Muscle matters: A proposed algorithm to guide screening, assessment and management of poor muscle health in primary care

Robin M Daly, David Scott, Linda Govan, Anita Muñoz, Anthony Villani, Simon Willcock

Background
Muscle health can decline from the third decade of life, potentially leading to the disease sarcopenia, which is characterised by low skeletal muscle mass, strength, and/or impaired physical function. Sarcopenia is a serious condition associated with many chronic conditions and increased healthcare costs, emphasising the need for early detection and intervention. However, in routine clinical practice, muscle health remains poorly recognised, underappreciated and rarely considered.

Objective
To develop a proposed clinical muscle health monitoring and management algorithm for use by healthcare professionals in identifying patients with or at-risk for poor muscle health to support early detection and timely management.

Discussion
Primary care represents an ideal setting to identify and support patients with or at-risk for poor muscle health. This article outlines an easy-to-use and practical four-step muscle health algorithm (SUSPECT, ASK and/or ASSESS, PREVENT or MANAGE, REVIEW) for early identification of poor muscle health, allowing for timely prevention or intervention.

SKELETAL MUSCLE, the most abundant tissue in the body, has critical structural, locomotive and metabolic functions and thus plays a key role in the onset and progression of many chronic diseases.[1,2] Muscle mass and strength can decline from the fourth decade of life and accelerate after the age of 60 years, leading to lifetime losses of ~30–40%.[3–5] Declines in physical function typically occur later in life and can exceed ~50% of maximal capacity.[3] If untreated, this can lead to the disease sarcopenia, which is a skeletal muscle disorder associated with an increased risk for falls, fractures, physical disability, mortality, reduced quality of life and increased healthcare costs.[1,6] Despite its significant impact, sarcopenia remains poorly recognised and underdiagnosed,[7,8] posing a major public health challenge in Australia's ageing population.

Currently there are no approved pharmacological agents to treat sarcopenia, but high-level evidence indicates muscle-strengthening exercises and adequate nutrition, particularly high-quality dietary protein, can improve or counteract muscle loss in older adults with or at risk of sarcopenia.[9–13] However, our previous research that involved >1350 Australian general practitioners (GPs) and practice nurses revealed only 23% screened/assessed for sarcopenia. While most (>80%) believed they should have a key role in identifying/managing it, a number of barriers were reported. These included: it is not a priority; they lack knowledge about the condition; they lack confidence in identifying and treating it; they lack services to refer on to; they don't have access to appropriate tools to identify or treat it; nor the time to address it in practice.[14] Similar findings have been reported among other healthcare professionals.[7,15–17] The absence of standardised screening/assessment/management tools and the complexity of integrating new processes into busy primary health workflows,[18] highlights the need for a simple and feasible approach to raise awareness about risk factors for poor muscle health and strategies for early identification to prevent, and/or reduce the risk of sarcopenia. This is supported by our previous work where we convened eight representatives from Australia's primary care and research communities to identify barriers and potential solutions to sarcopenia screening, assessment and management within routine clinical practice.[18] Key barriers identified were the absence of tools, resources and clear protocols for assessing and managing muscle health in primary care.[18] Therefore, the aim of this study was to develop a clinical muscle health monitoring and management algorithm for use by healthcare professionals in identifying patients with or at-risk for poor muscle health to support early detection and timely management.

Developing a muscle health monitoring and management algorithm for primary care

To guide the development of a muscle health monitoring and management algorithm, six experts (leading sarcopenia researchers [RMD, DS, AV] with backgrounds in exercise physiology and dietetics and primary-care [GPs and a practice nurse] representatives [LG, AM, SW]), convened for a 1-day workshop to discuss key literature that was provided to the expert group for pre-workshop review, and share experiences of muscle health management practices in Australian primary care settings. The literature focused on major sarcopenia guidelines and peer-reviewed publications related to sarcopenia screening, diagnosis and management. Following the workshop, a medical writer prepared a report on key aspects agreed on by the experts, and the group collaborated online to finalise the algorithm. The proposed four-step algorithm includes: (1) guidance on risk factors for poor muscle health (SUSPECT); (2) details on screening/assessment (ASK and/or ASSESS); (3) management suggestions (PREVENT or MANAGE); and (4) details on the follow-up process (REVIEW).

