6.2 Malnutrition

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Key points

- Malnutrition adversely affects physical and psychological health, and impairs recovery from disease, increasing mortality, complications, hospital stay and use of other healthcare resources.
- Malnutrition is common and costly, but is often unrecognised and untreated.
- Routine and regular screening – using a quick, simple-to-use, valid, evidence-based tool with a care plan – is recommended to improve the detection and treatment of malnutrition.
- Treatment should be undertaken promptly with appropriate nutritional support; energy, protein and other nutrients, including micronutrients, should be considered.

Malnutrition can be defined as '*a state of nutrition in which a deficiency or excess (or imbalance) of energy, protein and other nutrients causes measurable adverse effects on tissue/body form (body shape, size, composition), body function and clinical outcome*' (Elia, 2000, p. 2). Malnutrition is a broad term that includes not only protein energy malnutrition (both over- and undernutrition), but malnutrition of other nutrients, such as micronutrients. The adverse effects of malnutrition will mostly respond to nutritional treatment. This chapter concentrates on protein energy malnutrition (described here as malnutrition).

Prevalence of malnutrition and at-risk groups

Malnutrition is common, and is a major clinical and public health problem in the UK (Elia, 2000; Elia & Russell, 2009). At any given point in time, >3 million people in the UK are malnourished, with most (~93%) living in the community (Elia & Russell, 2009). Although malnutrition among people in hospitals was identified over three decades ago (Bistrian *et al.*, 1974; Hill *et al.*, 1977), it remains a common and often unrecognised problem (Elia, 2003; Stratton *et al.*, 2003). The British Association for Parenteral and Enteral Nutrition (BAPEN) national screening weeks have shown that approximately one-third of hospital admissions are at risk of malnutrition (Russell & Elia, 2014). Smaller surveys in hospitalised infants and children also suggest that malnutrition is common (Gerasimidis *et al.*, 2011; Pichler *et al.*, 2014; Stratton *et al.*, 2003).

The prevalence of malnutrition depends on the criteria used to define it and varies with age, the associated clinical condition and the type of treatments (including surgery) being undertaken. The frequency of malnutrition, and the risk of developing malnutrition, is typically highest in:

- Infants, young children and the elderly.
- Patients with gastrointestinal, respiratory or renal disease, and malignancy.
- Those with multiple comorbidities, including the critically ill.
- Individuals undergoing complex surgery, transplantation or burns treatment.

Once in hospital, deterioration in nutritional status often occurs unless action is taken to prevent it. Between 30 and 90% of adults and children lose weight while in hospital (Stratton *et al.*, 2003). This is partly because malnutrition is often unrecognised and untreated, frequently going undetected. Measurement and documentation of important nutritional information, including body mass index (BMI), unintentional weight loss and recent food intake, in hospital inpatients, outpatients and in many other care settings, are often lacking (Cawood *et al.*, 2008; Elia, 2000; Volkert *et al.*, 2010). This is partly due to the absence of formal screening programmes that link the recognition of malnutrition with treatment plans.

At any point in time, only about 2% of the >3 million adults at risk of malnutrition are in hospital, with 5% in care homes and the remainder in the community (2–3%

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in sheltered housing) (Elia *et al.*, 2010). Surveys suggest that 15–30% outpatients, 5–23% patients visiting a general practitioner (GP), 25% patients receiving district nursing care, 30–40% care home residents and 10–14% of individuals in sheltered housing are at risk of malnutrition (Elia *et al.*, 2015). The elderly is a group at particular risk, as suggested by a secondary analysis of a national survey, which found that 12% free-living and 21% institutionalised elderly are at risk of malnutrition, and that geographical inequalities exist (higher rates of malnutrition in the north than in the south of England) (Elia & Stratton, 2005). In addition, malnutrition is more common in those from more deprived areas (Collins *et al.*, 2016; Stratton & Elia, 2006). In community settings, as in hospitals, malnutrition is often undetected and untreated (Cawood *et al.*, 2008; Volkert *et al.*, 2010). An increasingly ageing population, the ongoing pressure on healthcare and social care resources, and the community-led NHS structure mean that a greater proportion of sick and debilitated individuals are cared for outside the hospital, with services commissioned by GP-led clinical commissioning groups (NHS Five Year Forward View, 2014). Sustainability and transformation plans (STPs) are now being implemented in local geographic areas to transform health and care outcomes delivered by NHS providers, CCGs, local authorities and care services, but their impact on malnutrition and nutritional care services has yet to be seen.

Causes of malnutrition

In the UK, the primary cause of malnutrition is disease, hence the term disease-related malnutrition. Other causes include poverty and deprivation, and behavioural problems in children. Disease-related malnutrition arises when nutritional intake does not meet nutritional needs because of decreased dietary intake, increased nutritional requirements or an impaired ability to absorb or utilise nutrients. Insufficient dietary intake is the main reason for malnutrition developing and progressing, and there are many factors that limit nutritional intake (see Figure 6.2.1). Broadly, these factors can be divided into two types:

- Disease-related factors that reduce intake despite availability of food.
- Other factors such as inadequate availability, quality or presentation of foods that reduce intake.

