Undernutrition and the Older Person

Key Points

1. Undernutrition in older people is common and the prevalence increases with increasing frailty.

2. Undernutrition in older people is associated with poor health outcomes and increased health care costs.

3. There are physiological reasons (reduced smell and taste) for decreased appetite and weight loss in older people and this includes the Anorexia of Ageing and Sarcopenia.

4. Sarcopenia is the loss of muscle mass and muscle function and is also independently associated with poor health outcomes.

5. Non-physiological factors such as poverty, social isolation and depression play a part in the development of undernutrition. These must be identified and managed.

6. Screening and assessment tools exist for use in clinical practice. It is important that older people are screened and assessed for undernutrition and sarcopenia.

7. There is no gold standard for the diagnosis of undernutrition and a consensus for the diagnosis of sarcopenia is yet to be reached.

8. In hospitals and long term care settings, management of under-nutrition includes assistance with feeding and attention to the choice of food.

9. Nutritional management is best achieved through a multidisciplinary approach, including medical officers.

10. Older people have high daily protein requirements. Protein intake should be spread equally across three main meals. Caution is necessary where there is renal dysfunction.

11. Nutritional supplementation has been shown to have some impact on under-nourished older people and may be useful in helping some meet their protein requirement.

12. Percutaneous Endoscopic Gastrostomy (PEG) feeding in advanced dementia has not been shown to prolong survival, improve nutrition, maintain skin integrity, prevent aspiration or improve quality of life.

This Position Statement represents the views of the Australian and New Zealand Society for Geriatric Medicine. This Statement was approved by the Federal Council of ANZSGM on 23rd November 2015. Authors: Professor Renuka Visvanathan and Assoc Professor Solomon Yu.

Background Paper

Malnutrition refers to both over-nutrition and undernutrition. Undernutrition in older people is common and associated with multiple adverse health outcomes. It therefore warrants our attention.

Physiological Factors Associated With Weight Loss

The term ‘anorexia of ageing’ refers to the decline in energy intake and appetite that can occur with progressive ageing. This reduction in energy intake often exceeds the decrease in energy expenditure and body weight is unintentionally lost. When body weight decreases in older people, lean body tissue is thought to be lost disproportionately.

The anorexia of ageing is not only associated with a reduction in sense of taste and smell but also includes changes to the satiety and satiation cascade and hormonal (e.g.
cholecystokinin) and neurotransmitter (nitric oxide) control of food intake\(^2\).

Physical inactivity, motor unit remodelling, decreased hormone levels (e.g. testosterone), production of catabolic cytokines and reduced protein synthesis contribute to the development of sarcopenia\(^5\). Between 2010-2014, there have been six attempts to reach a consensus as to how best to define sarcopenia\(^6-11\). In general, it is agreed that sarcopenia is both the loss of muscle mass and the impairment of muscle function (strength or performance)\(^7\).

**Non-physiological Factors Associated With Weight Loss**

Important and frequently missed are the non-physiological factors where nutritional interventions can only be successful if these factors are adequately addressed. ‘MealsOnWheels’ is one of many mnemonics for common treatable causes of undernutrition in older people\(^12,13\).

M - medication effects
E - emotion, depression
A - alcoholism
L - late life paranoia
S - swallowing disorders
O - oral factors such as dentition, ulcers
N - no money
W - wandering and other dementia related behaviour
H - hyperthyroidism, hypothyroidism, hyperparathyroidism, hypoadrenalism
E - enteric problem (malabsorption)
E - eating problems (inability to feed self)
L - low salt, low cholesterol diet
S - social problems.

**The Prevalence of Undernutrition and Sarcopenia**

A large proportion of community dwelling older people are at risk of undernutrition (Table 1). With increasing frailty there is an increasing prevalence and risk of undernutrition.

Undernutrition leads to weight loss, which in turn results in sarcopenia. The prevalence of sarcopenia in Australia is estimated to be highest in older people aged 80 years and over, with one in five being affected\(^14\).

