

Nutritional disorders

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Nutritional disorders are relatively common in Australia.^{1,2,3} The disorders themselves cause significant morbidity, but they may also contribute to other disease states, including cardiovascular disease, neoplastic disease, osteoporosis (and therefore fractures) and cholelithiasis.

There are many forms of nutritional disorder, which may be classified as shown in table 1. Each type of nutritional disorder has its own prevalence which is generally dependent on age, gender, ethnicity, education and socioeconomic conditions, and which changes with time. This depends partly on the changing food supply, along with other lifestyle changes, e.g. physical activity and substance abuse (e.g. tobacco, alcohol). There are few Australians who are spared a nutritionally related disorder at some time in their life, whether this be a micronutrient deficiency, obesity, ischaemic heart disease, diabetes, gastrointestinal cancer or osteoporosis. Moreover, what is often regarded as overnutrition may in fact be partial undernutrition if the broader role of provision by food of biologically active non-nutrients (flavonoids, phytoestrogens, salicylates, etc.) is considered.

Clinical features and diagnostic considerations

Although the overall prevalence of nutritional disorders is high, some groups are more susceptible to particular disorders.

- General indicators of vulnerability include socioeconomic and educational disadvantage, physical inactivity, substance abuse, reproductive years (for women), later life, chronic illness and multiple medication.
- The next best indicators after vulnerability are food intake and body composition.
- The recognition of nutritional disorders requires particular attention to food and nutrient intake in history taking and the documentation of anthropometric measures on examination.
- Nutritional disorder is far more common than is reflected in the clinical symptoms or signs of micronutrient deficiency or excess.
- The process of nutritional diagnosis can be viewed as follows:
 - 1) Assessment of food and nutrient intake by asking key questions, obtaining a history of usual intake across the day or asking the patient to keep a food diary over one week.
 - 2) Assessment of energy/nutrient expenditure/utilisation to determine whether the patient is in steady state, positive balance (i.e. expending less

energy/nutrients than they are ingesting) or negative balance.

- 3) Assessment of body composition using anthropometry (i.e. calculation of body mass index), skinfold thicknesses and body circumferences. Table 2 shows the significance of body mass index (BMI), which is calculated as follows:

$$\text{BMI} = \frac{\text{weight (kg)}}{(\text{height (m)})^2}$$

Table 1. Classification of nutritional disorders

Disorders affecting food or nutrient intake

Eating disorders
Physical handicap
Low levels of physical activity
Loss of appetite due to medication or micronutrient deficiency
(e.g. thiamine and zinc deficiencies)

Body compositional disorders

Decreased lean mass
Increased fat mass or maldistribution of fat
Osteopenia
Fluid shifts

Nutritionally dependent disorders

Metabolic, e.g. lipid disorders, diabetes
Haematological, e.g. anaemia, lymphopenia
Immunological, e.g. with protein-energy malnutrition (PEM)

Nutritionally responsive disorders

Inherited disorders of metabolism
Disorders related to ageing
Consequent on other disease processes, e.g. malabsorption, chronic renal failure, neoplastic disease
Iatrogenic, e.g. due to medication use, institutionalisation
Low levels of physical activity with relative low energy and nutrient intakes, e.g. with physical handicap
Self-inflicted, e.g. meganutrient dosage and toxicity
Food sensitivities, which are more common than food allergies, and generally relate to salicylates, biogenic amines or occasionally monosodium glutamate (MSG)⁴

Table 2. Significance of body mass index (BMI)

BMI	Description	Further investigation
< 18.5	Underweight	Assess muscle mass at upper arm or calf
< 17	Moderately underweight	It is possible for increased fat mass to obscure a decline in lean mass, especially muscle
< 16	Severely underweight	
18.5 to 24.9	Normal	Assess abdominal fatness (AHR: abdomen to hip ratio)
25 to 29.9	Overweight	(Abdominal circumference is measured midway between the lower rib cage and the superior iliac crest)
> 30	Obese	
> 40	Morbidly obese	

Table 3. Investigations to be considered when an abnormality in nutritional intake or body composition is found

Abnormality	Investigations
Reduced intake \pm BMI < 18.5	Search for other evidence of: Micronutrient deficiency, e.g. anaemia, vitamin D deficiency Protein-energy malnutrition, e.g. hypoalbuminaemia, lymphopenia, immunodeficiency Osteopenia, i.e. bone density studies
Excessive intake \pm increased total (BMI > 25) or increased abdominal fatness (AHR: females > 0.85; males > 0.90)	Search for: Coronary risk factors Impaired glucose tolerance Hyperuricaemia

These methods can be supplemented with more direct assessments, if they are required and available (e.g. impedance for body water and fat, dual energy X-ray absorptiometry (DEXA) for bone density, neutron activation for nitrogen, and whole body counting for K^{40} , a naturally occurring radioisotope of potassium which serves as an index of lean mass).

Consider the relation of intake and losses to body composition, e.g. if the patient is obese and in steady state, further enquiry into periods when positive energy balance was obtained will be useful in making a comprehensive diagnosis.

4) Where an abnormality in intake or body composition is found, further investigation in relation to biochemical, haematological or immunological impact may be appropriate (see table 3).

