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Functional and cognitive rehabilitation interventions during intensive care admission: A protocol for a systematic integrative review

Marie Oxenbøll Collet | Eva Laerkner | Janet Jensen | Ingrid Egerod | Jan Christensen | Niels Kasper Jørgensen | Rikke Schmidt Kjærgaard | Sepideh Olausson | Hilde Wøien | Theis Lange | Anne Højager Nielsen | Maj-Brit Nørregaard Kjær | Camille Rahbek Lysholm Bruun | Anders Perner

Abstract

Background: Long-term cognitive impairment occurs in up to 60% of intensive care unit (ICU) survivors. Early use of functional and cognitive rehabilitation interventions, while patients are still in ICU, may reduce cognitive decline. We aim to describe the functional and cognitive interventions used during the ICU stay, the healthcare professionals providing interventions, and the potential impact on functional and cognitive rehabilitation.

Method: In this integrative systematic review, we will include empirical qualitative, quantitative, mixed- and multiple-methods studies assessing the use of functional and cognitive rehabilitation provided in ICU. We will identify studies in relevant electronic databases from 2012 to 2022, which will be screened for eligibility by at least two reviewers. Literature reported as narrative reviews and editorials will be excluded. We will assess the impact of interventions evaluating a cognitive and functional function, quality of life, and all-cause mortality at 6–12 months after ICU discharge. The Revised Cochrane risk-of-bias Tool will be used for assessing risk of bias in clinical trials. For observational studies, we will use the National Institutes of Health Quality Assessment tool for Observational Cohort and Cross-Sectional Studies. Furthermore, we will use the critical appraisal skills programme for qualitative studies and the mixed methods appraisal tool for mixed methods studies. We will construct four matrices, including results describing which ICU patients and healthcare professionals were engaged in rehabilitation, which interventions were included in early rehabilitation in ICU, the potential impact on patient outcomes of rehabilitation interventions provided in ICU and a narrative synthesis of themes. A summary of the main results will be reported using modified GRADE methodology.
Intensive care survival has improved over the past two decades, but many patients report cognitive, mental and physical impairments also known as post intensive care syndrome (PICS). Long-term cognitive impairment has been found in up to 60% of ICU survivors, representing a growing public health concern. Cognitive impairment affects executive function, memory, attention, visuospatial and mental processing speed. Mental impairment includes fatigue, loss of interest, poor appetite, sense of hopelessness, insomnia, symptoms of PTSD that may provoke flashbacks, hyperarousal, and severe anxiety. Physical impairment includes ICU-acquired weakness ranging from generalised poor mobility, quadri- or tetraparesis, leading to persistent disabilities in daily living and risk of pulmonary, neuromuscular and nutritional issues.

Some of the risk factors for PICS are acute respiratory distress syndrome, sepsis, existing cognitive deficit, and delirium. In addition, mechanical ventilation and prolonged duration of bedrest are known as factors that worsen physical outcomes in ICU survivors. Some of these risk factors may not be preventable, but some negative outcomes have the potential for at least becoming less severe than current research findings describe today.

Rehabilitation in the ICU involves physical therapy by assisting patients after injury, illness, or disability through movement and exercise, manual therapy, education, and pain management. Physical therapy is widely implemented in the ICU, where physical therapists work closely with the patients and ICU nurses on mobilisation activities. Rehabilitation in the ICU may also involve occupational therapy, to enable engagement in daily living, by supporting patients in ‘doing’ and performing individual meaningful everyday activities related to life after hospitalisation. In the ICU, this also includes interventions targeting the physical, cognitive and emotional/psychological abilities of patients (mobility, orientation, coping skills), ICU environment (physical set-up, noise, culture) and different tasks the patient may be able to perform (self-care activities, communication with staff, socialising with family members). Currently, the role of occupational therapists in ICU rehabilitation is not well established or implemented, and ICU rehabilitation is dominated by physical therapy.