Numerous studies across many different diagnostic groups have documented energy, protein and micronutrient intakes to be insufficient to meet nutritional requirements, particularly in institutionalised patients. Also, studies have shown that food in institutions (hospitals, care homes) is often not consumed and is therefore wasted, sometimes because catering practices do not meet the needs of the sick (see Chapter 4.4.1, Food service). Nutritional support (oral nutritional

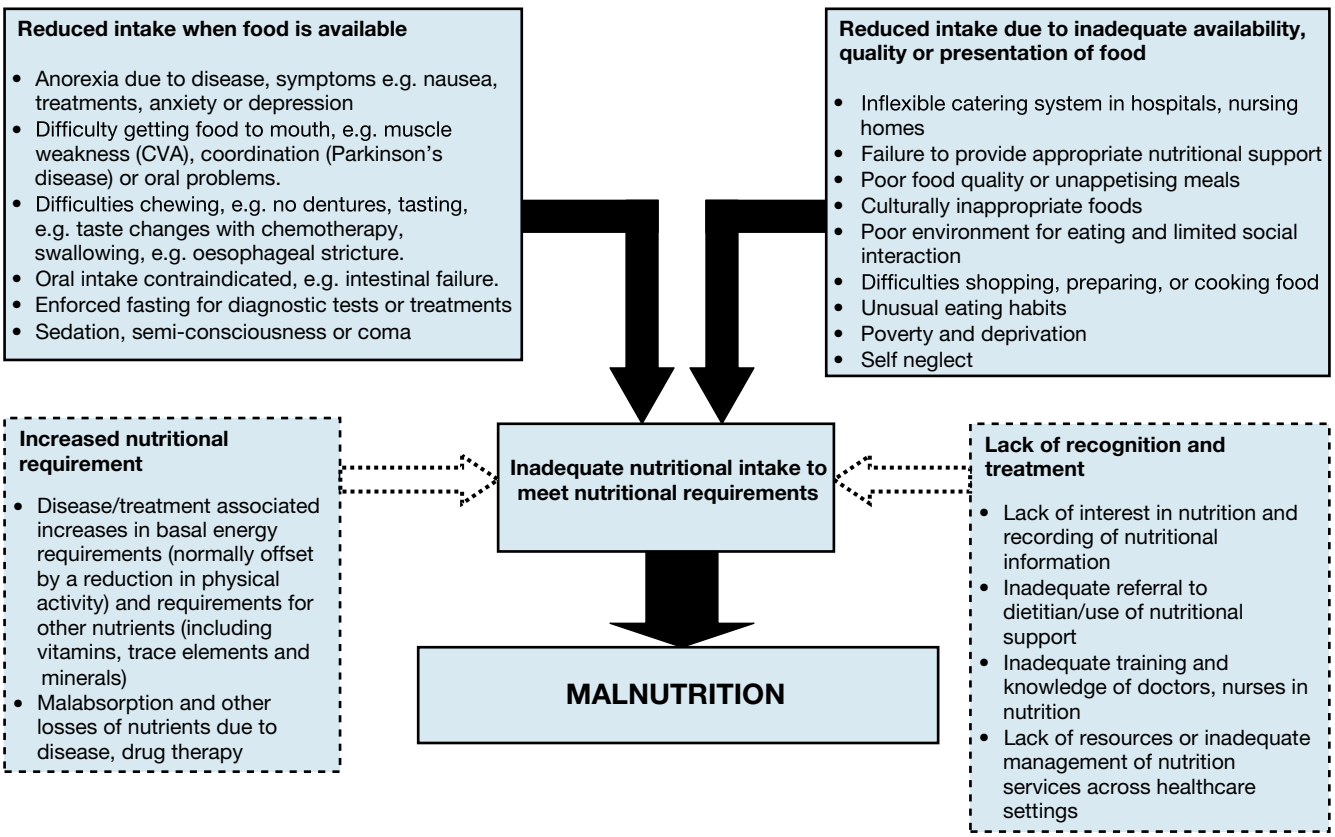


Figure 6.2.1 Causes of malnutrition

supplements, enteral tube feeding, parenteral nutrition) is often not used early enough or frequently enough to prevent or treat malnutrition, despite a large and growing evidence base that indicates the benefits of nutritional support if used appropriately. This is increasingly an issue as current economic constraints mean budget holders may choose to withhold prescribed nutritional care, failing to recognise that greater costs result when leaving malnutrition untreated (increased costly hospital admissions and complications such as infections and pressure ulcers) (Elia *et al.*, 2015).

Malnutrition may also arise if total requirements for energy and nutrients are increased with disease, after trauma and surgery, and with some treatments, e.g. drug therapy and chemotherapy. Increments in basal energy metabolism occur in a number of disease states, post-operatively and in sepsis and burns patients. However, in many cases, this is offset by reductions in physical activity (Gibney *et al.*, 1997; Jebb, 1997), so that total energy expenditure is not substantially increased (see Chapter 6.1, Nutritional requirements in clinical practice). Increased nutrient losses and inability to absorb nutrients also elevate requirements, increasing the risk of malnutrition developing.

