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Conference on 'Nutrition and age-related muscle loss, sarcopenia and cachexia'

Implications of skeletal muscle loss for public health nutrition messages: a brief report

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Age-related skeletal muscle loss, sarcopenia, cachexia and wider malnutrition (under nutrition) are complex in aetiology with interaction of clinical, social and economic factors. Weight loss and loss of skeletal muscle mass in older people are associated with increased morbidity and mortality with implications for increasing health and social care costs. There is insufficient evidence to identify the ideal treatment options. However, preventing weight loss and loss of skeletal muscle in older age will be keys to reducing morbidity and mortality. This will require all those coming into contact with older people to identify and address weight loss early, including through diet, improving physical activity and increasing social interaction. Public health messages on diet should, in the main, continue to focus on older people achieving current UK dietary recommendations for their age as visually depicted in the eatwell plate together with associated messages regarding dietary supplements where appropriate.

Skeletal muscle loss: Public health messages

While different dimensions of age-related loss of skeletal muscle, sarcopenia, frailty and cachexia were discussed at the conference, cited here[1–3], there remain considerable gaps in agreed definitions, approaches and potential mechanisms to address and support people with muscle loss. Part of the diversity in definitions and approaches is the recent recognition of the importance of these conditions. In this respect, these conditions are similar to malnutrition which is both a cause and a consequence of ill-health and may also contribute to sarcopenia and frailty.

Importance of skeletal muscle mass and function

Skeletal muscle accounts for 30–40 % of adult male and 20–30 % of female body size with losses of about 1 % per year starting after age 50 years[4]. Muscle strength also declines with age and is associated with muscle loss. Muscle mass, strength and function are also correlated with each other leading to poor health outcomes and mortality[5,6]. The loss of so much of this important body compartment with age leads to a number of conditions relating to public health and chronic health conditions as shown in Table 1[7–9].

The mechanisms and causes for the loss of skeletal muscle mass strength and function with age were described during the meeting. The known causes of the loss of skeletal muscle mass are related to age, physical activity and smoking behaviours. However, other potential causes are under intensive research. The major research in nutrition has been in the type and amount of protein relevant for prevention and treatment of sarcopenia and cachexia. Although research indicates that there may be anabolic resistance to uptake of amino acids in older people, the current evidence suggests that sufficient dietary protein will overcome these issues[3]. Other aspects of diet may be relevant but have not been extensively studied[10]. Malnutrition is complex in its aetiology and treatment, and cannot always be corrected. The root

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Table 1. The impact of age-related skeletal muscle loss on conditions relating to public health and chronic health conditions

Condition	Mechanism or link
Obesity	Reduction in metabolically active tissue with age leading to reduced energy expenditure and so contributing to onset of obesity
Sarcopenic obesity (low skeletal muscle mass associated with obesity)	Leads to functional impairment
Increased functional impairment, physical disability and mortality	Skeletal muscle mass is associated with muscle strength and function
Worse clinical and surgical outcomes on hospital admission	Increased rates of infections, hospitalisation, length of stay and recovery
Type 2 diabetes	Increased insulin resistance and impaired regulation of blood glucose
Worse prognosis and survival from cachexia (extreme, rapid, acute loss of muscle and body weight)	Lower resilience to onset of cachexia due to the loss of the body's reserves of skeletal muscle
Osteoporosis, falls and fractures (UK costs: £2·1 billion per year)[7]	Greater muscle mass and strength protect bone density and against falls
Sarcopenia (loss of skeletal muscle mass, strength and function with age) (prevalence: of 8–18 % in those over 65 years of age. USA costs: £11·04 billion)[6,8]	Leads to functional and metabolic impairment
Frailty and weakness (the combinations of weight loss, low grip strength, exhaustion, low physical activity and low gait speed) (prevalence: 6·5–65 % in those over 65 years of age)[9]	Consequences are functional and metabolic impairment

