

# Malnutrition and undernutrition

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## Abstract

The term malnutrition is used to describe a deficiency, excess or imbalance of a wide range of nutrients, resulting in measurable adverse effects on body composition, function and clinical outcome. As such it can refer to individuals who are either over- or under-nourished, although it is usually used synonymously with undernutrition, as is the case in this article. Although it is well known that malnutrition is common in the developing world, the fact that it occurs quite frequently in UK health settings as a consequence of either psychosocial circumstances or the effects of illness or injury is not widely appreciated. Furthermore, since malnutrition has direct effects on clinical outcomes and is associated with massive health-care expenditure, better recognition and treatment would result in improved patient outcomes, reduced costs and decreased medico-legal risks. It is therefore the responsibility of all doctors to recognize the fundamental importance of proper nutritional care. The focus of this article is primarily concerned with malnutrition and its consequences in the UK.

**Keywords** Clinical outcome; health economics; malnutrition; MUST score; nutritional care; refeeding syndrome

The term malnutrition is used to describe a deficiency, excess or imbalance of a wide range of nutrients, resulting in measurable adverse effects on body composition, function and clinical outcome.<sup>1</sup> It is the responsibility of all doctors to recognize the importance of proper nutritional care to good clinical practice.<sup>2,3</sup> Worldwide, more than 3.5 million mothers and children under 5 die unnecessarily each year owing to malnutrition,<sup>4</sup> and around 178 million children have stunted growth. Micronutrient deficiencies affect huge numbers; iodine deficiency alone is thought to affect about 2 billion people.

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## What's new?

- Updated, detailed nationwide BAPEN survey assessing nutritional status of hospital admissions revealed the extent of the problem
- The high estimated financial cost of malnutrition has focused political attention on addressing the problem of malnutrition
- Objectives for Nutrition in Undergraduate Medical Training (ICGN/Academy of Royal Medical Colleges)

Malnutrition is both a common cause and consequence of disease, yet, in the UK, it remains an under-recognized problem facing patients, clinicians and wider society.<sup>2</sup> It is not only seen frequently in hospital and institutional care settings but is widespread in the community. Approximately 2% of the UK adult population are underweight – defined as a body mass index (BMI) below 18.5 kg/m<sup>2</sup> – but this is an underestimate of malnutrition, since those unintentionally losing weight from a position of relative excess are also at potential nutritional risk whatever their BMI. The prevalence of malnutrition in the free-living elderly and those with chronic diseases increases at least twofold and individuals in institutional care have a prevalence of malnutrition of around 30–40%.<sup>5</sup> UK hospital patients are particularly likely to be malnourished for reasons summarized in [Table 1](#). In a series of large national surveys conducted by the British Association of Parenteral and Enteral Nutrition (BAPEN) between 2007 and 2011, around 30% of patients admitted in hospital were at risk as indicated by a high score on the Malnutrition Universal Screening Tool (MUST) with a particularly high prevalence of around 50% in admissions from care homes.<sup>5</sup> Many patients also see a further decline in their nutritional status during their hospital admission, which can then increase their risk of complications and length of stay.

**Micronutrient deficiencies:** in the UK, specific micronutrient deficiencies are also surprisingly common, especially in the elderly. Folate deficiency has been described in 29% of independent adults over 65 years old and 35% of those in institutions, while vitamin C deficiency affects 40% of those in institutional care.<sup>6</sup>

## Causes of malnutrition

Although a proportion of malnutrition in developed countries is associated with poverty, social isolation and substance misuse, exacerbating the health inequalities in vulnerable populations, most adult malnutrition in the UK is associated with disease, arising from several sources ([Figure 1](#)).

Reduced dietary intake is probably the single most important aetiological factor. It results from many factors, including age, depression, and dementia, and in illness or injury there is often a marked reduction in appetite usually due to modified secretion of cytokines, glucocorticoids, peptides, insulin and insulin-like growth factors.<sup>7</sup> In hospital in-patients, these problems may also be compounded by failure to provide regular nutritious meals, missed meals due to clinical investigations, and lack of help with feeding when required.<sup>8</sup> Among patients undergoing

**Causes of malnutrition and further deterioration in nutritional status among hospital in-patients**

<p>Medical causes of inadequate and/or poor quality oral intake</p>	<ul style="list-style-type: none"> <li>• Anorexia of disease</li> <li>• Nausea and vomiting</li> <li>• Gastrointestinal dysfunction</li> <li>• Reduced absorption of macro- and/or micronutrients</li> <li>• Increased nutrient losses</li> <li>• 'Nil by mouth' for investigation or medical reasons</li> <li>• Physical disability and inability to feed self</li> </ul>
<p>Environmental causes of inadequate and/or poor quality oral intake</p>	<ul style="list-style-type: none"> <li>• Inadequate food quality</li> <li>• Inadequate food availability</li> <li>• No protected meal times</li> <li>• Missed meals when going for investigations</li> <li>• Inadequate training and knowledge of medical and nursing staff</li> </ul>
<p>Altered requirements</p>	<ul style="list-style-type: none"> <li>• In critical illness there are altered substrate demands and several sub-groups of patients have a increased energy expenditure (see below)</li> </ul>

