
Medical Nutritional Evaluation

Elaine B. Feldman

Introduction

Family physicians, pediatricians, and internists are the usual providers of primary medical care for adults, with gynecologists increasingly performing that task for women. The assessment of nutritional status should be carried out in their offices and in hospital settings.¹ The most common reasons for office visits that may require nutritional intervention are problems related to hypertension, diabetes mellitus, degenerative joint disease, heart disease, asthma, abdominal pain, and pregnancy care, as well as part of a general medical examination.²

Nutrition science should be applied to many aspects of primary care delivery.^{1,3,4} The history, physical examination, and laboratory tests are used to assess nutritional status. As a result, patients may be categorized as normal, malnourished, or at risk of malnutrition. Dietary history, anthropometric measurements, and specific physiologic and biochemical laboratory tests should be appropriately elaborated in patients with malnutrition or at nutritional risk. These usually require referrals. In order to communicate effectively with their patients, physicians should know the components of a healthy diet in terms of foods as well as nutrients and the patterns of consuming food in meals. Details of food composition, however, are more likely in the knowledge base of dietitians and nutritionists.

The physician should obtain specific information about the patient's body weight and its change over time, the patient's recent meal intake (e.g., foods eaten the previous day), appetite, food preferences, level of physical activity, special diets, and intake of supplements. Height and weight are vital signs that should be measured accurately under standardized conditions (not self-reported) in all patients, and body weight should be measured at followup visits. The complete blood count (CBC) and serum albumin provide clues to nutritional anemias and protein status. The patient who is starved, or with gastrointestinal diseases, malabsorption, hepatic and pancreatic disease, renal failure, trauma, sepsis, cancer, or requiring critical care should be given special attention in assessing nutritional status and developing nutritional therapy.⁵ A registered dietitian is an invaluable resource in assessing dietary intake by dietary recalls, prospective food records, or food frequency questionnaires.

The use of dietary supplements of vitamins and minerals is common in our population to meet nutritional needs, optimize nutritional health, and prevent disease. Over-the-counter remedies are available and are marketed with little restriction. Since patients often do not report supplement use to the physician, toxicity or possible drug–nutrient interactions can be overlooked with serious adverse consequences. Unsubstantiated health claims may lead to problems because of toxicity, adverse interactions with other medications or foods, and avoidance of orthodox effective remedies.

The health professional should be aware of good food sources for vitamins and minerals (Section 1, 5-10), appropriate serving sizes, and the facts of nutrient fortification and enrichment of foods, especially as they evolve into newer modalities for nourishment. Encouraging patients to read food labels will result in improving their nutrition knowledge and health (see Section 14). Proper food/nutrient intake lessens the risk of cardiovascular and cerebrovascular diseases (atherosclerosis, hypertension) and cancer.

In the practice of primary care, a miscellany of special circumstances, when suspected, may warrant nutritional interventions. While serious nutritional deficiencies have disappeared in affluent countries, physicians should be aware of their occurrence in patients with alcoholism. That diagnosis should be recognized and the substance abuse treated. Special nutritional needs of women should be addressed. These include replacing iron loss from menstruation to prevent or treat anemia, ameliorating accelerated menopause-related calcium loss from bone, and the special needs of pregnant and lactating women including meeting the periconceptual need for folic acid to prevent neural tube defects, and recognizing the greater susceptibility of women to obesity and alcoholism because of their size, body composition, and metabolic/hormonal differences compared to men. Dementia is increasing as the population ages. More than one-half of cognitive deficiencies in the elderly are attributable to vascular disease and increasingly result from thromboembolism. Risk of vascular disease is increased by a diet high in saturated fats, low in antioxidants, vitamin B₁₂, and choline — especially important in the patient in the middle years. Vegetarians not ingesting any animal products may be at nutritional risk, and vitamin supplementation may be recommended. Patients who cannot or will not eat should be evaluated for possible enteral or parenteral nutrition support and referred to a dietitian or nutrition support team. Caregivers must be wary of dietary fads, most prevalent with regard to weight reduction. Finally, all physicians should be educated in the principles of a health-promoting diet.⁶

Patient Evaluation

The medical history will provide 80 to 90% of the information leading to a diagnosis.^{5,7,8} The evaluation of nutritional status will emphasize certain elements of the medical history and social background that will differ depending on the patient's gender, age, and the presenting problem. The usual level of physical activity and the degree of stress should be noted. It is imperative to distinguish whether any impairment of nutritional status is caused by a patient's disease or is directly related to abnormal intake of nutrients or an unbalanced diet. Malnutrition resulting from disease can be managed effectively only if the underlying disease is controlled or cured. For example, is there physiological or anatomic loss of gastrointestinal function, or is the degree of weight change out of proportion to food intake indicating hyper- or hypometabolism? Does the patient have diabetes mellitus? Is there excessive blood loss from menstruation?

