



Sarcopenia: loss of muscle mass

A HEALTHCARE PROFESSIONAL FACT SHEET

Managing Adult Malnutrition
in the Community

Dr Anne Holdoway, Consultant Dietitian
Dr Ann Ashworth, Consultant Dietitian

There is increasing evidence on the importance of preserving muscle mass in the population as a whole as we age or live with a long term condition¹. The European Working Group on Sarcopenia in Older People has called for healthcare professionals who treat patients at risk for sarcopenia to take actions that will promote early detection and treatment².

This document has been created to provide insights and practical advice to support health care professionals, including Physiotherapists and Occupational Therapists, on what we know about sarcopenia, how we might treat or prevent it and how it links to malnutrition. It outlines:

- why it is important to identify sarcopenia to achieve the best outcomes for patients whether they are underweight, normal weight, overweight or obese
- the multiple factors that can contribute to sarcopenia and the consequences to patient health
- practical advice on diagnosis and treatment of patients according to their current nutritional status

Sarcopenia and Malnutrition – definitions, prevalence, causes and interrelationship

Table 1 - Definitions

Sarcopenia	Malnutrition
A classified disease characterised by progressive and generalised loss of skeletal muscle mass and function, resulting in reduced physical performance that can contribute to frailty, prolonged physical disability, increased risk of falls, a poorer quality of life and death ²⁻⁴	A state of nutrition in which a deficiency or excess (or imbalance) of energy, protein and other nutrients causes measurable adverse effects on tissue/body form (body shape, size and composition) and function and clinical outcome ⁵

Depending on the definition used, sarcopenia affects between 4 and 25% of older, free-living adults in the UK - prevalence data varies according to the identifying tests used as well as underlying diagnosis⁶⁻⁸. Evidence suggests that incidence increases with age, so older adults are particularly at risk, especially those with conditions which limit activity or result in periods of bed rest⁴. It is estimated to cost the UK ~£2.5 billion per annum arising from the health services required to manage the consequences⁹.

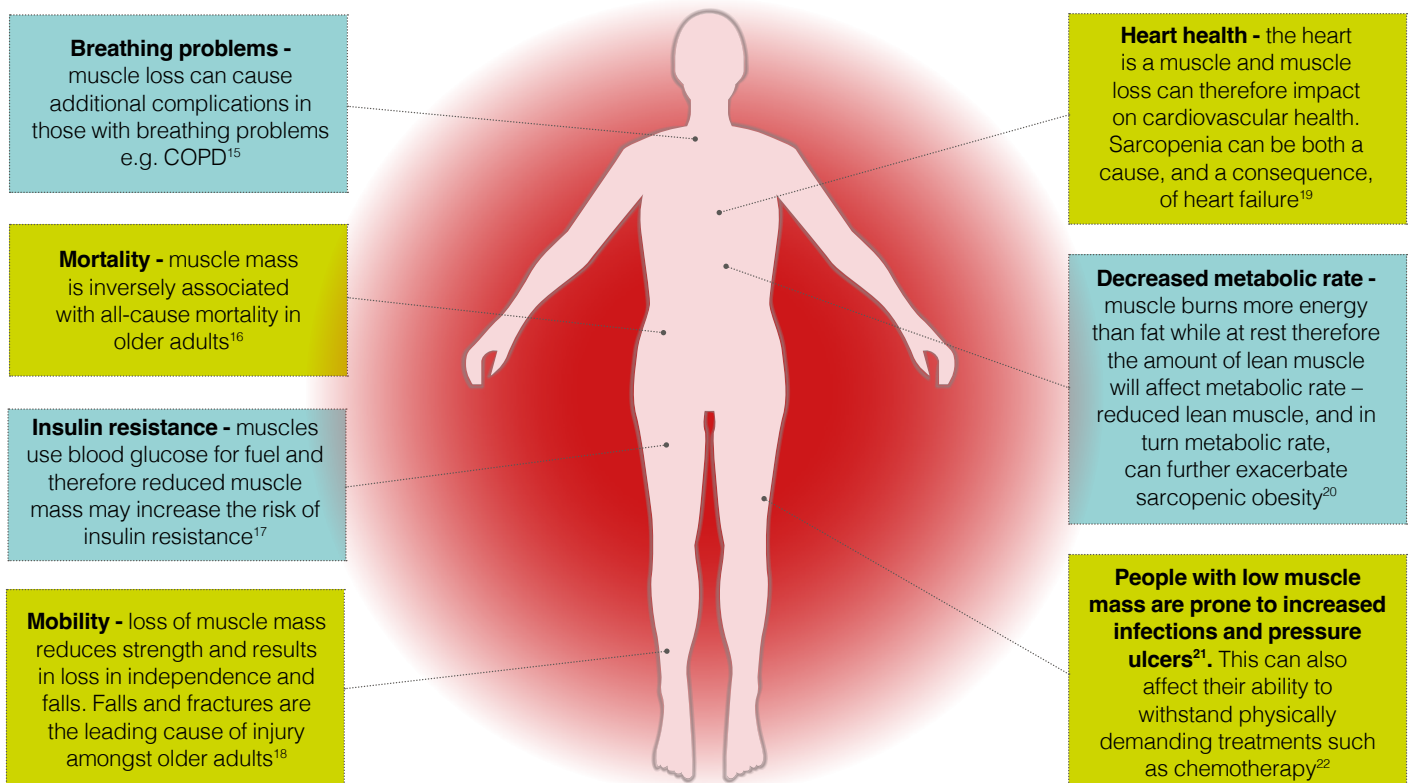
Malnutrition, resulting from under or over nutrition, can lead to sarcopenia. Recent evidence has found patients with malnutrition had approximately three to four times the risk of developing sarcopenia than those without malnutrition^{10,11}. Whilst sarcopenia is common among adults of older age it can also occur earlier in life⁴. Disease, inactivity, and poor nutrition⁴ can all contribute (See Table 2, page two).