The goal of rehabilitation in the ICU is to enable patients who experience disability due to injury, illness, or environmental restrictions to uphold functions and skills and continue activities of daily living. Therefore, functional and cognitive rehabilitation interventions in the ICU are needed. Intensive care has over the past 20 years evolved from heavy sedation to a goal of light sedation, aimed to support the patient in maintaining functions of daily living and cognitive awareness and rehabilitation strategies may be implemented earlier in patient ICU treatment. Nonetheless, functional and cognitive rehabilitation interventions are not well implemented in the ICU and are largely dependent on ICU organisational and available resources and the individual ICU clinicians’ knowledge and experience. This integrative review will highlight functional and cognitive rehabilitation interventions for intensive care patients that can be provided during ICU stay.

We aim to describe the functional and cognitive interventions used during the ICU stay, the healthcare professionals (HCPs) providing interventions, and the potential impact on functional and cognitive rehabilitation.

We will conduct an Integrative systematic review including empirical qualitative, quantitative, and mixed-method studies.

A list of rehabilitation interventions will be defined. The study is registered at The Prospective Register of Systematic Reviews (PROSPERO) (CRD420222373044). No specific reporting guideline has been developed for reporting integrative reviews, but we will use an adapted version of the PRISMA to report the findings of the review. We will also use a modified GRADE summary of findings table, and critically appraise included studies.

With the inclusion of experimental and non-experimental research as well as empirical literature, we will use the integrative review method to review and synthesise the data to more fully understand the phenomenon of ICU functional and cognitive rehabilitation in the ICU current literature. To ensure a systematic approach and rigour we will follow the five stages described by Whittmore & Kraft: (1) problem identification, (2) literature search, (3) data evaluation, (4) data analysis, and (5) presentation.

The scope of this systematic integrative review is as follows:

1. Patients: adults as defined in the studies and acutely admitted to an ICU. HCPs: nurses, physicians, physiotherapists, occupational therapists, psychologists, dietitians, occupational therapists, social workers.

2. Interventions: physical therapy, occupational therapy, music therapy, art therapy, consultation, case-management, education, empowerment, behaviour. Some studies include in situ consultation as described by Cohen et al. (2012) in a Cochrane review.

3. Outcomes: quality of life, intensity of sedation, cognitive function, physical function, pain, nausea and vomiting, respiratory function, nutrition status, blood pressure, heart rate, respiratory rate, oxygen saturation, sleep patterns, and physical and emotional well-being.

4. Study design: randomised controlled trials, non-randomised controlled trials, case-control studies, comparative studies, cohort studies, descriptive studies, case studies, and review articles.

5. Data analysis: qualitative synthesis, quantitative synthesis, and mixed method synthesis.
therapists, or other persons who provided functional and cognitive rehabilitation interventions during ICU stay.

2. Interventions: any functional or cognitive intervention performed during the ICU stay.

3. Comparator (for quantitative studies): any comparator group that received another intervention, not including functional and cognitive interventions or studies using standard practice as a comparator will also be included.

4. Outcomes: Long-term (beyond 90 days) all-cause mortality, delirium and coma-free days, mechanical ventilation-free days, cognitive function (mini MoCA, MoCA, RBANS etc.), Health-related quality of life (e.g., EQ-5D-5L), Functional function (FIM, COPM etc.), serious adverse events and adverse events, use of health care services (of physical and cognitive rehabilitation) 6–12 months after ICU stay including readiness to return to work. If other relevant outcomes are identified they will be added.

3.1.2 | Literature search, stage 2

Type of literature
In this review, we will include evidence from peer-reviewed literature identified through academic databases with a qualitative, quantitative, or mixed-method design in an ICU setting/context related to rehabilitation practices. This also includes cross-over, and quasi-randomised trials and multiple-methods studies. We will not include studies, such as quality improvement, narrative reviews, grey literature, theoretical studies, and editorials (Table 1).

