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Unit No. 1

SINGAPORE CLINICAL PRACTICE GUIDELINES FOR SARCOPENIA: SCREENING, DIAGNOSIS, MANAGEMENT, AND PREVENTION

A/Prof Lim Wee Shiong

ABSTRACT

Sarcopenia refers to the age-associated progressive and generalised loss of skeletal muscle mass plus loss of muscle strength and/or reduced physical performance. Despite its importance, sarcopenia often remains unrecognised and inadequately managed in routine clinical care. A workgroup was convened by the Chapter of Geriatricians and the Society for Geriatric Medicine Singapore to develop the first-ever country-specific CPG for sarcopenia. The workgroup developed 20 evidence-based recommendations that aim to facilitate adoption of the Asian Working Group for Sarcopenia (AWGS) 2019 consensus into current practice in Singapore. The CPG recommends a case-finding approach in at-risk older adults using validated case-finding tools. Screen-positive individuals should be assessed for "possible sarcopenia" and underlying causes. For diagnosis, the CPG recommends using the AWGS 2019 algorithm, and when necessary, dual-energy X-ray absorptiometry to determine low lean mass for a confirmatory diagnosis of sarcopenia. For treatment, the CPG recommends resistance exercises and a quality protein-rich diet/protein supplementation, with Vitamin D supplementation for insufficiency (<30 micrograms/L). For prevention, the CPG recommends regular resistance-based physical activity and adequate protein intake (≥1.0 g/kg bodyweight). We encourage more research to address local evidence gaps. It is hoped that this first country-specific CPG for sarcopenia will play a big role in facilitating the adoption of the AWGS 2019 consensus into current practice in Singapore.

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INTRODUCTION

Sarcopenia is defined as the age-associated progressive and generalised skeletal muscle disorder that involves loss of muscle mass plus loss of muscle strength and/or reduced physical performance.[1] Sarcopenia is associated with adverse health consequences including falls, functional decline, hospitalisation, frailty, increased healthcare costs, and mortality. A systematic review and meta-analysis showed a consistent association between sarcopenia and mortality, with a pooled odds ratio of 3.59 (95 percent CI 2.96-4.27) and a larger effect size in men and women aged 79 years and older.[2]

The prevalence of sarcopenia increases with age with a slight male predominance. In Asia, using the Asia Working Group for Sarcopenia (AWGS) 2014 criteria for sarcopenia diagnosis, prevalence ranges from 5.5 to 25.7 percent.[3] When only larger studies >1,000 in sample size are considered, the prevalence estimates become more precise, ranging from 7.3 to 12 percent. Locally, the prevalence of sarcopenia ranges from 6.1 percent to 44.3 percent, reflecting differences in study setting, sarcopenia criteria, and cut-offs. The prevalence of sarcopenia in primary care and specialist outpatient clinics was 27.4 percent and 44.3 percent, respectively.[4] Amongst healthy community-dwelling older persons, the reported prevalence ranged from 27 percent in the GeriLABS-2 study to 32.2 percent in the Yishun study with a male predominance.[5,6]

Older age may be the most important among numerous reported risk factors: a local population study of older adults aged >60 years found that handgrip strength demonstrated a decreasing trend with increase in age across all ethnic groups and sexes.[7] Household status, lifestyle habits such as binge drinking with weekly or daily alcohol consumption, physical inactivity, poor nutritional and dental status, and comorbidities (e.g., osteoporosis, cardiovascular risk factors) are also independently associated with sarcopenia. The likelihood of developing sarcopenia is significantly correlated with the number of cardiometabolic risk factors, notably diabetes, hypertension, and dyslipidaemia. In particular, type 2 diabetes is an important predictor of sarcopenia, with accelerated decline in leg lean mass and muscle strength in older people with diabetes. In local studies, factors significantly associated with sarcopenia include stroke disease, cognitive impairment, physical frailty, social frailty, low physical activity, and risk of malnutrition.[4]

CHALLENGES IN CLINICAL PRACTICE

Despite its importance, sarcopenia often remains unrecognised and inadequately managed in routine clinical care.[8] A major hindrance to its clinical integration is the variation in diagnostic tools for sarcopenia. Locally, there is heterogeneity in clinical practice regarding the diagnostic criteria for sarcopenia; tests used for case-finding and evaluation of muscle function; the cut-offs for these tests; and how these tests are being performed. The published research studies on sarcopenia in the local population have hitherto not been systematically examined and summarised.