Table 2: Multiple factors responsible for changes to body composition, contributing to sarcopenia²

<p>Ageing</p> <ul style="list-style-type: none"> - Age-associated muscle loss 	<p>Muscle mass declines ~30-50% between the ages of 40-80 years⁸. In addition, aging stimulates infiltration of fat into muscle, which impairs new muscle growth¹².</p> <p>Older adults have reduced muscle perfusion¹³ and digestive capacity. Weight loss in older adults carries the risk of loss of lean body mass¹⁴.</p> <p>Hormones:</p> <ul style="list-style-type: none"> - in women, menopause is associated with increased body weight and fat mass, especially around the centre of the body (increasing waist circumference) and decreased fat-free mass¹² - in men, there is a reduction in testosterone by 1% each year, leading to reduced muscle mass¹²
<p>Disease</p> <ul style="list-style-type: none"> - Inflammatory conditions (e.g. malignancy) - Osteoarthritis - Neurological disorders 	<p>Inflammation associated with disease increases muscle breakdown especially in acute exacerbations or flare ups.</p>
<p>Inactivity</p> <ul style="list-style-type: none"> - Sedentary behaviour (e.g. limited mobility or bedrest) - Physical inactivity 	<p>Physical inactivity further accelerates age-related decline in muscle mass, leading to a decrease in metabolic rate.</p>
<p>Malnutrition</p> <ul style="list-style-type: none"> - Under-nutrition or malabsorption - Medication-induced anorexia - Loss of appetite - Over-nutrition/obesity 	<p>Malnutrition can cause sarcopenia: by under-nutrition (not getting enough calories or protein each day to sustain muscle mass) or overnutrition / obesity.</p> <p>Obesity promotes low-grade inflammation, which in turn leads to insulin resistance, promoting further gain in fat mass and loss of muscle mass leading to sarcopenic obesity.</p>

Left untreated sarcopenia can affect recovery from surgery or injury, hamper response to treatment, reduce functional capacity or contribute to a more rapid deterioration in pre-existing conditions (see Figure 1).

Figure 1 : Some of the consequences of loss of muscle mass



Identification of Sarcopenia

In the acute setting and specialist units skeletal muscle mass can be assessed by body composition methods such as CT scans, DEXA and bioimpedance²³. These methods are unlikely to be available in community settings where a more pragmatic approach is required:

- the SARC-F questionnaire, a 5-item questionnaire can be used to determine the likelihood of sarcopenia²⁴ (bit.ly/3uH3PgT)
 - if the results suggest sarcopenia is likely (i.e. score ≥ 4), this should be followed by simple strength measurements, such as hand-grip strength and the sit to stand test
- physical performance can be assessed by gait speed, timed up and go test and the 400m corridor walk². Further information may be available from your local dietetic, physiotherapy or occupational therapy department
- Step by step instructions for conducting the sit to stand, 4 stage balance test and timed up and go test are available from: bit.ly/2SvgXXW under the functional assessments section.
- Instructions on administering a two-minute walk endurance test and a four-meter walk gait speed test can be found at: sforce.co/2RMW36L

Further information on hand grip strength and walking/gait speed is also available in the PENG Pocket Guide to Clinical Nutrition²⁵.

