



An evidence-based guide for the identification and nutritional management of malnutrition and frailty in the Australian and New Zealand community

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Dietitians
Australia



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Ngā Pukenga Kai Ora o Aotearoa



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Contents

Expert panel.....	4
Introduction.....	5
Malnutrition and frailty overview.....	8
Identifying malnutrition and frailty: screening and assessment.....	11
Managing malnutrition and frailty: nutrition intervention, evaluation and monitoring.....	13
Transitions of care (e.g. from hospital to home).....	23
Resources / extra reading.....	24
Appendix.....	28
References.....	30

Expert Panel

Name	Qualifications	Position	Institution
Authors			
Dr Shelley Roberts	PhD, APD	Allied Health Research Fellow	Griffith University and Gold Coast Health
Dr Megan Rattray	PhD, Dietitian	Research Fellow	Griffith University
Contributors			
Tory Crowder	NZRD	Clinical Manager, Nutrition & Dietetics	Canterbury District Health Board
Prof Carol Wham	PhD, NZRD	Professor of Public Health Nutrition	Massey University
Chadia Bastin	APD	Clinical Lead, Dietetics	Gateway Health
Andrea Elliot	APD	Director Dietetics	Eastern Health
A/Prof David Scott	PhD, Exercise Scientist	Associate Professor (Research) & NHMRC Investigator	Deakin University
Prof Ruth Hubbard	MD, FRACP	Masonic Chair of Geriatric Medicine	Princess Alexandra Hospital and University of Queensland
Dr Natasha Reid	PhD, GradCert Epi	Research Fellow, Ageing and Geriatric Medicine	Princess Alexandra Hospital and University of Queensland
Steve Tobiano		Health consumer	
Prof Andrea Marshall	PhD, RN	Professor of Intensive Care Nursing	Griffith University and Gold Coast Health
Dr Janet Sluggett	PhD, AACPA	Senior Research Fellow (NHMRC Early Career Fellow)	University of South Australia
Vanessa Schuldt	APD	Senior Policy Officer	Dietitians Australia
Julie Dundon	AdvAPD	Aged Care Subject Matter Lead	Dietitians Australia
A/Prof Lauren Ball	PhD, AdvAPD	Principal Research Fellow & NHMRC Investigator	Griffith University
Dr Peter Collins	PhD, APD	Senior Dietitian	Mater Health, Brisbane and Mater Research Institute, University of Queensland

AdvAPD: Advanced Accredited Practising Dietitian

APD: Accredited Practising Dietitian

NZRD: New Zealand Registered Dietitian

AACP: Australian Association of Consultant Pharmacy Associate

RN: Registered Nurse

Introduction

This evidence-based guide provides practical guidance for healthcare professionals (HCPs) to identify and manage malnutrition and frailty among adults in the community setting. It was informed by current evidence [1] and has been developed by a multidisciplinary panel of experts. Further, it has been tailored to the Australian and New Zealand (ANZ) context based on feedback from health consumers and multidisciplinary HCPs with experience in managing malnourished and frail clients in the community.

Aim and Scope

The aim of this guide is to support HCPs in providing evidence-based care to adults with or at risk of malnutrition and/or frailty, to improve their health and wellbeing outcomes and reduce the costs associated with these conditions. The guide has a community focus, but may also be used by hospital-based HCPs (e.g. when assisting patients to transition back to the community) or in residential aged care settings. It contains evidence-based recommendations for improving the nutritional intake (focusing on energy and protein) of malnourished and/or frail adults. While this document provides overall guidance on managing malnutrition and frailty, we encourage its use in combination with other evidence-based guidelines as indicated (e.g. for specific conditions, overall dietary quality or calculating nutrient needs) and in consultation with a dietitian, to provide an individualised and holistic approach to nutrition care ([see Resources](#)).

Topics covered

- Malnutrition, frailty and their overlap
- How to identify patients at risk of or with malnutrition and/or frailty in the community via screening, assessment and referrals
- How to manage the nutritional components of malnutrition and frailty in the community, including selecting client-centred goals, intervention strategies and evaluation outcomes
- Transitions of care (e.g. hospital to home)

Topics not covered:

- Enteral nutrition (tube feeding)
- Parenteral nutrition (intravenous feeding)
- Acute care / hospital setting
- Eating disorders
- Paediatrics
- Sarcopenia
- Residential Aged Care Facilities (RACFs)
- Non-nutritional management of frailty



Malnutrition and frailty are everybody's business

All HCPs who interact with community members should feel a responsibility for identifying and managing malnutrition and frailty. All HCPs have an important role to play ([see Table 1](#)). As such, this guide is designed for use by multidisciplinary HCPs working in the community setting responsible for the provision of care to clients.

Table 1. Multidisciplinary team roles and responsibilities in the nutritional management of malnutrition and frailty

Healthcare professional	Overall Role	Responsible for (in the context of nutrition care)					
		Recognise risk factors / screen	Refer to dietitian (or geriatrician for frailty)	Assess / diagnose	Set goals, select & implement strategies	Monitor & evaluate outcomes	Other*
Dietitian	Nutrition care of the client	✓	—	✓ (malnutrition)	✓	✓	✓
General practitioner	Health care of the client	✓	✓ (or begin early intervention)	✓	✓ (in consultation with other HCPs as appropriate)	✓	✓
Nurse	Care of the client	✓	✓ (or begin early intervention)	✓ (in consultation with a dietitian / geriatrician)	✓ (in consultation with a dietitian / geriatrician)	✓	✓
Physiotherapist / exercise physiologist	Physical strength and function of the client	✓	✓ (or begin early intervention)	✓ (frailty)	—	—	✓ (prescribe/supervise exercises to increase muscle strength, balance & endurance for ADLs and/or help reduce pain and fatigue to improve appetite)
Pharmacist	Optimise medicine management (especially in frail older people who may be at risk of medicine-related harm)	✓	✓ (or begin early intervention)	—	—	—	✓ (provide advice on medicines, timing and dosage that may impact on nutrition status, interactions & symptoms)
Occupational therapist	Functional capacity of the client	✓	✓ (or begin early intervention)	—	—	—	✓ (improve function and independence with ADLs through reviewing kitchen set up to make cooking safer and/or suggesting equipment to make meal preparation easier)
Speech pathologist/ speech language therapists	Safety of the client's chewing / swallowing	✓	✓ (or begin early intervention)	—	—	—	✓ (improve nutrition intake and client safety through assessing and advising on food consistency for swallowing difficulties and/or setting up strategies to assist with memory)
Geriatricians	Specialist assessment and management of the older client	✓	✓ (or begin early intervention)	✓ (undertake Comprehensive Geriatric assessment)	✓ (establish frailty goals or care)	—	✓
Dentists	Maintaining oral health (which assists with eating, e.g. tooth health, dentures etc.)	✓	✓	—	—	—	✓ (provide care to optimise dentition)
Non-tertiary qualified HCPs (e.g. AHAs, case managers, Indigenous health workers) or services (e.g. ACATs, RAS)	Supporting HCPs to undertake assessments; and monitor, plan, and coordinate health and welfare programs	✓	✓	—	—	✓ (monitor)	✓

ACATs: Aged Care Assessment Teams
ADLs: Activities of daily living
AHAs: Allied Health Assistants

GP: General practitioner
HCPs: Health care professionals
MDT: multidisciplinary team

RAS: Regional Assessment Services.

* All health professionals should encourage adherence to nutrition interventions and communicate with the MDT about the patient's nutrition care.

Malnutrition and frailty overview

Malnutrition and frailty are common and overlapping problems that impact a person's overall health and function. While typically prevalent among older adults (i.e. ≥ 65 years of age), these conditions also affect younger clients with acute or chronic health conditions. As malnutrition and frailty are often unidentified and untreated in the community [2], there is an urgent need for HCPs from various disciplines, including medicine, nursing and allied health to understand, recognise and act on suspected malnutrition and frailty among community-dwelling adults.

Malnutrition

Malnutrition (also known as protein-energy malnutrition) is defined slightly differently by the three main clinical nutrition bodies worldwide [3-5] (see Box 1); however, all recognise that malnutrition is a result of insufficient energy and protein intake to meet the body's needs, causing weight loss, wasting of muscle and fat stores, attenuated physical and mental function, and poorer clinical outcomes [6, 7]. In the ANZ community setting, 1%–17% of adults are malnourished and 4%–63% are at risk of developing malnutrition[^] [1]. Malnutrition is also prevalent in hospitals, affecting a third of inpatients in ANZ [8], many of whom are admitted with malnutrition [9] and/or discharged back into the community without its resolution [10], resulting in poor patient outcomes and increased health care costs. A 2011 study estimated that malnutrition adds AU\$1,745 per patient per admission (controlling for the underlying condition and treatments administered), costing ANZ hospitals over AU\$10.7 million per year [11].

[^]Note: Prevalence rates are generated from studies conducted mostly among older adults (≥ 65 years), considering malnutrition is associated with increased age; however, it is seen in younger clients too.

Box 1. Definitions of malnutrition

Malnutrition is diagnosed if:

ASPEN two or more of the following criteria are met: (i) insufficient energy intake, (ii) weight loss, (iii) loss of muscle mass, (iv) loss of subcutaneous tissue, (v) localized or generalised fluid accumulation, (vi) diminished functional capacity

ESPEN either (i) BMI is < 18.5 kg/m²; or (ii) unintentional weight loss (mandatory) is present with either reduced BMI or a low-fat free mass index

GLIM at least one phenotypic criterion (non-volitional weight loss, low BMI or reduced muscle mass) and at least one etiologic criterion (reduced food intake, assimilation, inflammation or disease burden) are met

ASPEN: American Society for Parenteral and Enteral Nutrition

BMI: body mass index

ESPEN: European Society for Parenteral and Enteral Nutrition

GLIM: The Global Leadership Initiative on Malnutrition

Frailty

Frailty status is intended to capture a holistic conceptualisation of health. While this notion is widely accepted, frailty measurement is still the subject of debate given more than 67 different instruments have been utilised to measure frailty. However, the Physical Frailty Phenotype [12] and Deficit Accumulation / Frailty Index [13] are among the most commonly used approaches [14]. While there are slightly different definitions, frailty can be described as a loss of physiological reserve leading to diminished adaptive capacity and adverse outcomes, including death [12, 13]. Between 2%–29% of ANZ community-dwelling older adults are frail and between 41%–54% are prefrail[^] [1]. A sex-frailty paradox has been observed, where Australian women have higher levels of frailty compared to men (18-29% vs. 6-21%) and yet tend to live longer lives [15]. An international review reported health care costs exerted by community-dwelling prefrail and frail elderly people increased by \$179–13,424 and \$1,616–32,550, respectively, compared to robust individuals [16]. Further, among community-dwelling elderly with weight loss, the health care costs were increased by \$1,630–6,209 [16].

[^]Note: While frailty is closely linked with advancing chronological age, it may also be observed in younger clients (particularly those with chronic disease or who are critically ill), however limited work has been undertaken in the ANZ context to quantify this.