**Consequences of Undernutrition and Sarcopenia**

Undernutrition is associated with poor health outcomes, which significantly affect quality of life and is costly to individuals, families and the community. It is reported that the cost to the United Kingdom from malnutrition is in excess of £7.3 billion per year\(^15\). The examples below use the MNA as a means of classifying nutritional status but many other studies using other measures to define undernutrition have also shown similar associations.

**Increased Mortality** - In a study looking at older hospitalised patients (age 75+), patients who died (14.9±5.2) had lower MNA scores that those that survived (18.5±5.5, P<0.001)\(^16\).

**Prolonged Hospitalisation** - Older patients with Mini Nutritional Assessment (MNA) scores >24 (28.3±27.6 days) spent less time in hospital compared to older people with MNA scores <17 (59.9±77.0 days, P<0.001)\(^16\).

**Increased Frequency of Hospitalisation** - Undernourished community dwelling older people (MNA<24) are more likely to have 2 or more emergency hospital admissions over a 12 month period than nourished older people (RR 2.96 95%CI 1.15-7.59)\(^17\).

**Residential Aged Care Placement** - In one study of individuals with Alzheimer’s Disease, multivariate analysis revealed that a MNA score of less than 25.5 and overeating behavioural problems were associated with requiring residential care\(^18\).

**Falls** - Community dwelling older people who are under-nourished (MNA<24) are more likely to report falling in a 12 month period than nourished older people (RR 1.65; 95%CI 1.13-2.41)\(^17\).

**Increased risk of Osteoporosis** - A MNA score < 27 was associated with an increased
risk of having osteoporosis in the femoral neck and/or hip in community dwelling older people (OR2.09, 95%CI 1.14-3.83).19

**Pressure Ulcers** - In a nursing home study looking at older people with pressure ulcers, only 17% were well nourished whilst 29% were at risk of malnutrition (MNA 17-23.5) and 54% were malnourished (MNA<17).20

Sarcopenia is also independently associated with significant adverse health outcomes and is a strong predictor for future disability. Sarcopenia is associated with increased risk of falls and fractures. Furthermore, sarcopenia is associated with future functional decline and physical disability. Sarcopenia is associated with higher hospitalisation rates and mortality. The direct healthcare cost from sarcopenia is said to be comparable, if not more than osteoporosis, estimated at US$18.5billion/year.24

**Screening and Assessment of Undernutrition and Sarcopenia**

It is important to distinguish between screening and assessment. The British Dietetics Association (briefing paper) defines nutrition screening as: ‘A simple and rapid process of identifying clinical characteristics known to be associated with malnutrition’. The screening process is intended to identify those individuals at risk of becoming malnourished and who require referral to a trained dietitian for comprehensive nutrition assessment. It also defines nutrition assessment as: ‘A comprehensive process of identifying and evaluating the nutritional status of an individual using appropriate measurable method.’

Therefore, in clinical practice, one has firstly to screen (Table 2) to detect nutritional risk and then carry out a more detailed assessment to determine whether undernutrition is present.

The Subjective Global Assessment is often used to assess nutritional status. Detailed nutritional assessment includes most of the following:

1. History determining non-physiological risk factors, illness and reduced oral intake;
2. Physical examination;
3. Bed side anthropometric measurements (may include body mass index [BMI], weight loss, skinfold thickness assessment);
4. Haematology and biochemical assessment (the presence of hypoalbuminaemia, anaemia, hypocholesterolaemia, low lymphocyte counts);
5. Dietary assessment (food diaries, food charts); and
6. Body composition measurements (bio-electrical impedance, DXA)

There is also a need to screen and assess for sarcopenia as sarcopenia is a major contributing factor to the development of frailty (please refer to the position statement on frailty).

