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EVALUATION AND ANALYSIS OF MOBILITY LEVELS, FUNCTIONAL OUTCOMES AND LENGTH OF HOSPITALIZATION IN PATIENTS ADMITTED TO INTENSIVE CARE UNITS (ICU)

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Abstract: INTRODUCTION: Mortality in Intensive Care Units (ICUs) can be associated with several factors such as increased time of mechanical ventilation and hospitalization, failure in the extubation process, high risk of infections and acquired muscle weakness. These factors are relevant in this context, as they lead to loss of functionality. **GOALS:** To assess the importance of early mobilization and use of metrics, and to analyze clinical and functional outcomes related to the most common physiotherapeutic interventions used in ICUs. **METHODS**: This systematic review was registered on September 30, 2022 in the International Prospective Register of Systematic Reviews, under number CRD42022361431, conducted in accordance with the Cochrane guidelines for systematic reviews and reported in accordance with the Preferred Reporting Items Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement. The assessment of the risk of bias in the included studies was performed by the RoB 1.0 tool in all its domains in duplicate by the reviewers, in addition to the statistical analysis demonstrated by Forrest-plot graphs. **RESULTS:** Fifty patients were included and counted among the different studies of this review. In the analysis of the risk of bias, all were assessed as low risk of bias in all categories. Regarding the forest plots with meta-analysis representations, we observed that there was no statistically significant difference in relation to the time of mechanical ventilation and other conventional interventions or with electrostimulation in the outcome of acquired muscle weakness. **CONCLUSION:** We can infer that the studies present good methodological quality. Regarding the different physiotherapeutic interventions used to improve functional capacity, we did not observe any significance in the analyses. In order to obtain greater definition and methodological quality, it is necessary to standardize the evaluations through functional metrics in patients admitted to Intensive Care Units.

Keywords: Intensive care units; Functionality Scale; Acquired muscle weakness.

INTRODUCTION

Several factors commonly observed in Intensive Care Units (ICU) may be associated with an increased risk of mortality, such as increased time on mechanical ventilation and hospital stay, failure in the extubation process, high risk of infections and acquired muscle weakness. These long periods lead to loss of functionality and are extremely relevant factors in terms of the patient's clinical improvement[1].

Immobilization in intensive care requires the application of functional assessment metrics that are objective, assertive and specific enough to help guide physiotherapy procedures.[2], as well as finding new rehabilitation strategies respecting the individuality and function of each patient [3]. In addition to this conduct guidance that helps prevent or reduce the harmful effects caused by ICU admission, functional status after hospital discharge tends to be better[1,4].

The literature is clear about critically ill patients with unfavorable outcomes, in addition to high mortality rates, responsible for excessive hospital expenses. [5], evaluative and interventionist strategies that can reduce these rates are of utmost importance, potentially saving thousands of lives around the world annually[6].

Therefore, the purpose of this systematic review is to evaluate and analyze the different physiotherapy interventions most used in intensive care, in addition to which functional scales help measure mobility and function intrinsic to the morbidity and mortality of these patients.

METHODS

This systematic review and meta-analysis were registered on September 30, 2022 in the International Prospective Register of Systematic Reviews (PROSPERO) platform, with the following registration number CRD42022361431, conducted in accordance with the Cochrane guidelines for systematic reviews of interventions[7] and reported in accordance with the Preferred Reporting Items Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement[8]. The assessment of the risk of bias in the included studies was performed using the RoB 1.0 instrument.[9] in all its domains in duplicate by reviewers, in addition to the statistical analysis demonstrated by Forrest-plot graphs.

To search for studies to be included in this systematic review, a strategy based on Evidence-Based Practice (EBP) was used, ordered by PICOS, an acronym for Population (P), Intervention (I), Comparison (C), Outcomes (O) and Study Design (S). Thus, the search and selection strategy of the studies was ordered as follows: P: patients admitted to the intensive care unit; I: early mobilization (exercises, cycle ergometer; electrical stimulation); C: Conventional physiotherapy or without interventions; O: Time limit for mechanical ventilation, complications, death; S: Randomized clinical trial.

Two reviewers (LFO and RRC) independently screened the relevant titles and abstracts using *EndNote* for exclusions. When there was no consensus among the reviewers, a third reviewer (NM) was consulted for judgment. When it was no longer possible to exclude texts based on titles and abstracts, the full texts (LFO and RRC) were read according to the eligibility criteria, reaching the final number of texts to be summarized in this review. In case of disagreements, the same procedure was adopted for titles and abstracts.

RISK OF BIAS

The risk of bias for each included study was assessed using version 2 of the tool: Cochrane *risk of bias* [10,11]. Bias was assessed based on five domains: randomization process (selection bias), deviations from intended interventions (performance bias), missing outcome data (attrition bias), outcome measurement (detection bias), and selection of reported outcome (reporting bias). Each potential source of bias was rated as high, low, or unclear, along with a rationale for each decision in a "Risk of bias" table. Summary judgments were categorized as low risk, some concerns, or high risk, according to the guidelines: *Cochrane handbook for systematic reviews of Interventions*[7].