A/PROF LIM WEE SHIONG
Senior Consultant
Department of Geriatric Medicine, Institute of Geriatrics and Active Ageing
Tan Tock Seng Hospital

Co-chair,
Singapore Clinical Practice Guidelines for Sarcopenia

SINGAPORE CLINICAL PRACTICE GUIDELINES FOR SARCOPENIA

To address these challenges, a workgroup was convened by the Chapter of Geriatricians and the Society for Geriatric Medicine Singapore to develop contextualised, evidence-based Clinical Practice Guidelines (CPG). The workgroup drew upon three main sources of evidence: AWGS 2019 consensus; updated literature review of Singapore studies till 31 Dec 2020; and recent systematic reviews. The workgroup developed twenty recommendations covering case-finding, diagnosis, treatment, prevention, and research (refer to **Table 1**).[4]

The AWGS 2019 consensus was selected from among the various diagnostic criteria as it provides an algorithm for identifying and diagnosing older adults with or at-risk for sarcopenia based on cut-offs that have been validated in Asian populations, including contributions from Singapore studies.[1] Moreover, the updated algorithm includes case-finding and diagnostic protocols for use in community setting without advanced diagnostic equipment such as primary healthcare or community-based preventative services (refer to **Figure 1**). Specifically, the AWGS 2019 introduces the category "possible sarcopenia", defined by low muscle strength or reduced physical performance, which is recommended for use in primary healthcare and preventive services but not in hospital or research settings.[1]

This article summarises the salient features of the recommendations; full details can be found in the CPG publication.[4]

A. CASE-FINDING

Many cases of sarcopenia go undiagnosed. However, universal screening at the population level is not recommended as screening tools have diagnostic limitations and the effect of such screening on relevant outcomes is unproven.[9] Therefore, a case-finding approach for sarcopenia in older adults aged 60 years and above is recommended, and is particularly relevant in care settings where a higher prevalence of sarcopenia might be expected, such as admission to hospital, rehabilitation settings, or nursing homes.[10] This approach involves looking for sarcopenia in high-risk populations with relevant co-morbidities (for instance, chronic lung, kidney, liver or heart disease; diabetes mellitus; stroke and Parkinson's disease; knee osteoarthritis; osteoporosis; and central obesity), history of falls, functional decline or limitation, and the malnourished or those at risk of malnourishment.

Three case-finding tools are recommended: SACR-F, calf circumference (CC), or the combination of the two (SARC-CalF). The SARC-F is a self-reported 5-item questionnaire that assesses symptoms in strength, assistance in walking, rising from a chair, climbing stairs, and falls (refer to **Table 2**). Using the recommended cut-off of ≥4 points, the SARC-F shows low-moderate sensitivity and moderate-high specificity for sarcopenia diagnosis in the community and outpatient clinic setting.[11] With evidence supporting the increased sensitivity of SARC-F using the lower cut-off of ≥2 points, further assessment for sarcopenia would be warranted if there is clinical suspicion, even though the SARC-F score may be <4.[12,13]

CC has moderate-to-high sensitivity and specificity in predicting sarcopenia or low skeletal muscle mass.[1] Recommended cut-offs are CC <34 cm for men and <33 cm for women. Accurate measurement is critical. As there is systematic overestimation of sitting over standing measurements by 0.7 cm leading to under-detection in the sitting position, CC should be measured in the standing position using a nonelastic tape. Notably, the diagnostic performance of CC can be attenuated in sarcopenic obesity due to decreased sensitivity with under-detection in women.[14] The SARC-CalF combines both CC and SARC-F, which is analogous to the corresponding components of low muscle mass and muscle function. The SARC-CalF improves the sensitivity of SARC-F for case-finding by adding CC, with a score ≥11 indicating sarcopenia.[15] Similar to CC, the diagnostic performance of SARC-CalF is attenuated by obesity with under-detection of sarcopenic obesity in both older men and women.[16]