When malnutrition and frailty overlap

Malnutrition and frailty, while distinct from each other, share some common characteristics, causes/ risk factors, and outcomes [17] ([see Figure 1](#)). For example, malnutrition plays a key role in the pathogenesis of frailty and vice versa [18] and the effects of each condition are compounded when present together [19], demonstrating the complex and overlapping relationship between the conditions that contributes to and worsens the other. For example, a large cross-sectional study reported malnutrition was related to an almost four-fold increase in risk of frailty among community dwelling older adults [19]. Consequently, individuals over the age of 65 years will commonly present with both frailty and malnutrition [20]. Sarcopenia, an age-related skeletal muscle disorder characterised by loss of lean mass and function [21, 22] is also associated with both malnutrition and frailty [23, 24]. However, as the treatment of sarcopenia often involves formal exercise rehabilitation alongside nutrition support, it is beyond the scope of this guide. Please refer to Resources for guidance in managing this condition.



Figure 1. Characteristics, causes/risk factors and consequences of malnutrition and frailty

Characteristics

Malnutrition

- Insufficient energy & protein intake
- Loss of subcutaneous tissue (muscle/fat)
- Fluid accumulation
- Unintentional weight loss
- Loss of muscle mass^a/function (weakness)^b
- Diminished functional capacity^b / decreased endurance^{a,b} / slow performance^{a,b}
- Exhaustion

Frailty

Causes/Risk

Malnutrition

- Parkinson disease [26] / having no diabetes [27]
- Being Indigenous [28, 29]
- Poor self-reported health [6, 26, 27]
- Poor physical function (e.g. difficulty walking/climbing stairs) [6, 26, 30-32]
- Dementia/cognitive decline [26]
- Depression [30]
- Poor appetite [6, 26, 27]
- Dependence with daily activities (e.g. eating, shopping, cooking) [6, 26]
- Low body weight/BMI [32-34]
- Social isolation (e.g. living/eating alone, loss of interest in life) [26, 28-31, 34-36]
- Hospitalisation [6, 27, 31, 37]
- Polypharmacy [26, 38-40]
- Increasing age [26, 31, 32, 36, 39, 41, 42]
- Low educational/income level [30, 35, 39]
- Poor nutritional intake (e.g. poor diet quality, low protein intake) [33, 34, 43-46]
- Chewing/swallowing difficulty (e.g. poor dentition, dysphagia) [26, 27, 32, 47, 48]
- Women [30, 36, 39, 41]
- Higher BMI [41, 42, 49]
- Being malnourished [43]
- Multimorbidity [39, 41, 42]
- High mean Drug Burden Index [38, 40]
- More likely to have visited a HCP prior to a problem [37]

Frailty

Consequences

Malnutrition

- Institutionalisation [50]
- Infections [51]
- Pressure injuries [52]
- Increased risk of falls and fractures [53]
- Mortality [39]
- Functional decline [50] / disability [53, 54] / poor quality of life [55]
- Hospitalisation [56]
- Increased acute and long-term healthcare costs [57, 58]
- More emergency department visits [56]

Frailty

Legend

Malnutrition

Malnutrition & Frailty overlap

Frailty

Findings sourced from ANZ studies where possible; international review papers also used.

^a Malnutrition characteristics

^b Frailty characteristics

Identifying malnutrition and frailty: screening, referral, and assessment

Screening

Routine screening allows HCPs to identify and prioritise at-risk clients so they can be formally assessed and receive timely, appropriate care from member(s) of the multidisciplinary team. It involves using a validated screening tool to determine a client's risk of malnutrition or frailty (see [Appendix 1](#) for list of screening tools and their validity and practicability in the community setting). **With access to a validated screening tool and minimal training, any HCP can screen for malnutrition or frailty risk**, so at-risk clients can be referred to a dietitian for comprehensive nutrition assessment and intervention; or to a geriatrician, dietitian, physiotherapist, and/or exercise physiologist for frailty management. Figure 2 outlines the process for identifying malnutrition and frailty in community settings.

Referral

Clients identified to be at risk of malnutrition and/or frailty should be referred to an appropriate HCP(s) for formal assessment (see [Table 1](#) and [Figure 2](#)). **Dietitians are specifically trained to manage clients with malnutrition, or those 'at risk' of malnutrition [59, 60] and geriatricians are trained to manage people who are frail, or 'at risk' of frailty.** Community-based dietitians can be accessed through community public health clinics or private practices. They can provide services in clinics, in the home, or in aged care settings. HCPs and consumers can use the Dietitians Australia <https://member.dietitiansaustralia.org.au/faapd> or Dietitians New Zealand <https://dietitians.org.nz/find-a-dietitian/> websites to 'Find a dietitian' in their area.

Assessment and diagnosis

Malnutrition and frailty assessments involve systematically collecting and evaluating relevant information to diagnose these problems and their severity, and understand their causes [61] (see [Figure 1](#)), so appropriate interventions can be put in place. **Dietitians are uniquely trained to assess for and diagnose malnutrition, and should be the first point of call. If a dietitian is unavailable for a face-to-face consultation, telehealth is recommended. If no dietitian is available, another HCP should consider the likelihood of malnutrition; it should not go un-investigated. Any trained HCP can assess frailty status; however if a geriatrician is available, they should be consulted first.**

Figure 2: The process of identifying and assessing malnutrition and frailty in the community

Screen

WHO: Any HCP or non-tertiary qualified HCP (Table 1) can screen for malnutrition or frailty. GPs, practice nurses and allied health clinicians are all well-placed to screen for malnutrition and frailty in the community because of their common interactions with clients [59].

WHAT: Evidence-based screening tools should be selected and used based on their validity and practicability in the intended setting (see Appendix 1). For malnutrition, tools that perform best in the community setting include the MNA-SF (first choice) and MUST (second choice). For frailty, tools that perform best in the community include the Clinical Frailty Scale and the FRAIL scale.

WHEN: Screening should be done on first contact with a new patient, when there is suspected malnutrition or frailty, or when there is a change in the patient's circumstances (e.g. new diagnosis, recent hospitalisation, changes in how a person accesses food e.g. loss of licence, death of spouse, change to mobility). **Re-screening** should be undertaken when deemed feasible and needed (e.g. every 1-3 months for high-risk clients).

PRIORITISE: Screening should be prioritised for those at increased risk, such as patients with acute or chronic disease, reduced BMI or recent unintentional weight loss, older age, Indigenous, recently discharged from hospital.



Refer

At-risk patients should be referred as follows:

Malnutrition: Dietitian

Frailty: Geriatrician, Dietitian, Physiotherapist and/or Exercise Physiologist

If a client declines referral to HCPs listed above, see Box 3 for guidance to begin early nutritional interventions.

Refer to other HCPs as needed: Occupational Therapist or Community Nurse for clients requiring assistance in the home; Speech Pathologist for clients with chewing or swallowing problems; Pharmacist for a comprehensive medicines review (to identify any medicines that may be increasing malnutrition risk); GP for specialised overall assessment and management of client.



Assess / Diagnose

Malnutrition - Dietitians assess:

1. Food/nutrition: adequacy to meet needs, based on client's dietary preferences
2. Anthropometrics: height, weight, BMI
3. Biochemistry: blood test results
4. Clinical/physical: physical appearance, appetite

Best performing assessment tools: MNA, SGA^a

Diagnostic tools: GLIM, ASPEN and/or ESPEN criteria (see Box 1)

Frailty - Any trained HCP can assess:

1. Health: co-morbidities, age, health status etc.
2. Physical: weakness, exhaustion, endurance etc.
3. Nutritional: appetite, dietary intake, symptoms
4. Psychological: cognition, depression, anxiety
5. Social: Coping capacity, social relations.

Best performing assessment tools for community: Comprehensive Geriatric Assessment^b, Frailty Index, Frail Scale

Practice Tips

Clients can and should be involved in the screening process. Research shows that while most patients are accepting of nutrition screening, many don't understand its purpose or its results, which is a barrier to enacting dietary advice [38]. If formal screening is not an option, clinicians can use Figure 1 to informally identify risk factors / prioritise patients who are at highest risk for referral/management.

^aNote: low quality of evidence for tools' concurrent validity in community setting; more research is needed

^bShould only be conducted by a Geriatrician

Managing malnutrition and frailty: nutrition intervention, evaluation and monitoring

Malnutrition and frailty can be managed with appropriate nutrition intervention (+/- prescribing exercise, social support, help with activities of daily living) in the community [62]. The goal of nutrition interventions targeting malnutrition and frailty is to improve a client's nutritional intake, especially of energy and protein, to optimise nutrition status and outcomes. **Dietitians are uniquely qualified in medical nutrition therapy and dietary counselling to provide nutritional guidance** to clients at risk of, or with, malnutrition and/or frailty [59, 60] and **should be the first point of call for managing malnutrition** (including in frail clients). Below is step-by-step guidance for dietitians in the nutritional management of malnutrition and frailty. Some sections are also applicable to non-dietetic HCPs (i.e. 'Select and implement nutrition interventions').

(1) Set goals, select outcome measures, and estimate requirements

It is important to view each client as a unique individual and set client-centred goals and select outcomes to measure the effectiveness of nutrition interventions from the outset ([see Box 2](#)). When setting client-centred goals, HCPs, particularly aged care providers, should be guided by and comply with the Aged Care Quality Standards (refer to Resources).

Client-centred goals

Clients should be involved in selecting the goals and outcomes most important to them. This can be achieved through adopting a client-centred approach to care planning, which involves HCPs helping clients to identify pertinent health values, and together, choosing strategies that best align with the clients' personal context [63]. To learn more about the principles of shared decision making, refer to Resources. HCPs should ensure:

- Goals/outcomes are agreed upon with the client, family/whanau or carer
- Goals/outcomes are selected in consideration of disease type, stage, treatment (e.g. goals/outcomes will be different for curative vs. palliative care)
- Goals are culturally appropriate and negotiated in a culturally safe manner
- Goals factor in the clients' socioeconomic circumstances
- Goals are realistic and expectations for improvements are explained/understood
- Outcomes are easily measured/assessed (and preferably can be monitored/tracked by the client/carers themselves)

Box 2. Examples of client-centred goals and outcome measures dietitians can use with clients

Scenario A

An older client arrives at your dietetic practice. They were recently discharged from a 1-month stay in hospital following a hip fracture, where they lost -5% body weight. The client expresses that they have reduced energy levels and low mood, but their desire is to get back to cooking their own dinner and watering their garden.

Client centred goals that you set with the client during the first consultation may be around function rather than just nutrition. For example, the client's goals may be to improve their energy levels, strength and mobility to be able to cook/garden. Objectives for meeting these goals may be to improve energy/protein intake and increase weight/strength. Strategies to achieve this may include education on high protein, high energy (HPHE) foods and arranging shopping assistance (in short term), paired with exercises prescribed by a physiotherapist or exercise physiologist.