Identification of Malnutrition - Nutritional Screening

A validated screening tool, such as the Malnutrition Universal Screening Tool ('MUST')⁵ should be used to identify adults at risk of malnutrition²⁶: bit.ly/3uml9GP. It combines assessment of BMI, recent unplanned weight loss and presence of acute illness.

Considerations

Differential diagnosis

Three conditions which can be considered in the differential diagnosis of sarcopenia are malnutrition, cachexia and frailty⁴:

- Malnutrition; see Table 1 for definition
- Cachexia; a term used to describe severe weight loss and muscle wasting, often associated with cancer and acute inflammation
- Frailty; characterised by unintentional weight loss, self-reported exhaustion, weakness, slow walking speed and low physical activity

The above conditions can often co-exist, making diagnosis challenging. Seek support from other healthcare professionals if concerned e.g. Dietitian.

How being overweight and obese can mask sarcopenia and malnutrition

The prevalence of 'sarcopenic obesity', or obesity in combination with sarcopenia, is increasing in adults aged 65 and over¹². Care must be taken to ensure that sarcopenia is not missed if the patient is overweight or obese.

When assessing the risk of malnutrition in those who are overweight or obese pay attention to:

- > 5% unplanned weight loss over the previous 6 months or >10% unplanned weight loss over more than 6 months
- reduced food intake of $\leq 50\%$ of energy requirement for 7 days, or any reduction for more than two weeks, or presence of any chronic gastrointestinal condition which adversely impacts food assimilation or absorption²⁷ and/or inflammation caused by acute disease/injury or chronic disease related²⁷

Focussing care on obesity and failing to identify sarcopenia could lead to adverse outcomes⁴

Dysphagia

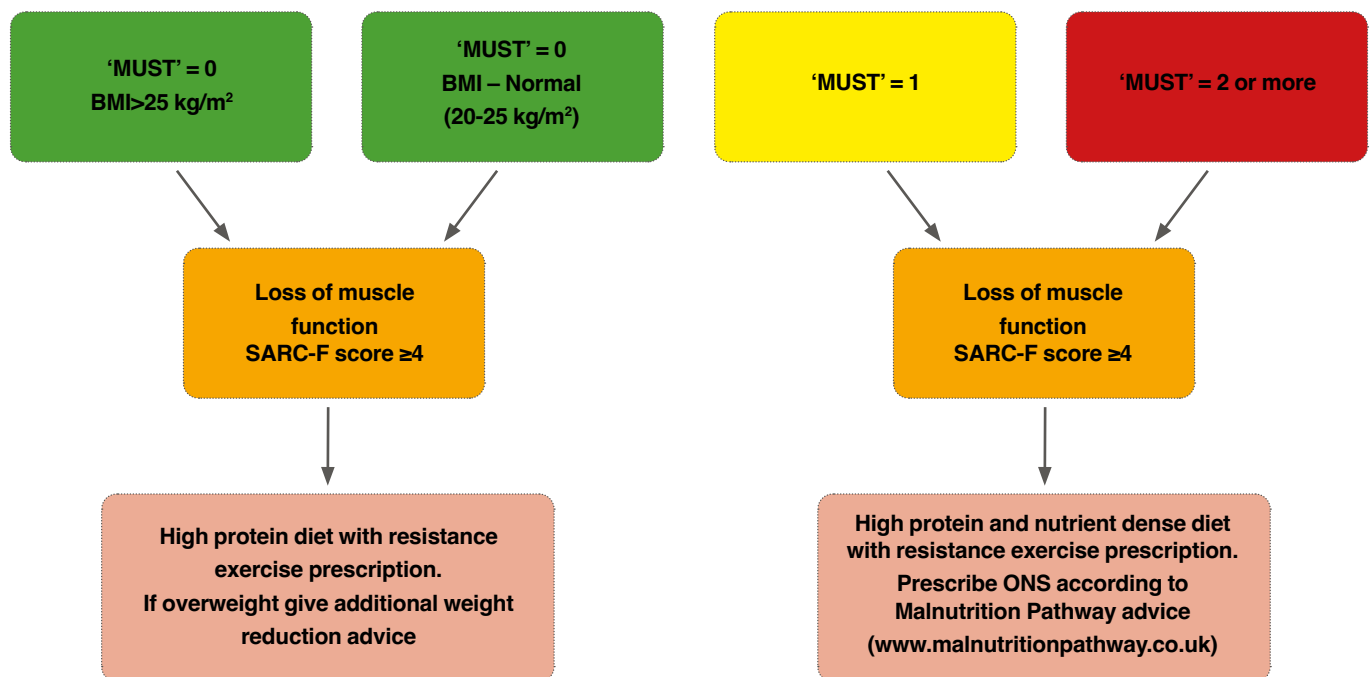
A relationship between atrophy of the swallowing muscles and sarcopenia has been reported²⁸. Healthcare professionals should be alert for this possibility and act accordingly, such as referral to Speech and Language Therapists for texture modification of diet and thickening of fluids if indicated. Further information on dysphagia can be found in the Malnutrition Pathway Dysphagia Fact Sheet (bit.ly/2HXZaUd).