RESULTS

Initially, in the first search of the databases, using the respective search strategy, 512 studies were found. With the help of the *Rayyan* software, duplicates (43) were excluded, leaving 469 studies for subsequent analysis.

The reviewers independently selected all titles and abstracts identified with the software; 200 studies were considered ineligible, divided into folders for exclusion reasons, in addition to the duplicate exclusions that appeared after automatic exclusion and were made visually.

Thus, 7 studies were included for a more detailed and complete text analysis, being defined as potentially eligible. Of these, 4 studies were excluded because they did not meet the eligibility criteria (different design, age range outside the stipulated by the study, evaluation methods that did not cover the studied theme). We ended up including three studies to be analyzed, as per the study selection flowchart shown in figure 1.

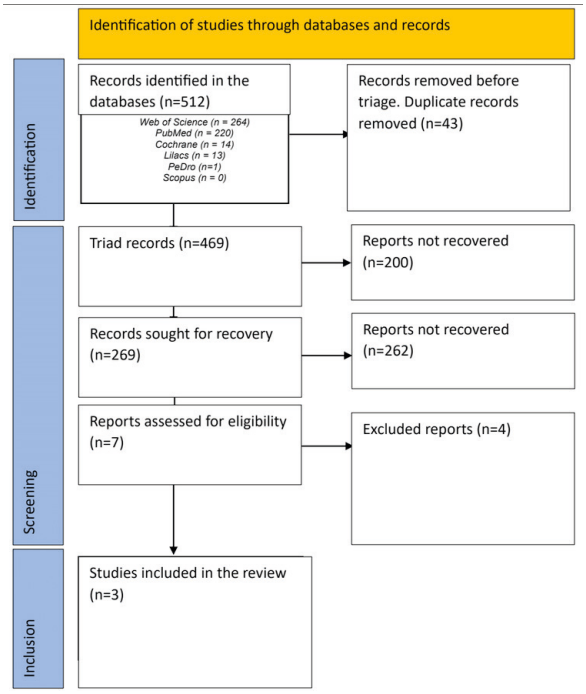

Figure 1: PRISMA 2020 flowchart for new systematic reviews that included only database and registry searches.

Source: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj. n71

RISK OF BIAS

Overall, in summary, all domains demonstrate low risk of bias. The full risk of bias assessment is shown in Figure 2.

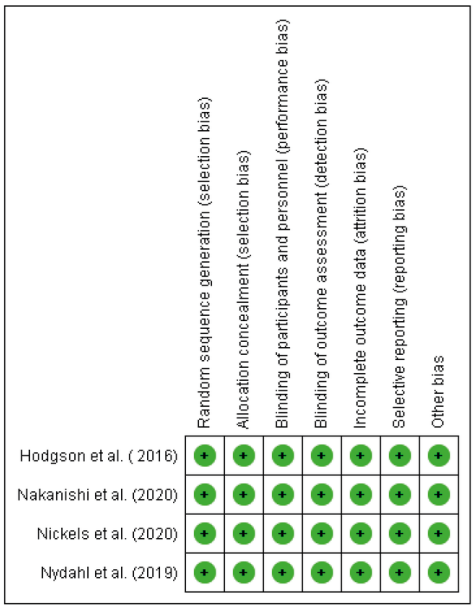

Figure 2: Risk of bias summary: review authors' judgments on each risk of bias item for each included study.

META-ANALYSIS

No statistically significant differences were observed in the clinical outcomes related to time off mechanical ventilation. It is possible to note the touch on the null hypothesis line with a trend demonstrated in the graph in relation to the control group when compared to the intervention group. However, this trend cannot be taken into consideration, to judge its clinical applicability, as demonstrated in figure 3.

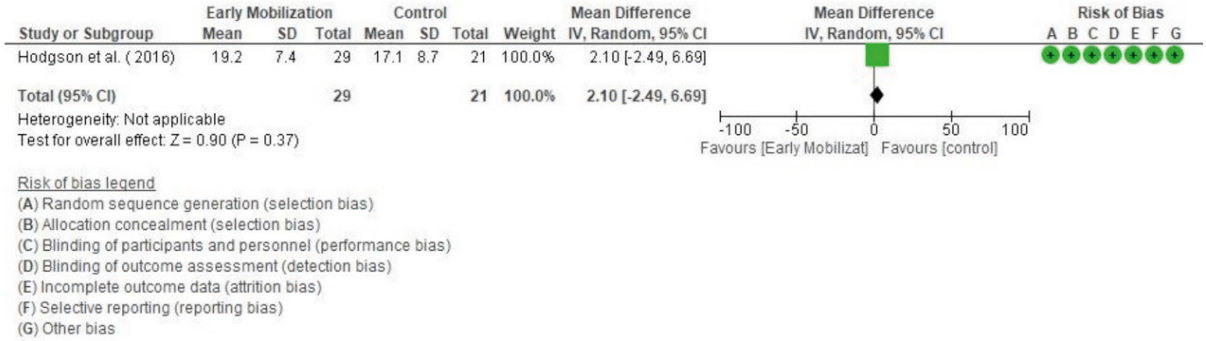

Figure 3: *Forest plot* of studies on the outcome timeout mechanical ventilation, comparing early mobilization versus control group used for meta-analysis.

