



BMJ Open Effect of multicomponent rehabilitation on independence and functioning in elderly patients with common age-associated diseases: protocol for a scoping review (REHOLD)

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ABSTRACT

Introduction Elderly patients after hospitalisation for acute events on account of age-related diseases (eg, joint or heart valve replacement surgery) are often characterised by a remarkably reduced functional health. Multicomponent rehabilitation (MR) is considered an appropriate approach to restore the functioning of these patients. However, its efficacy in improving functioning-related outcomes such as care dependency, activities of daily living (ADL), physical function and health-related quality of life (HRQL) remains unclarified. We outline the research framework of a scoping review designed to map the available evidence of the effects of MR on the independence and functional capacity of elderly patients hospitalised for age-related diseases in four main medical specialties beyond geriatrics.

Methods and analysis The biomedical databases (PubMed, Cochrane Library, ICTRP Search Platform, ClinicalTrials) and additionally Google Scholar will be systematically searched for studies comparing centre-based MR with usual care in patients ≥ 75 years of age, hospitalised for common acute events due to age-related diseases (eg, joint replacement, stroke) in one of the specialties of orthopaedics, oncology, cardiology or neurology. MR is defined as exercise training and at least one additional component (eg, nutritional counselling), starting within 3 months after hospital discharge. Randomised controlled trials as well as prospective and retrospective controlled cohort studies will be included from inception and without language restriction. Studies investigating patients < 75 years, other specialties (eg, geriatrics), rehabilitation definition or differently designed will be excluded. Care dependency after at least a 6-month follow-up is set as the primary outcome. Physical function, HRQL, ADL, rehospitalisation and mortality will be additionally considered. Data for each outcome will be summarised, stratified by specialty, study design and type of assessment. Furthermore, quality assessment of the included studies will be performed.

Ethics and dissemination Ethical approval is not required. Findings will be published in a peer-reviewed journal and presented at national and/or international congresses.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- ⇒ The REHOLD (REHAbilitation in OLDer patients) scoping review will systematically investigate the extent and nature of the available evidence on the effects of multicomponent rehabilitation on independence and functional capacity in elderly patients after hospitalisation.
- ⇒ Main and secondary outcomes are patient-centred and defined according to the bio-psycho-social model of the International Classification of Functioning, Disability and Health.
- ⇒ The review will summarise the evidence provided by randomised controlled trials as well as controlled cohort studies in the main somatic specialties of orthopaedics, oncology, cardiology and neurology.
- ⇒ Assessment of methodological limitations and risk of bias in the studies to be included will be performed to evaluate the available evidence and identify research needs related to the objectives of this scoping review.
- ⇒ As this work is a scoping review, the pooled clinical effects of multicomponent rehabilitation on independence and functioning in older patients will not be calculated.

Trial registration number <https://doi.org/10.17605/OSF.IO/GFK5C>.

INTRODUCTION

The proportion of elderly people is increasing in many nations worldwide, to a greater extent in high-income countries.¹ Noteworthy gains in life expectancy (eg, overall decreased mortality rates) in the past decades have supported the population's ageing process.²⁻³ In countries such as Germany, France, the USA, Italy or Great Britain, reductions in tobacco-induced cardiovascular diseases, especially for men, and decreased diabetes mortality have contributed to an

increased life expectancy.^{3 4} Furthermore, innovations in healthcare, such as the acute revascularisation and effective pharmacotherapy for coronary heart diseases or improved detection of cancer, have considerably diminished the mortality in the elderly population.^{5 6}

However, this increased longevity is often not accompanied by an extended period of good health.¹ Commonly, older people experience declines in their health condition, such as reductions in physical function or mental capacities, mostly due to the presence of age-associated diseases (eg, sarcopenia).^{7 8} The prevalence of chronic diseases such as cardiovascular diseases, diabetes mellitus, chronic respiratory diseases or Parkinson's disease is generally high in the elderly population.^{1 9 10}

Elderly patients are characterised by an up to 80% prevalence of multimorbidity with a complex interaction of diseases and high rates of hospitalisation.^{11 12} After hospital discharge, a deterioration of functioning in terms of worsened physical function, impairments in activities of daily living (ADL), social participation and lower perceived health-related quality of life (HRQL) is most likely to be observed.^{2 13-15} That applies to geriatric (simultaneous presence of several diseases requiring treatment, high degree of disease severity and risk of complications) and non-geriatric elderly patients after hospitalisation.