Older adults with relevant symptoms or chronic conditions, or are positive on the case-finding tools, should be evaluated for "possible sarcopenia" via the assessment of handgrip strength or the 5-time chair stand. Individuals with "possible sarcopenia" should be evaluated for potential underlying causes, namely the **4Ds** of drugs (medications such as statins, fibrates, and steroids can cause myalgia and proximal weakness); diabetes mellitus; other diseases (chronic lung, kidney, liver or heart disease, osteoporosis, knee osteoarthritis, and neurological conditions); and deficiency (Vitamin D deficiency and risk factors for malnutrition such poor dentition or oral health, swallowing difficulties, conditions/medications causing anorexia or malabsorption, or socioeconomic factors affecting access to food)[4,10] (refer to **Table 3**). In addition, they should be offered advice on lifestyle modifications in diet – namely a good quality diet with an adequate caloric and protein intake – and regular physical activity, which includes resistance-based muscle strengthening activities (>2 days/week) and multi-component physical activity (>3 days/week) for maintaining muscle strength. Where relevant, suitable cases can be referred for further evaluation of underlying causes and provision of appropriate personalised intervention programmes by the multidisciplinary team.

B. DIAGNOSIS

Based on the AWGS 2019 algorithm, the diagnosis of sarcopenia requires the presence of both low muscle mass and impaired muscle function (low muscle strength or low physical performance), with specified cut-offs for each diagnostic component[1] (refer to **Figure 2**). The presence of low muscle mass, low muscle strength, and low physical performance would constitute "severe sarcopenia". Of note, the AWGS 2019 algorithm for sarcopenia is applicable only for older adults aged ≥60 years. This is in line with the

definition of sarcopenia as age-associated by AWGS 2019, and the recommended age cut-off at either age 60 or 65, depending on how each country defines "older people".

As per the recommendations of AWGS 2019, the diagnosis of "possible sarcopenia" without the need for confirmatory DXA imaging would suffice in the primary care or community preventive services settings. Older adults with sarcopenia often do not want expensive scans or testing to determine muscle loss (noting unnecessary costs and time), preferring instead to rely on their primary care provider's clinical judgement for a diagnosis of sarcopenia.[17] Thus, the CPG recommends that DXA is performed only when it is necessary to determine low lean mass for a confirmatory diagnosis of sarcopenia, for instance, in complex cases with diagnostic and/or management conundrums.

1. Skeletal Muscle Mass Measurement

When it is necessary to determine low lean mass for a confirmatory diagnosis of sarcopenia, dual-energy X-ray absorptiometry (DXA) is recommended as the imaging modality. The DXA cut-offs for low muscle mass in sarcopenia diagnosis are appendicular skeletal mass index (ASMI) <7.0 kg/m^2 in men and <5.4 kg/m^2 in women.

During the DXA procedure, subjects lie supine with arms and legs at their sides during the 15-minute scan. Radiation exposure from body composition DXA scan is minimal at 1-4 μSv. Readings of lean mass from the four limbs are summed and divided by height squared to yield the height adjusted appendicular lean mass. However, as DXA measures lean mass rather than muscle mass per se, limitations include: 1) DXA can misclassify body composition in individuals with high levels of water and fibrous tissue; 2) DXA shows only a weak association with adverse health outcomes; and 3) DXA does not provide information about muscle quality. Despite these limitations, DXA remains a useful modality with capacity for rapid clinical implementation.[18]

At this juncture, bioelectrical impedance analysis (BIA) is not recommended for clinical practice although it is relatively easy to use and is endorsed by AWGS 2019. BIA equations and cut-off points are population- and device-specific. Thus, its routine use in clinical care is not recommended in the absence of well-conducted local validation studies.[19] It is recommended to use a validated device, preferably multifrequency, which correlates more closely with DXA-measured appendicular skeletal mass. BIA devices designed for home use are not recommended because of suboptimal diagnostic accuracy.[20] Of note, BIA readings can also be affected by other factors such as hydration status and is contraindicated in those with pacemakers or cardiac devices.