In clinical practice, the most practical method to assess for muscle performance is through gait assessment and the measurement of gait speed and this should be a first step in risk identification. A gait speed of <0.8m/s is evidence of impairment. A meaningful improvement in function is achieved with improvements in gaits speed of >0.1m/s.9

However confirmation of sarcopenia risk also requires the presence of low muscle mass. Australian researchers have demonstrated that low muscle mass exists when appendicular skeletal muscle mass (ASM) (as assessed by dual absorptiometry x-ray) values are < 7.36 kg/m² for men and < 5.81 kg/m² for women.14

Screening for low ASM in clinical practice is possible using the following anthropometric equation (PE) for ASM:

\[
ASM_{PE} = 10.05 + 0.35(\text{weight}) - 0.62(\text{BMI}) - 0.02(\text{age}) + 5.10 \quad \text{if male}
\]

(Standard Error of Estimate [SEE] 1.87; adjusted R² (%) 90.6)

Where the PE is used, the following cut-offs are recommended: <8.28 kg/m² for men and <5.97 kg/m² for women.25

**Interventions**
Non-pharmacological

There are many simple non-pharmacological intervention measures that can make a beneficial difference to the nutritional health of older people. The inter-disciplinary team is often required to manage undernutrition (Table 3). Simple dietary advice can be found on various government websites: -www.nhmrc.health.gov.au, -www.healthed.govt.nz/resource/eating-healthy-older-people-te-kai-t%C5%8Dtika-e-ora-ai-te-hunga-kaum%C4%81tua -www.MyPyramid.gov.

Education of family members or carers is a vital part of ensuring improved nutritional health. For example, some families may choose to eat with their parents on weekends to ensure good oral intake.

Oral health is very important and older people should be encouraged to see their dentist and oral hygienist. When risk of poor nutrition is identified, medical practitioners should undertake medication review to deprescribe, where safe to do so. Older people should not be unnecessarily exposed to medications that reduce appetite and taste, or cause gastritis, constipation and ulcers.

Knowledge and overall community nutritional health status may be improved through action taken by primary healthcare providers, government and non-government organisations. The benefits of healthy eating and healthy physical activity should not be under-estimated. An integrated nutrition and exercise program for older Americans recently reported that post-intervention, 75% of participants showed positive improvement in nutritional and exercise stages of change.

In this study, the nutrition and physical activity questionnaires included a ‘stage-of-change’ question. For example, the nutrition questionnaire included a question about calcium-rich food intake which required a choice from 5 statements reflecting each stage of change: pre-contemplation, contemplation, preparation, action, and maintenance. Satisfaction with the program was 99% and 24% of participants reported improved health status.

Consumption of alcohol with meals may improve appetite and stimulate food intake. Similarly, taste and smell intensification of food may also improve oral intake. Eating in a communal setting as opposed to eating alone can also result in better nutritional intake.

Restrictive diets should not be prescribed to long term care residents unless absolutely necessary. Liberalising diets as opposed to the prescription of restrictive diets has been shown to enhance food intake and quality of life. It is important that meals when provided take into account consumers’ cultural and religious needs.

In view of physiological changes that result in early satiety, smaller frequent meals may be a preferred option compared to large main meals. In one study, smaller meals which were protein enriched resulted in increased oral intake compared to standard meals.

Recently, a group of international experts representing key organisations including the ANZSGM met to determine the Dietary Protein Needs with Aging (PROT-AGE study group). Key recommendations included a strong recommendation that older people require between 1.0-1.2 g/kg body weight/day and where there was the presence of chronic diseases, dialysis or frailty, then the need increases to 1.5g/kg body weight/day. Ideally, between 25-30g of protein (2.5-2.8g of leucine) per meal is required with the three main meals each day. The protein recommendations reduce for older people with renal dysfunction but not on dialysis. Exercising in close proximity with protein intake is said to be very beneficial and should be encouraged.

Pharmacological

Nutritional Supplements

Some frail older people may struggle to meet their daily protein needs without supplementation. Nutritional supplements are products that can be taken in addition to food (e.g. drinks, puddings etc.) or added to food (e.g. powder). They are often rich in macro- (e.g. protein) and micro-nutrients (e.g. vitamins).

It has previously been widely recommended that nutritional supplements be taken between
meals as they may suppress normal meal intake if taken at meal times but this needs to be balanced against the need to meet protein requirements at main meals. Two recent studies in elderly patients have provided evidence that the provision of nutritional supplements with or just before meals does not necessarily suppress meal intake in older patients. The fact that intra-duodenal protein suppresses appetite and energy intake less in healthy older than in young adults is also reassuring. Therefore, it follows that it is important that strategies to meet protein and caloric requirements are put in place taking into account also organisational work patterns. For example, in hospitals and in residential care, the provision of supplements with meals may ensure that supplements are actually consumed.