Medical History

The elements of a medical history include the present illness, past medical and surgical history, family history, a medication list, and review of systems.

Pertinent questions to ask are:

- What is the patient's usual weight?
- Has there been any recent change in weight?
- If so, how much and over what period of time?
- What are the maximum and minimum weights?
- What was the weight one year ago, five years ago?

A rapid and profound weight loss is probably the single most important clue to malnutrition. This leads the history taker into an evaluation of normal or abnormal food and nutrient intake. Are there

- Change in smell or taste
- Depression, alcoholism
- Dental problems, poor dentition, sore tongue or swallowing difficulties, affecting appetite or enjoyment of eating
- Poverty, low socioeconomic status, limited access to food
- Special diet prescriptions
- Food idiosyncrasies, (e.g., pica), food fads, excessive use of dietary supplements
- Mechanical problems in eating due to muscle weakness, joint deformities, tremors
- Altered memory or dementia interfering with food and water intake
- Digestion and absorption problems
 - Medications such as antacids, laxatives, oral contraceptives, anticonvulsants
 - Parasites
 - Surgical resection of the gastrointestinal tract
 - Malabsorption syndromes
- Utilization
 - Anticonvulsants, oral contraceptives, antimetabolites, isoniazid
 - Inborn errors of metabolism
- Losses
 - Blood loss
 - Diarrhea (change in bowel habits)
 - Vomiting
 - Draining wounds, fistulas, ostomies
 - Burns
 - Proteinuria, dialysis
- Destruction
 - Fever, sepsis

Hypermetabolism
Multiple trauma, burns
Constipation, obstipation

- Special requirements
 - Chronic disease
 - Recent major surgery
 - Alcohol abuse
 - Hormone replacement therapy
 - Chemotherapy
 - Immunosuppressive therapy
 - Behavior
 - Excessive use of caffeine
 - Alcohol abuse
 - Fad diets
 - Excessive use of dietary supplements
- Miscellaneous
 - Neurologic symptoms, e.g., numbness, dizziness, weakness
 - Skin rash, dryness, flaking, hair loss

Socioeconomic History

The psychosocial evaluation should generate information concerning the patient's income and living conditions. This is especially important in the elderly.

- Does the patient live alone?
- Does he or she have access to shopping?
- Are the facilities for storing and cooking food adequate?
- Does the patient have a history of smoking?
- Are financial resources adequate?
- Are there assistance programs available?

Family History

Many nutritional disorders are familial or inherited. Thus, history of cancer, cardiovascular disease, metabolic diseases, gastrointestinal or liver disease, obesity, etc., should alert the examiner in the patient evaluation.

Diet History and Evaluation

An extensive assessment is best done by the professionally trained dietitian, and is required in patients who have nutritional problems or appear at risk of malnutrition. Nevertheless, the physician should acquire basic knowledge of the patient's food intake, meal pattern, and dietary habits, including use of dietary supplements in order to assess general nutritional adequacy and identify potential problems that may need to be addressed.

The physician has the opportunity to practice preventive nutrition by evaluating the patient's energy balance (intake, activity) and the consumption of dietary components predisposing to vascular disease, cancer, or other chronic diseases.

In the inpatient setting it is important to note the diet prescribed and whether the time constraints of diagnostic tests or interventional therapies preclude the patient's eating the meals that were ordered.

General Physical Examination

Height and weight should be considered vital signs and should be measured and recorded with careful attention to accuracy and precision. Height should be measured annually, and weight at most office visits and at regular intervals in the hospitalized patient. The Body Mass Index (BMI) is a useful parameter for monitoring body size. [Table 3.20](#), Section 3, provides BMIs for a wide variety of body sizes. A body weight that is decreased profoundly alerts the physician to increasing morbidity or mortality. A weight loss to <80% of ideal increases chances of infection, while weight loss to 60% of ideal predicts dying, and few individuals survive a loss of 50% of body weight.⁹

Observation, inspection, and measurement are the primary tools of the examination. The physical signs of malnutrition are listed and categorized according to anatomic site and organ system in [Table 25.1](#).

Finding abnormalities provides leads rather than a diagnosis, and alerts the examiner to further measurements and laboratory tests. Easily recognized abnormalities indicate advanced disease.

Laboratory Tests

Some routine laboratory tests can assist in the nutritional assessment and diagnosis. These include CBC, blood chemistries (glucose, electrolytes, minerals, liver and kidney function tests), and tests of blood coagulation ([Table 25.2](#)).