**Table 1**

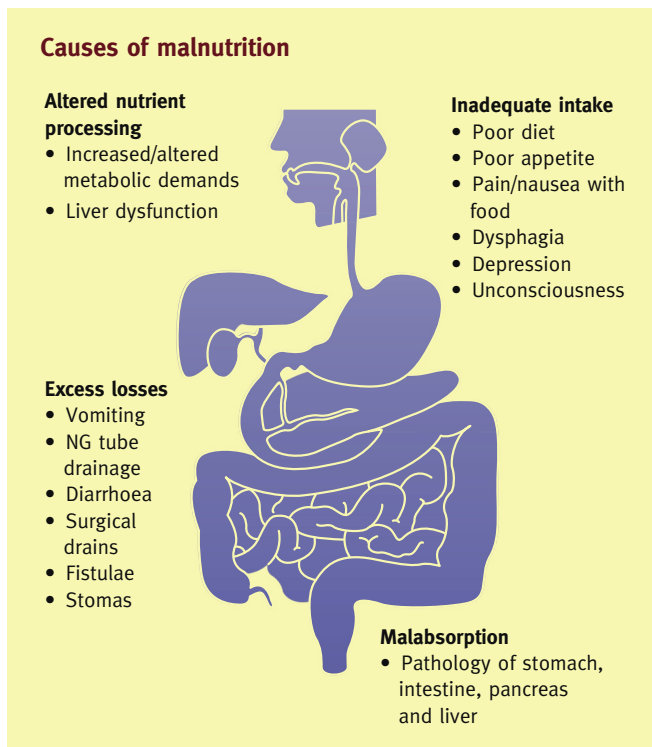
abdominal surgical procedures, varying degrees of intestinal failure (whether short-term or more sustained) add further nutritional risks, and some other groups (e.g. haemato-oncology patients) also experience intestinal failure from chemotherapy/radiotherapy damage. While there may be a rebound of appetite after recovery which helps restore lost weight and function, this is often suppressed by continued inflammation or by early recurrence of the precipitate illness (e.g. in patients with chronic obstructive pulmonary disease (COPD)).

Although for many years it was thought that increased energy expenditure was predominantly responsible for disease-related malnutrition, in many disease states total energy expenditure is actually less than that measured in normal health, since any basal hyper-metabolism from disease is offset by reduced physical activity. Studies in intensive care patients therefore demonstrate that energy expenditure is usually below 2000 kcal/day.<sup>9</sup> Patients with injury, inflammation or neoplasia may also have altered demands for specific amino acids, which are met by catabolic draw on reserves causing excess lean tissue wasting. This sarcopenia is very evident as cachexia in a thin patient but is more difficult to detect in overweight patients.

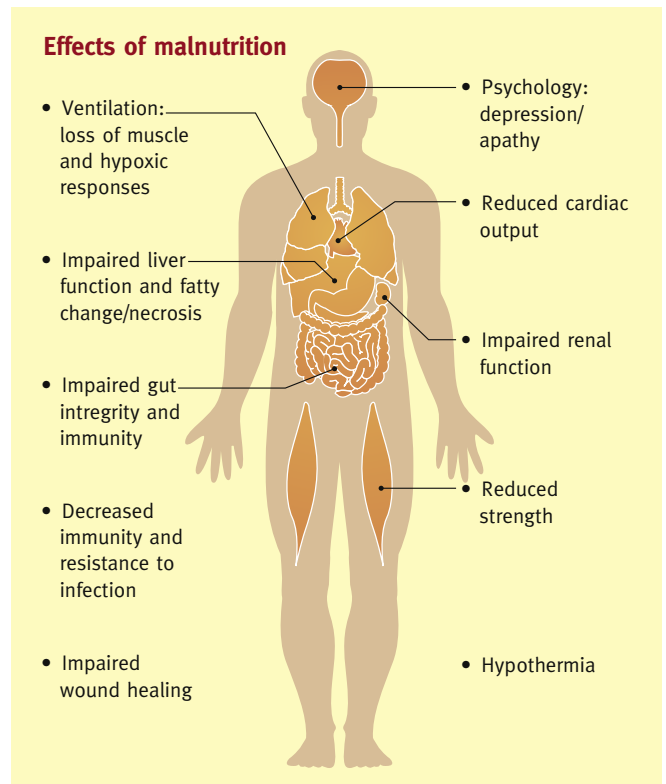
**Consequences of malnutrition**

Malnutrition affects the function and recovery of every organ system (see [Figure 2](#)).

**Muscle and bone:** weight loss caused by depletion of fat and, particularly, muscle and lean organ mass, is often the most obvious clinical consequence of malnutrition although



**Figure 1**



**Figure 2**

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