Systematic search
We will conduct a comprehensive electronic search in the following databases: Medline (National Library of Medicine), Excerpta Medica Database (EMBASE), Cumulative Index to Nursing and Allied Health Literature (CINAHL), Cochrane Central Register of Controlled Trials Library (CENTRAL), and searches will be peer-reviewed according to the Peer Review for Electronic Search Strategies (PRESS) template prior to official use. The focus of the search will be limited to English language literature. We will use search techniques such as review of reference lists (backward chaining) and citations (forward chaining). The timeframe of the search will be from 1st January, 2012, forward to November 2022, as the past decade has seen an exponential rise in the literature concerning functional and cognitive rehabilitation in ICU. The search strategy includes the concept of ICU treatments and care, designs, and methods.

Screening title and abstracts
Five authors will independently and in duplicate screen the title and abstract of each publication identified in the initial search. Titles not relevant, for example, those not focusing on cognitive or functional or ICU patients, will be excluded. Any titles considered ambiguous or where reviewers disagree will progress to abstract screening. When reviewing the abstract, two authors will independently and in a duplicate screen all publications included from the title screening. Disagreement will be resolved by discussions between the two authors. If an agreement cannot be reached a third author will be involved.

Full-text screening
At least two reviewers will independently and in duplicate review articles for eligibility. A decision will be reached by consensus or by arbitration of a third reviewer (IE). Inclusion criteria are elaborated in Table 1. Covidence systematic review software, Veritas Health Innovation, Melbourne, Australia (Covidence) available at www.covidence.org will be used for identifying duplicates, screening for eligible studies, and data extraction. The data extraction will include relevant data such as demographic and study features, a comprehensive description of any intervention and a description of outcomes. A list of expected outcomes is described in Table 2. If other relevant outcomes are identified during full-text screening, they will be added. The data extraction will also include a summary which will be used to inform the categorisation of the study design, methodology and main results (electronic supplementary material (ESM) Table S1).

3.1.3 | Data evaluation, stage 3

A modified GRADE Summary of Findings table will be developed including all defined outcomes described in Table 2. The certainty in evidence for each outcome of interest will be critically evaluated independently by two authors, using the four grades of quality of evidence: high, moderate, low, and very low. Individual RCTs will begin
TABLE 2  List of expected outcomes.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>• All-cause mortality after randomisation within 6–12-month follow-up</td>
<td>Reported as frequencies and IQR at both 6- and 12 months follow-up, and RR for death between intervention group and control group.</td>
</tr>
<tr>
<td>• Delirium and coma-free days</td>
<td>Median number of days and IQR and independent t-test between groups.</td>
</tr>
<tr>
<td>• Mechanical ventilation-free days</td>
<td>Median number of days and IQR and independent t-test between groups.</td>
</tr>
<tr>
<td>• Cognitive function (mini MoCA, MoCA, RBANS etc.)</td>
<td>Total global cognitive score and sub-scores as median and IQR and independent t-test between groups.</td>
</tr>
<tr>
<td>• Health-related quality of life (HRQoL, EQ-SD-5L etc.)</td>
<td>Total score as median and IQR and independent t-test between groups.</td>
</tr>
<tr>
<td>• Functional function (FIM), COPM etc.</td>
<td>Total score as median and IQR and independent t-test between groups.</td>
</tr>
<tr>
<td>• Rates of adverse events</td>
<td>Reported as frequencies and IQR and RR for death between the intervention group and control group.</td>
</tr>
<tr>
<td>• Number of patients receiving support from either relatives or institutional help</td>
<td>Reported as frequencies and IQR and independent t-test between groups.</td>
</tr>
<tr>
<td>• Number of patients returning to work</td>
<td>Reported as frequencies and IQR and independent t-test between groups.</td>
</tr>
<tr>
<td>• Number of patients who are part of functional or cognitive rehabilitation after hospital discharge with a follow-up of 6-12 months.</td>
<td>Reported as frequencies and IQR and independent t-test between groups.</td>
</tr>
</tbody>
</table>

at high quality while cross-over-, and quasi-randomised trials and observational studies will start at low quality. Outcomes evaluated by mixed methods and quality studies are not expected to overlap with outcomes evaluated by RCTs and observational studies, and therefore will be described in the final matrix but graded very low.21,22 If any disagreement a third author will be consulted if the discussion cannot resolve the disagreement. If any studies are excluded in the data evaluation process it will clearly be stated in the PRISMA flowchart and a report of the excluded studies will be available in the (ESM Figure S1).