Step 1: SUSPECT

Since muscle loss can commence in the third decade of life and accelerates after the age of 60 years,[3,4] it was recommended that poor muscle health be considered from the age of 50, but screening be conducted in patients with common risk factors or based on clinical judgement (Figure 1). For instance, patients with slow walking speed, poor balance or difficulty rising from a chair, or comorbidities known to exacerbate muscle loss (eg chronic diseases, acute illnesses/injuries resulting in immobilisation),[19–23] should prompt further investigation. Certain medications listed in Figure 1 that are linked to muscle loss to treat diseases such as cancer, cardiovascular disease, diabetes, obesity and inflammatory-related diseases,[24] should be reviewed. Additionally, weight loss, low body mass index, early menopause, malnutrition, sedentary lifestyle, physical inactivity, history of falls/fractures and recent hospitalisation are recognised risk factors for sarcopenia.[19,20,25–27] It is recommended that for patients with ≥1 risk factor, or for whom clinical judgement suggests poor muscle health is present (or they are at risk), the practitioner should proceed to ASK and/or ASSESS as appropriate based on available resources and patient capacity (eg time and ability to perform certain assessments).

Step 2: ASK and/or ASSESS

Step 2 (ASK) aims to identify patients at increased likelihood of poor muscle health and is suitable as a standalone risk assessment approach in clinical settings where resources, space and/or time may be limited, because it relies only on patient-reported outcomes. It is recommended the 5-item SARC-F screening questionnaire be used: Strength, Assistance in walking, Rise from a chair, Climb stairs and Falls.[28] Current guidelines[6,28,29] recommend a SARC-F score ≥4 or clinical suspicion to initiate objective assessment of sarcopenia, but SARC-F scores ≥1 or ≥2 have shown to improve sensitivity for identifying those with low muscle strength.[30,31] Findings from our 2024 National Muscle Health survey involving 1261 Australian adults aged 50–94 years across all states and territories found that 25.7% had a SARC-F score ≥2.[32] Therefore, a screening cut-off ≥2 was recommended (Figure 1), which along with clinical suspicion, should trigger an objective assessment of muscle strength and/or function (ASSESS), where time and resources support it. Otherwise, it can be considered sufficient to progress to step 3 (MANAGE).[32]

Step 2 (ASSESS) might be conducted after step 2 (ASK), or instead of, as resources permit. Step 2 (ASSESS) aims to objectively identify those with low muscle strength and/or poor function using at least one of three approaches, depending on time, resources or patient-specific constraints (eg osteoarthritis precluding handgrip strength [HGS] assessment): (1) HGS using a commercially available dynamometer (available online for <AU$100); (2) five-times sit-to-stand (STS) as a measure of dynamic leg muscle strength; and/or (3) 3-metre timed-up-and-go (TUG) as a measure of physical function (Figure 1). These were selected based on their practicality for use within clinical settings as they require minimal training and time, can be easily replicated under standardised conditions, use low-cost equipment, and have normative values.

Since this algorithm is intended to guide identification, prevention or management of poor muscle health before the onset of sarcopenia, we recommend cut-offs for each assessment approach as follows:

- HGS (men <37 kg; women <23 kg)[33]
- Five-times STS (≥11 seconds)[33]
- 3-metre TUG (≥10 seconds).[34]

These cut-offs represent scores below the 20–25th percentile of normative ranges for adults ≥60 years, rather than applying cut-offs from current operational definitions of sarcopenia. Practitioners should recognise younger patients at risk for poor muscle health might not meet these criteria, and in such circumstances, clinical judgement is recommended to determine whether prevention/management strategies are appropriate. For example, weight loss (≥5%), prolonged immobilisation and other risk factors (step 1, SUSPECT) can result in muscle loss, but younger patients might not meet our criteria for poor muscle health. Nevertheless, practitioners should consider strategies to prevent further muscle declines and reverse those that have already occurred.

Step 3: PREVENT or MANAGE

Based on step 2 (ASK/ASSESS), in the presence of an increased likelihood of poor muscle health (clinical suspicion and/or SARC-F ≥2), low muscle strength and/or impaired function, clinicians should proceed to step 3 (MANAGE). For patients not meeting these criteria, it is recommended to proceed to step 3 (PREVENT) (Figure 1).

Current guidelines for sarcopenia prevention/management recommend a multi-component exercise program incorporating progressive resistance training with challenging balance/mobility activities (at least twice weekly, ~6–10 exercises, 2–3 sets, 8–12 repetitions) of moderate–high effort targeting the major muscle groups, coupled with optimising energy and dietary protein intake.[9–11,35] To optimise patient engagement and health outcomes, programs should be individually tailored, progressive and reassessed after ~12 weeks (and thereafter as recommended by an exercise professional),