After setting goals, you should select *outcome measures* to monitor the client's progress in achieving these goals, also at the first consultation. These may include energy/protein intake and nutrition status (direct nutrition), weight and strength (clinical health), and quality of life, mood and functional ability (client value-based care). You should check these with the client to ensure they are relevant and valuable outcome measures to them.



Scenario B

A 39-year-old client with a head and neck cancer presents to your follow up oncology clinic after completing six weeks of radical chemoradiotherapy. The client has a gastrostomy feeding tube for enteral nutrition and has lost a further 6% body weight in two months since finishing treatment and now has a BMI of 19. Although she is starting to eat small amounts of puree foods, she still has resolving mucositis, pain on swallowing and taste changes.

Client centred goals: Establish goals at this review clinic. They will be based around nutrition, oral function, weight management and texture modification with enteral nutrition prescription adjustment. For example, the client's goals may be to return to eating a normal diet and wean from the enteral feed with the gastrostomy being removed. She would also like to return to work in the next six months. Objectives will be to increase HPHE texture modified foods and oral nutritional supplements (ONS) with a planned reduction of enteral feeding, while increasing or maintaining weight. Strategies will include education on diet texture and fortification, ONS prescribing, and speech language therapist input for swallowing rehabilitation. After setting goals, you should select *outcome measures* to monitor the client's progress in achieving these goals, also at the first consultation. These may include energy/protein intake and nutrition status (direct nutrition), weight and strength (clinical health), and quality of life, mood and functional ability (client value-based care). You should check these with the client to ensure they are relevant and valuable outcome measures to them.

After setting goals with the client, outcome measures will be put in place to monitor her intakes of oral food, ONS and enteral feed to determine nutritional adequacy (direct nutrition). Weekly weights and symptom reporting (clinical health) and communication with the speech language therapist about swallowing function (client value-based care) will also be important. The client may want to set a date to aim for removal of the gastrostomy and return to work (client value-based care).



Estimating nutrition requirements

Common objectives to achieve better nutrition intake and outcomes include improving access to healthy food, overcoming barriers to eating, and meeting estimated nutrition requirements. The latter involves achieving an energy intake of 30–40 kcal/kg/day (125–167 kJ/kg/day) and a protein intake of 1.2–1.5g of protein/kg/day, depending on the health status and age of the client [67, 68]. The clients' actual or adjusted body weight is used for energy and protein calculations (refer to Table 2 and Resources for guidance).

Clients with a high BMI (>25 kg/m²) can still be malnourished or frail – it's not just about being underweight. In fact, malnutrition or frailty may fail to be assessed in overweight and obese clients as HCPs may disregard the risk of these conditions in these clients.

Table 2. BMI categories and body weight adjustments for adults under and over 65 years

BMI category	BMI ^a and age category		Calculating energy requirements
	Adults <65 years	Adults ≥65 years*	
Underweight	<18.5 kg/m ²	≤23 kg/m ²	Use actual weight
Healthy weight	18.5–24.9 kg/m ²	24–30 kg/m ²	Use actual weight
Overweight/ obese	BMI ≥25 kg/m ²	≥31 kg/m ²	Consider using adjusted body weight ^b : IBW ^c + [(actual weight – IBW ^c) x 25%]

Adapted from Nutrition Education Materials Online [69].

BMI: Body mass index.

IBW: Ideal body weight.

*Older persons have greater BMI threshold due to higher risk of poor health/mortality associated with lower body weight in older people.

^a BMI is calculated by dividing the client's weight (kg) by their height in metres squared (m²). e.g. BMI for a 75kg, 175cm client is: $75 \div 1.75^2 = 24.5 \text{ kg/m}^2$.

^b Adjusted body weight is used to ensure requirements are not overestimated in overweight and obese clients. e.g. adjusted body weight for a 175cm, 120kg client, using an IBW of 76.6kg (as per IBW calculation below) is: $76.6 + [(120 - 76.6) \times 0.25] = 87.5 \text{ kg}$.

^c IBW is the client's weight at BMI 25 kg/m². e.g. IBW for a 175cm client is: $(1.75 \times 1.75) \times 25 = 76.6 \text{ kg}$.

(2) Select and implement nutrition interventions

HCPs who aren't dietitians still have an important role in managing clients at risk of malnutrition and frailty in the community setting. A recent systematic review of 18 studies found that non-dietetic HCP interventions for nutritional management of adults at risk of malnutrition may reduce falls and frailty risk and improve weight, nutritional intake, quality of life and client satisfaction [70]. While the quality of evidence was low, these findings suggest **non-dietetic HCPs also have a potential role in managing malnourished, frail or at-risk individuals** [70]. However, when a dietitian is available, they should be consulted in the first instance. The types of dietitian-led nutrition interventions available to manage malnutrition and frailty are outlined in Figure 3.

Intervention selection should be linked to severity of the client's condition and where possible, strategies should address the underlying factors contributing to that client's malnutrition or frailty. Box 3 provides guidance for non-dietetic HCPs (i.e. for when dietitians are unavailable, such as in small rural settings) to implement nutritional strategies to manage malnutrition and/or frailty. A combination of strategies to combat malnutrition or frailty may be required. **Where possible, the nutritional management of malnutrition and frailty should be managed using a combination of education and a food-based approach first (+/- ONS and/or support services).** Box 4 provides an outline of practical management of malnutrition and frailty in the community.

Figure 3. Nutrition strategies for dietitians to manage malnutrition and frailty and guidance on their implementation

Nutrition education	Food-based fortification	Support services	Oral nutritional supplements
 <ul style="list-style-type: none"> • Provide individualised dietary counselling, prioritising clients' needs and preferences • Use geographically and culturally relevant resources in combination with dietary strategies (see Resources) • Ensure the amount and type of advice and/or resources provided are individualised to the client's condition, circumstances, cultural/ethnic beliefs, and ability to process information, remembering medications can affect their cognitive abilities • Where possible, use visual aids or convey information in relative terms to demonstrate how proposed intervention may help client meet nutrition needs (e.g. if you consume x this will help you meet x% of your needs) • Involve nurses, GPs and carers where appropriate to deliver/ reinforce dietary education 	 <ul style="list-style-type: none"> • Encourage small, frequent meals/snacks focusing on nutrient-rich foods/fluids • Protein intake should be spread equally across the day • Fortify meals/diet with HPHE products (skimmed milk powder, cheese, full-fat milk, butter) to increase energy and protein intake without increasing the volume of food consumed • Try other energy-providing fluids if cow's milk is not tolerated (e.g. milk alternatives like calcium-enriched soy milk) • Choose foods that are enjoyed by the client • Factor in potential barriers to intake, such as physical (e.g. poor dentition, appetite loss), mechanical (chewing/ swallowing problems), and/or environmental (e.g. financial issues) • Consider a multivitamin or mineral supplement if indicated (taking medicine and nutrient interactions into consideration) 	 <ul style="list-style-type: none"> • If support services are required, consider what services are available (see below and Resources) and which would be most useful. For example: <ul style="list-style-type: none"> - Government support programs (e.g. Home Care Packages Program) - Home visiting doctor - Transition Care Programs - Palliative care services - Telephone helplines - Home delivered meal programs (e.g. Meals on Wheels) • Review the need for service(s) regularly with the client and their family to ensure they are achieving the objectives they were employed to achieve; and that the client does not become reliant on these services or regress functionally • Consider the cost, acceptability (i.e. some may prefer family to assist) and cultural appropriateness of the service to the client • Involve family in decision making wherever possible and notify them when commencing/changing or terminating service(s) 	 <ul style="list-style-type: none"> • ONS should be used under the supervision of a dietitian. • When nutritional requirements are unable to be met through food alone, choose appropriate ONS for the client, factoring in their preferences (e.g. milk or juice; sweet or savoury), health condition/s (e.g. renal function or dietary intolerances) and personal circumstances (e.g. cost, access, ability to buy/prepare) • Test preferences by offering a range of samples first • Prescribe preferred product(s)/ flavour(s) and determine dose, timing and frequency • Involve and inform family wherever possible about potential issues and ensure they know how to access/order the ONS • Taste fatigue should be considered and reviewed regularly

Consider the multidisciplinary team

Consider referral to and/or input from other healthcare professionals such as occupational therapist, speech pathologist

Nutrition education and counselling

Dietitians should provide individualised nutrition education and counselling to clients for any type of nutrition intervention implemented [71, 72]. Further, appropriately trained HCPs can use resources developed by dietitians to guide conversations with malnourished, frail or 'at risk' clients ([see Resources](#)). This may involve providing culturally appropriate written materials on high protein high energy (HPHE) foods, modifying recipes/fortifying foods, menu planning, developing cooking skills or overcoming cooking barriers, or using memory aids/reminders to eat, in order to meet the learning needs of the client.



Evidence for nutrition education and counselling

Nutrition education that is tailored to the individual's needs and delivered by trained dietitians has been shown to contribute to high adherence to dietary advice among older individuals [73-75]. However, not all clients and/or their family are offered this service and individuals offered free dietetic counselling are not always accepting of it [73]. Hence, **nutrition education should be reinforced by other HCPs** (e.g. nurses or GPs when elderly adults visit their services or are seen in the home) [76] or domiciliary carers [77, 78]. **Geographically and culturally relevant resources** (including information on HPHE foods and types of support services in their local area) have also been shown to be effective at improving nutritional status among community-dwelling ANZ adults [79] and therefore **should be provided by any HCP when counselling from a dietitian is not immediately available** ([see Resources](#)).

Food-based fortification

Food-based fortification involves increasing the amount of energy and protein in a meal/snack without increasing its volume. This is achieved by substituting and/or adding readily available HPHE ingredients (e.g. powdered milk, cheese, yoghurt for protein; and oils, butter, cream for energy) and/or powdered modules (casein, whey protein, maltodextrin) to food or beverages [79, 80]. This is the preferred first line approach to treat lower risk clients due to access, cost, palatability, and sustainability.

Evidence for food-based fortification

A 2018 systematic review of studies conducted in acute care settings demonstrated that food-based fortification is an effective and well-tolerated intervention to improve energy and protein intake amongst older adults [81]. While evidence is lacking in the community setting, research suggests at-risk and malnourished community-dwelling adults in ANZ often have a low intake of HPHE foods such as dairy [34, 74, 82] and suggests focusing on core food groups as a simple and cost-effective approach to improve clients' nutrition. In fact, adding four dairy serves per day into residents' diets has been found to drastically reduce rates of malnutrition [82], fractures and falls [83] in aged care. Based on this research, **HCPs could educate clients on the demonstrated effectiveness of HPHE foods** (especially dairy) for improving nutrition intake and status, **work with clients to ensure they have access to these foods (financially, physically) and discuss options that meet clients' cultural needs and/or dietary preferences.**



Box 3. Potential interventions and services that can be implemented by HCPs to support dietitians in managing malnutrition and/or frailty



Scenario A

A 75-year-old female client is seen by a GP. She seems to have lost weight since her last appointment. Further investigation confirms unintentional weight loss, poor appetite, and low mood. She lives alone with little motivation to cook but is still independent and mobile.

Risk factors: Older age, weight loss, poor appetite, poor social support/social isolation.