CT and MRI are currently considered gold standards for body composition measurement. However, due to the high cost and time required, they are mostly used in research and when needed for follow-up of another condition; for example, in patients with cancer. Ultrasound has been proposed as a simple alternative to measure muscle quantity and quality in clinical practice; however, it is user-dependent and studies are currently underway to standardise the measurement protocols and to develop validated cut-offs. D3 creatine is a recently developed non-invasive isotope dilution test that shows better correlation with outcome measures than DXA lean mass[21]; its applicability and potential for scalability in the clinical setting remain to be established.[18]

2. Muscle Strength

The CPG recommends handgrip strength as a feasible and valid assessment of muscle strength in clinical practice. Low handgrip strength has been shown to be highly predictive of a range of adverse outcomes. The devices used most often in Asia are the spring-type dynamometer (Smedley) and the hydraulic-type (Jamar). It is important to note that measurement protocols may differ depending on the dynamometer being used. For instance, the recommended positions for measuring handgrip strength are sitting with 90° elbow flexion for the Jamar dynamometer and standing with full elbow extension for the Smedley dynamometer respectively[22]; the protocol for Smedley dynamometer also permits sitting for those who are unable to stand unassisted. In addition, handgrip strength results of dynamometers may not be interchangeable.[23] Thus, the CPG does not recommend the use of hand dynamometers other than the Jamar or Smedley. Where possible, local validation studies of other hand dynamometers should be carried out in order to ascertain whether there is systematic or proportional bias relative to the Jamar or Smedley.

The recommended cut-offs for low handgrip strength are <28.0 kg in men and <18.0 kg in women.[1] The CPG recommends taking the maximum reading of at least two trials of HGS using the dominant hand in a maximum-effort isometric contraction, rather than using a fixed acquisition time. The maximum reading (instead of average reading) should be used, in view of better agreement with sarcopenia diagnosis and better predictive validity for poor physical performance at two years.[24] If handgrip strength is below the gender-specific reference value, it is important to exclude differential diagnosis that can impede handgrip performance (such as hand osteoarthritis, depression, dementia, Parkinson's disease, and other neurological disorders) before ascribing the diagnosis of "possible sarcopenia".[10]

3. Physical Performance

The CPG recommends 5-time sit-to-stand test (5-STS), 6-m usual gait speed, or Short Physical Performance Battery (SPPB) as feasible and valid measurements of physical performance in clinical practice. Timed-up-and-go is not recommended, because the results may reflect multiple complex patho-etiologies. The 5-STS involves asking the participant to stand up from a chair and to sit back down as quickly as possible five times. Either the stand or sit stop can be used, as long as the same protocol is consistently used.[25] AWGS 2019 recommends ≥12 seconds as the cutoff for low physical performance to corresponded to a walking speed of

1.0 m/s.[1] The 6-m usual gait speed test involves measuring the time taken to walk 6 m at a normal pace from a moving start, without deceleration, and taking the average result of at least two trials as the recorded speed. The SPPB assesses lower limb function in the three domains of balance, gait speed, and 5-STS. Each of the three subtests is scored from 0 to 4, and summing the three subtests yields the total score (range: 0-12). It should be noted that compared with the revised European Working Group on Sarcopenia in Older People consensus (EWGSOP2), the AWGS recommends higher cut-offs for gait speed (<1 m/s vs ≤0.8 m/s) and SPPB (≤9 vs ≤8) respectively.[1,26]

C. TREATMENT

The mainstay of treatment is non-pharmacological involving the modalities of exercise and diet. The CPG recommends physical exercise focusing on progressive resistance-based (strength) training as first-line therapy to manage sarcopenia in older persons. Resistance exercise results in benefits of medium effect size for handgrip strength and large effect sizes for 5-STS and SPPB, with limited benefits on muscle mass.[27,28] Resistance exercise requires muscles to hold or work against an applied force or weight through resistance machines, free weights, resistance bands, or bodyweight. Resistance training should be progressive and involve sufficient exercise dosage to induce a training stimulus. Exercise prescription principles including frequency, intensity, type, time, and duration are crucial when planning interventions for different target groups, and should preferably be done in consultation with trained professional such as physiotherapists, exercise physiologists, and fitness professionals.[29]

