



Review

Systematic review of early exercise in intensive care: A qualitative approach



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ABSTRACT

Introduction: Practice guidelines recommend early physical therapy in intensive care units (ICU). Feasibility, safety and efficacy are confirmed by growing evidence-based data.

Purpose: To perform a qualitative systematic literature review on early exercise in ICUs, focused on the subject areas of “how to do”, “for which patients” and “for what benefits”.

Methods: Articles were obtained from the PubMed, Google Scholar, Physiotherapy Evidence Database (PEDro), Embase, CINAHL, CENTRAL, Cochrane and ReeDOC databases. The full texts of references selected according to title and abstract were read. Data extraction and PEDro scoring were performed. Consort recommendations were used for the drafting of the systematic review, which was declared on the Prospero website.

Results: We confirm the feasibility and safety of early exercise in the ICU. Convergent evidence-based data are in favour of the efficacy of early exercise programs in ICUs. But the potential benefit of earlier program initiation has not been clearly demonstrated. Our analysis reveals tools and practical modalities that could serve to standardize these programs. The scientific literature mainly emphasizes the heterogeneity of targeted populations and lack of precision concerning multiple criteria for early exercise programs.

Conclusion: Changes in the professional culture of multidisciplinary-ICU teams are necessary as concerns early exercise. Physical therapists must be involved and their essential role in the ICU is clearly justified. Although technical difficulties and questions remain, the results of the present qualitative review should encourage the early and progressive implementation of exercise programs in the ICU.

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1. Introduction

Neuromuscular diseases are frequently described complications following intensive care unit (ICU) hospitalization. The clinical diagnosis of neuromuscular disease is typically established by the Medical Research Council (MRC) scale. An MRC score of less than 48/60 is used as a cut-off for neuromuscular disease, but we currently lack a specific definition and widely accepted diagnostic criteria for

this issue [1–4]. Although additional work is needed to define the accurate pathogenic mechanisms underlying neuromuscular disease, it is known to have a multifactorial origin, arising from a sensorimotor axonal polyneuropathy with or without impairment of peripheral and respiratory skeletal muscles [1,2]. In the ICU, skeletal muscle mass is lost at a rate of 1–1.5% per day or 5% per week, leading to secondary muscle weakness [5,6]. This neuromuscular weakness increases the duration of mechanical ventilation (MV) [6] and is associated with functional disability and sequelae that impair quality of life for up to 5 years after hospitalization [3,7–9]. The incidence of neuromuscular weakness is up to 25–60% for patients ventilated for over 7 days (d) [6,10,11].

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Early physical therapy in the ICU aims at preventing or limiting this damage [3] by implementing specific physical interventions adapted for critically ill patients and their environment [6]. The ultimate goal should be to limit functional disability and delirium, increase autonomy and improve long-term quality of life.

One meta-analysis and four recent systematic reviews of the literature studied the safety and efficacy of early physical therapy during intensive care [5,12–15], and found that such interventions were associated with decreases in dyspnoea and increases in peripheral muscle strength, respiratory muscle strength, functional capacity and quality of life [13,14]. Notably, these studies also tended to highlight increases in weaning rates and time spent without a ventilator, along with decreases in the duration of MV [13,14] following early exercise interventions. Furthermore, one of these reviews suggested that such interventions were associated with decreases in the ICU length of stay (LOS_{ICU}) or hospital length of stay (LOS_H) [13]. No significant effect was observed with respect to hospital mortality, although the rates of adverse events (AEs) and 1-year mortality tended to be lower following an early exercise intervention [13,14].

Practice guidelines recommend early physical therapy in the ICU. Feasibility, safety and efficacy are confirmed by convergent evidence-based data [16,17]. However, the exact nature of “early physical therapy in the ICU” has not been clearly defined in the literature. Indeed, it is most often defined as “physical care” initiated earlier with respect to conventional care [13].

We hypothesized that an updated review of the literature on early exercise in the ICU, focused on “how to do”, “for which patients” and “for what benefits”, would help ICU teams implement physical interventions on a routine basis. To the best of our knowledge, we are the first to use a qualitative approach to systematically review early exercise in critically ill patients.

2. Methods

The study workflow is presented in Fig. 1.

