

# Malnutrition, Nutritional Assessment, and Nutritional Support in Hospitalized Adults



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## MALNUTRITION IN HOSPITALIZED PATIENTS

Numerous surveys conducted in developed countries in the 21st century continue to demonstrate the frequent rate of protein-energy malnutrition as well as depletion of specific micronutrients in patients with chronic illnesses and those requiring elective or emergent hospital admission. Hospitalized patients commonly receive inadequate amounts of calories, protein, vitamins, and minerals during their stay, and ad libitum intake of prescribed diets is typically inadequate. Studies have shown that worsening of malnutrition during hospitalization is common. This is problematic, because adequate intake of essential macronutrients (energy, carbohydrate, protein/amino acids, and fats) and micronutrients (vitamins, minerals, and electrolytes) is critical for optimal cellular and organ structure and function, muscle mass, tissue repair, immune function, ambulatory capacity, and patient recovery. Significant erosion of lean body mass (predominately derived from skeletal muscle) and deficiencies of specific vitamins and minerals are variously associated with weakness and fatigue, increased rates of infection, impaired wound healing, and delayed convalescence. This relationship is especially apparent in patients with chronic protein-energy malnutrition and body weight loss associated with illness.

Patients with acute or chronic illnesses typically have experienced several days to several months of continuous or intermittent decreased food intake due to anorexia, gastrointestinal symptoms, depression and anxiety, and other medical factors. They may also have had food intake restricted by surgical operations or diagnostic or therapeutic procedures and recovery from these. Some patients have abnormal nutrient losses due to diarrhea (e.g., with chronic malabsorptive and maldigestive disorders or infectious diarrhea), vomiting, polyuria (as in uncontrolled diabetes mellitus), wound drainage, dialysis, or other causes. Certain drugs, including corticosteroids, chemotherapeutic agents, antirejection drugs, and diuretics, are associated with skeletal muscle breakdown, gastrointestinal injury, or loss of electrolytes or water-soluble vitamins. Bedrest or markedly decreased ambulation are common in outpatient and inpatient settings and are associated with skeletal muscle wasting and impaired protein synthesis.

Catabolic and critical illnesses are associated with concomitantly increased blood concentrations of “counterregulatory” hormones derived from the adrenal glands and pancreas (e.g., cortisol, catecholamines, glucagon); release of pro-inflammatory cytokines from stimulated immune, endothelial, and epithelial cells, such as interleukins (e.g., IL-1, IL-6, IL-8) and tumor necrosis factor- $\alpha$  (TNF- $\alpha$ ); and peripheral tissue resistance to anabolic hormones such as insulin and insulin-like growth factor-I (IGF-I). These hormonal and cytokine alterations increase the availability of endogenous metabolic substrates that are critical for cellular and organ function, wound healing, and host survival (e.g., glucose via glycogenolysis and gluconeogenesis, amino acids via skeletal muscle breakdown, and free fatty acids via lipolysis). This combination of decreased nutrient intake and increased tissue nutrient losses (from the actions of these hormones and cytokines), coupled with increased energy (calorie), protein, and micronutrient needs due to inflammation, infection, and cytokinemia, is responsible for the wasting and micronutrient depletion commonly observed in medical patients with acute and chronic illnesses. Common causes of protein-energy malnutrition and micronutrient depletion in medical patients are shown in [Table 68-1](#). Obesity has become a widespread medical problem and is also a form of malnutrition; it is considered in detail in [Chapter 67](#).

## NUTRITIONAL ASSESSMENT

Serial assessment of nutritional status is a critically important component of routine medical care. The major objectives are to detect preexisting depletion of body protein, energy reserves, and micronutrients; to identify risk factors for malnutrition (see [Table 68-1](#)); and to take steps to prevent nutrient deficiencies, depletion of lean body mass, and loss of skeletal muscle. There are still no practical “gold standard” tests that can provide an index of general nutritional status. Blood concentrations of specific micronutrients (e.g., copper, zinc, thiamine, 25-hydroxyvitamin D, vitamin B<sub>6</sub>, folate, vitamin B<sub>12</sub>) and electrolytes (e.g., magnesium, potassium, phosphorus) are important to guide needs and repletion responses. Nutritional assessment involves an integration of multiple factors, including the patient’s medical and surgical history, type and severity of the acute or chronic underlying illness and its anticipated