



## Review Paper

# Early rehabilitation in the intensive care unit: An integrative literature review<sup>☆</sup>



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## ARTICLE INFORMATION

### Article history:

Received 27 June 2014

Received in revised form 19 April 2015

Accepted 11 May 2015

### Keywords:

Critical illness

Delirium

Muscle weakness

Quality of life

Rehabilitation

## ABSTRACT

**Objectives:** The aim of this review is to appraise current research which examines the impact of early rehabilitation practices on functional outcomes and quality of life in adult intensive care unit (ICU) survivors.

**Review method used:** A systematic literature search was undertaken; retrieved data was evaluated against a recognised evaluation tool; research findings were analysed and categorised into themes; and a synthesis of conclusions from each theme was presented as an integrated summation of the topic.

**Data sources:** Electronic databases of PubMed, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Ovid Medline and Google Scholar were searched using key search terms 'ICU acquired weakness', 'early rehabilitation' 'early mobility' and 'functional outcomes' combined with 'intensive care' and 'critical illness'. Additional literature was sourced from reference lists of relevant original publications.

**Results:** Five major themes related to the review objectives emerged from the analysis. These themes included: critically ill patients do not always receive physical therapy as a standard of care; ICU culture and resources determine early rehabilitation success; successful respiratory and physical rehabilitation interventions are tailored according to individual patient impairment; early exercise in the ICU prevents the neuromuscular complications of critical illness and improves functional status; early exercise in the ICU is effective, safe and feasible.

**Conclusions:** A limited body of research supports early rehabilitation interventions to optimise the short term outcomes and long term quality of life for ICU survivors. Critical care nurses are in an excellent position to drive change within their departments ensuring that early rehabilitation practices are adopted and implemented.

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## 1. Introduction

Recent attention in intensive care has shifted to include consideration of the long term impact of life saving strategies on the critically ill patient. An admission to intensive care can be associated with both physical and psychological complications including

muscle weakness and delirium which are related to the duration of mechanical ventilation, sedation, and forced immobility. Collectively, they impact negatively on the quality of life of intensive care unit (ICU) survivors.<sup>1</sup>

Prolonged immobility in the ICU can trigger neuromuscular weakness due to disuse atrophy, decrease in strength, and functional denervation.<sup>2</sup> Just one week of bed rest can result in a profound loss of muscle strength of up to 20%.<sup>3</sup> Delirium can also have devastating consequences for the ICU survivor including prolonged ventilation, increased risk of death and greater degrees of cognitive decline following hospital discharge.<sup>4,5</sup> Post-discharge problems associated with ICU delirium include a greater likelihood

<sup>☆</sup> This is the best nursing review paper from 2014.

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**Table 1**  
Inclusion and exclusion criteria.

Inclusion criteria	Exclusion criteria
No date limiter	Published in language other than English
Primary research article in peer reviewed journal	Review articles, abstracts, posters from scientific meetings
Investigates adult (>18 years of age) ICU patients receiving mechanical ventilation	Patients requiring long term rehabilitation suffering stroke or acquired brain injury
Evaluates in-ICU rehabilitation interventions	Investigates paediatric patient populations
Measures outcomes including functional, cognitive or quality of life	Interventions focus on post ICU or hospital discharge

of discharge to a place other than home and greater functional decline,<sup>6</sup> a higher one year mortality<sup>7</sup> and long term cognitive impairment.<sup>4</sup>

Given the impact on patients and the resulting effect on families and society, impaired recovery from severe critical illness is a major public health issue. Family members often become informal caregivers which can exert a secondary toll of ill-health; altered family relationships and impacted financial security.<sup>8</sup> Whilst healthcare organisations have successfully met the challenge of keeping most critical care patients alive until hospital discharge, it has become increasingly important to consider long term health related quality of life.