Potential intervention:

- Refer to a dietitian (either in person or telehealth) for assessment and a nutrition care plan.
- Any non-dietetic HCP can provide geographically relevant and/or evidence-based resources for improving nutrition intake, such as educational materials on high energy/high protein foods (especially dairy, 4 serves a day) and having smaller, more frequent meals.
- Community services such as shopping or cooking support programs, or other strategies to increase socialisation/reduce loneliness might be beneficial.
- Referral to a counsellor or psychologist may also be warranted to address mood issues.

Scenario B

Following a significant trauma due to a motor vehicle accident and subsequent admission to the intensive care unit, a 55-year-old, obese man is currently in rehabilitation. He suffers from depression, memory problems and sarcopenic obesity, among other comorbidities (diabetes, high blood pressure). He tires quickly and has little motivation to improve his body composition. Upon discharge from hospital and transition to community care, he will return home where he lives with his wife, who does the food shopping and prepares most of the client's meals at home.

Risk factors: Depression, poor physical function, high BMI, multimorbidity, recent hospitalisation.

Potential intervention:

- Refer to a dietitian to address potential malnutrition and/or frailty.
- A dietitian consultation, via telehealth or in person, can provide the client with educational resources on nutrition and health, with a focus on maintaining lean body mass/consuming healthy protein-rich foods after illness/injury. The client's wife should be included in this education as she is responsible for the household's shopping and cooking (and may be able to help with the client's low motivation).
- Provision of memory aids (by speech pathologist / speech language therapist), mobility aids and/or exercise prescription (by exercise physiologist), aids and appliances (by occupational therapist), or support services (by social worker) may also be useful, so refer to appropriate HCPs as needed.



Scenarios continue next page

Box 3. Potential interventions and services that can be implemented by HCPs to support dietitians in managing malnutrition and/or frailty – Continued

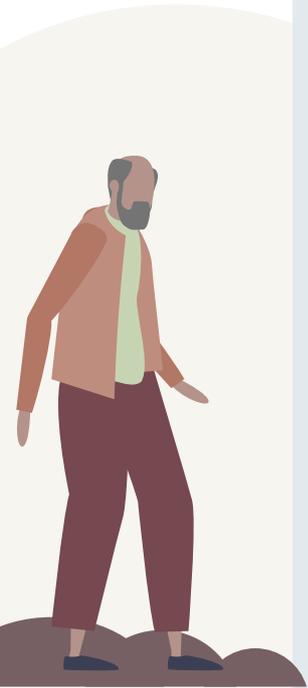
Scenario C

An 80-year-old Māori man is seen by a practice nurse at a rural GP clinic. He has superficial cuts and bruises after a fall in his home. Recently bereaved, it is noted this man has lost weight and has a lower respiratory tract infection. He has a history of smoking.

Risk factors: Depression, weight loss, co-morbidities (CVD), social inequity.

Potential intervention:

- Use a kaupapa Māori approach to engage with a local Iwi health service provider (available regionally) who have access to kaupapa Māori trained health professionals. Kaupapa Māori Health Services deliver to the needs of haukāinga (local people), are Māori-led, and provide whānau-centred solutions underpinned by tikanga (Māori culture). Using this approach, service providers can access support from whānau (family) and establish relationships with existing community and social support networks to gain insight into how best to address the wellbeing of this Māori man.
- Involvement of a dietitian would be beneficial to ensure nutritional needs are being met in the intervention planning. Cultural considerations should always be at the forefront of any intervention; this includes culturally important food and tikanga.
- A holistic approach is needed to address the four cornerstones of wellbeing around the Māori model of health: Te Whare Tapa Whā - hinengaro (mental well-being), wairua (spiritual well-being), whanau (family well-being) and tinana (physical well-being).



Scenario D

A General Practice Nurse is administering seasonal flu vaccinations for clients at higher risk and notices a 74-year-old gentleman with severe COPD who appears thin and frail. He reports losing weight within the last 6 months due to an infective exacerbation that saw him hospitalised for 4 days. His BMI is 18.8 kg/m² and he has experienced 8.5% weight loss over the previous 6 months. Although he reported feeling better, he hasn't been able to regain the weight he lost. He lives alone, has a limited budget for food and reports struggling with shopping and cooking due to being able to only walk 30m because of breathlessness.

Risk factors: Recent unintentional weight loss, severe COPD, limited exercise capacity, lives alone, budget constraints.

Potential intervention:

- Food-based fortification + nutrition education (shopping on a budget, cost effective ways to fortify foods) provided by a dietitian.
- Meals on Wheels or another meal delivery service as a way to reduce burden of food preparation.
- Social work referral to check he has all of his financial and care entitlements (i.e. benefits, access to support at home).
- On dietitian recommendation, the addition of nourishing fluids or commercial ONS as indicated.



Note: Strategies should be selected to address the underlying factors contributing to malnutrition and/or frailty.

Support services

There are many support services available to help individuals with their daily activities and nutrition at home. While services may vary depending on geographical location, there is a range of government programs, community services and private home care options for people who need help in the home ([see Resources](#)). These services may be as simple as taking a person shopping, helping them plan a weekly menu or prepare a shopping list, supporting them to cook and prepare meals, or reminding them to eat; or can involve a higher level of care like providing convenient/pre-made meals or transport.



Evidence for support services

One systematic review [84] and two small ANZ studies [80, 85] have reported beneficial effects of home-delivered meals on intakes of energy, protein and/or micronutrients in community-dwelling older adults. While this evidence demonstrates that such strategies can contribute to an individuals' overall intake, it is important to **involve a dietitian in the client's care to ensure they don't become dependent on support services. For example, inclusion of other foods (e.g. nourishing snacks and high-protein foods such as dairy products) is still necessary and recommended** [83] for older individuals to meet their nutritional needs when receiving home-delivered meals, but this is not always acknowledged by clients [80].

Oral nutrition support

Oral nutritional supplements (ONS) are often nutritionally complete substances containing macro- and micro-nutrients. There is a wide range of ONS formats (liquid, powder, pre-thickened, puddings), styles (milk, juice, savoury), types (high protein, low volume, fibre-containing), flavours (natural, vanilla, chocolate) and energy density (1-4kcal/ml) to meet individuals' preferences and needs. Most standard supplements provide -240-300kcal (1000-1250kJ), 10-12g of protein and a full range of vitamins and minerals per serving. Typically, in a high protein product, more than 20% of the product's total energy is provided by protein [86]. While they are a common strategy to improve nutrition intake among adults [74, 87, 88], ONS should only be used when diet alone is insufficient to meet a client's daily nutritional requirements, and not as a food replacement. Given the issues clients can face with ONS, such as flavour fatigue, low tolerance, drug-nutrient interactions, reliance and cost, dietitians should oversee the prescription and monitoring of ONS use, and family members should be cautioned about the potential issues. [See Resources](#) for further guidance on ONS use and prescription.



Evidence for oral nutrition support

Randomised Controlled Trials have shown a positive effect of daily ONS consumption on energy/protein intakes and nutritional status among malnourished older clients following discharge from hospital [89, 90]. Indeed, a recent overview of systematic reviews and meta-analyses of ONS interventions reported strong evidence for positive improvements in energy intake and body weight, however, discordance was evident for other outcomes (e.g. mortality, complications) [91]. Benefits are typically seen with 1-3 ONS serves per day (approximately 300-900kcal/day, 200-600ml/day) for 2-3 months; however, serving sizes and duration of ONS may vary depending on clinical needs [86, 92]. The success of ONS relies on client adherence, which is often variable [93-95]. While evidence is limited, ONS is demonstrated to be a cost-effective approach in the community setting [96, 97]. Dietary counselling provided by a dietitian in combination with nutrition support, such as ONS, has been found to be effective in improving energy intakes and body weight among older adults [98]. Where ONS is used as part of a malnutrition strategy, **HCPs should provide education to clients, involving their family wherever possible, on the potential benefits and limitations of ONS.**

Consider the multidisciplinary team

Consider a multidisciplinary team approach to determine the optimal nutrition intervention(s) according to the individual's clinical condition and socioeconomic status, and a plan for their implementation and evaluation. The care team may include a dietitian, GP, geriatrician, community nurse, pharmacist, occupational therapist, exercise physiologist, physiotherapist and/or speech pathologist (see Table 1). Informative and timely communication between HCPs, and relaying client findings/progress back to the GP and other members of the health care team, are highly important for the continuum of care.

(3) Evaluate/monitor outcomes

Selected nutrition intervention(s) should be evaluated/monitored using the outcome measures selected in Step 1 [1, 64, 65]. Qualitative and quantitative measures and validated tools (where available) should be used to collect data, and findings should be communicated to all HCPs involved in the client's care. Frequency of monitoring and evaluation will depend on the health care setting, strategies selected and disease severity. Depending on the severity of malnutrition and/or frailty, the following is recommended:

- **Severe or moderate malnutrition/frailty:** Weekly review until stable; then every 1-3 months or as needed
- **Mild malnutrition/frailty or responding well to nutrition intervention:** every 1-3 months

Box 4. Implementing nutrition interventions to manage malnutrition and/or frailty



SCREEN for malnutrition/frailty risk using validated tools (see Appendix 1) and/or consider underlying risk factors / causes of malnutrition/frailty (see Figure 1)

REFER at-risk clients to appropriate HCP (malnutrition risk: Dietitian; frailty risk: Geriatrician, Physiotherapist, Exercise Physiologist, and/or Dietitian)

ASSESS for malnutrition and/or frailty, considering severity/risk level

DOCUMENT the client's malnutrition or frailty status in their health record or care plan if they are identified as malnourished, frail or at risk (and the underlying causes)

INFORM the client of their malnutrition/frailty diagnosis or level of risk, and engage them in discussions about how this might be managed, explaining all treatment options

SET GOALS for the nutrition intervention in collaboration with the client, ensuring they agree with these; and **SELECT OUTCOME MEASURES** that are most meaningful and important to the patient (i.e. clinical, PROMs and PREMs)

DECIDE on nutrition interventions, which should be:

- Appropriate for the client's clinical condition and most likely to be effective in addressing malnutrition/frailty
- Identified as feasible and acceptable to the patient. Consider the client's condition and their treatment context (e.g. clients receiving palliative care will have different priorities to those receiving active/curative treatment)

COMMUNICATE with other health professionals as needed

EVALUATE and MONITOR progress accordingly, against the goals selected and adjust nutrition interventions as needed

Transitions of care (e.g. from hospital to home)

Transitions of care refers to the various points at which a client moves to, or returns from, a particular physical location (i.e. home, hospital, residential care settings) or makes contact with different HCPs to receive health care [99]. Managing transitions effectively from hospital into residential aged care or primary care (i.e. home) and vice versa are critical steps in managing malnutrition and frailty in community-dwelling adults, and requires involvement from and communication between all relevant HCPs. Further, family members often help to facilitate this transition, and thus should be involved in and updated about any decision-making and delivery of education/recommendations.