A subgroup analysis of trials showed that nutritional supplements reduced mortality (significant or approaching significance) when prescribed to under-nourished people and to the amount of 400kcal per day. It was reported that there was beneficial effect to hospitalised general geriatric populations. It was difficult to analyse for the effect of nutritional supplements on functional outcomes as the methods used to assess function were very diverse.

Importantly, it should be noted that the findings of this meta-analysis were dominated by the inclusion of the large international FOOD trial 2005 which focused specifically on stroke patients and included many subjects who were nourished. Quality well-designed research, specifically targeting older and at-risk older people in the community and long term care facilities are still required to evaluate the possible benefits, especially functional benefits.

Multivitamin and mineral supplementation

There has been interest in the benefits of micronutrients and minerals in reducing the risk of infections. It has been suggested that micronutrient supplementation in undernourished older people for greater than 6 months may reduce the risk of infections, but well-designed studies are required to confirm this. For example, in one study looking at older people in residential care facilities, micronutrient and mineral supplementation did not result in reduced infection rates. Low serum vitamin D has been associated with poor muscle health. Replenishing vitamin D (700 - 1000IU/day) has been shown to be beneficial in reducing risk of falls.

Others

Orexigenic and anabolic agents cannot be recommended for routine clinical use due to the lack of supporting evidence and the many adverse effects.

Undernutrition and Dementia

Many people with dementia are at risk of undernutrition and do lose weight. Interestingly, weight loss may precede the development of dementia. For example, men in the Honolulu-Asia Ageing Study lost weight in the 6 years preceding the diagnosis of dementia and this was more weight than those that did not develop the disease. There are many possible reasons why undernutrition and weight loss is associated with dementia. Wandering behaviour associated with dementia is said to increase metabolic rate and therefore increase energy requirements. Forgetfulness may result in reduced oral intake. Older people with dementia may not be able to purchase appropriate foods and similarly, they may not be able to prepare appropriate meals to meet nutritional needs, especially if living alone. All physiological and non-physiological factors that commonly occur with ageing may contribute to weight loss in older people with dementia as well. Food refusal is common and can be frustrating to caregivers. Food refusal may result in meals being missed altogether and care needs to be taken to provide opportunities for snacking and catering for food preferences. Dyspraxia may impact on the older person’s ability to feed themselves. At later stages, swallowing dyspraxia may set in, resulting in further weight loss and malnutrition. It is around this time that discussions about Percutaneous Endoscopic Gastrostomy (PEG) feeding arise. Hand
feeding becomes important at this stage and there is a need to ensure that residential care facilities and other health care facilities (i.e. hospitals) are appropriately staffed to enable this to occur. There has been no randomised trial comparing the benefits of PEG feeding to hand feeding. Families and carers need to also be included and encouraged to participate where possible.

**Percutaneous Endoscopic Gastrostomy (PEG) Feeding and Advanced Dementia**

Swallowing difficulties are common in advanced dementia. Advanced directives or a delegate (medical power of attorney or enduring power of guardianship) will guide management based on the older persons previously expressed wishes. In the absence of a clear directive, clinicians need to discuss the pros and cons of treatment with family members or carers. The goal of any treatment in any disease state should be to improve or maintain quality of life. There should not be prolongation of life without quality.

There is no evidence to suggest that the use of PEG feeding in older people improves any of the following outcomes: survival, maintained skin integrity, nutritional status and reduced aspiration risk. There is instead some evidence that PEG feeding is associated with an increased risk of pressure ulcer formation. Having said that, there has been no randomised clinical trial investigating the benefits of PEG feeding in advanced dementia. Such a trial is unlikely to be done.

Failure to eat or thrive is often due to the older person entering the terminal phase of an illness (e.g. advanced dementia). In such cases, the introduction of PEG feeding may actually reduce quality of life. In many cases, the institution of PEG feeding may be associated with denial of oral intake and this will have a negative impact on the quality of life, as being able to taste food is one of life’s pleasures. A qualitative study of adults revealed that oral intake of food and fluid was missed with PEG feeding. Physical restraints may sometimes be prescribed to prevent the older person from dislodging the PEG and this has a major detrimental effect on quality of life. Therefore, a realistic discussion with regards to the limited benefits and possible harms should occur with families to enable them to make an informed decision. Cultural and religious beliefs should also be taken into consideration in reaching a decision.

