Addressing Micronutrient Deficiencies in the Dietetic Management of Malnutrition

Dr Fiona Kinnear (PhD)
Registered Dietitian & Senior Medical Writer
at HRS Communications

With 48% of adults in both the community and hospital care settings in the UK identified to be at risk of malnutrition,[1] ensuring up to date clinical knowledge and skills, and appropriate and effective dietetic management strategies is essential. In this article, the malnutrition burden in the UK is discussed, with a focus upon its causes, consequences, and clinical management guidelines. The importance of considering micronutrient deficiencies is highlighted, with important considerations for your dietetic management suggested.

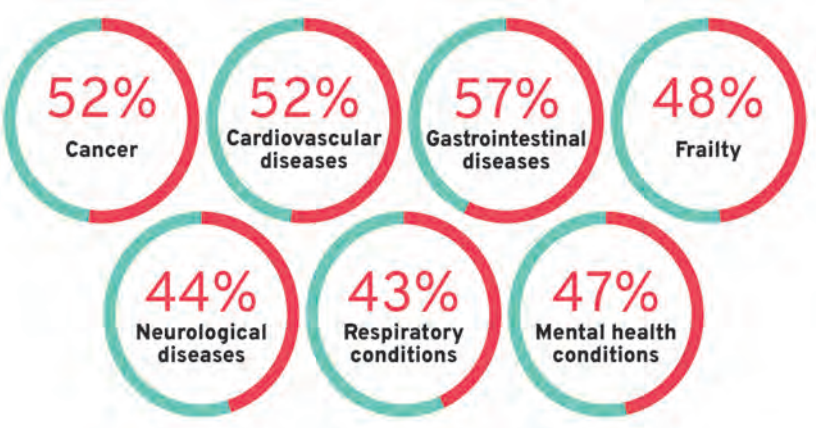
Malnutrition – the impact of the problem in the UK

Malnutrition can be either a cause or consequence of ill health, defined as *"…a state in which a deficiency of nutrients such as energy, protein, vitamins and minerals causes measurable adverse effects on body composition, function or clinical outcome."*[2]

The most recent estimates indicate 48% of adults across community and hospital settings in the UK are now at medium or high risk of disease-related malnutrition, an increase from 42% in 2019.[1] Risk of malnutrition is common across different healthcare settings, affecting people in care homes, hospitals and in their own homes.[1]

See **Figure 1** for the prevalence of medium and high risk malnutrition in associated conditions.

Figure 1: Prevalence of medium and high risk malnutrition in associated conditions[1]



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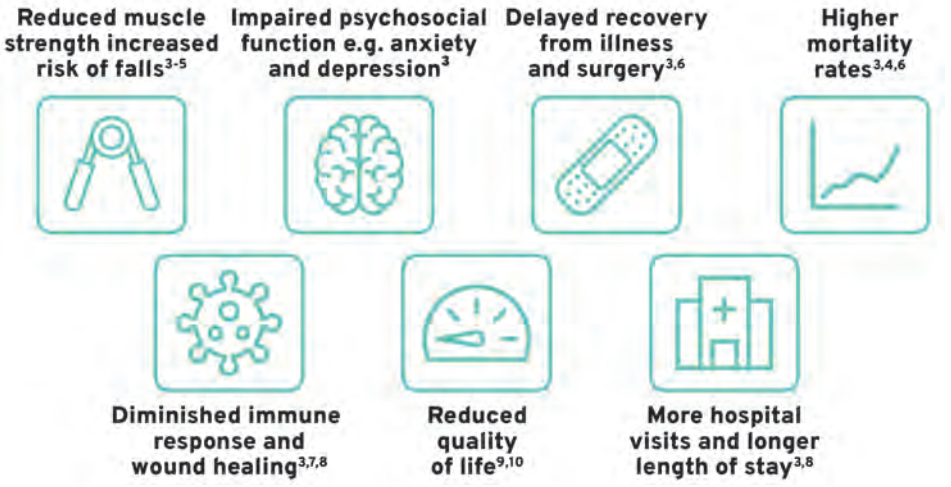
Several factors have been associated with malnutrition risk, including the impact of diseases and their treatments upon nutritional intakes, requirements and absorption.[3] Social factors such as poverty, isolation and loneliness are also implicated in malnutrition risk in people with and without a disease diagnosis.[3]

Impact of malnutrition upon patients & healthcare system

Malnutrition is associated with several adverse clinical consequences – see **Figure 2**.