Table 2. The adverse consequences of malnutrition

Impaired immune responses with increased risk of infection and reduced ability to fight it once established
Reduced muscle strength and muscle wasting, increased fatigue, detrimentally affecting ability to work and be independent
Reduced respiratory muscle function which may lead to increased difficulties in breathing and expectoration, increasing the risk of chest infection and respiratory failure
Impaired thermo-regulation with a pre-disposition to hypothermia
Impaired wound healing and delayed recovery from illness and increased risk of admission to hospital and length of stay
Apathy, depression and self-neglect

causes may be clinical, social or economic. Clinically, it is likely to be due to poor appetite as a consequence of disease (physical or mental) and/or to the presence of disease that interferes with the utilisation of nutrients and, in cachexia increases metabolic rate. Malnutrition in the elderly can be due to a range of problems (physical ones such as poor hand grip, eyesight and teeth; underlying chronic diseases such as cancer; mental health issues (dementia, depression, etc.) and psycho-social issues such as loneliness). Problems often interact in a complex cycle which drives body weight and muscle mass down.

Skeletal muscle mass and malnutrition

Malnutrition can cause a wide range of adverse consequences as shown in Table 2. Compared with older people at low risk of malnutrition, those with medium to higher risk are estimated to consult a general practitioner about 60 % more, have over 30 % more outpatient visits and 82 % more inpatient visits. This estimate equates to a healthcare cost of more than £7·3 billion each year[11]. Thus there are clear physiological, social and economic interests in addressing skeletal muscle loss and malnutrition.

Although the National Institute for Health and Clinical Excellence identified that oral nutritional supplementation reduced length of hospital stay by 1·4 d[12] there remains uncertainty about the dietary and other interventions to effectively prevent malnutrition in community settings. Improving dietary intake and maintaining skeletal muscle mass and function are likely not only to have cost savings for the health and social care systems, but may also have benefit for the psychosocial aspects of an older person's life; with wider impact on morbidity.

Current messages for public health nutrition

Although research is ongoing, current messages for public health nutrition can follow the UK Government healthy eating advice which is pictorially represented in the eatwell plate (Fig. 1), depicting the proportions of four main food groups that should form the diet, namely: bread, rice, potatoes, pasta and other starchy foods; fruit and vegetables; milk and dairy foods; meat, fish, eggs, beans and other non-dairy sources of protein. Foods and drinks high in fat and/or sugar should be consumed in small amounts and infrequently. UK Government advice is based upon recommendations from the expert committees such as the Scientific Advisory Committee on Nutrition[13]. Despite long-standing advice on the constituents of a healthier diet, many in the population fail to achieve these recommendations with consequent increased risk of diet-related morbidity and mortality.

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Fig. 1. The eatwell plate. The UK national food model showing the proportions and types of foods that contribute to a balanced diet.

These recommendations underpin much public health guidance and catering standards in England, including the statutory school meal standards[14], Public Health England's Healthier and More Sustainable Catering Toolkit[15] and recommendations from the Hospital Food Standards Panel[16]. While underlying mechanisms and treatments for age-related muscle loss, sarcopenia, cachexia and malnutrition continue to be investigated, the key to prevention remains to encourage older people to achieve their energy and other dietary requirements in keeping with the Government's eatwell plate and associated messages relating to dietary supplements.

Public Health England's toolkits are based upon principles that meet the dietary reference values for population groups. For older people, Public Health England recognise that achieving appropriate energy levels does not necessarily mean choosing higher (saturated) fat and sugar foods given the wider diseases to which they contribute; although such foods may have a role in the short term to boost energy intake[17].

Conclusion

Prevention approaches must recognise the joint role of services that come into contact with older people, so that consistent messages and multidisciplinary support can be provided. Early identification of weight loss is essential to allow effective assessment and appropriate support to rectify this. At the present time existing public health nutrition messages aimed at preventing malnutrition, weight loss and loss of skeletal muscle mass remain appropriate.

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Conflicts of Interest

None.

Authorship

L. B. L. and A. W. wrote the manuscript. L. B. L. was employed by Public Health England and A. W. by Norwich Medical School the University of East Anglia at the time of writing this manuscript.

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