

Unit No. 2

MANAGEMENT OF MALNUTRITION IN COMMUNITY-DWELLING OLDER ADULTS: THE IMPORTANCE OF SCREENING AND INTERVENTIONS TO IMPROVE NUTRITIONAL AND FUNCTIONAL OUTCOMES

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ABSTRACT

The worldwide population is ageing rapidly, and the number of people aged ≥ 65 years is expected to double by 2050. Prevalence of risk of malnutrition is high among community-dwelling older adults and is associated with adverse health outcomes and higher costs of care. Anorexia of ageing is a major cause, characterised by unintentional loss of appetite and reduced oral intake. Achieving energy, protein and micronutrient requirements are important to maintaining health and functional independence. Older adults require a minimum of 1.0 to 1.2 g/kg body weight/day of protein to maintain muscle health. The only exception to this recommendation is older adults with advanced kidney disease and not on dialysis. Nutritional supplementation, in addition to diet, is often required. Several international guidelines recommend oral nutritional supplements (ONS) and dietary advice for older people with malnutrition. ONS containing β -hydroxy- β -methylbutyrate (HMB) has been shown to improve nutritional and functional outcomes in community-dwelling older adults with or at risk of malnutrition. As such, early screening for malnutrition risk in older adults is an important public health strategy. Such screening enables early identification, intervention and best clinical outcomes. Raising awareness on the importance of nutritional health in older people is key, in order to maintain physical function and independent living for as long as possible, preserve the quality of life and reduce burdens of unhealthy ageing on healthcare systems.

Keywords: Malnutrition, screening, older adults, community-dwelling, oral nutritional supplement, HMB

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INTRODUCTION

Among community-dwelling older adults, the prevalence of risk of malnutrition is high and is associated with adverse health outcomes and higher costs of care. Primary care clinicians and public health leaders are uniquely positioned to change nutrition policy, training, and practice in ways

that help maintain physical function and independence with ageing. This paper provides an overview of the problem and its potential solutions.

PREVALENCE AND BURDEN OF MALNUTRITION

Malnutrition is described as “*both a cause and consequence of ill health*”; older people are particularly vulnerable.¹ Malnutrition leads to the development of frailty and sarcopenia, in addition to other predisposing factors.^{2,3} With a rapidly ageing population, malnutrition is an increasing concern. In 2019, of the 703 million persons aged ≥ 65 years worldwide, 261 million (37 percent) lived in Eastern and South-eastern Asia, a number that is expected to double (573 million) by 2050. In Singapore, there were about 719,000 people (12.4 percent of the total population) aged ≥ 65 years. By 2050, this age group is expected to reach 2,132,000 (33.3 percent).⁴

With age being an important risk factor, malnutrition is a major problem worldwide as it affects almost a quarter of adults over the age of 65. According to the World Health Organisation (WHO), the global prevalence of malnutrition among community-dwelling older adults ranges from 1.3 percent to 47.8 percent.⁵ In Asia, the prevalence of malnutrition or its risk is notably high among older, hospitalised adults, ranging from 16 percent to 78 percent.⁶ China, which has the largest ageing population in the world, has recently reported that 20 million (11 percent) of their 177 million older adults are malnourished. By 2050, this number is expected to reach 62 million.⁷ Surveys conducted in other Asian countries also showed a high prevalence of older adults in the community at risk of malnutrition: Hong Kong (30.0 percent), Taiwan (30.6 percent), Malaysia (29.6 percent) and India (48.17 percent; this figure includes community-living older adults attending clinics and those living in old-age homes).⁸⁻¹¹ In Singapore, the overall prevalence of risk of malnutrition in community-dwelling older adults is 27.6 percent.¹²

The increase in life expectancy is considered “a human success story” of strides in medicine, public health and disease prevention efforts. However, this demographic shift also represents challenges to healthcare and pension systems and increases in long-term care costs.¹³ In old age, the risk of developing chronic diseases increases and overall health and physical capacities decline. Nutritional status can also be progressively compromised over the continuum of care: upon hospital admission, up to 50 percent of patients are malnourished; many patients with normal nutritional status experience a decline during hospitalisation; after discharge, weight loss is associated with increased risk of readmissions.¹⁴⁻¹⁶ Due to altered hunger physiology, taste

