

**AMERICAN ASSOCIATION OF CLINICAL ENDOCRINOLOGISTS'
POSITION STATEMENT ON CLINICAL NUTRITION
AND HEALTH PROMOTION IN ENDOCRINOLOGY**

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Abbreviations:

AACE = American Association of Clinical Endocrinologists; **INC** = Intersociety Nutrition Council

BACKGROUND

The discipline of clinical nutrition is spread over a diverse array of medical and surgical specialties. Many medical societies report both a significant decrease in and an inadequate number of physician members trained in nutrition at a time when the prevalence of many nutrition-related medical conditions is escalating (1,2). The American Association of Clinical Endocrinologists (AACE) has an opportunity to develop a strategy to understand barriers to becoming a physician nutrition expert and to create a comprehensive approach to position itself and its members at the forefront of ambulatory and hospital clinical nutrition. The benefits of healthy nutrition apply to all persons. In 1988, the first Surgeon General's Nutrition Report on Nutrition and Health stated, "For the two out of three adult Americans who do not smoke and do not drink excessively, one personal choice seems to influence long-term health more than any other – what we eat (3)." Optimizing nutrition is important to promote health, prevent disease, and improve clinical outcomes in many common medical disorders.

Endocrinologists are uniquely suited as experts in metabolism—indeed, the endocrinology subspecialty boards explicitly include "metabolism"—and clinical nutrition is a natural extension of the field of endocrinology. While other clinicians may be involved in the care of these patients, nutrition and metabolic problems are often subordinated or entirely overlooked in the absence of an endocrinologist or other physician with expertise in clinical nutrition.

The spectrum of nutrition includes overnutrition, undernutrition, and specialized nutritional issues related to illness. Table 1 provides nutrition knowledge related to health and disease that is important to master. Table 2 applies nutrition knowledge to clinical conditions and highlights the value that can be added by endocrinologists with nutrition expertise. Currently, endocrinology fellowship programs provide extensive training in conditions like prediabetes, diabetes mellitus, hypertension, and dyslipidemia. However, clinical nutrition also includes neoplastic, gastrointestinal, renal, pulmonary, cardiac, and neuropsychiatric diseases; nutrition through the life-cycle; nutrition and pregnancy; sports nutrition; malnourished states; vitamin and mineral metabolism; and the use of dietary supplements. Few endocrinology fellowship programs offer concentrated education in these areas of clinical nutrition.

The discipline of hospital clinical nutrition focuses on the care of ill, malnourished patients who receive standard (oral) nutrition, enteral tube feeding, parenteral nutrition, and/or various nutritional supplements. Enteral tube feeding and parenteral nutrition support are costly and associated with risk, yet provide significant net benefit when appropriately prescribed and managed. It is reported that at least one-third of medical and surgical patients are malnourished, and the prevalence has not decreased over the past several decades (4). Malnourished patients have a longer length of stay, poorer outcomes and survival, and increased cost of care (5).

Physician oversight of hospital nutrition is crucial for many reasons. Controversies regarding early nutrition support and suppression of autophagy in critical illness, as well as combined enteral and parenteral nutrition support to reduce underfeeding, characterize the current landscape of hospital nutritional medicine. Overfeeding and the induction of refeeding syndrome are common, avoidable complications of nutrition support. Hyperglycemia occurs in approximately one-third of hospitalized patients and this risk is dramatically increased in patients receiving nutrition support (6,7). Thus, optimizing nutrition support use can reduce costs by applying expertise in patient selection, assessment, implementation, and monitoring.

To this end, the management of patients receiving nutrition support requires a targeted physical examination based on knowledge and experience of malnutrition; tailoring of the intervention based on an understanding of the medical and/or surgical conditions; and formulation of nutrient and metabolic prescriptions based on familiarity of biochemical and physiological responses, laboratory test results, and potential pitfalls of other modalities for nutritional assessment. Participating in formal research programs in nutrition-related fields confers obvious benefits to a career in an emerging discipline, such as metabolic support, which bridges nutrition and endocrinology. Finally, a track record of effective teaching is required for house staff to learn and become interested in nutritional medicine. Unfortunately, bowing to economic pressures, many hospitals have discontinued nutrition teams, leaving nonphysician staff to oversee this complex and specialized branch of medicine.