Consequences of malnutrition

Malnutrition has a diversity of effects, influencing every system of the body. It has many adverse consequences on body structure and function, physical and psychological health, and on recovery and outcome after disease and injury, including surgery (Stratton *et al.*, 2003). Malnutrition results in loss of body structure, with weight loss due to loss of fat and lean tissue, including organ mass. In children, malnutrition will also impair growth and development, leading to stunting and/or wasting. However, malnutrition is more than a reduction in nutritional status, as there are impairments in physical and psychological health and function, including the following:

- Impaired immune function increasing susceptibility to infection and sepsis.
- Delayed wound healing and increased risk of pressure ulcers.
- Muscle wasting and weakness that may affect:
  - Respiratory function – weakened respiratory muscles may make it difficult to cough and expectorate effectively, increasing the risk of chest infection. This may also make it harder to wean a patient from artificial ventilation.
  - Cardiac function – this may be impaired, resulting in reduced cardiac output and liability to heart failure.
  - Mobility – weakness of skeletal muscles delays a return to full mobility. Reduced mobility increases the risk of thromboembolism and pressure ulcers.
- Altered gastrointestinal structure and function, impairing digestion, absorption and the gut barrier.
- Apathy and depression, leading to loss of morale and reduced will to recover.
- General sense of weakness and illness, which impairs appetite and physical ability to eat, and hence tends to perpetuate and worsen the state of malnutrition.
- Adverse effects on learning and behaviour in children, with potential long-term deficits in cognition.
- Poor libido, fertility, pregnancy outcome and mother–child interactions.

These physical and psychological consequences of malnutrition increase susceptibility to disease, impair clinical outcome and increase healthcare use and costs. Individuals identified as being at risk of malnutrition have:

- Increased risk of mortality and complications during and after hospitalisation.
- Longer hospital stays and greater hospital costs.
- Greater requirement for healthcare post-discharge.
- Increased risk of admission to hospital and more visits to the GP.

Consequently, increased use of healthcare resources means malnutrition is very expensive. A recent report estimated that the annual expenditure owing to malnutrition in England (in adults and children) was £19.6 billion (approximately 15% of the total expenditure on healthcare and social care) (Elia *et al.*, 2015). Most of the expenditure was due to healthcare rather than social care, and from secondary (hospital) care rather than primary care of adults (mostly older adults), rather than in children. The healthcare cost of a malnourished patient (£7408 per year) is more than three times greater than that of a non-malnourished person (£2155/year).

Detection of malnutrition

The rationale for establishing a policy to routinely detect malnutrition is that it:

- Is a common and costly problem.
- Has many adverse short- and long-term effects on health, function and recovery.
- Is treatable in most cases.

For many years, malnutrition has been under-detected and undertreated. For this reason, many national organisations – including the BDA (2009), the Royal College of Physicians (RCP) (2002), BAPEN (Elia, 2003), Healthcare Improvement Scotland (2014), the Welsh government (2013), NICE (2006, 2012) and the UK Department of Health (DH) (2008, 2014) – recommend that malnutrition be routinely identified using screening. Legislation in England (Regulation 14 of the Health and Social Care Act 2008; see DH, 2008) states that registered organisations have a duty to safeguard service users from malnutrition and dehydration, to identify poor nutrition and dehydration with nutritional screening, and to take action to treat it. The Care Quality Commission (CQC) is the independent regulator of healthcare and social care in England that monitors, inspects and regulates registered care-providing organisations and their compliance with this aspect of the law.

It has also been suggested that obesity should be routinely identified, ideally using the same screening procedure (Elia, 2003). Obesity has many health risks (see Chapter 7.13.1, General aspects and prevention of obesity), but its treatment should not generally be undertaken in those who are acutely unwell. Such patients may still be at risk of malnutrition due to weight loss or limited dietary intake (e.g. nil by mouth post-stroke), and should be treated accordingly.

Screening

Screening is a rapid, simple and general procedure, often carried out at first contact with an individual, to detect those with significant risk of malnutrition, so that action plans for monitoring and/or treatment can be implemented. Some individuals may need help or advice with eating and drinking; others may need special diets and a referral to a dietitian for expert advice. Screening should be routinely and regularly undertaken in hospitals, nursing and residential care, and in other primary care settings, e.g. patients seen by district nurses, at-risk groups or newly registered patients in GP practices. The frequency of screening and any associated monitoring and treatment will depend on the patient group, the healthcare setting and the resources available.

Screening is a multidisciplinary responsibility and can be undertaken by nurses, doctors, dietitians or other healthcare professionals. Screening, using a test or tool, should be part of a screening programme that includes a full range of activities from identification of risk with the tool, to diagnosis and treatments. Screening can precede nutritional assessment, which is a more in-depth and specific evaluation of those individuals at risk, and is typically undertaken by a dietitian (see Chapter 2.2, Assessment of nutritional status). Nutritional assessment may be required in the case of serious nutritional problems, to identify micronutrient status or to undertake other detailed dietary investigations. Although dietitians have the expertise, it is neither practical nor cost-effective for them to assess the nutritional status of every patient admitted to hospital, and they are unlikely to come into direct contact with many of those at risk in the community (often only after problems have arisen). Therefore, identification of people with, or at risk of, malnutrition requires a locally agreed policy and the assistance of other health professionals.

There are many screening tools in use in clinical practice, but it is important to use a tool that meets the important characteristics listed in Table 6.2.1. A screening tool for malnutrition should attempt to establish the following in the most objective way possible:

- Chronic protein energy status, e.g. BMI, weight for height, weight and height for age.
- Any recent changes in protein energy status, e.g. weight loss, inadequate dietary intake.
- Any likely future changes in protein energy status, e.g. likelihood of inadequate dietary intake and weight loss.