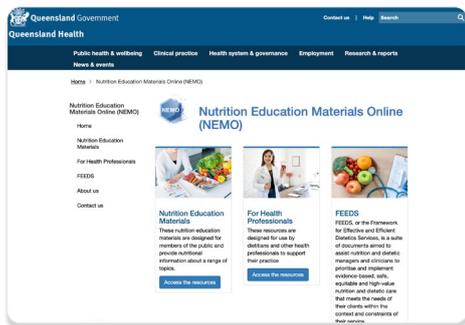
Evidence for transitions of care

Community-dwelling older adults are slow to return to their baseline nutritional state after hospitalisation [100]. Consequently, rehospitalisation rates for older adults are high and up to a third of readmissions are considered preventable [101]. Early dietetic intervention on and/or following discharge has been shown to reduce avoidable readmissions by 28% [101], improve intake and weight gain [90, 102, 103], ameliorate gait speed [104], and reduce 6-month and 90-day mortality by 8% [105] and 5% [103], respectively. Yet, many older adults who need quality nutrition care in this transition period do not receive it [106, 107]. Acute care and community HCPs should work together to improve transitions of care by ensuring adequate documentation, handover and referrals, and communication; and in turn, potentially improve client outcomes.



Resources / Extra reading

Resources to provide to clients



Nutrition Education Materials Online (NEMO)

Resources to support the management nutrition among adults in the community

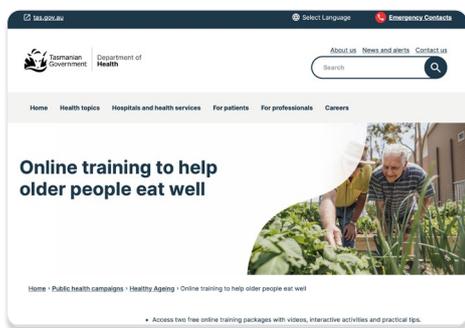
<https://www.health.qld.gov.au/nutrition>



Sydney North Health Network

Educational and practical resources for health aging and frailty in older community dwelling adults

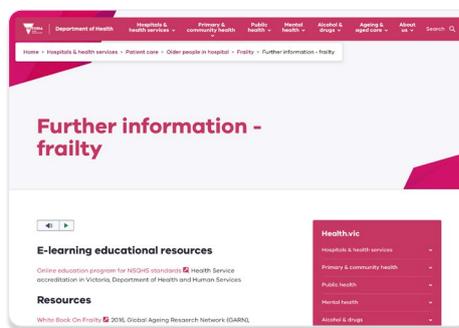
<https://sydneynorthhealthnetwork.org.au/programs/frailty/>



Appetite for Life

Educational and practical resources made specifically to support nutrition and exercise among elderly adults in the community

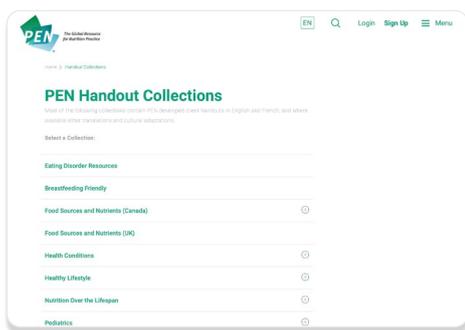
http://www.dhhs.tas.gov.au/healthyageing/resources_and_contacts/appetite_for_life



Health Vic

Educational and practical resources for managing frailty in older community dwelling adults

<https://www2.health.vic.gov.au/hospitals-and-health-services/patient-care/older-people/frailty/frailty-resources>



PEN: The Global Resource for Nutrition Practice

Educational and practical resources for community dwelling adults around the globe (note: requires a PEN subscription)

<https://www.pennutrition.com/HandoutCollections.aspx>



Healthinfo

Educational and practical resources for community dwelling adults living in New Zealand

<https://www.healthinfo.org.nz/>

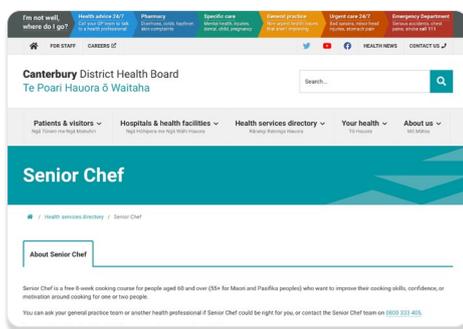
Resources on services available



Planning and coordinating healthcare

List of support at home and transition of care services for malnourished elderly adults living in Australia

<https://www.betterhealth.vic.gov.au/health/servicesandsupport/healthcare-and-support-at-home#bhc-content>



Senior Chef

A NZ cooking course for people aged ≥ 60 (≥ 55 for Maori and Pasifika peoples) who want to improve their cooking skills, confidence, or motivation around cooking

<https://www.cdhb.health.nz/health-services/senior-chef/>



Just Cook

A NZ programme aimed at building cooking skills, food and nutrition confidence and addressing social isolation among older people

<https://nutritionfoundation.org.nz/our-programmes/JUST-COOK>

Resources to guide evidence-based practice



Australian Guide to Healthy Eating

A food selection guide, visually representing the proportion of the five food groups recommended for consumption each day (note: this Guide does not necessarily meet the dietary needs of older people, especially those with malnutrition or frailty)

<https://www.eatforhealth.gov.au/guidelines/australian-guide-healthy-eating>



Estimating energy & protein requirements

Thorough guidance around estimating energy, protein & fluid requirements for adults

https://www.health.qld.gov.au/_data/assets/pdf_file/0022/144175/est_ratgs.pdf



Malnutrition in aged care

Dietitians Australia position statement on malnutrition in residential aged care settings

https://dietitiansaustralia.org.au/wp-content/uploads/2021/04/DietitiansAustralia_Malnutrition_in_Aged_Care_Dec-2020.pdf



The Aged Care Quality Standards

Guidance for aged care services to maintain compliance with the Quality Standards

<https://www.agedcarequality.gov.au/providers/standards>



Aged Care Quality Standards storyboards and user guide

Guidance for aged care services to implement the Quality Standards

<https://www.agedcarequality.gov.au/resources/aged-care-quality-standards-storyboards-and-user-guide>



Older people and aged care dietitian role statement

Dietitians Australia role statement for dietitians working in aged care

https://dietitiansaustralia.org.au/wp-content/uploads/2021/11/Older-People-Aged-Care-Role-Statement_2021.2.pdf

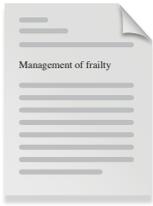


Nutrition Care Pathways for Hospital-to-Community Transitions

Evidence-based, practical guidance on how to deliver nutrition care during hospital-to-community transitions for malnourished adult patients

<https://aspenjournals.onlinelibrary.wiley.com>

Resources to guide evidence-based practice



Management of frailty

Evidence-based findings describing the definition and management of frailty (includes exercise prescription)

<https://sydneynorthhealthnetwork.org.au/wp-content/uploads/2018/12/Asia-Pacific-Frailty-Guidelines-2017.pdf>



Exercise Recommendations in Older Adults (ICFSR)

Evidence-based, practical guidance around exercise prescription for older adults

<https://link.springer.com/article/10.1007/s12603-021-1665-8>



Sarcopenia

Evidence-based findings describing the definition and management of sarcopenia.

[https://www.thelancet.com/article/S0140-6736\(19\)31138-9/fulltext](https://www.thelancet.com/article/S0140-6736(19)31138-9/fulltext)



Shared decision making

Describes barriers and facilitators for shared decision making as experienced by older patients, informal caregivers and HCPs

<https://bmjgeriatr.biomedcentral.com/track/pdf/10.1186/s12877-021-02050-y.pdf>



What are PROMs and PREMs?

NSW Agency for Clinical Innovation - overview of patient-reported outcome and experience measures

https://aci.health.nsw.gov.au/_data/assets/pdf_file/0003/253164/Overview-What_are_PROMs_and_PREMs.pdf



Patient-reported outcome measures

Australian Commission on Safety and Quality in Health Care information and resources on PROMs and PREMs.

<https://www.safetyandquality.gov.au/our-work/indicators-measurement-and-reporting/patient-reported-outcome-measures>

Appendix 1:

List of malnutrition and frailty screening tools and their validity in community settings

Ranking system



Tool	Evidence of validity in community	Criteria for use					Recommendation ranking and access
		For whom	By whom	Is sensitive	Is specific	Is simple	
Malnutrition screening tools							
Mini Nutritional Assessment-short form (MNA-SF)	Six-item questionnaire. Promising criterion validity in community, with high sensitivity (81-100%) and specificity (82-100%). Note studies use MNA-FF as reference standard so incorporation bias is present [108].	Older community-dwelling adults	All HCPs				1 st choice for older adults https://www.mna-elderly.com/forms/mini/mna_mini_english.pdf
Malnutrition Universal Screening Tool (MUST)	Five-step tool. Validated in hospital, residential aged care and community settings [109]. Two validation studies in community (more needed): 100% sensitivity, 98% specificity when validated against dietitian assessment; 58% sensitivity, 96% specificity when validated against unintentional weight loss or BMI [108].	All adults	All HCPs				1 st choice for all adults; 2 nd choice for older adults https://www.bapen.org.uk/pdfs/must/must_full.pdf
Malnutrition Screening Tool (MST) [110]	Short, two-question survey on appetite and unintentional weight loss. Widely validated in hospital settings, with high sensitivity (90-98%) and specificity (85-89%); but not validated in community [108]. Community validation studies are needed.	All adults	All HCPs and/or client/family				2 nd choice for all adults https://www.health.qld.gov.au/_data/assets/pdf_file/0029/148826/hphe_mst_pstr.pdf
Seniors in the Community: Risk Evaluation for Eating and Nutrition Questionnaire (SCREEN-II; now SCREEN-14) [111]	A 17-item questionnaire. Good validity among older community-dwelling Canadian and New Zealand adults, with reported sensitivity from 84-90% and specificity 62-86% when tested against clinical assessment by a trained dietitian. More validation studies needed in other settings [108]. Designed for community-dwelling older adults [112].	Older community-dwelling adults	All HCPs and/or client				3 rd choice for older adults https://olderadultnutritionscreening.files.wordpress.com/2021/04/screen-14-tool_2021-1.pdf
Determine your Health Checklist (DETERMINE)	Self-completed, 10-question survey designed to assess nutritional status in community-dwelling older adults [113]. Predictive validity in community setting is poor (unable to predict mortality, hospitalisation, or weight loss of >5%). Reported criterion validity show 75-91% sensitivity and 11-54% specificity; but few studies used appropriate reference standards [108].	Older community dwelling adults	By client				http://www.dhs.gov.vi/home/documents/DetermineNutritionChecklist.pdf
Frailty screening/assessment tools[^]							
Clinical Frailty Scale	Face-to-face assessment of patients by HCPs who assign categories of diminishing capacity from 1 (very fit) to 9 (terminally ill). Sensitivity 35-76% and specificity 95 to 100% (with Fried frailty phenotype as reference standard) [114]	Community-dwelling older adults	All HCPs				1 st choice Rockwood, K., Song, X., Chris MacKnight, Bergman, H., Hogan, D., McDowell, I., Mitnitski, A. A global clinical measure of fitness and frailty in elderly people. CMAJ, 2005. 173: p. 489-495.
FRAIL scale	Five-item scale of self-reported yes/no questions taking ~10 mins to complete. Sensitivity 87-96% and specificity 64-86% (with Fried frailty phenotype as reference standard), with FRAIL scale score of 2 being the optimal cut-off point, among community-dwelling Australian [115] and Chinese adults [116].	Community-dwelling Australian and Chinese adults	Client self-complete				2 nd choice Morley JE, Malmstrom TK, Miller DK. A simple frailty questionnaire (FRAIL) predicts outcomes in middle aged African Americans. J Nutr Health Aging, 2012. 16: p. 601-8.
Frailty Index	Predicts adverse health outcomes and correlates strongly with other frailty measures. Involves a count of deficits from a pre-determined list. While it can be complex and time consuming (30 mins) to complete, newer versions can be completed in 10-15 minutes. Sensitivity 46-61%, specificity 84-90% when compared with Fried's Frailty Phenotype [117].	All adults	All HCPs Some self-report available also				3 rd choice Mitnitski, A., X. Song, and K. Rockwood, The estimation of relative fitness and frailty in community-dwelling older adults using self-report data. The Journals of Gerontology Seris A: Biological Sciences and Medical Sciences, 2004. 59: p. M627-M632