The current sociomedical problem can therefore be framed as follows:

- There is a profound shortage of physicians who are experts in clinical nutrition;
- There is an epidemic nationally and globally of overnutrition and undernutrition that will have dramatic potential adverse effects on the American health care system; and
- Endocrinologists have a background in metabolism and when trained in nutritional medicine will be able to provide ambulatory and hospitalized patients with expert nutrition care.

Table 1
Application of Nutrition Knowledge to Patient Care: Physiology and Metabolism

Area of interest	Nutrition concepts important in health and disease
Body composition	Differences based on sex, growth, and aging. Knowledge of parameters of nutrition assessment (body mass index, waist to height index, anthropometrics, bioelectrical impedance, and dual-energy x-ray absorptiometry).
Regulation of energy expenditure and intake	Energy assessment, requirements, and measurement. Components and regulation of the metabolic rate in health and illness. The use of indirect calorimetry.
Components of a healthful diet	Understanding the composition of healthful diets.
Energy and protein needs	Protein sources and intake, protein quality, metabolism and regulation, requirements in health and disease.
Carbohydrate and fiber	Types of carbohydrate and fiber, digestion and storage, body needs, and relation to illnesses.
Fats and oils	Types of fats and relation to disease and health.
Diet types and effects on obesity-associated comorbidities	Review of commonly promoted diets (low-fat, low-carbohydrate, Dietary Approaches to Stop Hypertension, Mediterranean, vegetarian, and fad diets, among others).
Phytochemicals	Phytochemicals in nutrition health.
Vitamins and minerals	Understanding the definition and rationale of adequate intake, reference daily intake, recommended dietary allowance, and upper limit for nutrients.
Fat-soluble vitamin physiology	Food sources, absorption, storage and function of vitamins A, D, E, and K.
Water-soluble vitamin physiology	Food sources, absorption, storage and function of B vitamins (B ₁ -thiamin, B ₂ -riboflavin, B ₃ -niacin, B ₆ -pyridoxine, B ₁₂ -cobalamin), vitamin C, and folate.
Manifestations of vitamin deficiencies and excess	Symptoms and signs of common deficiencies.
Minerals and trace elements physiology	Food sources, absorption, metabolism, and role of calcium, phosphate, magnesium, iron, iodine, zinc, copper, chromium, and selenium.
Manifestations of mineral and trace element deficiencies and excess	Signs and symptoms of common deficiencies.
Nutrition through the life cycle	Understanding nutritional needs based on age.
Pediatrics	Growth and development. Signs and symptoms of deficiencies.
Pregnancy and lactation	Energy intake, weight goals, folate, calcium, iodine, and vitamin D requirements.
Adults	Changes in energy needs and musculoskeletal physiology. Midlife nutritional risk (obesity, diabetes, cardiovascular disease) and deficiencies (iron, B ₁₂ , vitamin D).
Elderly	Fall risk, bone loss, nutritional neuropathies, and sarcopenia.
Physical activity and exercise	The difference between activity and exercise on cardiovascular health, muscle mass, and energy needs. Age-related guidelines.
Nutrition and sports	Nutritional needs and hydration in athletes. Sports-related nutritional risks.
Complementary and integrative medicine	Prevalence of use.
Dietary supplements	Differences between nutrients in food vs in supplements. Safety and efficacy of dietary supplements, and risk of drug-supplement interactions.
Functional foods and nutraceuticals	Familiarity with functional foods and beverages in the diet and their reported benefits.
Probiotics	Therapeutic use.
Genetics and epigenetics	Nutrient-gene interactions, nutrigenetics, nutrigenomics, etc.
Drug-nutrient interactions	The importance of foods such as fiber, protein, calcium, etc, on drug binding and absorption.
Metabolic response to illness and injury	Changes that occur in metabolism, stress hormones, energy requirements, cytokines, and acute phase proteins.
Public health disparity	Cultural and ethnic related issues, food policy.