For the latter, specialist multicomponent rehabilitation (MR) is advocated as a valid method to restore or maintain functioning.¹⁶⁻¹⁸ Ideally, MR follows an individualised, multiprofessional approach according to the bio-psycho-social model of the International Classification of Functioning, Disability and Health (ICF) by the WHO.^{7 19} Several guidelines for specific age-related diseases describe MR with its core components (eg, exercise training, lifestyle counselling) and recommend it,²⁰⁻²² with evidence supporting its efficacy in reducing mortality rates, morbidity and physical function outcomes in the general rehabilitation population and even in elderly patients.²³⁻²⁵

However, there is a lack of information about the impact of MR on the functional health status and corresponding patient-centred outcomes, especially care dependency of elderly patients.^{26 27} At the same time, patients of older age are remarkably under-represented in specialised MR such as cardiac rehabilitation.²⁸

Due to demographics, we expect a growing population of older people commonly affected by chronic diseases and their manifestation in acute events such as myocardial infarction, femoral fracture or joint replacement but not meeting the criteria for complex geriatric care. To optimise continuous tailored care of those patients and reduce the personal and societal burden, post-hospitalisation MR should be adapted and strengthened as specific evidence becomes available.

In this scoping review, we aim to systematically investigate the extent and nature of the available evidence on the effects of MR on care dependency, physical function, HRQL and ADL in elderly patients (≥ 75 years of age) after

hospitalisation compared with usual care for common age-associated conditions in the medical specialties of orthopaedics, oncology, cardiology and neurology, where rehabilitation programmes are widely implemented and established. Furthermore, we will assess the quality of the included studies in terms of methodology limitations and overall risk of bias in order to outline implications for future research in this rapidly growing research field.

METHODS AND ANALYSIS

This study protocol describes the methodology of a planned scoping review designed to map, summarise and critically appraise the quality of the available studies, which provided evidence on the effects of REHAbilitation in OLDER patients (REHOLD). The protocol was prepared following the guidelines set by the Joanna Briggs Institute (JBI Manual for Evidence Synthesis)²⁹ and according to the PRISMA-ScR (Preferred Reporting Items for Systematic review and Meta-Analyses extension for Scoping Reviews)³⁰ recommendations. The protocol was registered in the Open Science Framework (OSF) database in April 2023.

Inclusion criteria

According to the JBI Manual for Evidence Synthesis guidelines,²⁹ we defined a priori the population, concept, context and types of evidence sources (table 1). Hence, studies investigating patients at least 75 years of age hospitalised for acute events (eg, surgery, acute decompensation, stroke) due to age-associated diseases (eg, cancer, cardiovascular diseases, osteoarthritis) in the main specialties of orthopaedics, oncology, cardiology or neurology will be included.

MR as a recommended rehabilitation format in elderly patients³¹ is the intervention of interest. In this protocol, we defined MR as any kind of exercise training and at least one additional component (eg, nutritional counselling, occupational therapy). MR must be carried out supervised, be based at a centre and have to start no later than 3 months after hospital discharge. MR should have been compared with the usual care (eg, specialist counselling).

Primarily, we will include randomised controlled trials (RCTs). Additionally, prospective controlled cohort studies (pCCS) and retrospective controlled cohort studies (rCCS) will be accounted for in order to aggregate all available evidence (ie, real-world evidence).³² Publications from inception in any language will be considered.

Studies investigating patients below 75 years of age, patients with diseases not belonging to the orthopaedic, oncologic, cardiologic or neurological specialty (eg, geriatrics), interventions not meeting the above MR definition, or differently designed as prespecified will be excluded.