When objective measures are not feasible (e.g. in an acutely unwell, bed-bound individual), or there is concern about their interpretation (e.g. oedema), alternative measures should be considered. As part of the screening programme, the underlying cause of changes in nutritional status (e.g. disease or condition, psychosocial issues and behavioural problems) should also be established and treated if appropriate (e.g. for those who are terminally ill, active treatment may not be undertaken). Although there are many factors that increase

Table 6.2.1 Important characteristics of a screening tool for malnutrition

Characteristic	Attributes
Practical	Quick and easy to complete and to understand
	Has a range of alternative measures for when weight or height cannot be measured
Universal	Can be used in all adults of all ages (including the elderly), including the sick and healthy; is applicable across different care settings (hospital, GP practice, nursing home, free living); allows continuity of care
	Can be used for public health purposes
Reliable	Good reproducibility between users
	Good internal reliability
Valid	Content, face, internal, concurrent and predictive validity
Evidence based and independently peer-reviewed	
Linked to a care plan for treatment	Facilitates nursing and other staff initiating appropriate monitoring or treatment and referral to the dietitian or nutrition support team
Developed by a multidisciplinary group for use by all healthcare professionals	
Acceptable to patients and healthcare professionals	

an individual's risk of malnutrition, e.g. gastrointestinal symptoms, metabolic stress and pressure ulcers, they do so by affecting the adequacy of nutritional intake relative to an individual's nutritional needs. In most cases, nutritional intake is reduced, nutritional needs are not met and the result is that weight is lost. Therefore, a screening tool is able to assess the risk of malnutrition simply by identifying chronic protein energy status (e.g. BMI in adults), and previous and predicted recent changes in status (e.g. weight loss and reduced dietary intake). Thus, screening can reflect aspects of an individual's nutritional status, encompassing:

- Past, e.g. unintentional weight loss and lack of nutritional intake.
- Present, e.g. BMI.
- Future, e.g. potential for lack of nutritional intake and weight loss.

The past can be most easily assessed using unintended weight loss over a defined time scale, e.g. 3 months. This is assessed in terms of the extent of unintentional body weight loss, ideally as a percentage of usual body weight, e.g. >10% of weight lost in 3 months. A period of 3–6 months is the most common timeframe over which to assess weight loss, although it can be a shorter (e.g. 1 week) or longer (e.g. 1 year) time interval. Weight loss is also a marker for inadequacy of nutritional intake. No nutritional intake for >5 days (without disease) equates to a weight loss of 5–10% (Elia, 2003). Detailed dietary history is not taken as part of screening since it is time consuming and requires a nutritional expert, e.g. dietitian, to undertake (screening is not usually undertaken by dietitians). Detailed dietary information may be obtained as part of nutritional assessment.

The present or current status of an individual can be objectively identified using BMI. This is a simple and reproducible index that reflects body composition and function. A BMI of <20 kg/m^2 is considered to be underweight, and a BMI of <18.5 kg/m^2 as severely underweight. Individuals with a BMI of >30 kg/m^2 are considered obese. These are nationally recognised and accepted cut-offs for BMI, and they are based on the loss of physiological function and well-being, and increased clinical risk as BMI decreases. They are consistently recommended for all adults, including elderly people. However, these cut-offs denote only risk of malnutrition, as some individuals may be constitutionally thin, fit and well despite having a low BMI.

When screening for the risk of malnutrition, particularly in the acute setting, a consideration of the future likelihood of deterioration in nutritional status (poor, inadequate nutritional intake leading to weight loss) is needed. For example, a free-living individual suffers a stroke and is admitted to hospital, unable to swallow and eat. Despite having a desirable BMI and no history of weight loss, patients are at risk of malnutrition as they will be unable to eat for >5 days. During this timeframe, even an individual without disease or injury would lose 5–10% of body weight, feel unwell and lose muscle mass (Elia, 2003). Similarly, those who suffer severe injury are unconscious and have intestinal failure, and many others with severe, acute illness are at risk of malnutrition due to a prolonged inability to eat or drink. These individuals will usually require nutritional assessment by a dietitian or nutrition support team, and the provision of artificial nutritional support.

Similar principles apply to screening for malnutrition in paediatrics, although there is more complexity, as consideration of growth and development is required. Anthropometric measurements have been widely used to screen for malnutrition in children. These include weight for age, height for age, BMI for age, weight for height and mid-upper-arm circumference (see Chapter 3.8.2, Growth, nutritional assessment and nutritional requirements). The WHO charts for children (aged 0–4 years) are purported to reflect optimal growth in children of all ethnic groups because of the striking similarities in results obtained from the countries that contributed data (Wright *et al.*, 2010). The charts are based on anthropometric measurements obtained from children who were breastfed for about 6 months by relatively affluent, non-smoking mothers who experienced a healthy pregnancy. The charts, which have separate sections for preterm babies, infants aged 0–1 years and older children, have been widely adopted in the UK and other countries. Establishing the most appropriate cut-off points for unintentional weight change in children of different ages can be difficult because growth rates vary considerably with age. In contrast to adults, where weight maintenance is considered to be normal, failure to increase weight over even a short period of time, e.g. 1 month, in a rapidly growing child may represent substantial growth failure, and a 5% weight loss over the same period can be of serious concern. In clinical practice, rapid changes in weight, dietary intake and disease-related factors might all need to be taken into account. A variety of screening tools have been developed for use in children (mostly in hospital settings), such as Paediatric Yorkhill Malnutrition Score (PYMS), Screening Tool for Risk on Nutritional Status and Growth (STRONGkids), and Screening Tool for the Assessment of Malnutrition in Paediatrics (STAMP). Nevertheless, a universally accepted tool is lacking (Chourdakis *et al.*, 2016), and discrepancies exist between the currently available tools as they incorporate different criteria to detect malnutrition (see Chapter 3.8.2, Growth, nutritional assessment and nutritional requirements).