Table 2	
Application of Nutrition Knowledge to Patient Care: Value Added By Endocrinologists	
Condition	Value added by endocrinologists
Metabolic Overweight Obesity Metabolic syndrome Pre-diabetes Diabetes mellitus Dyslipidemia	Endocrinologists are trained and board certified in metabolic disorders and commonly treat ambulatory patients with these conditions. Thus, endocrinologists are well positioned to provide nutrition care in the prevention and management of these disorders, many of which coexist. It follows that endocrinologists also are well suited to care for these conditions in hospitalized patients requiring enteral tube feeding or parenteral nutrition.
Endocrine Secondary causes of weight gain and obesity Medication-related weight gain and weight loss Hyperglycemia and hypertriglyceridemia in hospitalized patients	Endocrinologists are trained and board certified in endocrine disorders and are skilled at evaluating patients for secondary causes of weight gain or loss. In addition, hyperglycemia and hypertriglyceridemia are common in the hospital setting.
Pregnancy	Vitamin and mineral needs during pregnancy, recommended weight gain in nonobese and obese women, and nutrition support in hyperemesis gravidarum.
Gastrointestinal Malabsorption (celiac sprue, infiltrative disease, gastric bypass, short bowel syndrome, etc) Dysmotility Postbariatric surgery nutritional needs	Any condition causing malabsorption can result in weight loss, malnutrition, and nutritional deficiencies. After bariatric surgery, many patients will face these issues. Patients with malabsorption may not present with usual symptoms and signs, or only subtle features, of nutrient deficiencies. Some may require long-term enteral or parenteral nutrition and attention to vitamin and mineral needs. Knowledge of nutrition assessment and management is needed.
Cardiovascular Hypertension Cardiometabolic risk	Patients with cardiovascular disease often have diabetes mellitus, dyslipidemia, and obesity. Endocrinologists frequently work with these conditions in a multidisciplinary team that includes dietitians and diabetes educators.
Renal Acute kidney disease Chronic kidney disease Hemodialysis and chronic renal replacement therapy Renal stone disease	Patients with chronic renal disease, and especially those requiring hemodialysis or chronic renal replacement therapy, may be malnourished or have abnormalities in minerals and vitamins. Renal replacement therapy may provide extra dextrose and may lead to hyperglycemia. Nutrition support in patients with chronic kidney disease requires knowledge of glucose, protein, vitamin, and mineral management.
Pulmonary Sleep apnea Mechanical ventilation	Patients with obstructive sleep apnea are usually overweight or obese and often have secondary hypogonadism that can be addressed by an endocrinologist. Nutrition support in ventilator-dependent patients requires expertise so as not to prolong intubation by overfeeding or underfeeding.
<i>(Continued next page)</i>	