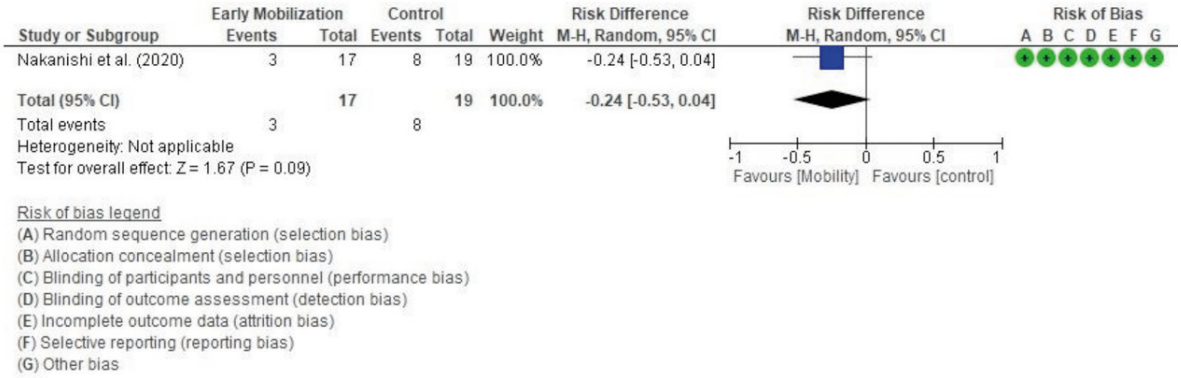

Figure 4: *Forest plot* of studies on the outcome acquired weakness, comparing early mobilization (electrical stimulation) versus control group used for meta-analysis.

Regarding muscle weakness acquired in the intensive care unit, it is noteworthy to praise early mobilization with the use of electrical stimulation as a favorable intervention in relation to clinical outcomes related to functional mobility, as demonstrated in figure 4.

DISCUSSION

In the analysis of the secondary outcomes proposed in our study, they end up corroborating the literature, such outcomes as length of hospital stay and time on invasive mechanical ventilation can apparently be reduced by the fact of early mobilization.[12–15]. In this scenario, we still need to contextualize the different aspects that can influence the outcomes analyzed, especially in an environment as organic as an intensive care unit, the population studied, the time and dosage of the type of mobilization performed, in addition to the conduct and types of units, which intrinsically predict the relationship between professionals per bed and other aspects that can be studied in the future. [2].

It is worth highlighting that blinding outcomes are practically impossible to conduct, which may therefore pose a risk of bias in conducting studies, directly affecting the level of consciousness and sedation and consequently the assessment and monitoring of the level of mobility.

We must also consider the use of electrostimulation within the interventions applied as specific techniques in early mobilization. In addition to its easy clinical applicability, a pilot study demonstrated that its application to the abdominal muscles helps in the weaning process and reduces the time of mechanical ventilation[16].

Another aspect to consider with electrostimulation is the attempt to prevent muscle atrophy, which ends up having attenuated proteolysis in critically ill patients[17].

Burtin *et al.*, (2009)[18], demonstrated the effectiveness of the prior use of the cycle ergometer in mechanically ventilated patients with favorable outcomes in their functionality subsequently evaluated by the Perme scale. Given this, it can be inferred that conventional physiotherapy has its real benefits, but the association of interventions can be extremely beneficial, enhancing these functional results.

To carry out early mobilization, it is necessary to integrate important mechanisms such as clinical expertise, time and resources, the importance of interdisciplinary discussions, promoting alignment of conducts that can be more assertive in relation to early mobilization in critically ill patients. [19].

IMPLICATIONS AND RECOMMENDATIONS FOR FUTURE PRACTICES

We consider early mobilization an important tool in the hands of physiotherapists in intensive care settings. We need to overcome sociocultural barriers in different populations, remembering that these checklists facilitate their implementation, ensuring safety and a well-directed activity plan.

CONTRIBUTIONS OF THE AUTHORS

Luis Felipe Orsi Gameiro (LFO) and Ronny Rodrigues Correia (RRC), wrote the first draft of the manuscript and searched the literature; Luis Felipe Orsi Gameiro (LFO) and Ronny Rodrigues Correia (RRC), extracted and analyzed the data and finalized the manuscript; Norma Sueli Pinheiro Módolo (NPM), reviewed the manuscript, supervised the work and extracted the data. All authors read and approved the final manuscript.

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