Appendix 1:

List of malnutrition and frailty screening tools and their validity in community settings

Ranking system



Tool	Evidence of validity in community	Criteria for use					Recommendation ranking and access
		For whom	By whom	Is sensitive	Is specific	Is simple	
Fried's Frailty Phenotype (also known as Fried Scale)	Five-item assessment of deficits, taking 5-10 mins to complete. Requires measurement of hand grip strength and gait speed, which are not always practical/ feasible in community settings. Can identify frailty and predict adverse clinical outcomes; hence is widely used in clinical and research settings. Low-moderate sensitivity (40-44%) and high specificity (85-94%) for predicting functional decline/ disability, mortality, institutionalisation in community-dwelling adults [118].	Community-dwelling adults	All HCPs				Fried, L.P., C.M. Tangen, J. Walston, A.B. Newman, C. Hirsch, J. Gottdiener, T. Seeman, R. Tracy, W.J. Kop, G. Burke, and M.A. McBurnie, Frailty in older adults: evidence for a phenotype. The journals of gerontology.
Tilburg Frailty Indicator [119, 120]	Developed for identifying frail community-dwelling older people and is validated in this setting with high diagnostic accuracy (95% sensitivity; 86% specificity) for frailty [121]. Takes ~14 mins to complete.	Community-dwelling older people	All HCPs				https://geriatriahcsc.files.wordpress.com/2014/03/tiburg.pdf
Vulnerable Elders Survey [122]	Developed to identify community-dwelling vulnerable elderly at risk for functional decline. Relatively short and easy to complete. Predicts functional decline/disability, mortality and institutionalisation in community-dwelling adults with high sensitivity (88-92%) but low-moderate specificity (47-59%) [118]	Community-dwelling, vulnerable older people	All HCPs				https://www.cfps.org.sg/publications/the-singapore-family-physician/article/82_pdf
Groningen Frailty Indicator [123]	15-item tool that can determine the level of frailty. Moderate sensitivity (52-63%), specificity (69-77%) for predicting functional decline/disability, mortality and institutionalization in community-dwelling adults [118].	Institutionalization in community-dwelling adults	All HCPs				https://geriatriahcsc.files.wordpress.com/2014/03/gfi.pdf

DXA: Dual-energy X-ray absorptiometry

^ There is limited to no distinction between frailty screening and assessment tools; rather, tools are used interchangeably for both screening and assessment/diagnosis. Further, while there is consensus on the definition of frailty, there is no agreement on how it should be measured

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References

1. Roberts S, Collins P, Rattray M. Identifying and Managing Malnutrition, Frailty and Sarcopenia in the Community: A Narrative Review. *Nutrients* 2021; 13: 2316.
2. Dwyer JT, Gahche JJ, Weiler M, Arensberg MB. Screening Community-Living Older Adults for Protein Energy Malnutrition and Frailty: Update and Next Steps. *Journal of Community Health* 2020; 45: 640-60.
3. Cederholm T, Bosaeus I, Barazzoni R, Bauer J, Van Gossum A, Klek S et al. Diagnostic criteria for malnutrition – An ESPEN Consensus Statement. *Clinical nutrition* 2015; 34: 335-40.
4. Cederholm T, Jensen GL, Correia MITD, Gonzalez MC, Fukushima R, Higashiguchi T et al. GLIM criteria for the diagnosis of malnutrition – A consensus report from the global clinical nutrition community. *Clinical nutrition* 2019; 38: 1-9.
5. White JV, Guenter P, Jensen G, Malone A, Schofield M, Force ASPENMT et al. Consensus statement of the Academy of Nutrition and Dietetics/American Society for Parenteral and Enteral Nutrition: characteristics recommended for the identification and documentation of adult malnutrition (undernutrition). *Journal of the Academy of Nutrition and Dietetics* 2012; 112: 730.
6. O’Keeffe M, Kelly M, O’Herlihy E, O’Toole PW, Kearney PM, Timmons S et al. Potentially modifiable determinants of malnutrition in older adults: A systematic review. *Clinical nutrition* 2019; 38: 2477-98.
7. Visser M, Volkert D, Corish C, Geisler C, de Groot LC, Cruz-Jentoft AJ et al. Tackling the increasing problem of malnutrition in older persons: The Malnutrition in the Elderly (MaNuEL) Knowledge Hub. *Nutrition bulletin* 2017; 42: 178-86.
8. Agarwal E, Ferguson M, Banks M, Bauer J, Capra S, Isenring E. Nutritional status and dietary intake of acute care patients: Results from the Nutrition Care Day Survey 2010. *Clinical Nutrition* 2012; 31: 41-7.
9. Chatindiara I, Allen J, Popman A, Patel D, Richter M, Kruger M et al. Dysphagia risk, low muscle strength and poor cognition predict malnutrition risk in older adults at hospital admission. *BMC geriatrics* 2018; 18: 1-8.
10. Crichton M, Craven D, Mackay H, Marx W, de van der Schueren M, Marshall S. A systematic review, meta-analysis and meta-regression of the prevalence of protein-energy malnutrition: associations with geographical region and sex. *Age and Ageing* 2018; 48: 38-48.
11. Rowell DS, Jackson TJ. Additional costs of inpatient malnutrition, Victoria, Australia, 2003–2004. *The European Journal of Health Economics* 2011; 12: 353-61.
12. Fried LP, Tangen CM, Walston J, Newman AB, Hirsch C, Gottdiener J et al. Frailty in older adults: Evidence for a phenotype. *The journals of gerontology Series A, Biological sciences and medical sciences* 2001; 56: 146-56.
13. Mitnitski AB, Mogilner AJ, Rockwood K. Accumulation of deficits as a proxy measure of aging. *TheScientificWorld* 2001; 1: 323-36.

14. Buta BJ, Walston JD, Godino JG, Park M, Kalyani RR, Xue Q-L et al. Frailty assessment instruments: Systematic characterization of the uses and contexts of highly-cited instruments. *Ageing research reviews* 2015; 26: 53-61.
15. Gordon EH, Peel NM, Samanta M, Theou O, Howlett SE, Hubbard RE. Sex differences in frailty: A systematic review and meta-analysis. *Experimental gerontology* 2017; 89: 30-40.
16. Chi J, Chen F, Zhang J, Niu X, Tao H, Ruan H et al. Impacts of frailty on health care costs among community-dwelling older adults: A meta-analysis of cohort studies. *Archives of gerontology and geriatrics* 2021; 94: 104344.
17. Laur CV, McNicholl T, Valaitis R, Keller HH. Malnutrition or frailty? Overlap and evidence gaps in the diagnosis and treatment of frailty and malnutrition. *Applied physiology, nutrition, and metabolism* 2017; 42: 449-58.
18. Martone AM, Onder G, Vetrano DL, Ortolani E, Tosato M, Marzetti E et al. Anorexia of aging: A modifiable risk factor for frailty. *Nutrients* 2013; 5: 4126-33.
19. Boulos C, Salameh P, Barberger-Gateau P. Malnutrition and frailty in community dwelling older adults living in a rural setting. *Clinical Nutrition* 2016; 35: 138-43.
20. Chatindiara I. High prevalence of malnutrition and frailty among older adults at admission to residential aged care. *Journal of primary health care* 2020; 12: 305-17.
21. Chen L, Lee W, Peng L, Liu L, Arai H, Akishita M et al. Recent Advances in Sarcopenia Research in Asia: 2016 Update From the Asian Working Group for Sarcopenia. *Journal of the American Medical Directors Association* 2016; 17: 767.e1-.e7.
22. Studenski SA, Peters KW, Alley DE, Cawthon PM, McLean RR, Harris TB et al. The FNIH sarcopenia project: Rationale, study description, conference recommendations, and final estimates. *The journals of gerontology Series A* 2014; 69: 547-58.
23. Ha Y-C, Choi H, Kim K-H, Lee Y-K, Koo K-H, Park K-S et al. Malnutrition and chronic inflammation as risk factors for sarcopenia in elderly patients with hip fracture. *Asia Pacific journal of clinical nutrition* 2013; 27: 527-32.
24. Liguori I, Curcio F, Russo G, Cellurale M, Aran L, Bulli G et al. Risk of Malnutrition Evaluated by Mini Nutritional Assessment and Sarcopenia in Noninstitutionalized Elderly People. *Nutrition in clinical practice* 2018; 33: 879-86.
25. Faxen-Irving G, Cederholm T, Grönstedt H, Franzen E, Seiger Å, Wikström S et al. Relationships between nutritional status, sarcopenia and frailty in nursing-home residents. *Clinical nutrition* 2018; 37: S59-S60.
26. Moreira NCF, Krausch-Hofmann S, Matthys C, Vereecken C, Vanhauwaert E, Declercq A et al. Risk factors for malnutrition in older adults: A systematic review of the literature based on longitudinal data. *Advances in nutrition* 2016; 7: 507-22.
27. van der Pols-Vijlbrief R, Wijnhoven HAH, Schaap LA, Terwee CB, Visser M. Determinants of protein-energy malnutrition in community-dwelling older adults: A systematic review of observational studies. *Ageing research reviews* 2014; 18: 112-31.
28. Tkatch MT, Towers AJ, Keller HH, Wham CA. Nutrition risk prevalence and associated health and social risk factors in Māori and non-Māori: Results from the New Zealand Health, Work and Retirement Study. *Australasian journal on ageing* 2021; DOI: 10.1111/ajag.12952.