Individuals with other nutritional concerns or problems may need to be referred to a dietitian for more detailed evaluation of the extent or risk of nutritional depletion (Chapter 2.2, Assessment of nutritional status). Particular attention should be paid to the aspects shown in Table 6.2.2. The nature and extent of these problems will determine the way malnutrition is managed or averted. All individuals requiring detailed nutritional assessment and artificial nutritional support need to be referred to a dietitian or nutrition support team (see Chapter 6.3, Oral nutritional support and Chapter 6.4, Parenteral nutrition).

Table 6.2.2 Aspects relating to malnutrition to be considered in nutrition assessment

Aspects	Description
Dietary aspects	Adequacy of current intake
	Recent changes in food intake
	Appetite Existence of factors likely to impair food intake
Clinical aspects	Presence of factors likely to increase nutrient requirements
	Presence of factors likely to increase nutrient losses
	Acute or chronic disease affecting the gastrointestinal tract
	Use of drugs and other treatments affecting food intake or nutrient utilisation
Physical aspects	Signs of muscle wasting, emaciation or oedema
	Presence of pressure ulcers (stages I–IV) or other wounds (see Chapter 7.17.6, Wound healing, tissue viability and pressure sores)
Anthropometric aspects	Degree and rapidity of any unintended weight loss BMI, growth (in infants and children)
	Evidence of muscle wasting, e.g. reduced mid-arm muscle circumference or grip strength
Psychosocial aspects	Depression, anxiety or apathy
	Social isolation
	Poverty

Setting up a screening programme

To facilitate a screening programme, which includes routine screening, monitoring, assessment and treatment plans, and which may include referral to a dietitian, the following are suggested:

- Establish a policy locally that ensures that screening is undertaken and repeated as appropriate (specifying areas, if any, that are exempt from routine screening).
- Agree on the screening tool to be used locally and the resources available for a screening programme across healthcare settings.
- Devise locally agreed care plans for monitoring and treating those identified by screening.
- Ensure equipment required for screening, e.g. weighing scales, stadiometers/length boards, tape measures and callipers, is available and regularly calibrated as appropriate.
- Establish the criteria for those requiring more detailed nutritional assessment and dietetic referral (this will vary locally depending on the resources available).
- Set up systems for the documentation of the results of screening, monitoring and treatment.
- Regularly audit the efficacy of the screening programme.

Malnutrition Universal Screening Tool ('MUST')

Although there are several screening tools available for adults, the Malnutrition Universal Screening Tool ('MUST') is mentioned here as an example because it meets all the key characteristics outlined in Table 6.2.1. 'MUST' was developed by the Malnutrition Advisory Group, a multidisciplinary group of the BAPEN, and it is supported by the BDA, the Royal College of Nursing, the Registered Nursing Homes Association and the RCP (England). 'MUST' is also recommended in Scotland and Wales (Healthcare Improvement Scotland, 2014; Welsh Government, 2013). NICE Clinical Guidelines and Quality Standards (CG32 2006, QS24 2012) also recommend the use of 'MUST'. The tool has been extensively peer-reviewed by many national organisations and independent healthcare practitioners for use in clinical settings and for public health.

'MUST' (see Figure 6.2.2) is an evidence-based tool (Elia, 2003) that has been designed to help identify adults who are at risk of malnutrition, as well as those who are obese. It has not been designed to detect poor vitamin and mineral status. 'MUST' involves the identification of chronic protein energy status (BMI), change in status (unintentional weight loss) and the presence of an acute disease resulting in, or likely to result in, no dietary intake for >5 days. It has been developed for use in all adults, including the elderly, the sick and healthy free-living individuals, and those in healthcare i.e.:

- Hospital wards.
- Outpatient clinics.
- General practice.
- Community settings, e.g. patients receiving care at home, in care homes or sheltered housing.
- Public health.

'MUST' can be applied to all types of adult patients, is easy and rapid to use, and can be used by multidisciplinary teams; it is reproducible, internally consistent and valid. It can be used in situations where weight or height cannot be measured, providing a range of alternatives, including reported or documented measurements, other surrogate measures, subjective criteria and clinical judgement. The tool categorises individuals into low, medium and high risk of malnutrition, and identifies the obese. 'MUST' provides guidelines for care plans, which should be modified to suit local policy and resources.

Practicalities

'MUST' is a five-step screening tool which includes simple management guidelines that can be used to develop a care plan. The steps are shown in Figure 6.2.2, and are listed in the following text:

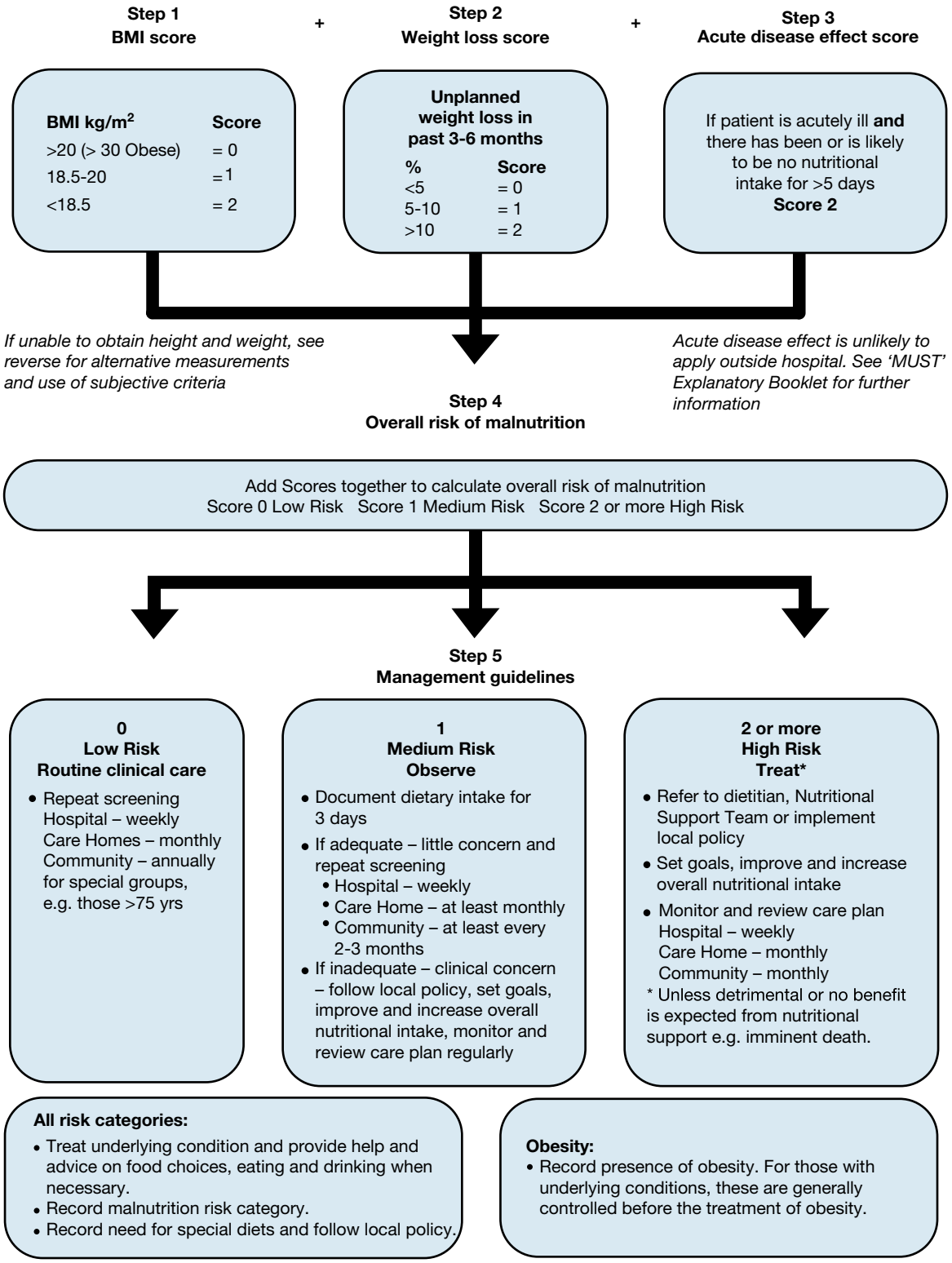


Figure 6.2.2 Malnutrition Universal Screening Tool 'MUST'. Source: British Association for Parenteral and Enteral Nutrition (BAPEN) 2013. Reproduced with permission of the British Association for Parenteral and Enteral Nutrition, www.bapen.org.uk.

Step 1

Measure height and weight to calculate BMI and a BMI score. If unable to measure weight and/or height, use alternative procedures:

- Recently documented or self-reported height and weight (if reliable and realistic).
- If an individual is unable to report his or her height, use a surrogate measure to estimate height, e.g. ulna length (see Appendix A3) or knee height.
- If weight and height cannot be obtained, use mid-upper-arm circumference (MUAC) to estimate BMI. If MUAC is <23.5 cm, BMI is likely to be <20 kg/m^2. If MUAC is >32.0 cm, BMI is likely to be >30 kg/m^2.

Step 2

Note the percentage unplanned weight loss and give a weight loss score. If recent weight loss cannot be calculated:

- Use self-reported weight loss (if reliable and realistic).
- Changes in MUAC can also be used as an approximate indication of weight loss, e.g. a 10% reduction in MUAC suggests a weight loss of 10%.

Step 3

Establish if there is an acute disease effect and score (for patients who are acutely ill and for whom there has been or is likely to be no nutritional intake for >5 days – unlikely to apply outside of hospital).

Step 4

Add scores from steps 1–3 to obtain the overall risk of malnutrition.

Step 5

Use management guidelines and local policy to develop appropriate care plans. If BMI or weight loss (steps 1 and 2) cannot be obtained, the following criteria can assist in the professional judgement of whether an individual is at risk of malnutrition (medium and high risk) or not (low risk):

- BMI – obtain a clinical impression of whether the individual is very thin (obvious wasting)/thin, or is of acceptable weight, overweight or obese.
- Unplanned weight loss – obtain a clinical impression of whether the individual has lost weight. Have clothes and/or jewellery become loose fitting? Is there a history of decreased food intake, reduced appetite or swallowing problems over the past 3–6 months? Is there evidence of underlying disease, psychosocial problems or physical disabilities that are likely to cause weight loss?

Care should be taken when interpreting BMI or percentage weight loss in individuals with fluid disturbances, plaster casts, amputations and critical illness, and in pregnant or lactating women (Elia, 2003). For more information on undertaking 'MUST', charts to calculate BMI and weight loss scores, electronic applications, use of alternative measures, and screening individuals in whom extra care in interpretation is needed, see Elia (2003), as well as www.bapen.org.uk.