Figure 2: Adverse clinical consequences of malnutrition



The significant physical and psychological burden of malnutrition upon individuals and their families also has financial implications for the healthcare system:[3, 8]

Economic analyses demonstrate that identifying and managing malnutrition is cost-effective, with the associated improvements in nutritional status and clinical outcomes leading to significant reductions in healthcare use and costs.[8]

Management of malnutrition

Clinical guidelines advocate a 'food first' approach in the first-line management of patients identified as having, or being at risk of, malnutrition.[2, 3] This approach aims to optimise patients' nutritional intakes through the addition of energy and protein dense foods or ingredients to their usual diet.[2, 3] For patients unable to meet their nutritional requirements through 'food first' approaches alone and/or who are categorised as 'high risk' during nutritional screening, an oral nutritional supplement (ONS) may be considered, under the guidance of a healthcare professional skilled and trained in nutritional requirements and support, such as a dietitian.[2, 3] ONS are intended to supplement the diet rather than replace foods and the need for ONS should be closely monitored by the dietitian and discontinued in patients no longer at risk of malnutrition.[2, 3] ONS are associated with increased energy, protein and micronutrient intakes, however evidence regarding the impact upon clinical outcomes is inconclusive and dependent upon each specific patient group and/or disease type.[11, 12]

Understanding micronutrient deficiencies

Addressing protein and energy deficits is most often the focus of nutritional interventions in malnourished patients.[13] However, micronutrient deficiencies are a specific form of malnutrition which commonly occur alongside, or independently, of protein-energy malnutrition.[13-16] Unlike protein-energy malnutrition, which most often presents with measurable weight and/or muscle loss, micronutrient deficiencies can be more challenging to diagnose, often requiring assessment of blood biomarkers in addition to assessment of nutritional intakes.[14-17]

As with protein-energy malnutrition, micronutrient deficiencies can be caused by a complex range of physical, disease-related and social factors which affect nutrient intake and/or utilisation.[3, 13, 15] The term 'hidden hunger' describes the presence of micronutrient deficiencies which can occur without energy or protein deficits and typically reflects energy-dense but nutrient-poor diets.[17]

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Consequences of micronutrient deficiencies

Due to the pivotal role of vitamins and minerals in multiple physiological processes, including immune function, metabolism, growth and bone function, micronutrient deficiencies are implicated in both the development and exacerbation of several diseases and conditions (**Table 1**).[7, 13-15, 18] Micronutrient deficiencies can result in significant short- and long-term consequences to individuals across all age groups, living with and without concurrent disease and are recognised to contribute to a large burden of mortality and morbidity worldwide.[14-16, 19]

Table 1: The role of micronutrients physiological processes & the consequences of deficiencies

PHYSIOLOGICAL PROCESS	KEY MICRONUTRIENTS	CONSEQUENCES OF DEFICIENCY
Immune function	Vitamins A, B2, B6, B9, B12, C, D and E; Zinc, Copper, Selenium and Iron.[7,14,18]	Impaired immune function which can increase susceptibility to infections, delay wound healing and prolong recovery from illness.[7,18,20]
Bone development	Vitamins C, D and K; Calcium, Phosphorus and Magnesium.[14,15,21]	Reduced bone mineral density which can increase susceptibility to developing osteoporosis which in turn increases risk of falls and bone fractures.[21]
Metabolism and cellular processes (e.g. cell differentiation and defence against oxidative stress)	Vitamins B1, B2, B3, B6, B9, B12, C, D and E; Iron, Selenium and Zinc.[14,15,19]	Associated with impaired physical and cognitive functions, iron deficiency anaemia and worsened prognosis of diseases such as cancer and cardiovascular disease.[14,15,19,20]

Potential benefits of micronutrient supplementation in malnourished patients

In instances where dietary intakes alone are not expected to be able to correct identified micronutrient deficiencies, supplementation with the relevant micronutrient(s) may be beneficial and are acknowledged in clinical guidelines for nutrition support for adults with, or at risk of, malnutrition.[2, 15]

Research indicates that targeted supplementation with the relevant vitamins and minerals required to address identified micronutrient deficiencies may improve immune function,[18] reduce risk of acute infections,[7, 18] support optimal bone mineral density,[21] improve prognosis of diseases,[14, 19, 20] and improve recovery amongst hospital inpatients.[14]

Vitamin and mineral deficiencies rarely occur in isolation and physiological processes are the result of micronutrients working in combination, highlighting the importance of providing a comprehensive range of micronutrients to patients requiring nutritional support.[15]

Summary & implications for dietetic practice

Malnutrition is a common and ever-growing problem with serious implications for the health outcomes of all affected[1] and substantial financial consequences for the healthcare system.[3, 8] Appropriate identification and management in healthcare settings is essential and associated with improved mortality and morbidity outcomes and reduced healthcare costs.[3, 8] In addition to addressing energy and protein deficits, dietetic management plans should include assessment and regular monitoring of micronutrient deficiencies which can be easily overlooked due to lack of visible symptoms.[2,15] In line with clinical guidelines, supplementation with a comprehensive vitamin and mineral supplement should be considered in adults receiving nutritional support.[2, 15] Supplementation with individual or multiple nutrients, tailored toward the unique needs of each individual, may contribute to improved health outcomes.[14, 15, 19, 20]

Dietetic Practice Case Study Request

Alliance Pharmaceuticals are keen to hear from Dietitians with valuable clinical experience and insights on use of multivitamin and mineral supplementation for patients needing nutritional support. If you're interested in authoring an article, please contact us at: **medinfo@alliancepharma.co.uk** with 'CN article' in the subject line.

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