29. Wham CA, Teh R, Moyes S, Dyall L, Kepa M, Hayman K et al. Health and social factors associated with nutrition risk: Results from life and living in advanced age: A cohort study in New Zealand (LILACS NZ). *The Journal of nutrition, health & aging* 2015; 19: 637-45.
30. Wham C, Maxted E, Teh R, Kerse N. Factors associated with nutrition risk in older Māori: A cross sectional study. *New Zealand medical journal* 2015; 128: 45-54.
31. Streicher M, Zwiener-Pot J, Bardon L, Nagel G, Teh R, Meisinger C et al. Determinants of Incident Malnutrition in Community-Dwelling Older Adults: A MaNuEL Multicohort Meta-Analysis. *Journal of the American Geriatrics Society* 2018; 66: 2335-43.
32. Chatindiara I, Williams V, Sycamore E, Richter M, Allen J, Wham C. Associations between nutrition risk status, body composition and physical performance among community-dwelling older adults. *Australian and New Zealand journal of public health* 2019; 43: 56-62.
33. Craven DL, Pelly FE, Lovell GP, Isenring E. Nutrition Risk Measured Online in Community-Living Older Australians. *Journal of nutrition in gerontology and geriatrics* 2018; 37: 241-54.
34. Watson S, Zhang Z, Wilkinson TJ. Nutrition risk screening in community-living older people attending medical or falls prevention services. *Nutrition & dietetics* 2010; 67: 84-9.
35. Besora-Moreno M, Llauro E, Tarro L, Sola R. Social and Economic Factors and Malnutrition or the Risk of Malnutrition in the Elderly: A Systematic Review and Meta-Analysis of Observational Studies. *Nutrients* 2020; 12: 737-53.
36. Thompson MQ, Theou O, Karnon J, Adams RJ, Visvanathan R. Frailty prevalence in Australia: Findings from four pooled Australian cohort studies. *Australasian journal on ageing* 2018; 37: 155-8.
37. Dent E, Hoon E, Karnon J, Newbury J, Kitson A, Beilby J. Frailty and health service use in rural South Australia. *Archives of gerontology and geriatrics* 2015; 62: 53-8.
38. Gnjjidic D, Hilmer SN, Blyth FM, Naganathan V, Cumming RG, Handelsman DJ et al. High-Risk Prescribing and Incidence of Frailty Among Older Community-Dwelling Men. *Clinical pharmacology and therapeutics* 2012; 91: 521-8.
39. Thompson MQ, Yu S, Tucker GR, Adams RJ, Cesari M, Theou O et al. Frailty and sarcopenia in combination are more predictive of mortality than either condition alone. *Maturitas* 2021; 144: 102-7.
40. Jansen KM, Bell JS, Hilmer SN, Kirkpatrick CMJ, Ilomäki J, Le Couteur D et al. Effects of Changes in Number of Medications and Drug Burden Index Exposure on Transitions Between Frailty States and Death: The Concord Health and Ageing in Men Project Cohort Study. *Journal of the American Geriatrics Society* 2016; 64: 89-95.
41. Tembo M, Holloway-Kew K, Sui S, Dunning T, Low A, Yong S et al. Prevalence of Frailty in Older Men and Women: Cross-Sectional Data from the Geelong Osteoporosis Study. *Calcified tissue international* 2020; 107: 220-9.
42. Thompson MQ, Theou O, Adams RJ, Tucker GR, Visvanathan R. Frailty state transitions and associated factors in South Australian older adults: Frailty state transitions. *Geriatrics & gerontology international* 2018; 18: 1549-55.
43. Lorenzo-López L, Maseda A, De Labra C, Regueiro-Folgueira L, Rodríguez-Villamil JL, Millán-Calenti JC. Nutritional determinants of frailty in older adults: A systematic review. *BMC geriatrics* 2017; 17: 108-121.
44. Coelho-Júnior HJ, Rodrigues B, Uchida M, Marzetti E. Low protein intake is associated with frailty in older adults: A systematic review and meta-analysis of observational studies. *Nutrients* 2018; 10: 1334.

45. Das A, Cumming RG, Naganathan V, Blyth F, Ribeiro RV, Le Couteur DG et al. Prospective Associations Between Dietary Antioxidant Intake and Frailty in Older Australian Men: The Concord Health and Ageing in Men Project. *The journals of gerontology Series A, Biological sciences and medical sciences* 2020; 75: 348-56.
46. Moradi S, Hadi A, Mohammadi H, Asbaghi O, Zobeiri M, Marx W et al. Dietary Inflammatory Index and the Risk of Frailty Among Older Adults: A Systematic Review and Meta-Analysis. *Research on aging* 2020; 43: 323-31.
47. Hakeem FF, Bernabé E, Sabbah W. Association between oral health and frailty: A systematic review of longitudinal studies. *Gerodontology* 2019; 36: 205-15.
48. Ram A, Kerse N, Moyes SA, Muru-Lanning M, Wham C. Dietary Protein Intake and Determinants in Māori and Non-Māori Octogenarians. *Te Puāwaitanga o Ngā Tapuwae Kia Ora Tonu: Life and Living in Advanced Age: A Cohort Study in New Zealand. Nutrients* 2020; 12: 2079.
49. Amiri S, Behnezhad S, Hasani J. Body Mass Index and risk of frailty in older adults: A systematic review and meta-analysis. *Obesity medicine* 2020; 18: 100196.
50. Griffin A, O'Neill A, O'Connor M, Ryan D, Tierney A, Galvin R. The prevalence of malnutrition and impact on patient outcomes among older adults presenting at an Irish emergency department: a secondary analysis of the OPTI-MEND trial. *BMC geriatrics* 2020; 20: 455-66.
51. Isabel TD, Correia M, Waitzberg DL. The impact of malnutrition on morbidity, mortality, length of hospital stay and costs evaluated through a multivariate model analysis. *Clinical Nutrition* 2003; 22: 235-9.
52. Banks M, Bauer J, Graves N, Ash S. Malnutrition and pressure ulcer risk in adults in Australian health care facilities. *Nutrition* 2010; 26: 896-901.
53. Kojima GMD. Frailty as a Predictor of Future Falls Among Community-Dwelling Older People: A Systematic Review and Meta-Analysis. *Journal of the American Medical Directors Association* 2015; 16: 1027-33.
54. Kojima G. Quick and Simple FRAIL Scale Predicts Incident Activities of Daily Living (ADL) and Instrumental ADL (IADL) Disabilities: A Systematic Review and Meta-analysis. *Journal of the American Medical Directors Association* 2018; 19: 1063-8.
55. Kojima G, Iliffe S, Jivraj S, Walters K. Association between frailty and quality of life among community-dwelling older people: a systematic review and meta-analysis. *Journal of epidemiology and community health* 2016; 70: 716-21.
56. Kojima G. Frailty as a Predictor of Emergency Department Utilization among Community-Dwelling Older People: A Systematic Review and Meta-Analysis. *Journal of the American Medical Directors Association* 2019; 20: 103-5.
57. Sulo S, Riley K, Liu Y, Landow W, Lanctin D, VanDerBosch G. Nutritional Support for Outpatients at Risk of Malnutrition Improves Health Outcomes and Reduces Healthcare Costs. *Quality in Primary Care* 2020; 28: 12-8.
58. Abizanda P, Sinclair A, Barcons N, Lizán L, Rodríguez-Mañas L. Costs of Malnutrition in Institutionalized and Community-Dwelling Older Adults: A Systematic Review. *Journal of the American Medical Directors Association* 2016; 17: 17-23.
59. Dietitians Australia. *Malnutrition in Aged Care*. ACT: Dietitians Association of Australia; 2020.

60. Australia D. Role Statement on 'Older People and Aged Care Dietitians'. ACT: Dietitians Association of Australia 2021.
61. Academy of Nutrition and Dietetics. The Nutrition Care Process Model 2017. Available from: <https://www.ncpro.org/pubs/2020-encpt-en/ncp-model>.
62. Hickson M, Child J, Collinson A. Impact of a dietitian in general practice: Care of the frail and malnourished. *Journal of Human Nutrition and Dietetics* 2021; 35: 145-53.
63. Sladdin I, Ball L, Bull C, Chaboyer W. Patient-centred care to improve dietetic practice: an integrative review. *Journal of human nutrition and dietetics* 2017; 30: 453-70.
64. Splett P, Myers EF, Splett P, Mn SP, Myers EF. A Proposed Model for Effective Nutrition Care. *Journal of the American Dietetic Association* 2001; 101: 357-63.
65. Cant R. What outcome measures do Australian dietitians use to evaluate nutrition education interventions with individual patients? *Nutrition & dietetics* 2008; 65: 284-91.
66. Kingsley CMBF, Patel SMBF. Patient-reported outcome measures and patient-reported experience measures. *BJA education* 2017; 17: 137-44.
67. Queensland Government. Estimating energy, protein & fluid requirements for adult clinical conditions 2017. Available from: https://www.health.qld.gov.au/__data/assets/pdf_file/0022/144175/est_rqts.pdf.
68. The Australian and New Zealand Society for Geriatric Medicine. Position Statement No 6: Undernutrition and the Older Person. Sydney, NSW The Australian and New Zealand Society for Geriatric Medicine.
69. Nutrition Education Materials Online. Estimating energy, protein & fluid requirements for adult clinical conditions: Queensland Government; 2019. Available from: https://www.health.qld.gov.au/__data/assets/pdf_file/0022/144175/est_rqts.pdf.
70. Dabbous M, Hastings R, Weekes CE, Baldwin C. The role of non-dietetic healthcare professionals in managing interventions among adults at risk of malnutrition: A systematic review. *Clinical nutrition* 2021; 40: 4509-25.
71. Volkert D, Beck AM, Cederholm T, Cruz-Jentoft A, Goisser S, Hooper L et al. ESPEN guideline on clinical nutrition and hydration in geriatrics. *Clinical nutrition* 2019; 38: 10-47.
72. Watterson C, Fraser A, Banks M, Isenring E, Miller M, Silvester C et al. Evidence based practice guidelines for the nutritional management of malnutrition in adult patients across the continuum of care. *Nutrition & dietetics* 2009; 66: S1-S34.
73. Leggo M, Banks M, Isenring E, Stewart L, Tweeddale M. A quality improvement nutrition screening and intervention program available to Home and Community Care eligible clients. *Nutrition & dietetics* 2008; 65: 162-7.
74. Hamirudin AH, Walton K, Charlton K, Carrie A, Tapsell L, Milosavljevic M et al. Feasibility of home-based dietetic intervention to improve the nutritional status of older adults post-hospital discharge. *Nutrition & dietetics* 2017; 74: 217-23.
75. Wyers CE, Reijven PLM, Breedveld-Peters JJL, Denissen KFM, Schotanus MGM, van Dongen MCJM et al. Efficacy of Nutritional Intervention in Elderly After Hip Fracture: A Multicenter Randomized Controlled Trial. *The journals of gerontology Series A* 2018; 73: 1429-37.
76. Young K, Bunn F, Trivedi D, Dickinson A. Nutritional education for community dwelling older people: A systematic review of randomised controlled trials. *International journal of nursing studies* 2011; 48: 751-80.