Self-screening with 'MUST'

A patient-friendly version of 'MUST' has been developed for adults to screen themselves for malnutrition, or for a carer to screen a relative, where appropriate. Self-screening in outpatients has been shown to be reproducible, to have good concurrent validity with healthcare professional screening, and to be easy for a wide variety of individuals to complete and predict patient outcome (Cawood *et al.*, 2012; McGurk *et al.*, 2013). Further information can be found on www.bapen.org.uk. Decisions are needed locally on how best to implement self-screening within different care settings appropriately (e.g. in outpatients, sheltered housing, general practice etc.) as part of the overall management of malnutrition.

Benefits of implementing a screening programme

Considering the enormous costs of disease-related malnutrition, a condition that is largely treatable, prompt identification with screening, followed by the most appropriate, effective, evidence-based treatment is recommended (Elia, 2003; Elia *et al.*, 2005; NICE, 2006). NICE recently released a summary of which sets of NICE clinical guidelines produced the greatest cost savings (accessed December 2016). The guideline on nutritional support (in the form of oral nutritional support, tube feeding and parenteral nutrition) was in the top two. Specifically, NICE suggest that improving systematic screening, assessment and treatment of malnourished patients (NICE CG32 guideline) could lead to an estimated cost saving of £72,800 per 100,000 individuals. NICE makes the following suggestion: '*If this guidance* [CG32] *were fully implemented and resulted in better nourished patients, then this would lead to reduced complications such as secondary chest infections, pressure ulcers, wound abscesses and cardiac failure. Conservative estimates of reduced admissions and reduced length of stay for admitted patients, as well as reduced demand for GP and outpatient appointments, indicate that significant savings are possible*' (NICE, 2016).

Pragmatic programmes of screening implementation (using 'MUST') in care homes have highlighted some such benefits (Baggaley *et al.*, 2013; Cawood *et al.*, 2009). Programmes involving education and training on malnutrition; screening and treatment using the framework of 'MUST'; locally agreed care plans; and monitoring improved the documentation of nutritional status, the proportion of residents screened, and the use of appropriate care plans. After the implementation of the screening programme, a reduction in the number and duration of hospital admissions was observed, associated with a significant cost saving. Similar improvements in nutritional care and outcome have been observed in other settings, e.g. hospital wards, where screening has been implemented (Kruizenga *et al.*, 2005; Rypkema *et al.*, 2003).

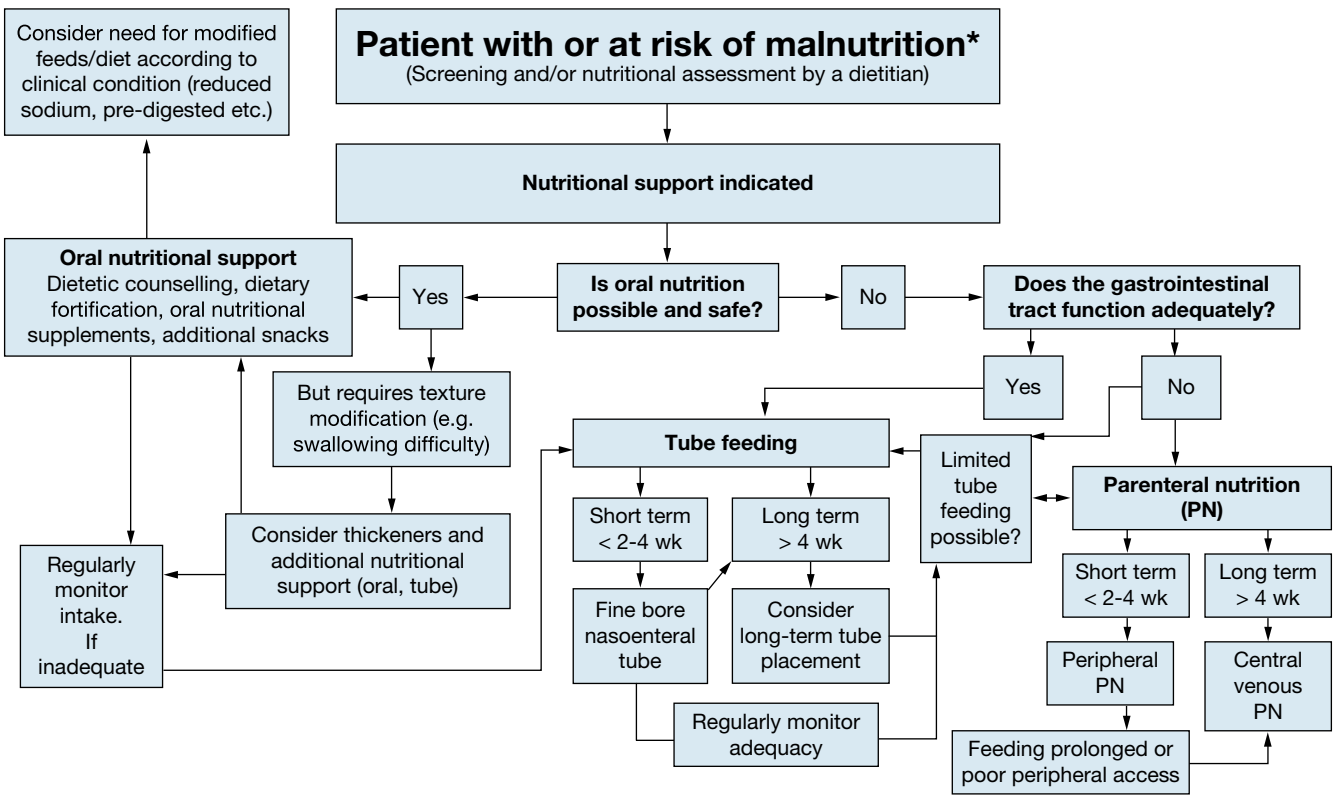
Treatment of malnutrition

Following the identification of patients at risk of malnutrition with screening, there is a need to implement evidence-based treatments. Nutritional treatment of malnutrition (often termed nutritional support) can encompass modification of the diet (dietary fortification), dietetic counselling, use of oral nutritional supplements (single and multinutrient supplements), enteral tube feeding, parenteral nutrition and combinations of these therapies (Figure 6.2.3). The nutritional treatment of malnutrition should be undertaken alongside management of the underlying causes of malnutrition, e.g. disease, symptoms associated with disease and its treatment, and psychosocial problems.