The CPG also recommends a quality diet with adequate caloric and protein intake as first-line therapy for older persons with sarcopenia. The anabolic resistance of ageing muscle results in blunted response to nutrients and hormones such that older adults have higher daily protein requirements than younger people to prevent sarcopenia. The PROT-AGE and AWGS guidelines therefore recommend a daily protein intake of 1.0-1.2 g/kg bodyweight (BW), which is higher than the 0.8 g/kg BW of general guidelines.[30,31] A diet-first whole food approach is advocated, which is based on the premise that whole foods, unlike single nutrients, provide benefits that are greater than the sum of their constituents.[32] Moreover, employing a food-first approach may resonate better with older adults. Relevant myo-protective food groups are meats, fruits and vegetables, dairy products, and other whole foods such as cereals and fish. Clinicians should consider nutritional intervention with protein supplementation in older persons with sarcopenia who are unable to meet the recommended protein intake through diet. At this juncture, the evidence-base for both leucine and its active metabolite, beta-hydroxy beta-methylbutyrate (HMB), remains insufficient to recommend either leucine or HMB in the management of sarcopenia.[4,33] Lastly, nutritional interventions should be combined with physical exercise in older adults with sarcopenia, as this may confer additional benefit over either intervention in isolation.[34]

Clinicians should consider Vitamin D supplementation for sarcopenic older adults with Vitamin D insufficiency (<30 micrograms/L). In a network meta-analysis of randomised controlled trials evaluating Vitamin D in the treatment of sarcopenia, while no trial provided therapeutic-dose Vitamin D as an isolated intervention, Vitamin D supplementation in combination with exercise and protein supplementation significantly increased handgrip strength.[35] At this juncture, no drugs have been approved for the specific treatment of sarcopenia. Evidence suggests limited benefit of testosterone for physical function, and caution should be taken regarding the cardiovascular side-effect profile. Bimagrumab, a monoclonal antibody of activin receptor type 2B, was not more effective than placebo in improving muscle strength and physical performance, despite significant changes in body composition with increased lean body mass and decreased fat mass in a phase II study.[36] Based on the current evidence, the CPG does not recommend pharmacologic interventions for the specific management of sarcopenia. However, the field of pharmacotherapy is a rapidly evolving one with clinical trials underway to develop new drugs that target different mechanistic pathways in sarcopenia.[37]

D. PREVENTION

Akin to bone health, we should likewise adopt a cradle-to-grave life course approach towards muscle health. To prevent or delay sarcopenia development, the key is to start as early as possible to maximise muscle strength in youth and young adulthood, maintain muscle strength in middle age, and finally to minimise loss in older age so that we can remain above the threshold of low physical performance and postpone the onset of disability for as long as possible.[26] The CPG recommends regular physical activity and resistance-based exercise to prevent sarcopenia in older adults. The Singapore Physical Activity Guidelines (SPAG) for older adults specifies a target of 150 to 300 minutes of moderate-intensity aerobic physical activity per week, with recommendations for muscle strengthening activities (≥2 days/week) as well as multi-component physical activity (≥3 days/week) for maintaining muscle strength.[38] In addition, older adults should be encouraged to have adequate protein intake of at least 1.0 g/kg bodyweight/day to prevent sarcopenia.

E. RESEARCH

Moving forward, the CPG recommends more local research in sarcopenia focusing specifically on local cut-offs by sex and ethnicity; community prevention programmes and interventional studies; impact on quality of life, cost-effectiveness, and patient acceptability; and overlap syndromes such as sarcopenic obesity, osteosarcopenia, and osteosarcopenic obesity.[4]

CONCLUSION

In summary, the CPG addresses the knowledge-practice gap in sarcopenia through a systematic and rigorous process to develop 20 recommendations that cover the areas of case-finding, diagnosis, treatment, prevention, and research. It is hoped that this first country-specific CPG for sarcopenia will play a big role in facilitating the adoption of the AWGS 2019 consensus into current practice in Singapore.