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and olfactory impairment, slower gastrointestinal motility, poor nutrient absorption from disease and polypharmacy, weakness due to low muscle mass, impaired cognition and other physical and socioeconomic factors, older people experience “anorexia of ageing” or unintentional loss of appetite and decrease in food intake. This predisposes them to protein and energy malnutrition, physical inactivity, frailty, sarcopenia and mortality.¹⁷⁻¹⁹

SPECIAL NUTRITIONAL NEEDS IN THE OLDER ADULTS

Among community-dwelling older adults, energy, macronutrient and micronutrient intakes have been reported to be below the recommended values.^{20,21} Adequate energy intake is important, as it prevents muscle catabolism by providing energy to maintain essential life-preserving physiological function. Sufficient protein intake prevents negative nitrogen balance, i.e., muscle protein breakdown exceeding muscle protein synthesis. Protein requirements vary between individuals, but the recommended intake is higher for older adults (at least 1.0 to 1.2 g/kg body weight/day) compared to younger adults (0.8 g/kg body weight/day) due to anabolic resistance.²²⁻²⁴ The protein requirement for older adults who are at risk of malnutrition or acute or chronic illness ranges from 1.2 to 1.5 g/kg body weight/day.^{22,25} Older adults with severe illness or injury or marked malnutrition need up to 2.0 g/kg of body weight.^{22,25} The only exception for these recommendations is for older adults with advanced kidney disease and not on dialysis, where the recommended protein requirement is up to 0.8 g/kg body weight/day.²⁵

Key micronutrient deficiencies, particularly vitamins A, B12, D, and zinc, are common in older adults.^{26,27} The Strengthening Health In ELDerly through nutrition (SHIELD) study revealed that more than half (52 percent) of community-dwelling older adults with *normal nutritional status* have vitamin D deficiency or insufficiency, while over ten percent have zinc deficiency.²⁸ Given that these findings were based on a cohort of older adults with normal nutritional status, the prevalence of micronutrient deficiencies is likely to be higher among those at risk of malnutrition. In older adults, vitamin D deficiency is associated with an increased risk of falls, functional decline, and muscle weakness, while zinc deficiency is associated with reduced immunity, delayed wound healing, and changes in taste perception (with loss of appetite and anorexia).²⁸ By contrast, vitamin D has been shown to play a role in muscle and bone health.²⁹⁻³³ Vitamin D supplementation significantly improves muscle strength, particularly in older adults and those who are vitamin D deficient (<12 µg/L).³⁴

Achieving the required energy, protein and micronutrient intakes may not be possible from diet alone in older adults, and nutritional supplementation, such as oral nutritional supplement (ONS), is often required. Such supplementation is especially important for older adults to maintain health and functional independence.

SCREENING AND DIAGNOSIS OF MALNUTRITION

Given the high prevalence of malnutrition risk in community-dwelling older adults, nutrition screening to identify those at risk and providing early intervention to improve their nutritional status would be an important public health strategy. Several malnutrition screening tools have been reviewed for validity, agreement and reliability for use in the community, such as Malnutrition Universal Screening Tool (MUST) and Mini Nutritional Assessment Short Form (MNA-SF).³⁵⁻³⁹ In addition, tools such as Malnutrition Screening Tool (MST), MUST and MNA-SF offer structured pathways of care, which can be implemented based on screening results.³⁵

Nutrition screening is a simple process to identify people who are at risk of malnutrition and may benefit from further assessment by a dietitian and nutrition intervention.³⁵ Dwyer et al. likened screening for malnutrition to that of screening for hypertension as part of routine health care in community-dwelling older adults.⁴⁰ However, nutrition screening in general practice in the community is uncommon.³⁵ In addition, malnutrition is viewed as a secondary concern among general practitioners.⁴¹ Making nutrition screening a priority is important because early intervention in at-risk individuals can reduce the length of stay, hospital readmissions, and mortality.⁴²