The best strategy for treating malnutrition should be devised for the individual patient, while considering several factors. First, the type of nutritional treatment chosen will depend on whether the individuals are safely and physically able to eat and drink. If they are, consideration is needed of the likely adequacy of intake, which may be severely compromised by anorexia, other side effects of disease, and any modifications required, e.g. texture, composition (see later). In addition to the diet, oral nutritional supplements and feeding via tube may be required. If the individual is not safely able to eat and drink, and oral intake is contraindicated, non-oral means of feeding are required (enteral tube feeding). If feeding into the gastrointestinal tract is contraindicated, then intravenous feeding (parenteral nutrition) is considered (see Chapters 6.3, Oral nutrition support, Chapter 6.4, Enteral nutrition and Chapter 6.5, Parenteral nutrition). For some patients, combinations of treatments will be required.

Second, the method of nutritional support chosen may vary depending on whether an individual will require short- or long-term support, if they are acutely or chronically ill, and if they are in hospital or in the community. In the community, the ability of individuals and their carers/parents to manage nutritional support (e.g. for the very young and old) and their preferences regarding feeding methods need to be considered. Nutritional treatments may need to be modified (in texture, composition, consistency and quantity) if there are symptoms (e.g. nausea, swallowing problems, severe anorexia, electrolyte disturbances, etc.) associated with the disease or its treatment (see Chapter 7.3, Dysphagia). Deficiencies of micronutrients (e.g. vitamins, minerals and trace elements) frequently coexist (Elia & Stratton, 2005; Finch *et al.*, 1998). Nutritional treatment of malnutrition should consider the provision of micronutrients in addition to energy and protein. All micronutrient deficiencies should be corrected.

Active nutritional treatment may not be considered appropriate in terminally ill or dying patients. For more



*** For all patients, treat underlying conditions, ensure help with feeding and help/advice on special diets as required (gluten free, low sodium, diabetic, texture modification).**

Figure 6.2.3 Algorithm for the treatment of malnutrition

SECTION 6

information on the ethics of withholding or withdrawing feeding, see Lennard-Jones (1998), as well as Chapter 7.16 (Palliative and end-of-life care) in this book. Once the extent of the shortfall between an individual's nutritional requirements and his or her current or anticipated dietary intake (which could be from food and drink, or may be nothing if intake is contraindicated) has been estimated, the types and quantities of nutritional support can be chosen. Most individuals with malnutrition, both in hospital and in the community, can be managed orally with diet and supplementation. The choices about which form of treatment to use will largely depend on the needs of the individual patient, although local policy and resources need also to be considered. These needs may change during the course of treatment, and so regular monitoring and changes to the types of nutritional support used are required.

Practical pathways for managing malnutrition in the community, including malnutrition in some specific patient groups (e.g. chronic obstructive pulmonary disease, lung cancer), provide further guidance on identifying malnutrition and first-line nutritional support (www.malnutritionpathway.co.uk).

Monitoring progress

With nutritionally compromised individuals, it is essential that their condition and the effectiveness of the nutritional support strategy be reviewed at regular intervals. Nutritional support should not be prescribed or provided indefinitely, and goals for treatment should be set and monitored. As a result of monitoring, the type or level of nutritional support may need to be adjusted, dietary guidance amended or reinforced, and new goals set. Monitoring may include assessments of the following:

- Weight loss, stabilisation or gain (may repeat screening), and growth.
- Body composition (e.g. muscle mass) and function (e.g. strength, ability to walk and quality of life).
- Changes in nutritional (and fluid) intake – quantity, type, variety. Weight change can be a marker of the adequacy of nutritional intake.
- Effectiveness of remedial suggestions (e.g. change in drug therapy or texture of foods) for alleviating problems with food intake.
- Bowel function, fluid and electrolyte balance, swallowing function, skin condition, or other symptoms indicative of malnutrition and micronutrient status.
- Compliance with nutritional support.

The frequency of monitoring will depend on the following:

- Severity of malnutrition.
- Clinical condition of the individuals (stable, deteriorating, improving) and their age.
- Type of nutritional support being used, e.g. patients receiving artificial nutrition may need daily monitoring.
- Setting of an individual (hospital, nursing home, home).
- Resources available for follow-up and monitoring.

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Further reading

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Internet resources

Care Quality Commission, www.cqc.org.uk

NICE Clinical Guidance Nutrition support for adults: oral nutrition support, enteral tube feeding and parenteral nutrition CG32. www.nice.org.uk/Guidance/CG32

NICE Nutrition support in adults QS24, www.nice.org.uk/Guidance/QS24

Malnutrition pathway, www.malnutritionpathway.co.uk

'MUST': Further supporting information about 'MUST', the tool, and self-screening can be downloaded from www.bapen.org.uk

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