between 30% to 60% of hospitalized people[2].

Another study refers to the loss of muscle mass quickly in the first week after hospitalization, being identified more severely in patients with multi-organ failure, where there is interdependence between the variables: loss of muscle mass, inflammation and acute lung injury[27]. This statement justifies the data obtained in relation to muscle strength, where the first evaluation (after suspension of sedation) is lower than 48 according to MRC, which suggests a muscle weakness acquired in the critically ill patient, with the participant presenting a score of Lower MRC in the last evaluation is the patient who suffered more complications during the ICU stay due to multiple associated comorbidities. However, in general, all participants evolved from the first assessment without sedation to the last assessment performed, as shown in the data analyzed in another study[26]. Muscle weakness can be mitigated if a EM program is put in place that aims to carry out a wide range of rehabilitation techniques[2].

With regard to balance, we find that the gains are more limited, reaching values of "decreased balance". The most immediate implications of fragility in balance are felt in functionality and in the capacity for self-care.

We verified through the production and analysis of data resulting from the implementation of the intervention project, that the patients admitted to the ICU correspond to a population with special care needs. Despite the high degree of complexity required to implement a motor rehabilitation intervention plan for people undergoing MV (where the safety and stability of the participant is essential), we verified that the EM program indicates functional health gains. Despite evident progress in the motor field, as well as progress in the assessment of functional capacity, at the date of the last assessment of the participant, low scores remained, demonstrating that the participants remained with a high degree of functional dependence. These functional deficits were limiting regarding the implementation of all phases of the EM protocol, so it was not possible to include and carry out phase 5 of the protocol in any of the participants.

However, there were some limitations to the implementation of the mobilization protocol. The decision and inclusion criteria in each phase of the protocol were related to the assessment of the patient's state of consciousness and collaboration. No daily awakening protocol was implemented in this ICU, such as decreased sedation and assessment of the state of consciousness. This was a measure instituted according to medical criteria. To minimize the deleterious effects of immobility and ensure the maintenance of the patient's functional capacity, it would be important to implement daily wake-up protocols and mobilization protocols. Another perceived limitation was the impossibility of applying the whole of the early mobilization project in terms of progressing through the 5 phases of the project. Only 25% of patients reached phase 4 of the protocol, none of which had clinical characteristics that would make it possible to integrate phase 5. The criticality of the clinical situation of the patient admitted to the ICU and the short hospital stay of some patients in the unit constituted a barrier to application in full. We suggest that the protocol be extended to the different contexts in which the patient travels after discharge from the ICU, promoting a trajectory of integrated care in order to be able to monitor and evaluate the progression of the patient throughout the hospital stay.

CONCLUSION

With the rehabilitation intervention project, we intended to assess whether PM in mechanically ventilated patients triggered beneficial motor changes in critically ill patients. With the application of the protocol and subsequent analysis of the results, changes in oximetry and pulmonary auscultation were observed, compatible with an improvement in the ventilation/oxygenation ratio. Regarding the motor pattern, the results obtained are suggestive of the benefits in muscle strength and joint amplitude, verified in its maintenance and/or increase in all participants.

There were no serious adverse events during the implementation of the protocol, which indicates that rehabilitation care, provided it is based on stability and safety criteria, is a safe and viable intervention, even if performed early. It should be noted that rehabilitation care with early onset is essential to promote the patient's biopsychosocial well-being in the short, medium and long term.

The data obtained corroborate what the most current literature states, thus demonstrating that rehabilitation nursing can contribute to minimize or prevent limitations and sequelae resulting from immobility. The data indicate a pattern of continuous improvement, without worsening the deficits. These may be part of the EM culture already established in the service, where there is a concern to provide excellence and continuous care, with a view to promoting maximum functionality and quality of life, even though this desire, in most cases, happens outside the context of intensive care.

Rehabilitation is generally a long process, involving technical components that aim at organic and functional recovery and psychosocial components that contribute to reintegration and adaptation to the social, family and work context. In this sense, it is essential to promote the patient's involvement, motivating and stimulating throughout the rehabilitation process.

The small number of participants and the small time interval for implementation are assumed to be limitations of the study.

Ethical Disclosures

Conflicts of interest: The authors have no conflicts of interest to declare.

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Confidentiality of Data: The authors declare that they have followed the protocols of their work center on the publication of data from patients.

Protection of Human and Animal Subjects: The authors declare that the procedures followed were in accordance with the regulations of the relevant clinical research ethics committee and with those of the Code of Ethics of the World Medical Association (Declaration of Helsinki).

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Proteção de Pessoas e Animais: Os autores declaram que os procedimentos seguidos estavam de acordo com os regulamentos estabelecidos pelos responsáveis da Comissão de Investigação Clínica e Ética e de acordo com a Declaração de Helsínquia da Associação Médica Mundial.

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