In general, patients who are screened positive for malnutrition should be referred to dietitians for diagnosis and further assessment of their nutritional needs. Recently Global Leadership Initiative on Malnutrition (GLIM) has been introduced as a way for clinicians to diagnose malnutrition in their patients based on one phenotypic criterion (involuntary weight loss, low body mass index BMI or low muscle mass) and one etiologic criterion (reduced food intake, malabsorption or inflammation from acute disease or chronic illness).⁴³ The inclusion of low muscle mass in the phenotypic criteria highlights the important relationship between muscle mass and nutrition.^{19,43}

Loss of muscle mass occurs progressively with ageing, such that beyond 40 years of age, up to eight percent of muscle mass is lost per decade, and up to 15 percent is lost in each decade after age 70.⁴⁴⁻⁴⁶ The loss of muscle mass has numerous clinical implications; the decrease in lean body mass over time. The greater the loss of lean body mass, the greater the severity of complications such as impaired immunity, increased risk for infections, slowed healing, weakness, thinning of skin, increased risk of pneumonia and ultimately death.^{19,47} Hence, assessment of muscle mass is now recommended in the management of malnutrition, rather than focusing on weight alone.⁴⁸

NUTRITION INTERVENTIONS

The WHO recommends ONS and dietary advice for undernourished older people.⁴⁹ Similarly, the European

Society for Clinical Nutrition and Metabolism (ESPEN) guideline recommends ONS in older people at risk of malnutrition when dietary counselling, oral intake and food fortification are insufficient to meet nutritional targets.⁵⁰ The Singapore Health Promotion Board (HPB) also recommends nutritional supplements and high-calorie and/or high-protein snacks in older adults with unintentional weight loss to increase intake of nutrients.⁵¹ ONS provides complete and balanced nutrition that meets the acceptable macronutrient distribution range set by the Institute of Medicine for Nutrition.⁵²

Recent systematic reviews have investigated the effects of ONS in both hospitalised patients and community-dwelling adults.^{53,54} Nutrition interventions have been shown to significantly increase energy intake and body weight. In a systematic review by Sauer et al., nutrition interventions (ONS, energy and protein-enriched diet, calcium-vitamin D supplement, dietary advice), alone or in combination, have a significant positive impact on energy and protein intake, body weight, nutritional and functional status, and muscle strength in community-dwelling adults.⁵⁴ In a meta-analysis, Gomes et al. assessed the link between nutritional support and clinical outcomes among malnourished or at nutritional risk medical in-patients and reported improved survival and reduced hospital readmissions.⁵³ Hence, combining ONS with standard care such as dietary advice is therefore important in clinical practice to improve muscle health, especially during the period of illness, recovery, and rehabilitation in people with or without malnutrition.

Leucine and its derivatives are important for muscle mass synthesis and maintenance.^{19,48} β -hydroxy- β -methylbutyrate (HMB), an active metabolite of leucine, has been shown to be a potent stimulator of protein synthesis and an inhibitor of protein breakdown.⁵⁵ It is produced physiologically in small amounts (0.2 to 0.4 g per day) and it is difficult to obtain HMB from diet alone.^{56,57} HMB has been shown to decline with age.⁵⁸ It has been extensively studied in healthy older adults or immobilised and recovering patients.⁵⁸⁻⁶⁰ Several reviews and meta-analyses reported benefits of improved muscle strength, function, and quality with the use of HMB in older adults.^{55,59,60}

In a double-blind, randomised, placebo-controlled trial consisting of 811 older adults at risk of malnutrition in Singapore (the SHIELD study), participants were asked to consume either ONS containing HMB or placebo twice a day for 180 days, along with dietary counselling as the standard of care.⁶¹ The intervention product consisted of 262 kcal, 10.5 g protein, 0.74 g calcium HMB per serving, 8.5 g fat, 34.2 g carbohydrate, 7.75 mcg (310 IU) vitamin D3, and other vitamins and minerals. There was a significant improvement in malnutrition risk and nutritional outcomes such as weight, BMI, mid-upper arm circumference, and vitamin D levels in the intervention group compared to the placebo group. The intervention group was also found to have higher leg strength and greater handgrip strength in females. Among those with low Appendicular Skeletal