To assess the risk of bias in RCTs, cluster-randomised trials and crossover trials the Revised Cochrane risk-of-bias tool will be used to assess the effect of assignment to intervention (the intention-to-treat effect).23 Risk of bias in the observational cohort and cross-sectional studies will be assessed with the National Institutes of Health Quality Assessment Tools.24 The Critical Appraisal Skills Programme tool will be applied for studies using a qualitative design,25 and the Mixed Methods Appraisal Tool version 2018 will be applied for studies using a mixed methods approach.26

3.1.4  Data analysis, stage 4

Four data matrices for the initial analysis will be constructed, including details of all authors and countries of origin, year of publication, design, method, sample size, quality rating, intervention (including duration) and results. The first data matrix will include results related to ICU patients and HCPs that have been engaged in functional and cognitive rehabilitation interventions in ICU. The second data matrix will include results describing which interventions are included in functional and cognitive rehabilitation and how they are performed. The third matrix will include the results of the impact of functional and cognitive interventions. A narrative synthesis of themes from studies will be conducted using adapted framework analysis.27 From the included studies we will inductively code and construct an initial matrix. The categorisation of the data will be discussed with the research team and patient and public panel (PPI panel). The interpretation of the final matrix will be translated into themes or concepts.

3.1.5  Reporting and dissemination, stage 5

The review is part of a larger research initiative to develop and test functional and cognitive rehabilitation interventions aimed to prevent cognitive dysfunction after critical illness.

3.2  Ethical considerations

There are no specific ethical considerations to conducting this review.

3.3  Study strengths and limitations

This integrative review will not provide true evidence-based knowledge to implement in practice. However, including different research methods will strengthen the in-depth analyses and conclusions and will give ICU clinicians a better understanding of functional and cognitive rehabilitation possibilities during ICU stay.19

4  CONCLUSIONS

This integrative synthesis of extant literature should provide insight into functional and cognitive interventions for ICU patients that may prevent or reduce the risk of long-term adverse outcomes such as deficits in functional, mental, and cognitive function. We anticipate that ICU patients and families, clinicians working in both hospital and rehabilitation settings, and fellow researchers will have an interest in the review. The findings will be used to inform and prioritise future research studies in development and pilot test of a complex functional and cognitive rehabilitation intervention for ICU patients to improve their cognitive outcomes.

AUTHOR CONTRIBUTIONS

Conceptualization: MOC, EL, JJ, IE, JC, NKJ, RSK, SO, HW, TL, AHN, MNK, CRLB, AP. Funding acquisition: MOC, IE, AP. Methodology:
MOC, EL, JJ, IE, JC, NKJ, RSK, SO, HW, TL, AHN, MNK, CRLB, AP.
Project administration: MOC, AP. Supervision: IE, AP, TL Writing –
original draft: MOC Writing – review & editing: MOC, EL, JJ, IE, JC,
NKJ, RSK, SO, HW, TL, AHN, MNK, CRLB, AP.

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DATA AVAILABILITY STATEMENT
This protocol manuscript does not have any data to share.

ORCID
Marie Oxenbøll Collet https://orcid.org/0000-0002-8387-3960
Hilde Wøien https://orcid.org/0000-0002-0723-4112
Anne Hajager Nielsen https://orcid.org/0000-0002-8955-9374
Maj-Brit Nørregaard Kjær https://orcid.org/0000-0002-6536-0504

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SUPPORTING INFORMATION
Additional supporting information can be found online in the Suppor-
ting Information section at the end of this article.

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