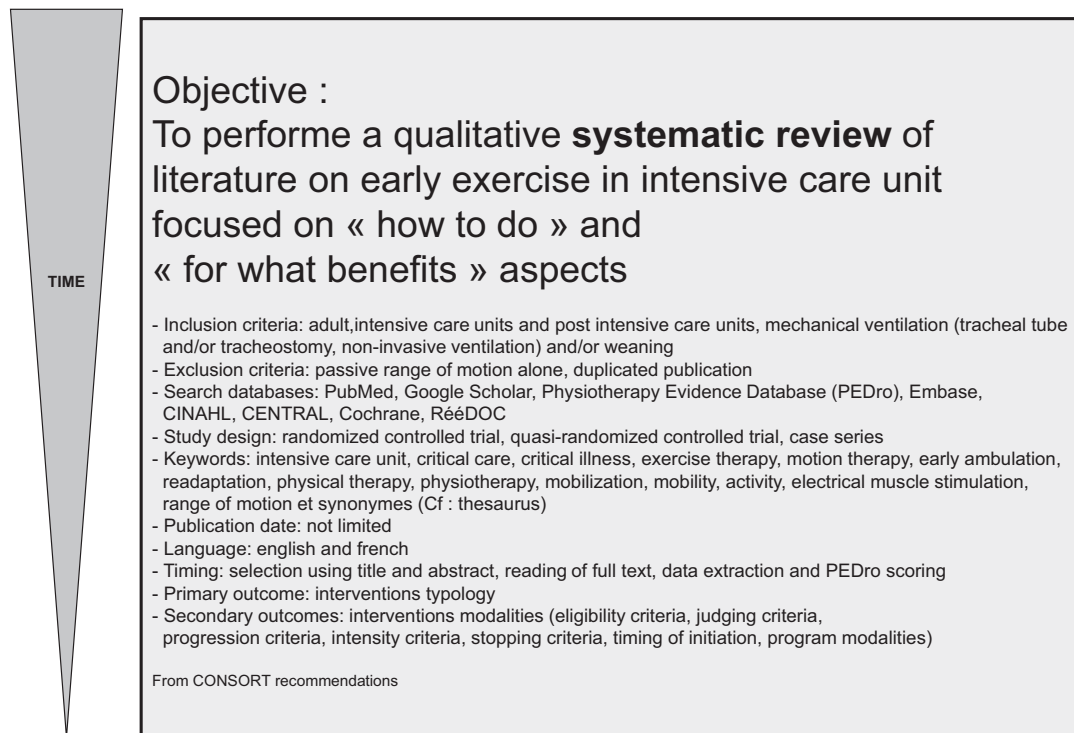


Fig. 1. Workflow.

2.1. Inclusion and exclusion criteria

To be included in the analysis, articles had to be related to adults (age ≥ 18 years) who were (or have been) hospitalized in ICUs and under mechanical ventilation (MV; tracheal tube, tracheostomy, or non-invasive ventilation [NIV]) or weaned from MV. Early exercise was defined as exercises carried out in the bed or chair (i.e., using weights, elastic bands, cycloergometry or any other appropriate means that allowed the exercise intensity to be established), transfers and ambulation with the objective of improving the patient's ventilatory and functional independence. Articles were excluded if they mentioned an isolated passive mobilization, such as passive mobilization of members, reversal in bed, transfer to a chair, or mechanical verticalization. Duplicate publications (i.e., those found in more than one of the screened databases) were included only once.

2.2. Database searches

The PubMed, Google Scholar, Physiotherapy Evidence Database (PEDro), Embase, CINAHL, CENTRAL, Cochrane and REEDOC databases were searched.

2.3. Study design

We included randomized controlled trials (RCTs), quasi-randomized controlled studies, and case series.

2.4. Search equation and keywords

We used the search equation (“intensive care units” [MeSH terms] OR “critical illness” [MH] OR “critical care” [all fields]) AND (“early ambulation” [MH] OR “motion therapy, continuous passive” [MH] OR “exercise therapy” [MH]) AND (“adult” [MeSH Terms]), built with a librarian. The latter resulted in a limited number of references treating our subject. Consequently, we

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