This decision aid tool developed for consumers is helpful: [https://www.med.unc.edu/pcare/resources/feedingoptions](https://www.med.unc.edu/pcare/resources/feedingoptions)

**Conclusion**

Undernutrition in older people is common and is associated with costly adverse health outcomes. Undernutrition with loss of weight results in sarcopenia, which also leads to functional decline and physical disability. Screening and assessment tools exist to identify older people at risk of undernutrition and sarcopenia. Screening needs to occur in all settings. Although there may be physiological reasons for weight loss in the older person, there are often many other non-physiological factors that may be amenable to intervention. These need to be identified and addressed. All screening processes should lead into a care plan. There may be a role for nutritional supplementation in under-nourished older people. Adequate protein intake coupled with exercise, are important interventions. Involvement of the inter-disciplinary team in the care of older under-nourished people is likely to be of benefit.

**Table 1 - Prevalence of malnutrition by the level of care**

<table>
<thead>
<tr>
<th>Clinical Setting</th>
<th>Under-nourished (%) (MNA&lt;17)</th>
<th>At-risk of Undernutrition (%) (MNA 17-23.5)</th>
<th>Total (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>European community</td>
<td>1</td>
<td>44</td>
<td>45</td>
</tr>
<tr>
<td>Australian acute hospital</td>
<td>20</td>
<td>30</td>
<td>50</td>
</tr>
<tr>
<td>American sub-acute</td>
<td>29</td>
<td>63</td>
<td>92</td>
</tr>
</tbody>
</table>
Table 2 - Nutritional Screening Tools

<table>
<thead>
<tr>
<th>Malnutrition Screening Tool (MST)</th>
<th>Developed in Australian acute hospital. This tool consisted of two questions regarding appetite and recent unintentional weight loss. The interrater reliability of the tool was high (93-97%). A positive screening will lead to action plan that include referral to dietitian.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Malnutrition Universal Screening Tool (MUST)</td>
<td>Widely used in the United Kingdom. Can be used in all health care settings. Linked to a generic care plan.</td>
</tr>
<tr>
<td>Simplified Nutritional Assessment Questionnaire (SNAQ)</td>
<td>Simple 4-item appetite assessment tool. Detecting risk of poor nutritional health prior to weight loss.</td>
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<tr>
<td>Rapid Screen</td>
<td>2-item screening tool. Where resources are limited and targeted referrals to the clinical dietitian are a must, the rapid screen may be beneficial.</td>
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<tr>
<td>The Mini Nutritional Assessment (MNA)</td>
<td>The Mini Nutritional Assessment consists of 2 sections- the screening MNA-short form [MNA-SF] and the assessment section. Despite this, the MNA should really be used as a screening tool to assess risk rather than as an assessment tool to determine nutritional status. The new MNA-SF has included calf circumference as an option, where BMI cannot be calculated. This increased the applicability of this tool in clinical practice.</td>
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Table 3 The Inter-disciplinary Team and Nutritional Health

| Doctor/Nurse | Identifying and managing the multiple non-physiological factors that may be contributing to poor nutritional health |
| Dental Services | Oral health assessment and management. |
| Dietitian | Provision of appropriate nutritional advice to families and/or individuals |
| Speech Pathologist | Dysphagia assessment. Working together with dietitians to provide individuals and families with suggestions about appropriate meal preparation. |
| Occupational Therapist | Involved when home modification and equipment is required to enable food preparation and feeding |
| Social Worker | Providing financial advice and overcoming social isolation. |
| Psychologists | Management of depression. |
| Community Service Providers | May support meal preparation and provide supervision of oral intake. |
| Meals on Wheels | Can only supplement food intake and is not a meal replacement service. |
REFERENCES


Cervo FA, Bryan L, Farber S. To PEG or not to PEG: a review of evidence for placing feeding tubes in advanced dementia and the decision-making process. Geriatrics. 2006;61: 30-35.