77. Marshall S, Agarwal E, Young A, Isenring E. Role of domiciliary and family carers in individualised nutrition support for older adults living in the community. *Maturitas* 2017; 98: 20-9.
78. Marshall S, Bauer J, Capra S, Isenring E. Are informal carers and community care workers effective in managing malnutrition in the older adult community? A systematic review of current evidence. *The Journal of nutrition, health & aging* 2013; 17: 645-51.
79. Hamirudin A, Charlton K, Walton K, Bonney A, Albert G, Hodgkins A et al. Implementation of nutrition screening for older adults in general practice: Patient perspectives indicate acceptability. *The Journal of Aging Research and Clinical Practice* 2016; 5: 7-13.
80. Charlton K, Walton K, Moon I, Smith K, McMahon A, Ralph F et al. "It could probably help someone else but not me": A feasibility study of a snack programme offered to meals on wheels clients. *The Journal of Nutrition, Health & Aging* 2013; 17: 364-9.
81. Mills SR, Wilcox CR, Ibrahim K, Roberts HC. Can fortified foods and snacks increase the energy and protein intake of hospitalised older patients? A systematic review. *Journal of human nutrition and dietetics* 2018; 31: 379-89.
82. Iuliano S, Poon S, Wang X, Bui M, Seeman E. Dairy food supplementation may reduce malnutrition risk in institutionalised elderly. *British journal of nutrition* 2017; 117: 142-7.
83. Iuliano S, Poon S, Robbins J, Bui M, Wang X, De Groot L et al. Effect of dietary sources of calcium and protein on hip fractures and falls in older adults in residential care: cluster randomised controlled trial. *BMJ* 2021; 375: n2364.
84. Walton K, Rosario VA, Pettingill H, Cassimatis E, Charlton K. The impact of home-delivered meal services on the nutritional intake of community living older adults: a systematic literature review. *Journal of human nutrition and dietetics* 2020; 33: 38-47.
85. Walton K, Charlton KE, Manning F, McMahon AT, Galea S, Evans K. The nutritional status and energy and protein intakes of MOW clients and the need for further targeted strategies to enhance intakes. *Appetite* 2015; 95: 528-32.
86. Cawood AL, Elia M, Stratton RJ. Systematic review and meta-analysis of the effects of high protein oral nutritional supplements. *Ageing research reviews* 2011; 11: 278-96.
87. Cameron ID, Fairhall N, Langron C, Lockwood K, Monaghan N, Aggar C et al. A multifactorial interdisciplinary intervention reduces frailty in older people: Randomized trial. *BMC medicine* 2013; 11: 65-75.
88. Milte R, Miller MD, Crotty M, Mackintosh S, Thomas S, Cameron ID et al. Cost-effectiveness of individualized nutrition and exercise therapy for rehabilitation following hip fracture. *Journal of rehabilitation medicine* 2016; 48: 378-85.
89. Beck AM, Holst M, Rasmussen HH. Oral nutritional support of older (65 years+) medical and surgical patients after discharge from hospital: systematic review and meta-analysis of randomized controlled trials. *Clinical rehabilitation* 2013; 27: 19-27.
90. Beck AM, Kjær S, Hansen BS, Storm RL, Thal-Jantzen K, Bitz C. Follow-up home visits with registered dietitians have a positive effect on the functional and nutritional status of geriatric medical patients after discharge: a randomized controlled trial. *Clinical rehabilitation* 2013; 27: 483-93.
91. Baldwin C, Smith R, Gibbs M, Weekes CE, Emery PW. Quality of the Evidence Supporting the Role of Oral Nutritional Supplements in the Management of Malnutrition: An Overview of Systematic Reviews and Meta-Analyses. *Advances in nutrition* 2021; 12: 503-22.

92. Stratton RJ, Elia M. A review of reviews: A new look at the evidence for oral nutritional supplements in clinical practice. *Clinical nutrition Supplements* 2007; 2: 5-23.
93. Hubbard GP, Elia M, Holdoway A, Stratton RJ. A systematic review of compliance to oral nutritional supplements. *Clinical Nutrition* 2012; 31: 293-312.
94. Fielding RA, Trivison TG, Kirn DR, Koochek A, Reid KF, von Berens Å et al. Effect of structured physical activity and nutritional supplementation on physical function in mobility-limited older adults: Results from the VIVE2 randomized trial. *The Journal of Nutrition, Health & Aging* 2017; 21: 936-42.
95. Wright J, Baldwin C. Oral nutritional support with or without exercise in the management of malnutrition in nutritionally vulnerable older people: A systematic review and meta-analysis. *Clinical nutrition* 2018; 37: 1879-91.
96. Elia M, Normand C, Laviano A, Norman K. A systematic review of the cost and cost effectiveness of using standard oral nutritional supplements in community and care home settings. *Clinical nutrition* 2015; 35: 125-37.
97. Elia M, Parsons EL, Cawood AL, Smith TR, Stratton RJ. Cost-effectiveness of oral nutritional supplements in older malnourished care home residents. *Clinical nutrition* 2017; 37: 651-8.
98. Reinders I, Volkert D, de Groot LCPGM, Beck AM, Feldblum I, Jobse I et al. Effectiveness of nutritional interventions in older adults at risk of malnutrition across different health care settings: Pooled analyses of individual participant data from nine randomized controlled trials. *Clinical nutrition* 2019; 38: 1797-806.
99. World Health Organization. *Transitions of Care: Technical Series on Safer Primary Care*. Geneva: World Health Organization; 2016.
100. Chen CCH, Tang ST, Wang C, Huang G-H. Trajectory and determinants of nutritional health in older patients during and six-month post-hospitalisation. *Journal of clinical nursing* 2009; 18: 3299-307.
101. Russel C. *Addressing malnutrition in older adults during care transition*. Meals on Wheels America; 2019.
102. Neelemaat FMRD, Bosmans JEP, Thijs AMDP, Seidell JCPPD, van Bokhorst-de van der Schueren MAEPRD. Post-Discharge Nutritional Support in Malnourished Elderly Individuals Improves Functional Limitations. *Journal of the American Medical Directors Association* 2011; 12: 295-301.
103. Deutz NE, Matheson EM, Matarese LE, Luo M, Baggs GE, Nelson JL et al. Readmission and mortality in malnourished, older, hospitalized adults treated with a specialized oral nutritional supplement: A randomized clinical trial. *Clinical nutrition* 2015; 35: 18-26.
104. Young AM, Mudge AM, Banks MD, Rogers L, Demedio K, Isenring E. Improving nutritional discharge planning and follow up in older medical inpatients: Hospital to Home Outreach for Malnourished Elders: Improving post-discharge nutrition of older inpatients. *Nutrition & dietetics* 2018; 75: 283-90.
105. Feldblum I, German L, Castel H, Harman-Boehm I, Shahar DR. Individualized Nutritional Intervention During and After Hospitalization: The Nutrition Intervention Study Clinical Trial. *Journal of the American Geriatrics Society* 2011; 59: 10-7.
106. Starr KNP, McDonald SR, Bales CW. Nutritional Vulnerability in Older Adults: A Continuum of Concerns. *Current nutrition reports* 2015; 4: 176-84.
107. Young AM, Mudge AM, Banks MD, Rogers L, Allen J, Vogler B et al. From Hospital to Home: Limited Nutritional and Functional Recovery for Older Adults. *The Journal of Frailty & Aging* 2015; 4: 69-73.

108. Power L, Mullally D, Gibney ER, Clarke M, Visser M, Volkert D et al. A review of the validity of malnutrition screening tools used in older adults in community and healthcare settings – A MaNuEL study. *Clinical nutrition* 2018; 24: 1-13.
109. Elia E, Russell C, Stratton RJ, Todorovic V, Evans L, Farrer K. The 'MUST' explanatory booklet. Worcestershire; 2003.
110. Ferguson M, Capra S, Bauer J, Banks M. Development of a valid and reliable malnutrition screening tool for adult acute hospital patients. *Nutrition* 1999; 15: 458-64.
111. Keller HH, Goy R, Kane SL. Validity and reliability of SCREEN II (Seniors in the Community: Risk evaluation for eating and nutrition, Version II). *European Journal of Clinical Nutrition* 2005; 59: 1149-57.
112. Keller HH, McKenzie JD, Goy RE. Construct Validation and Test-Retest Reliability of the Seniors in the Community: Risk Evaluation for Eating and Nutrition Questionnaire. *The Journals of Gerontology Series A* 2001; 56: 552-8.
113. Posner BM, Jette AM, Smith KW, Miller DR. Nutrition and health risks in the elderly: the nutrition screening initiative. *American Journal of Public Health* 1993; 83: 972-8.
114. Sukkriang N, Punsawad C. Comparison of geriatric assessment tools for frailty among community elderly. *Heliyon* 2020; 6: e04797.
115. Thompson MQ, Theou O, Tucker GR, Adams RJ, Visvanathan R. FRAIL scale: Predictive validity and diagnostic test accuracy. *Australasian Journal on Ageing* 2020; 39: 529-36.
116. Dong L, Qiao X, Tian X, Liu N, Jin Y, Si H et al. Cross-cultural adaptation and validation of the FRAIL scale in Chinese community-dwelling older adults. *Journal of the American Medical Directors Association* 2018; 19: 12-7.
117. Drubbel I, Numans ME, Kranenburg G, Bleijenberg N, de Wit NJ, Schuurmans MJ. Screening for frailty in primary care: a systematic review of the psychometric properties of the frailty index in community-dwelling older people. *BMC Geriatrics* 2014; 14: 27.
118. Bongue B, Buisson A, Dupre C, Beland F, Gonthier R, Crawford-Achour É. Predictive performance of four frailty screening tools in community-dwelling elderly. *BMC Geriatrics* 2017; 17: 262-71.
119. Gobbens RJ, van Assen MA, Luijkx KG, Wijnen-Sponselee MT, Schols JM. The Tilburg frailty indicator: psychometric properties. *Journal of the American Medical Directors Association* 2010; 11: 344-55.
120. Gobbens RJ, Boersma P, Uchmanowicz I, Santiago LM. The Tilburg Frailty Indicator (TFI): New Evidence for Its Validity. *Clinical Interventions in Aging* 2020; 15: 265-74.
121. Mazoochi F, Gobbens RJ, Lotfi M, Fadayevatan R. Diagnostic accuracy of the Tilburg Frailty Indicator (TFI) for early frailty detection in elderly people in Iran. *Archives of Gerontology and Geriatrics* 2020; 91: 104187.
122. Saliba D, Elliott M, Rubenstein LZ, Solomon DH, Young RT, Kamberg CJ et al. The Vulnerable Elders Survey: a tool for identifying vulnerable older people in the community. *Journal of the American Geriatrics Society* 2001; 49: 1691-9.
123. Peters LL, Boter H, Buskens E, Slaets JPJ. Measurement Properties of the Groningen Frailty Indicator in Home-Dwelling and Institutionalized Elderly People. *Journal of the American Medical Directors Association* 2012; 13: 546-51.