Outcomes

Care dependency, defined by Boggatz *et al* as 'a subjective, secondary need for support in the domain of care

Table 1 Eligibility criteria according to population, concept, context and types of evidence.

	Inclusion	Exclusion
Population	Patients aged ≥ 75 years. Hospitalised for an acute event due to a common age-associated disease in one of the specialties of orthopaedics, oncology, cardiology or neurology (eg, fracture, joint replacement, cancer surgery, heart valve implantation, heart failure, decompensation, stroke).	Patients aged < 75 years. No hospitalisation. Hospitalised for diseases in other fields than the indicated specialties.
Concept	Studies assessing the effects of Multicomponent rehabilitation (MR) defined as: exercise training <i>and at least</i> one additional component (eg, nutritional counselling, patient education, social support, psychotherapy, logopaedics, occupational therapy). In comparison to usual care defined as medical care by the general practitioner or specialist including counselling and pharmacotherapy; no rehabilitation. Primary outcome Care dependency Secondary outcomes: health-related quality of life, physical function (eg, mobility, muscle strength), activities of daily living, rehospitalisation, mortality.	Non-multicomponent or non-exercise rehabilitation interventions defined as singular component interventions or interventions without an active training of participants. Control group procedure different from defined usual care. Any outcome different from defined primary and secondary outcomes.
Context (ie, specific setting of MR delivery)	MR started within 3 months after hospital discharge. Inpatient, outpatient or mixed. Centre-based. Follow-up at least 6 months after MR discharge.	MR started later than 3 months after hospital discharge. Home-based or telerehabilitation. No follow-up or follow-up shorter than 6 months after MR discharge.
Types of evidence	Randomised controlled trial, Prospective controlled cohort study or Retrospective controlled cohort study.	Reviews (eg, systematic, narrative). Case series or report. Study protocols, abstracts, posters or dissertations.

to compensate a self-care deficit³³ is set as the primary outcome of the REHOLD study (table 2). According to the WHO,⁷ an individual needs care assistance when activity limitations are present.³³ The specific limitations and needs determine the forms and the degree of care assistance required, which can be operationalised by the number of nurse visits at home, admission to a nursing home or by the results of specific care dependency scales

(eg, Care Dependency Scale for Rehabilitation, The Northwick Park Dependency Score).^{34 35}

HRQL, physical function and ADL (table 2) as aspects of functioning according to the ICF⁷ approach as well as rehospitalisation and mortality are defined as secondary outcomes. HRQL is a multidimensional concept that includes subjective evaluations of both positive and negative aspects of life.³⁶ Mainly patients' physical and mental

Table 2 Main and secondary outcome assessments.

Main outcome	Description
Care dependency	Assessment of the degree of care dependency (eg, CDS-R, ³⁴ NPDS, ³⁵ number of nurse visits at home, admission to nursing home).
Secondary outcomes	Description
HRQL	Assessment of general (eg, SF-36, SF-12, EQ-5D) ⁵⁵⁻⁵⁷ or disease-specific HRQL (eg, CHFQ, EORTC QLQ-C30). ^{58 59}
Physical function	Assessment of mobility, muscular strength or physical capacity (eg, 6-minute walk test, chair rise test).
ADL	Assessment of basic (eg, Barthel Index, Katz Index) or instrumental ADL (eg, Lawton Index). ⁶⁰⁻⁶²
Rehospitalisation	Need for new hospital admission (eg, need for reoperation or intervention).
Mortality	Patients deceased during the follow-up period.