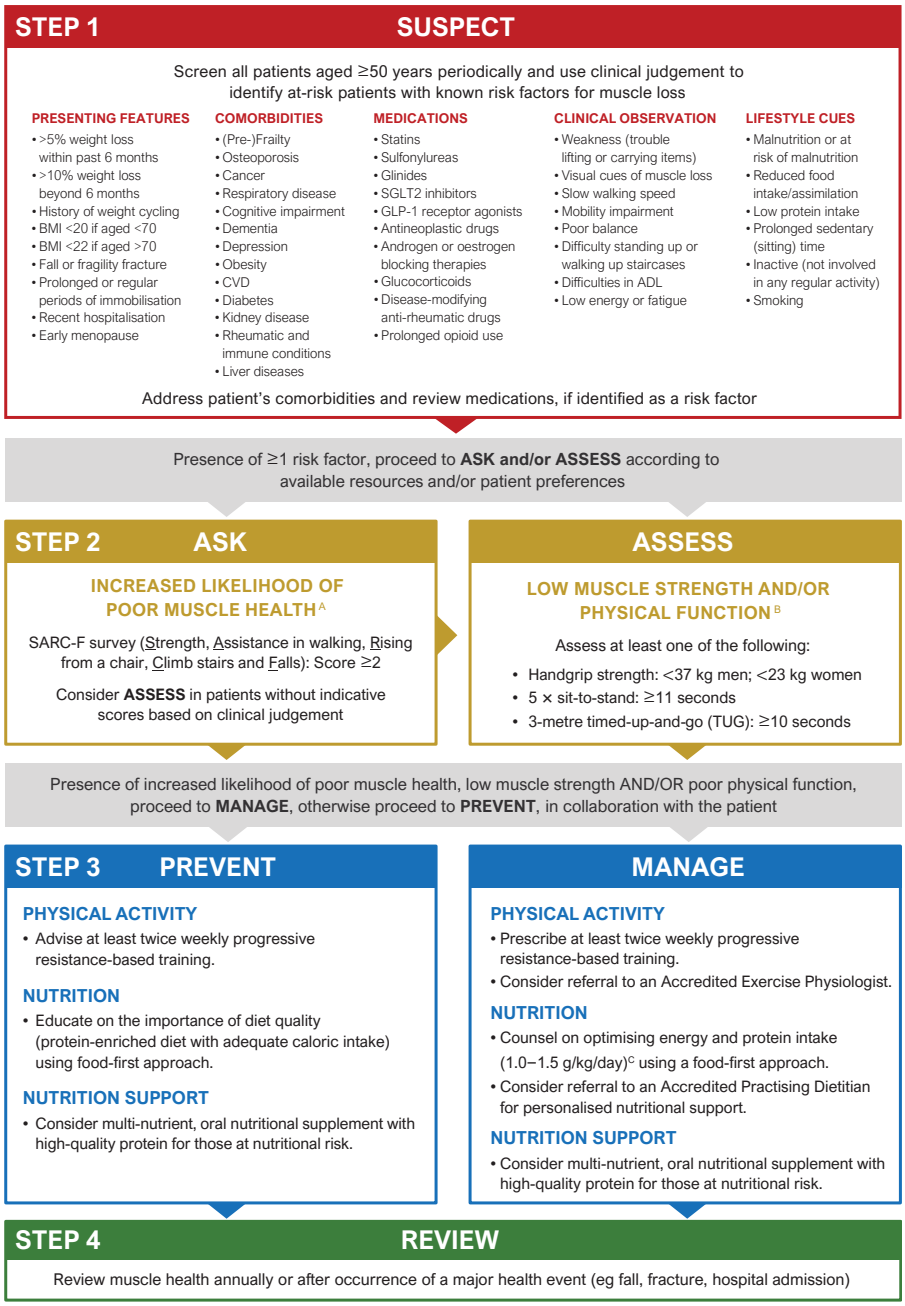

Figure 1. The four components of the muscle health monitoring and management in primary care algorithm: SUSPECT, ASK and/or ASSESS, PREVENT or MANAGE and REVIEW.

[A] Cut-off for SARC-F is based on evidence of highest sensitivity for early detection of increased likelihood of poor muscle health.

[B] Cut-offs for low muscle strength and low physical function represent scores below the 20th to 25th percentile of normative ranges based on data from adults aged 60 years and older. You might still consider younger patients without indicative scores for prevention and management.

[C] Except in those with significant kidney disease defined by an eGFR of <30 mL/min/1.73 m^2 in whom clinical judgement should be applied.

ADL, activities of daily living; BMI, body mass index; CVD, cardiovascular disease; eGFR, estimated glomerular filtration rate; GLP-1, glucagon-like peptide-1; SGLT2, sodium-glucose cotransporter-2.

with referral to an Accredited Exercise Physiologist (AEP) recommended for those managing one or more chronic conditions or who are placed on a GP chronic condition management plan. A local AEP can be found using the Exercise and Sports Science Australia 'Find an accredited exercise professional' link (www.essa.org.au/Web/Member-location-search.aspx).