Hemoglobin levels will show the presence of anemia that may be vitamin-specific or mineral related, and can indicate chronic disease. The red blood cell size and hemoglobin content and concentration can provide clues to liver disease, alcoholism, and specific nutritional deficiencies. While serum albumin is not a sensitive indicator of protein status, it does provide a clue. Low levels may indicate a limiting amount of substrate for hepatic protein synthesis. On the other hand, non-nutritional factors may be responsible for hypoalbuminemia such as expanded extracellular fluid, accelerated protein breakdown, and impaired liver and kidney function. Albumin levels also may be unreliable indicators

TABLE 25.1

Physical Signs of Malnutrition

System	Sign	Deficiency/Abnormality
Hair	Luster, texture (dull, dry)	Protein
	Depigmentation (flag sign)	
	Color (reddening)	
	Easily plucked	
	Areas of hair loss (alopecia)	
Face	Rash, seborrhea	Riboflavin
	Pallor	Iron, folate, B ₁₂
Eyes	Luster of cornea decreased, Bitot spots, xerosis, keratomalacia, night blindness	Vitamin A, riboflavin
	Conjunctival injection	Iron, B ₁₂ , folate
	Conjunctival pallor	Hypercholesterolemia
	Corneal arcus, eyelid xanthelasma	Wilson's disease, copper excess
	Kayser-Fleischer ring	Wernicke's syndrome, thiamin
	Nystagmus	
Lips	Cheilosis (swelling), angular stomatitis (fissures)	Riboflavin
Tongue	Glossitic (smooth, red)	B ₁₂ , folate, riboflavin
	Pallor, atrophy	Iron
	Decreased taste	Zinc
Gums	Bleeding, hypertrophy	Vitamin C
Neck	Goiter (enlarged thyroid)	Iodine
Skin	Rash, edema	Protein
	Pigmentation or depigmentation	Niacin
	Flakiness, peeling, dry	Protein, zinc
	Bleeding	Vitamin K
	Perifollicular hemorrhage	Vitamin C
	Hyperkeratoses	Vitamin A
	Nails	Spooning
Brittle		Protein
Muscles	Atrophy	Protein
	Weakness	Protein, iron, B ₁₂ , folate
Bones, joints	Fractures, deformities, tenderness	Vitamin D
	Deformities	Vitamin C
Heart	Enlargement	Selenium
	Failure	Thiamin
	Arrhythmias	Calcium, magnesium, potassium
Abdomen	Ascites	Protein
Neurologic	Hepatomegaly	Alcohol abuse
	Mental status/dementia	Thiamin, B ₁₂ , folate, niacin
	Cranial nerves	Thiamin
	Gait, ataxia	Thiamin, B ₁₂ , pyridoxine
	Sensory	Thiamin
	Diminished reflexes	Iodine
	Tetany	Calcium, magnesium
Paralysis	Potassium	

TABLE 25.2Laboratory Tests Useful in Clinical Nutritional Assessment^a

Laboratory Test	Body Compartment/ Organ System Function
Hemoglobin, hematocrit, red and white blood cell counts and indices, differential (calculate total lymphocyte count)	Protein, visceral Anemia
Urea, creatinine, glucose, sodium, potassium, chloride, carbon dioxide	Renal function Diabetes mellitus Acid-base balance
Cholesterol, triglycerides, lipoproteins	Lipid disorders
Total protein, albumin, uric acid	Liver, kidney function
Calcium, phosphate, magnesium, bilirubin, alkaline phosphatase	Minerals, skeleton
Aminotransferases, iron, ferritin	Liver function Anemia
Transferrin, transthyretin, retinol-binding protein	Iron Protein, visceral
Prothrombin time, partial thromboplastin time	Vitamin K, blood clotting

^a Adapted from Feldman, E.B. In *Laboratory Medicine; the Selection and Interpretation of Clinical Laboratory Studies*. Noe, D.A., Rock, R.C., Eds. Williams & Wilkins. Baltimore, 1993, ch. 10.

of protein status in the postoperative or acutely injured patient. Some enzyme tests are indicators of nutritional cofactor status, e.g., alkaline phosphatase and zinc, or aminotransferase for Vitamin B₆.

Nutrition Diagnosis and Prescription

The initial nutritional assessment will use information from the history, physical examination, and laboratory tests that may be supplemented by consultation with a dietitian, a clinical nutrition specialist, or other medical specialists or subspecialists. The patient's route of feeding, energy intake, and proportion and amount of macronutrients will be prescribed. The needs to replete or restrict and to supplement will be decided.

A single, ideal prognostic indicator of nutritional risk remains elusive. Rather, multiple parameters must be determined and interpreted in the light of the patient's medical status. One example of a global assessment⁷ utilizes elements from the history (weight change, dietary intake change, persistent gastrointestinal symptoms, functional capacity, diseases) and the physical examination (subcutaneous fat, muscle bulk and tone, edema, ascites) to categorize patients as in good nutritional status, with moderate or suspected malnutrition, or with severe malnutrition.