Principles of the Management of Malnutrition in Sarcopenia

If sarcopenia and risk of malnutrition have been identified, patients can be managed pragmatically, using management strategies detailed below. A multi-disciplinary approach may be required to support the identification and appropriate management. The corner stone of management will involve good nutritional care and exercise. Management of malnutrition should follow existing guidance²⁶ and can be linked to the malnutrition risk category (low, medium or high risk):

1. Identify and record risk of malnutrition and sarcopenia (see Figure 2). Treat underlying causes where possible, as in many cases, sarcopenia is multifactorial. These could include poor nutritional intake, bed rest, underlying disease such as bone and joint diseases, neurological disorders, metabolic disorders etc⁴.
2. Agree with patient the desired outcomes, emphasising that improvements in function are possible. These could include improvements in the activities of daily living, reduction in falls and an assessment of quality of life⁴.
3. Schedule ongoing monitoring and review.

Figure 2: Managing malnutrition and sarcopenia in the community:



Optimising Nutritional Intake - an Evidence Based Approach

Protein

Muscle makes up ~45-55% of body mass and has an important role for mobility and health. In health, muscle mass is maintained by a balance between muscle protein synthesis and muscle protein breakdown²⁹. However, with ageing and sedentary lifestyles, muscle protein breakdown can exceed synthesis and muscles may start to atrophy (shrink). Adequate protein intakes are essential to maintain muscle mass and promote muscle synthesis. Older adults however often have a reduced food intake which can result in lower protein intakes.

It is estimated that 10% of those in community care and 35% of those in institutional care fail to meet current requirements³⁰. More recently it has been noted that 27% of 65-74 year olds and 33% of the over 75 year olds had protein intakes below the current UK estimated requirements for all adults (0.75 g protein/kg body weight)³¹.

Protein requirements for older adults may be higher than current UK recommendations; Bauer et al³² have suggested that to maintain and regain lean body mass, older adults (> 65 years) require 1.0-1.2 g protein/kg body weight, with higher amounts for active/exercising older adults (≥1.2 g/kg/day) and in acute or chronic disease (1.2-1.5 g/kg body weight/day)³².

Older adults with severe kidney disease (GFR < 30 ml/min) and not on dialysis need individualised advice³².

Some evidence suggests 25-30 g of protein is needed at each meal to build and maintain muscle^{30,33,34}.

It is important that protein intake should be spread out through the day to maximize muscle protein synthesis. Evidence suggests that whey protein (found in dairy foods such as milk, yogurt and cheese) effectively stimulates muscle protein synthesis³⁵.

Table 3: Protein requirements for older adults^{1,25,32}

	Protein requirements g/kg body weight/day	Example daily protein requirements of a:
Healthy older adults	1.0-1.2 g	70 kg older adult – 70-84 g 55 kg older adult – 55-66 g
Older adults with an acute/chronic condition	1.2-1.5 g	70 kg older adult – 84-105 g 55 kg older adult – 66-83 g
Older adults with severe illness/injury	>1.5 g	70 kg older adult >105 g 55 kg older adult >83 g
Older adults with a BMI > 30 kg/m²	Use 75% of value above dependent on category	120 kg older adult = 90-108 g 120 kg older adult with acute/chronic condition = 108-135 g 120 kg older adult with severe illness/injury >135 g
Older adults with a BMI > 50 kg/m²	Use 65% of value above dependent on category	180 kg older adult = 117-140 g 180 kg older adult with acute/chronic condition = 140-176 g 180 kg older adult with severe illness/injury >176 g

Further information on protein can be found at bit.ly/3fLQc9L

The following advice may be helpful for patients (adapted from Phillips & Martinson¹⁴):

1. Ensure each main meal includes a good-quality protein source, for example, lean red meat, poultry, fish, eggs, milk, cheese, lentils, soy, or yogurt.
2. Aim for approximately 20-40 g protein, at each meal to achieve daily protein requirement (see table 3).
3. Choose higher protein products or protein enhanced foods such as certain brands of yogurt, dairy drinks or ice cream.
4. Include protein-based snacks, such as yogurt, smoothies containing milk, yogurt or vegetable protein, cottage cheese with oat cakes/crackers, or milky drinks.
5. Enrich milk, sauces, or desserts with dried skimmed milk powder to increase protein content (if protein intake is low) and to increase nutrient density.
6. Include dairy in desserts to boost the protein content of the meal (e.g., milk puddings or yogurt).