Muscle Mass Index (ASMI), calf circumference was significantly higher in the intervention group compared to the placebo group.⁶¹

Similarly, a randomised controlled trial conducted in Taiwan, involving community-dwelling pre-frail 65 to 80-year-old adults, showed that high-protein ONS containing HMB improved nutritional status, muscle mass, and intramuscular adiposity measured by magnetic resonance imaging.⁶² Another study among community-dwelling older Chinese adults with sarcopenia showed that exercise programs with or without ONS significantly improved leg extension and five-stand chair, but the group with ONS had additional benefits of increased total lean muscle mass and lower limb muscle mass.⁶³

Further to this, a multicentre, randomised controlled trial, which studied 330 malnourished ≥ 65 -year-old adults with malnutrition and sarcopenia from eight European and North American countries showed that ONS containing HMB improved leg muscle strength and quality in adults with mild to moderate sarcopenia, but not severe sarcopenia, compared to ONS without HMB group, suggesting additional benefits of HMB.⁶⁴ In Spain, an open-label study showed that the consumption of high protein ONS containing HMB significantly improved weight, fat-free mass, handgrip strength and quality of life of older patients at risk of malnutrition.⁶⁵ The AdNut study, another study conducted in Spain, evaluated the effect of high protein ONS containing HMB on nutritional status, activities of daily living (using Katz Index) and quality of life (using EQ-5D-3L questionnaire) among 235 older malnourished people living in the community or nursing homes. ONS containing HMB was found to improve body weight and nutritional status, independence level, activity, and mobility (quality of life), independent of baseline BMI.⁶⁶ In a randomised controlled trial in healthy older women, ONS containing HMB significantly improved leg strength and handgrip endurance.⁶⁷

The above studies demonstrate the benefits of addressing malnutrition and low muscle mass with nutrition interventions. Protein-enriched ONS, vitamin D and HMB are effective in improving nutritional outcomes, muscle quality, quantity and function in community-dwelling older adults.

PUBLIC HEALTH AWARENESS AND RECOMMENDATIONS

In view of the rapidly ageing population in the region and globally, it is essential to maintain physical function and independent living for as long as possible, thus helping preserve the quality of life and reduce burdens on healthcare systems. Malnutrition is not an inevitable consequence of ageing but is a modifiable risk factor for poor health and physical function. Thus, early screening and diagnosis by healthcare professionals are crucial. With nutrition and muscle health being key determinants of disability and

poor health outcomes, nutrition interventions are key to improve nutritional status and muscle health of older adults. Recent research has shown that the provision of ONS at home significantly reduced hospitalisation and healthcare resources in adults identified to be at risk of malnutrition or with malnutrition.⁶⁸

There needs to be an increase in awareness with regards to the burden of malnutrition among the community-dwelling older adults. This goal requires the effort of public health education to inform older adults, their families, and healthcare professionals who care for this population. Early screening for malnutrition and low muscle mass by health and social care providers is an important strategy to prevent and address the adverse health outcomes associated with malnutrition. This should be followed by the robust application of established evidence-based interventions as detailed above.

LIST OF ABBREVIATIONS

ASMI: Appendicular Skeletal Muscle Mass Index; BMI: Body Mass Index; ESPEN: European Society for Clinical Nutrition and Metabolism; GLIM: Global Leadership Initiative on Malnutrition; HMB: β -hydroxy β -methylbutyrate; HPB: Health Promotion Board; MNA-SF: Mini Nutritional Assessment Short Form; MUST: Malnutrition Universal Screening Tool; MST: Malnutrition Screening Tool; ONS: Oral Nutritional Supplement; SHIELD: Strengthening Health In ELDERly through nutrition; WHO: World Health Organisation.

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LEARNING POINTS

- **Prevalence of malnutrition risk and nutritional deficiencies is high among community-dwelling older adults.**
- **Malnutrition and low muscle mass are closely linked. Low muscle mass is one of the phenotypic criteria for the diagnosis of malnutrition in GLIM.**
- **ONS containing HMB has been shown to improve nutritional and functional outcomes in community-dwelling older adults at risk of malnutrition.**