ADL, activities of daily living; CDS-R, Care Dependency Scale for Rehabilitation; CHFQ, Chronic Heart Failure Questionnaire; EORTC QLQ-C30, European Organization for Research and Treatment of Cancer Quality Life Questionnaire; EQ-5D, EuroQol – five dimensions; HRQL, health-related quality of life; NPDS, Northwick Park Dependency Score; SF-36/12, Short Form 36 item/12 item version.

health perceptions as well as social support and socioeconomic status are involved.^{37 38}

Physical function as a subcomponent of functioning is closely related to body functions and structures.⁷ Generally, in elderly patients, physical functioning is measured by a variety of assessments addressing especially mobility or strength.³⁹ Limitations to these capacities can be considered an indicator of a lower level of functioning or increased risk of hospitalisation.^{40–42}

ADL are often measured in relation to standardised (basic) self-care activities such as bathing, dressing and toilet hygiene, and in relation to instrumental tasks like managing money or preparing meals. A higher number of impaired activities is an indicator of lower functioning.⁴³

The primary and secondary outcomes should be assessed after at least 6 months of follow-up subsequent to MR discharge.

Search strategy

The major biomedical electronic databases PubMed (including MEDLINE)⁴⁴ and the Cochrane Library (CENTRAL), which includes trials contained in EMBASE and CINAHL databases, will be searched. This search will be supplemented by exploring the ICTRP Search Platform (WHO) and the public register ClinicalTrials (https://clinicaltrials.gov/) to ensure that results from completed, not yet published studies will be also taken into account (eg, by contacting the principal investigator to obtain research outcome). Literature saturation will be ensured by manually screening of the reference lists of included studies and by retrieving ‘grey literature’ using Google Scholar (https://scholar.google.com/), which will be considered on a case-by-case basis. A rerun of the search will be performed directly after the data extraction process is completed, as recommended in the PROSPERO guidelines.⁴⁵

The search strategy adheres to the population, content and context descriptors. Thus, four search components, specialty (A), rehabilitation (B), interventions (C) and population (D), connected by the Boolean term ‘AND’ were created as combinations of Medical Subject Heading-terms. This search strategy will be repeated

for four specialties (component A): ‘oncology’, ‘orthopaedics’, ‘cardiology’ and ‘neurology’. Table 3 provides an example of the search terms used in oncology; a full description of the other medical specialties considered in this review is available as supplemental material (online supplemental appendix).

At each stage of the review process (title and abstract, full text), studies will be screened for eligibility by at least two reviewers. Their decisions will be blinded to each other and disagreements will be solved by a third reviewer. Reasons for exclusion and the number of excluded records will be reported according to PRISMA-ScR guidelines.³⁰ The internet-based software package Citavi (V.6.10; Swiss Academic Software, Switzerland) will be used for the literature search and for structuring records. The literature search results will be uploaded to the systematic review production software Covidence (www.covidence.org; Melbourne, Australia) for study selection, quality assessment and data extraction.

Data charting and synthesis

From each study to be included in the final synthesis, information regarding the study (design, author’s name, year of publication, continent/region) and the analysed population (no. of participants in total and of each subgroup, age, sex, referral diagnosis, comorbidities, inpatients/outpatients/mixed) will be extracted. Data on MR procedures (eg, number and type of components, duration, number of sessions per week) and usual care (eg, medications, type of counselling) and outcomes of each study will be collected. Data will be summarised descriptively, with study characteristics presented in tabular and graphical forms, stratified by medical specialty (orthopaedics, oncology, cardiology and neurology), study design (RCT, pCCS and rCCS) and type of outcome assessment.

Study quality assessment

The risk of bias (ROB) will be assessed using the ROB V.2.0 for RCTs.⁴⁶ This tool is structured into five domains through which bias might be introduced (randomisation process, deviations from intended interventions, missing outcome data, measurement of the outcome

Table 3 Component queries and combinations of the search terms for the specialty oncology.