Adequate dietary protein is also important to optimise muscle mass, particularly in older adults and those with malnutrition and sarcopenia. Current guidelines recommend a protein intake of 1.0–1.5 g/kg/day,[35–37] that includes 25–30g of high-quality protein per meal,[36] for older adults and those with acute or chronic conditions (including sarcopenia). In those with chronic kidney disease (CKD) stages 4 and 5 (estimated glomerular filtration rate <30 mL/min/1.73 m^2), clinical judgement of protein intake should be applied. When adequate calories, protein and nutrients cannot be achieved through a food-first approach or malnutrition is identified, a multi-nutrient oral nutritional supplement enriched with protein, including the essential amino-acid leucine and its metabolite beta-hydroxy-beta-methylbutyrate (HMB) to support muscle mass by increasing protein synthesis and attenuating protein degradation, is recommended.[35] For those with or at high risk of poor muscle health, referral to an Accredited Practising Dietitian (APD) is recommended for individualised nutrition support and monitoring, including those placed on a GP chronic condition management plan (https://member.dietitiansaustralia.org.au/Portal/Portal/Search-Directories/Find-a-Dietitian.aspx).

Step 4: REVIEW

It is recommended all patients undergo follow-up annually or as appropriate after a major health event (fall, fracture, immobilisation or hospital admission), change in health status/lifestyle (malnutrition) and/or commencement of medications or diagnosis of health conditions linked to muscle loss.[29] This should include a review of clinical risk factors and/or assessment of SARC-F and/or handgrip strength, five-times sit-to-stand and/or 3-metre timed-up-and-go performance.

Implementation of the muscle health algorithm

This proposed new algorithm is designed as a practical tool for primary care, providing a framework for clinicians to identify patients with/at risk for poor muscle health and aid in early detection and timely management. It aligns with established assessments to determine the likelihood of poor muscle health or confirm the presence of low muscle strength or function that can be performed during routine consultations (eg 75+ Comprehensive Health Assessment and Aboriginal and Torres Strait Islander assessments). The algorithm is expected to undergo further refinement as studies are conducted to understand its feasibility and appropriateness in primary care. Further research is needed to define evidence-based cut-offs with good/excellent sensitivity for identifying those with poor muscle health across diverse patient populations, including younger individuals. It is also necessary to evaluate potential barriers/enablers to the practical application of the algorithm in primary care settings across Australia, and to develop interventions that maximise its visibility and utility for practitioners.

Conclusion

Early detection and intervention of poor muscle health in primary care are vital to reducing the risk and impact of sarcopenia. The proposed muscle health monitoring and management in primary care algorithm provides the first step towards a practical and accessible framework for raising awareness, screening/assessment and management of poor muscle health in primary care.

Key points

- Muscle loss typically starts in the fourth decade of life and accelerates in later life, potentially leading to the disease sarcopenia.
- Poor muscle health and sarcopenia are associated with an increased risk of chronic disease, reduced quality of life and higher rates of mortality.
- Identification and management of poor muscle health is rarely considered in primary care.
- This article proposes a primary care four-step algorithm ([1] SUSPECT, [2]ASK and/or ASSESS, [3] PREVENT or MANAGE, [4] REVIEW) to aid in early identification and management of poor muscle health.
- Step 3, PREVENT or MANAGE, recommends comprehensive care, potentially supported by referral to an AEP and APD, including muscle-strengthening exercises and nutritional support ensuring adequate dietary protein.

Authors

Robin M Daly PhD, FASMF, FASBMR, Professor and Chair of Exercise and Ageing, Institute for Physical Activity and Nutrition, School of Exercise and Nutrition Sciences, Deakin University, Melbourne, Vic

David Scott PhD, BHM (Hons), Associate Professor and NHMRC Emerging Leadership Fellow, Institute for Physical Activity and Nutrition, School of Exercise and Nutrition Sciences, Deakin University, Melbourne, Vic; Chair of Sarcopenia Diagnosis and Management Task Force, Australian and New Zealand Society for Sarcopenia and Frailty Research (ANZSSFR), Melbourne, Vic

Linda Govan RN, MHA, MPH, Senior Project Manager, The Australian Primary Health Care Nurses Association (APNA), Melbourne, Vic

Anita Muñoz MBBS (Hons), FRACGP, Grad Cert Clin Teach, MPH, GAICD, General Practitioner and Director, Healthcare on Collins, Melbourne, Vic; Chair, Victoria Faculty, The Royal Australian College of General Practitioners, East Melbourne, Vic

Anthony Villani PhD, APD, Past-President, Australian and New Zealand Society for Sarcopenia and Frailty Research (ANZSSFR), Melbourne, Vic; Senior Lecturer, School of Health, University of the Sunshine Coast, Sunshine Coast, Qld

Simon Willcock MBBS, PhD, FRACGP, Honorary Professor, Macquarie University Hospital and Health Sciences Centre, Sydney, NSW

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Correspondence to:
robin.daly@deakin.edu.au

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correspondence **ajgp@racgp.org.au**

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