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Research paper

# Sarcopenia in post-acute care and rehabilitation of older adults: A review

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ABSTRACT

*Background:* Sarcopenia could be involved in post-acute disease and the rehabilitation process, although its prevalence, assessment, diagnostic criteria and treatment in those care settings remains unclear.
*Objective:* To review the literature about sarcopenia in older adults during post-acute care and rehabilitation.
*Methods:* Medline and PEDro searches identified observational and intervention studies published between 2005 and 2015. Researchers independently applied pre-set inclusion criteria and reached consensus on included articles. We recorded study design, setting, population, outcomes, diagnostic criteria, prevalence, the role of sarcopenia (predictor, intervention target intervention, etc), and measurement methods for muscle mass, strength and performance.
*Results:* We included 16 studies (9 prospective cohorts, 4 cross-sectional, 1 randomized controlled trial, 1 protocol of a randomized controlled trial and 1 review); mean population ages ranged from 61.5 to 84.6 years). Most frequent settings were rehabilitation wards (9 studies). Most frequent target population was orthopaedic patients (10 studies); no studies specifically addressed stroke, which is highly prevalent in older adults. Nine studies focused on the sarcopenia diagnosis and 7 on sarcopenia as a risk factor for other diseases. Most used assessment tools were bioelectrical impedance analysis for muscle mass, handgrip for muscle strength and gait speed for physical performance. Most studies used EWGSOP criteria. Sarcopenia prevalence was around 50% in hospital-based rehabilitation.
*Conclusions:* The available evidence about sarcopenia assessment in post-acute care and rehabilitation is scanty, and many aspects remain unclear. This review summarizes the findings from the main studies on this topic, suggesting clinical lessons learned and lines of future research.


## 1. Introduction

Sarcopenia is a syndrome characterized by progressive and generalized loss of skeletal muscle mass, quality and strength, with a risk of adverse outcomes such as physical disability, poor quality of life and death [1]. Normal aging is associated with approximately a 1% of loss of muscle from 30 years of age on, and this loss tends to accelerate, with a decrease of muscle strength from 20 to 40%, between the sixth and seventh decades, with a consequent risk of developing disability [2]. In recent years, increasing evidence has reported the prevalence of sarcopenia in older community-dwellers, and it ranges between 3 and 36% [2–6], depending on the characteristics of the study, its methodology and the selected diagnostic criteria. Sarcopenia is associated with disability, falls, frailty fractures, functional decline, decreased quality of life and increased mortality [1,6–9], and it seems to carry on relevant costs [10]. Considering both, the high prevalence and negative consequences and costs, it seems intuitive that improving the knowledge about early identification and effective treatment of sarcopenia is urgent. Treatment of age-related sarcopenia involves

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a multifactorial assessment and an individualized, multi-domain and interdisciplinary approach, including physical rehabilitation with resistance training, life style changes (e.g. smoking and alcohol drinking cessation), and nutritional supplementation with proteins, amino acids and vitamins [11].

Post-acute care and rehabilitation are pivotal to recover the maximum possible independence for older adults after incident disability due to either acute "catastrophic" events or a progressive chronic disease [12,13]. Due to multiple factors (frailty, comorbidity, associated social problems etc), the recovery process, in older adults, might be complex and might require a longer period of time. For these reasons, post-acute care and rehabilitation play an essential role in the care of older adults. A continuing interdisciplinary care following treatment of acute illness, usually performed in post-acute units, helps to prevent premature institutionalizations and to reduce unnecessary readmissions [14]. In the United States, post-acute care experienced the higher proportional increase in the last 15 years [14,15]. The effectiveness of geriatric rehabilitation in improving different healthcare outcomes has been demonstrated [16].