Component	Queries
(A) Oncology	((("Neoplasms"(Mesh)) OR "Oncology Service, Hospital"(Mesh)) OR "Oncology Nursing"(Mesh)) OR "Carcinoma"(Mesh) OR cancer(Text Word)
(B) Rehabilitation	"rehabilitation" (Subheading) OR "Rehabilitation Centers"(Mesh) OR "Physical and Rehabilitation Medicine"(Mesh) OR "Hospitals, Rehabilitation"(Mesh) OR "Rehabilitation Research"(Mesh) OR "Exercise Therapy"(Mesh) OR "Rehabilitation"(Mesh) OR multicomponent(All Fields)
(C) Interventions	"Exercise"(MeSH) OR "Patient Education as Topic"(MeSH) OR "Social Support"(MeSH) OR "Psychotherapy"(MeSH) OR "Speech Therapy"(Mesh) OR "Dietary Services"(MeSH) OR "Diet Therapy"(MeSH) OR "diet therapy" (Subheading) OR occupational therapy OR "training"
(D) Population	"Aged"(MeSH) OR "Aging"(MeSH) OR "elder* patient*" OR "old* patient"
Search terms	(A) AND (B) AND (C) AND (D)
MeSH, Medical Subject Heading-indexations.	

and selection of the reported result).⁴⁶ Based on signalling questions, the bias at each domain level will be evaluated and summarised as ‘low risk’, ‘some concerns’ or ‘high risk’ of bias.⁴⁷ The ROBINS-I⁴⁸ will assess the ROB in non-randomised studies, that is, pCCS, and rCCS. The ROBINS-I is structured into seven domains (bias due to confounding, participant selection, classification of intervention, deviations from intended interventions, missing data, measurement of outcomes and selection of the reported result).⁴⁹ As for the ROB V.2.0, a series of signalling questions will guide the reviewers in judging the ROB across the domains to determine an overall ROB (low, moderate, serious, critical, no information). The overall ROB of the studies to be included will be displayed in tables (grouped by study design) as recommended in the corresponding assessment tool.

Patient and public involvement

None.

ETHICS AND DISSEMINATION

Ethics approval is not required, as this review will include only published data. Findings will be published in a peer-reviewed journal and presented at national and international conferences.

DISCUSSION

The REHOLD scoping review will summarise and appraise the quality of the studies reporting evidence of the effects of MR in elderly patients after hospitalisation to focus on the functional health status and its various domains. However, as this work is a scoping review, the pooled clinical effects of MR on independence and functioning in older patients will not be calculated.

Elderly patients often present a complex set of morbidities and hence are prone to longer emergency room and hospital stays.⁵⁰ During hospital stays, these patients commonly experience loss of functioning with an up to 60% prevalence of hospitalisation-associated disability.⁴³ These disabilities may be due to the original disease that caused the hospitalisation, to multimorbidity, or to a surgery or intervention to which the patients were exposed.⁵¹ Thus, basic ADL like bathing or dressing are impaired, with elderly patients becoming reliant on the help of caregivers or requiring long-term care.⁴² The extent to which people aged 75 years and older need support with daily activities might lead to a loss of confidence or even to anxiety, which in turn would negatively affect their quality of life.⁵²

Besides physiological function (eg, ability to perform daily tasks), psychological and social domains also play a key role in the functional health status of elderly patients.^{53 54} Psychological mechanisms like emotional vitality, resilience, coping and spirituality help foster and maintain a state of perceived well-being, high self-assessed quality of life and a strong sense of personal

fulfilment.⁵⁴ Especially after hospitalisation, emotional vitality or engaging in social life are crucial for restoring and preserving functioning in elderly patients.⁵⁴ Furthermore, social engagement (eg, church attendance) and especially social relationships have been described as beneficial for maintaining functional health status.⁵³

MR carries the potential to improve physical function (eg, by reducing impairments to performing ADL) and positively influence patients’ social participation, which in return can lead to reduced patient care needs.¹⁷ To uncover this potential, the REHOLD study will aggregate the available evidence.

In addition, this review will identify knowledge gaps in the outlined area that may result from the underrepresentation of older patients in interventional studies,^{16 24} the wide range of operationalisation of functioning or a constrained quality of the studies to be included. In sum, with the REHOLD study we aim to map and assess the evidence revealing the possible benefits of MR in elderly patients. In addition to physical performance, this includes mainly care dependency, HRQL, ADL, rehospitalisation and mortality, which are important contributors to health conditions after being hospitalised for age-associated diseases.

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