The clinical practice guidelines for pain, agitation and delirium (PAD)<sup>1</sup> and the ABCDE bundle of cares (Awakening and Breathing trial Coordination; Delirium monitoring and management; and Early exercise and mobility)<sup>9</sup> are evidenced based multidisciplinary rehabilitation approaches that aim to improve the physical and psychological outcomes of critically ill, ventilated patients.<sup>4,10,11</sup>

Considering the increasing attention on evidence based strategies to preserve the vulnerable critically ill patient's physical, functional, and cognitive abilities, it is timely to review relevant research literature on rehabilitation strategies in the ICU.

## 2. Aim

This critical review of the research literature aimed to answer the following research question: What is the impact of early rehabilitation practices on functional outcomes and quality of life in adult ICU survivors?

## 3. Methods

An integrative literature review was undertaken to contribute to understanding the impact of early rehabilitation on quality of life for ICU survivors. The integrative review methodology allows for the combination of diverse methodologies to provide a comprehensive understanding of a particular healthcare problem.<sup>12</sup> Retrieved data were evaluated against a recognised evaluation tool; research findings were analysed and categorised into themes; and a synthesis of conclusions from each theme was presented as an integrated summation of the topic.<sup>13</sup>

A comprehensive search of online databases PubMed, Cumulative Index to Nursing and Allied Health Literature, Ovid Medline and Google Scholar was conducted. Initially, only studies that related to the ABCDE bundle and PAD guideline were sought. Although several research articles were retrieved that addressed isolated components of the bundles, only one published study specifically relating to the bundles was located.<sup>9</sup> Thus a broader approach was taken to review general rehabilitation of ICU patients with a focus on functional and quality of life outcomes.

Key search terms included 'ICU acquired weakness' 'early rehabilitation' 'early mobility' and 'functional outcomes' were combined with 'intensive care' and 'critical illness'. Year restrictions were not applied, however appropriate responses from electronic databases were not located prior to 2000 which reflect the

clinical practice of the time where early exercise was not seen to be a priority.

Additional literature was sourced from reference lists of relevant review articles and original publications. This ensured that the literature review was relevant and comprehensive. The inclusion and exclusion criteria for the research articles have been presented in Table 1. An illustration of the search trail has been presented in Fig. 1.

## 4. Critical appraisal

The Critical Appraisal Skills Program (CASP)<sup>14</sup> was used as a framework to systematically analyse and rigorously evaluate the chosen research articles and justified their inclusion within this literature review. The CASP tools for randomised controlled trials, cohort studies, and case control studies were used to appraise the strengths and weaknesses of the chosen studies.

The studies included in this paper were reviewed to determine if the results were clinically important and statistically significant. External validity of the research was appraised to ensure that results could be transferred to real world clinical practice in the ICU. A summary demonstrates the results of the critical appraisal (Table 2).

Whilst experimental research is considered the gold standard for generating valid treatment and effect evidence, descriptive and correlational studies play a key role in forming the basis of further research particularly in an area that has limited randomised control trials.<sup>15</sup> Thus it was deemed important and appropriate to include descriptive and correlational studies to enrich critical care knowledge with regards to the implementation of early rehabilitation programmes into ICU. The integrative review may include quantitative or qualitative research, or both.<sup>16</sup> In this review, qualitative studies were not examined as higher levels of evidence were available and met the aims of the research question.

Articles that met the inclusion criteria for this literature review were each evaluated against the CASP criteria and included three randomised controlled trials, four cohort studies, one case controlled study; one descriptive study, and one retrospective analysis study.

The studies were conducted in various critical care units and respiratory care centres throughout the world including seven in the United States of America, and one each in Australia, Taiwan and Belgium. Although the studies are predominantly from Northern America, they provide a world-wide perspective on a problem common to all ICU patients. A summary of the ten critiqued research articles is presented in Table 3.

### 4.1. Strengths and limitations of the included studies

Two of the studies met all CASP criteria for randomised controlled trials.<sup>11,17</sup> Several of the cohort studies were strengthened by the prospective and consecutive inclusion of all admitted mechanically ventilated patients over many months.<sup>18–20</sup> This ensured the participants were representative of the wider critical care cohort. A number of studies<sup>11,18,21,22</sup> achieved high rates of activity intervention despite the fragility of the patient condition

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