Table 1: Final recommendations of the Singapore Clinical Practice Guidelines with strength of evidence

	Recommendation	Strength of Evidence*
A. Case-finding	1. We recommend case-finding instead of a universal screening approach for sarcopenia.	Conditional
	2. We recommend case-finding for sarcopenia in older adults aged 60 years and above, especially in high-risk populations with relevant co-morbidities (for instance, chronic lung, kidney, liver or heart disease; diabetes mellitus; stroke and Parkinson's disease; knee osteoarthritis; osteoporosis; and central obesity), history of falls, functional decline or limitation, and malnourished or at risk of malnourishment.	Conditional
	3. Case-finding for sarcopenia can be performed using the SARC-F questionnaire, calf circumference or SARC-CalF.	Conditional
	4. Individuals screened as positive should be evaluated for "possible sarcopenia" via the assessment of handgrip strength or the 5-time chair stand.	Conditional
	5. Individuals with "possible sarcopenia" should be evaluated for the presence of reversible causes and counselled on lifestyle modifications in diet and exercise.	Insufficient evidence
B. Diagnosis	1. We recommend using the Asian Working Group for Sarcopenia (AWGS) 2019 algorithm for the diagnosis and grading of severity of sarcopenia.	Conditional
	2. We recommend the use of the Asia Working Group for Sarcopenia (AWGS) 2019 cutoffs to ascertain low lean mass and low levels of muscle strength and physical performance.	Conditional
	3. When it is necessary to determine low lean mass for a confirmatory diagnosis of sarcopenia, we recommend the use of dual-energy X-ray absorptiometry (DXA) as the imaging modality.	Conditional
	4. Muscle strength should be assessed using the standard protocol for Jamar or Smedley hand dynamometers.	Strong
	5. To measure handgrip strength, it is recommended to take the maximum reading (rather than the average reading) of at least two trials using the dominant hand.	Strong
	6. Physical performance should be assessed using the 5-time chair stand, 6-m usual gait speed, or Short Physical Performance Battery.	Strong
C. Treatment	1. Older persons with sarcopenia should be encouraged to participate in resistance-based exercises to improve muscle strength and physical performance.	Strong
	2. Clinicians should advise older persons with sarcopenia on the importance of a quality diet with adequate caloric and protein intake.	Conditional
	3. Clinicians should consider nutritional intervention with protein supplementation for older persons with sarcopenia.	Conditional
	4. Nutritional intervention should be combined with physical exercise to improve muscle strength and physical performance in older persons with sarcopenia.	Conditional
	5. We do not recommend prescription of pharmacotherapy for the specific management of sarcopenia in older adults.	Conditional

	6. Clinicians should consider Vitamin D supplementation for sarcopenic older adults with Vitamin D insufficiency (<30 micrograms/L).	Conditional
D. Prevention	1. Regular physical activity and resistance-based exercise should be recommended to prevent sarcopenia in older adults. 2. Older adults should be encouraged to have adequate protein intake of at least 1.0 g/kg body weight/day to prevent sarcopenia.	Strong Conditional
E. Research	We recommend more local research in sarcopenia focusing specifically on local cutoffs by sex and ethnicity; community prevention programmes and interventional studies; impact on quality of life, cost-effectiveness, and patient acceptability; and overlap syndromes such as sarcopenic obesity, osteosarcopenia, and osteosarcopenic obesity.	n/a

*Strength of evidence considers the benefit-harm balance, patient preferences/values, cost-effectiveness, as well as the certainty of evidence. Strong means that benefits clearly outweigh any risks; Conditional means that clinicians would only refer the intervention under specific conditions because there is a fine balance between risks and burdens; Insufficient evidence (No recommendation) – there is insufficient evidence to determine net benefits or risks.

Table 2: SARC-F Screen for Sarcopenia

Component	Question	Scoring
Strength	How much difficulty do you have in lifting and carrying 10 lbs (4.5 kg)?	None = 0 Some = 1 A lot or unable = 2
Assistance in walking	How much difficulty do you have walking across a room?	None = 0 Some = 1 A lot, use aids, or unable = 2
Rise from a chair	How much difficulty do you have transferring from a chair or bed?	None = 0 Some = 1 A lot or unable without help = 2
Climb stairs	How much difficulty do you have climbing a flight of 10 stairs?	None = 0 Some = 1 A lot or unable = 2
Falls	How many times have you fallen in the past year?	None = 0 1-3 falls = 1 4 or more falls = 2
		Total score : _____ ≥4 indicates sarcopenia