Educating Physicians in Nutrition

Nutrition plays an important role in the etiology, prevention, or treatment of many chronic diseases. Thus, an appropriate knowledge of nutrition principles should be part of the education and training of physicians, especially those in primary care.^{4,10} Family medicine specialists have developed guidelines for incorporating nutrition into their medical education and residency training programs.¹¹⁻¹³ The current guidelines are presented in [Table 25.3](#) and can be accessed on the Web site of the American Academy of Family Physicians, www.aafp.org.

TABLE 25.3**Recommended Nutrition Guidelines for Family Practice^a**

Develop Attitudes that Recognize

Nutrition is a major part of wellness, disease prevention and treatment of disease
Poor nutrition can cause disease
Family, ethnic and religious attitudes affect nutrition behavior
Socioeconomic factors are important in nutritional excess and deficiency
Different nutritional considerations at different times are required in the life cycle
Nutritionists and dietitians are important in the area of the patient's nutritional status, education and disease prevention

Develop Knowledge Of

Basic nutritional requirements/recommended allowances and intakes
Nutritional content of food and the food pyramid
Nutritional information from public and private sources
The role of qualified nutritional professionals as consultants
The changing nutritional requirements of infancy, childhood, adolescence, pregnancy, lactation, menopause, aging
Nutritional requirements of disease processes and exercise
Clinical effects of dietary fat, carbohydrate, proteins, and fiber
Basic concepts of vegetarianism
The role of nutrition in the treatment and prevention of disease: hypertension, heart, dental, gastrointestinal, liver and renal diseases, diabetes, alcoholism, anemia, cancer
Signs and symptoms of nutrient deficiencies
Breast feeding and formula feeding
Use of vitamin and mineral supplements
Weight reduction and dieting
Food and drug interactions
Allergies and food intolerance
Eating disorders
Refeeding syndromes
Nutrition quackery

Develop Skills In

Assessing nutritional status during the history and physical examinations
Assessing nutritional status and needs of hospitalized patients
Ordering laboratory and metabolic studies to detect nutritional deficiencies and assess adequacy of the nutrition provided
Counseling patients and family about specific nutritional needs related to their life cycle stage and disease process, the role of diet in preventing disease, safe weight reduction and dieting, including health benefits
Educating patients about food marketing and nutritional quackery
Prescribing and managing oral supplementation, tube feeding, peripheral nutrition, and total parenteral nutrition
Preventing and managing refeeding syndromes
Recognizing and appropriately referring patients with disordered eating habits

^a Adapted from *Physician's Curriculum in Clinical Nutrition*. STFM, Kansas City, 1995.

References

1. Feldman EB. In *Laboratory Medicine; the Selection and Interpretation of Clinical Laboratory Studies*. Noe DA, Rock RC, Eds, Williams & Wilkins, Baltimore, 1993, ch 10.
2. Kolasa KM. *Eur J Clin Nutr* 53: S89; 1999.
3. Feldman EB. *Southern Med J* 88: 204; 1995.
4. Feldman EB. *Nutrition* 16: 649; 2000.

5. Feldman EB. In *Essentials of Clinical Nutrition*. FA Davis, Philadelphia, 1988, ch 3.
6. Nutrition Screening Initiative. *Incorporating Nutrition Screening and Interventions into Medical Practice. A Monograph for Physicians*. 1010 Wisconsin Ave, NW Suite 800, Washington DC 20007. The Nutrition Screening Initiative, 1994.
7. Newton JM, Halsted CH. In *Modern Nutrition in Health and Disease*, Shils ME, Olson JA, Shike M, Ross, AC, Eds, 9th ed, Williams & Wilkins, Baltimore, 1999, ch 55.
8. Owen GM. In *Nutrition Assessment, a Comprehensive Guide for Planning Intervention*, Simko MD, Cowell C, Gilbride JA, Eds, 2nd ed, Aspen Publishers, Inc., Gaithersburg, MD, 1995, chap 6.
9. Feldman EB. In *Essentials of Clinical Nutrition*. FA Davis, Philadelphia, 1988, ch 13.
10. Feldman EB. *Am J Clin Nutr* 54: 618; 1991.
11. Society for Teachers of Family Medicine Working Group on Nutrition Education, *Physician's Curriculum in Clinical Nutrition*. STFM, Kansas City, 1995.
12. American Academy of Family Physicians (AAFP) *Recommended Core Educational Guidelines on Nutrition for Family Practice Residents*. American Academy Family Physicians, Kansas City, 1989, revised 1995.
13. Society for Teachers of Family Medicine. *Physicians Guide to Outpatient Nutrition*, in press.