Definitions, candidate patients, care models and organization among post-acute, subacute, intermediate care and rehabilitation resources are a source of debate and controversy, and comparing healthcare systems might be challenging. We will consider post-acute care as a global concept defining all those ambulatory or inpatients levels of care which are based on geriatric assessment and interdisciplinary care and which are mainly focused on rehabilitation. The concept of rehabilitation ward is more unspecific, focused on rehabilitation and does not seem to be carried on based on geriatric principles. For the purpose of this review, authors will include all of them (post-acute, subacute, intermediate care, rehabilitation resources and rehabilitation wards) [17–24]. In rehabilitation facilities, the prevalence of sarcopenia is higher compared to the community, increasing up to a 40% in ambulatory rehabilitation and up to 50% in inpatient settings, such as subacute geriatric care units [7,8]. However, in clinical practice, the evaluation of sarcopenia is neither routinely quantified with standardized and validated methods, nor consequently treated; similarly, the role of sarcopenia as a predictor of patients' recovery is not usually considered to estimate rehabilitation prognosis [25]. Despite the high prevalence observed in this setting and its impact on clinical and functional outcomes on survival, sarcopenia remains understudied in hospitalized older people in general and, in particular, in post-acute care and rehabilitation units.

The aim of this work is to review the evidence about epidemiology, identification, impact and treatment of sarcopenia in older adults in post-acute care and geriatric rehabilitation settings, and to critically discuss possible insights for both clinical approach as well as gaps in the evidence and future lines of research.

## 2. Methods

This is a critical review of the evidence, and not a systematic review.

### 2.1. Search strategy

A search for articles published between June 2005 and June 2015 was conducted on Public Medline (PUBMED) run by the National Center of Biotechnology Information (NCBI) of the Library of Medicine of Bethesda (USA); the following term associations were used: sarcopenia/sarcopenic, rehabilitation/physical therapy/exercise, elderly/older adults. The search was restricted to the following term associations: sarcopenia/sarcopenic AND rehabilitation/physical therapy/exercise AND elderly/older adults. In addition, we reviewed the bibliography of the selected articles. We selected only papers published in English. PEDro electronic database was researched for quality assessment.

### 2.2. Inclusion and exclusion criteria

#### 2.2.1. Inclusion criteria

We included studies in hospitalized elderly patients and community-dwelling older adults during the post-acute phase of acute disabling diseases (such as a fracture or stroke), or the exacerbation of chronic conditions, performing specific rehabilitation programs. We included all the works focused on prevention, diagnosis, treatment or management of sarcopenia.

#### 2.2.2. Exclusion criteria

We considered as exclusion criteria: studies non focusing on sarcopenia, studies performed in acute care units, in community-dwelling or institutionalized cohorts but not during the post-acute period neither undergoing specific rehabilitation programs and studies that included younger populations ($<$ 65 years old).

#### 2.2.3. Selection and quality assessment

We included prospective cohort studies, cross-sectional studies, randomized controlled trials, reviews, meta-analysis and position papers which considered elderly with diagnosis of sarcopenia (defined by the European Working Group of Sarcopenia in Older People [EWGSOP] criteria or by a different criterium) during the post-acute phase of a disease and undergoing rehabilitation. The titles and abstracts of the articles found with the mentioned search strategy were analyzed to assess whether they were valid for the present review: of those potentially relevant we read and analyzed the full text. Quality assessment was performed according to PEDro quality assessment score for randomized controlled trials.

Table 1 summarizes the methodology of our review. The following steps were developed:

- configuration of a working group, including seven professionals with expertise in geriatrics, sarcopenia and post-acute care from two different geriatric post-acute and rehabilitation hospitals;
- formulation of the aim of the review, based on "sarcopenia in post-acute and rehabilitation settings", and consensus on the detail of the search strategy (search engines, inclusion and exclusion criteria);
- identification of relevant studies;
- separate classification, analysis and presentation of the outcomes independently by the two research groups according to predefined and agreed items, in case of disagreement regarding the inclusion or classification of specific papers;
- consensus between the two research groups was reached through discussion.

## 3. Results

Four hundred and sixty-five citations were found in MEDLINE and PEDro. Four hundred and fifty-three were discarded because they did not fulfill the inclusion criteria. The full text of 12 papers were reviewed, four were included in addition from the bibliography of the selected articles (Fig. 1); therefore, we ended up with 16 articles in this review, which are presented in Table 2. We synthesize hereafter some of the main characteristics of this group of heterogeneous studies.