Table 3: 4Ds Mnemonic: Underlying causes of Sarcopenia

1. Drugs

Common

- Statins
- Fibrates
- Steroids
- Alcohol

Less common

- Chloroquine
- Colchicine
- Antiretroviral drugs, e.g., lamivudine, zidovudine
- Chemotherapy medications

2. Diabetes Mellitus

3. Other Diseases

- Chronic lung, kidney, liver, or heart disease
- Osteoporosis
- Knee Osteoarthritis
- Neurological diseases
- Cancer
- Cognitive impairment, depression

4. Deficiency

- Vitamin D deficiency
- Caloric or protein deficiency

Risk factors for under-nutrition:

Dentition or oral health problems
Dysgeusia (loss of taste)
Dysphagia
Diseases/drugs causing anorexia or malabsorption
Deprivation (Socioeconomic factors affecting access to food)

Figure 1: Diagnosis and management of "Possible Sarcopenia"

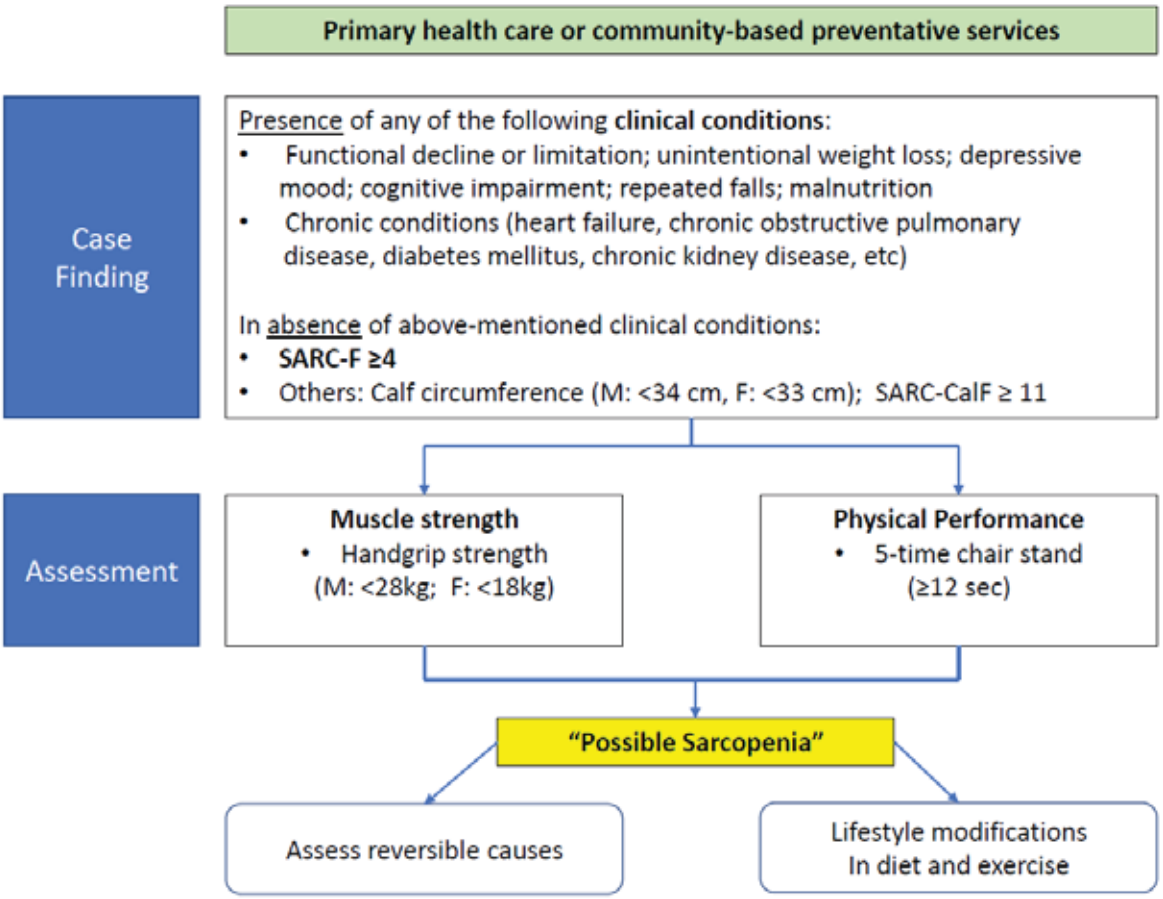
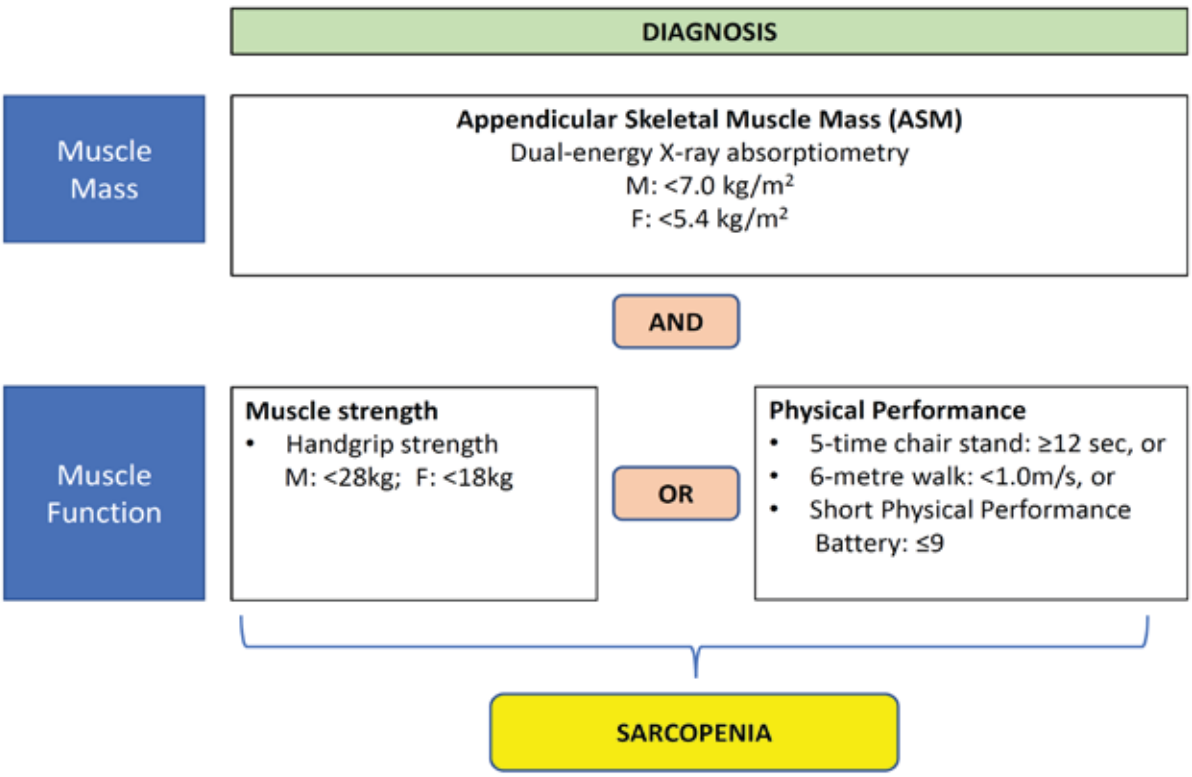


Figure 2: Algorithm for sarcopenia diagnosis (AWGS 2019 criteria)



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LEARNING POINTS

- **Sarcopenia is a geriatric syndrome that is associated with adverse outcomes in older adults.**
- **Diagnosis of sarcopenia requires the presence of low muscle mass and impaired muscle function (strength and/or physical performance). "Possible sarcopenia" is defined by low muscle strength or reduced physical performance, and is applicable for primary healthcare and community settings.**
- **Accurate case-finding and assessment requires proper administration using the correct instruments.**
- **Evaluate and address reversible causes in older adults with or at-risk for sarcopenia.**
- **Currently, the mainstay of treatment is non-pharmacological, comprising resistance exercise and adequate protein intake.**