In sarcopenic obesity in addition to protein recommendations there are also some dietary considerations to support healthy weight loss whilst minimising loss of muscle mass:

- **For obese individuals calorie intake may need to be limited to lose body fat and improve physical function. A safe rate of weight loss in those who are overweight or obese is considered to be ~0.5 kg/week¹²**
- **A lower carbohydrate, higher protein diet may not only enable a reduction of fat mass, but also preserve lean mass³⁶, which is of key importance in managing sarcopenia. Vegetables and fruit provide important vitamins and minerals and should therefore be encouraged aiming for 5 portions a day³⁷**

Whole diet approach

A recent UK dietary survey indicates that older adults fail to meet the recommendations for intake of fruit, vegetables, fibre and oily fish, with evidence of low intakes of Vitamin A, Vitamin D, riboflavin and folate. Furthermore, data indicated excess intakes of saturated fat, free sugars and salt³¹.

A 'Mediterranean' dietary approach may have the potential to be an effective strategy to improve the quality of the diet and prevent sarcopenia³⁸. The Mediterranean diet includes fruit and vegetables, nuts, olive oil, legumes (beans, peas and lentils) and more fish and poultry than red/processed meat, with lower amounts of butter, cream, margarine, sweetened fizzy drinks and confectionery³⁹.

It is important to ensure patients are getting a balance of vitamins and minerals. There are several specific nutrients that might need further consideration:

- Vitamin D: Vitamin D supplementation may reduce falls risk in older adults with low Vitamin D levels⁴⁰, and it also helps with the absorption of calcium, a nutrient which is vital for bone health. Current UK advice for all adults is to consider taking a daily supplement of Vitamin D (10 micrograms (µg); 400 International Units (IU)/day), between October and early March. Frail and housebound adults and those who always cover their skin when outdoors and people with dark skin (African, African-Caribbean or South Asian family origin) should take a daily supplement (10 µg; 400 IU/day) throughout the year⁴¹.
- Vitamin A/retinol: Population sub-groups at increased risk of osteoporosis, such as postmenopausal women and older people, should not consume more than 1500 µg/day of retinol³¹. Refer to a Pharmacist for further advice on supplement contents.
- Calcium: Dairy foods or non-dairy foods with added calcium should be included, to meet calcium requirements and prevent potential disturbances in bone metabolism¹².

Oral nutritional supplements (ONS)

When protein deficit is significant, dietary advice may not be enough to adequately increase intake, particularly in the presence of poor appetite. For example 20 g of protein equates to 3 eggs or a 100 g steak or 500 ml of milk or 80 g of peanut butter. A frail elderly person may be unable to consume such quantities at one meal let alone several times a day.

Current NICE guidance advises healthcare professionals to consider oral nutrition support for those at risk of malnutrition. This includes dietary advice and the use of oral nutritional supplements (ONS) where appropriate.

ONS in addition to dietary advice have been shown to significantly improve protein intakes and clinical outcomes (particularly high protein ONS)⁴² and may be necessary to help meet the requirements of patients at high risk of malnutrition. They also provide additional energy and micronutrients to improve overall nutrient intakes.

There may be instances where ONS may be appropriate in obese individuals with sarcopenia, for example if significant unintentional weight loss has occurred in the presence of disease. Consider whether a referral to a dietitian may be required in these situations

Exercise

Exercise in combination with diet is important to promote muscle maintenance and growth. Exercise programmes designed to improve strength and balance should be delivered over several weeks or months and can lead to a reduction in falls of up to 54%⁴³.

Individualised regimes or supervision from appropriately qualified healthcare professionals (e.g. physiotherapists) may be needed. It is important that activity advice is geared to the individual's history bearing in mind that what may be a little amount of activity to some may be a lot to others. There are several useful websites for further information:

- The Chartered Society of Physiotherapy (CSP) offers advice for specific conditions - bit.ly/3yEmsnL
- The Chief Medical Officer (CMO) has produced some specific guidelines for physical activity for older people bit.ly/3xo1MzZ and advice on the types of activities that can help maintain or improve aerobic capacity, strength, balance and bone health - bit.ly/3tP6Nzg (see page 17 of document)

Further information

Visit www.malnutritionpathway.co.uk for further information on malnutrition.

A specific fact sheet on falls can be found at www.malnutritionpathway.co.uk/falls.pdf

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