• With these steps a 'nutritional diagnosis' can be made and expressed as a statement, e.g. 'iron and folic acid deficiency dimorphic anaemia related to intake/malabsorption' or 'excessive fat intake and physical inactivity with abdominal obesity'.

Management principles^{1,3,5,6,7,8}

Management principles can be summarised as follows:

• Address all lifestyle factors which compromise nutritional status, e.g. physical inactivity, cigarette smoking, alcohol excess.

• Improve intake of nutrients by way of food as far as possible, e.g. encourage intake of chlorophyll con-

taining foods, wholemeal flour, seeds and nuts in magnesium deficiency.

- Use the oral route for nutritional support wherever possible.
- Unless there is a clear pathogenic basis for a single micronutrient deficiency, use a nutritionally complete form of nutrition support, i.e. food, formula food, or a micronutrient supplement as capsule or tablet. Use non-food supplements for finite periods of time unless the problem is chronic or permanent (e.g. short bowel syndrome).^{5,7}
- These principles can reasonably be expected to allow correction of nutritional imbalances over weeks or months.

Pharmacologic agents available for treatment

- *Formula foods* (19b) may be nutritionally complete, nutritionally enriched or nutrition dense/energy poor.
- *Micronutrient supplements* (19c, 19d, 21) including vitamins, elements and essential fatty acids (e.g. omega-3 and omega-6).
- *Macronutrients* (19b, 19e) including protein and dietary fibre of various types.
- *Non-nutrients*, e.g. flavonoids and non-provitamin A carotenoids such as lycopene.
- 'Designer foods', i.e. those containing components that may alter physiological states or disease processes, but may not have a counterpart in traditional commodities, recipes or products. For example,

phytoestrogens (naturally occurring compounds with hormone-like properties which may modulate menopausal symptoms or reduce the risk of breast cancer) are present in soya, which could be used to create phytoestrogen rich foods.

- **Antidepressants (3d):** in depression, where loss of weight is common, selective use of antidepressant medication can also help to stimulate appetite. (Tricyclic antidepressants, e.g. dothiepin, are particularly helpful.) Some agents, e.g. fluoxetine, may prove to be of value in anorexia nervosa, as may the antihistamine cyproheptadine (12a).⁹
- **Appetite suppressants (19e):** increasingly selective agents, e.g. dexfenfluramine, make it possible to decrease appetite.
- Growth factors (6c) will increasingly be available to modulate body composition.

Optimum treatment

- The characteristics of a food intake which is nutritionally optimal are:
 - 1) Wide biological variety, especially of plant derived food, and of different natural colours.
 - 2) Low in fat, especially saturated fat.
 - 3) Inclusive of fish on a regular basis (e.g. two to three times/week).
 - 4) Sparing in use of sodium as salt, soya sauce or sodium bicarbonate.
 - 5) Snacking (of low fat food, where there is an energy deficit) is preferable to a few large meals.
- Use of commercially available nutritional supplements must be tailored for the nutritional disorder and the preferences of the patient, for example:
 - 1) In the prevention of iron and folic acid deficiency in pregnancy, a product combining these two nutrients is usually the most practical.
 - 2) In recovery from debilitating illness, the supplement must be nutritionally complete, containing quantities of nutrients which are close to the RDIs (recommended dietary intakes). None of the commercially available preparations is entirely acceptable as they are generally not comprehensive or skew intakes away from RDIs.
 - 3) Taste, smell and interest in formula food can be a problem, particularly in the elderly.
- Where energy intake is less than 800 calories/day (3,400 kJ/day), micronutrient supplements must be used. When energy intake is less than 1,000 calories/day (4,200 kJ/day), it is preferable to use micronutrient supplements.
- In patients with significant feeding difficulties requiring hospitalisation, and where tube feeding is difficult or risky to maintain, the use of percutaneous endoscopic gastrostomy (PEG) can be of considerable value: earlier discharge and maintenance is possible at home or in a nursing home.
- For abdominal obesity, the single best available strategy would appear to be walking at least 45

minutes/day in the one stint, for at least five days/week.

- At all times, review the possibility of using food, of the greatest variety, as the preferred option.

Avoiding treatment errors

Possible errors include:

- Regarding weight as fat, which may lead to inappropriate intervention.
- Considering that micronutrients equate to food, when there are other properties and components of food to take into account.
- Regarding wasting as an intrinsic and irreversible part of disease, without a trial of nutrition intervention.
- Overstating (and sometimes understating) the problem of food sensitivity.
- Not empowering patients to make informed choices about their food intake; basing advice on sound nutrition science, but working, as necessary, with patient eclecticism.

When to refer

- The diagnoses and management of nutritional disorders is fundamental to primary healthcare.
- As long as food and nutrient intake and body composition are included much unnecessary referral will be avoided.
- There is a growing number of specialist physicians, surgeons and psychiatrists who are trained in clinical nutrition and who can assist with difficult nutritional diagnoses and planning management strategies.
- The Australasian Clinical Nutrition Society can advise on clinical nutrition referral; it co-publishes the *Asia Pacific Journal of Clinical Nutrition*. (The address of the secretary of this society is: Department of Medicine, Monash Medical Centre, Melbourne, Vic 3168; Fax: (03) 550 5524.)
- Dietitians can help with nutrition counselling.

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