Table 2 (Continued)	
Musculoskeletal Bone loss, calcium and vitamin D needs Hypovitaminosis D Gout Sarcopenia and wasting	Hypovitaminosis D is common in patients with malabsorption, obesity, osteoporosis, housebound status, and sun avoidance. It can lead to bone loss, falls, and fractures. Sarcopenia may increase fall risk in elderly persons. Endocrinologists are trained and board certified in the care of patients with osteoporosis and are well positioned to manage the nutritional needs of these patients.
Transplantation Hematologic Solid organ	Patients requiring transplantation are often in a high physiologic stress state and are at nutritional risk. Lipid, glucose, and bone health abnormalities are common. Patients may be cachectic or obese. An understanding of nutrition assessment and support; safest route of oral, enteral tube feeding, or parenteral nutrition; appropriate monitoring; and drug-nutrient interactions is required.
Neuropsychiatric Disordered eating Behavior modification for weight loss Dementia Dysphagia and aspiration risk	Endocrinologists frequently work as members of multidisciplinary teams. Patients with these conditions often require a close working relationship with the primary care physician, the psychologist for behavioral issues, the dietitian for diet and enteral supplement education, and long-term tube feeding care in patients at risk of aspiration. The ethical decisions for appropriate use and long-term tube feeding requires expertise in nutrition.
Cancer Cancer-related malnutrition and cachexia Chemotherapy and radiation therapy effects on nutrition status	Patients with cancer, with and without cachexia, are evaluated both in ambulatory and hospital settings.
Chronic infection	Nutrition for patients with chronic infections (eg, HIV) with or without wasting.
Hospital nutrition support Intensive care unit and critical illness Nutrition assessment and design Enteral tube feeding Parenteral nutrition Glucose goals and management during nutrition support Nutrition support in obese patients Monitoring during nutrition therapy	Nutritional support (oral nutrition supplements, enteral tube feeding, and/or parenteral nutrition) of hospitalized patients requires knowledge of nutritional assessment, nutrition design and administration to include medical and ethical indications for use, determination of route for feeding (gastric or jejunal enteral route, peripheral or central parenteral route), and monitoring of nutrition programs. Monitoring also involves an awareness of fluid and electrolyte/mineral management, complications of potentially harmful overfeeding and refeeding issues, vitamin and mineral deficiencies due to illness, and glucose management (ie, glucose goals, insulin administration, insulin infusion and insulin subcutaneous protocols, and prevention and treatment of hypoglycemia). Hospitalized obese patients present unique nutrition challenges to avoid overfeeding and related complications and to address the care of patients who have undergone bariatric surgery and have sarcopenia and nutrient deficiencies.
Metabolic response to illness and injury Specific disease states Management of stress-related hyperglycemia	Expertise in the metabolic response to illness and injury is needed for the assessment and management of specific nutrition and energy needs in patients with severe illness such as sepsis, pancreatitis, pneumonia, burns, wounds, multiple organ dysfunction, acute renal failure, and closed head injuries.
Perioperative nutrition assessment	Assessment of perioperative risk in patients with diabetes mellitus and obesity.

The solution is to train more physicians in clinical nutrition. For a variety of reasons, past efforts did not succeed. The reasons are manifold: lack of adequate nutrition education for medical students and house staff; the failure of nutrition programs to flourish beyond a few medical centers because of a lack of recognition of the importance of nutrition; the failure of board certification programs to be economically sustainable or sufficiently influential to motivate participation by physicians; the inability of medical societies to collaborate on efforts to train, certify, and support physician nutrition experts; and the failure to recognize the need for physician-directed nutrition programs. In this position statement, AACE delineates a 4-part approach to address the problem:

- (1) Coordination of nutrition education at various levels of medical training and practice;
- (2) Recognition of expertise in clinical nutrition through certification;
- (3) Collaboration with medical and surgical societies and government entities to address the problem of physician shortages in clinical nutrition; and
- (4) Medical community recognition of the importance of physician-directed nutrition practices.

AACE PROPOSAL

Part 1: Nutrition Education

The current medical system (from medical school through practicing physicians) needs physicians trained in clinical nutrition not only to improve the health of our patients, but also to develop national leaders in nutrition. National attention is shifting from a paradigm of disease management to a paradigm of health promotion and disease prevention. Currently, the quantity and intensity of nutrition education is inadequate for physicians (8-10). Half of graduating medical students rate the time dedicated to nutrition education as inadequate (11). The time devoted to nutrition in medical residency and fellowship programs is also limited and not comprehensive, an issue potentially resolved with dedicated training. Finally, practicing physicians also rate nutrition knowledge and skills as inadequate (12). Continuing medical education courses rarely address clinical nutrition adequately. Manuscripts authored decades ago called for greater attention to this problem and standardization of nutrition training for physicians, but this never materialized.

AACE proposes a staged system for education and training in nutrition for clinical endocrinologists. First, to establish a continuing medical education–accredited, Web-based didactic and case-based nutrition learning program coupled with symposia at regional AACE chapter meetings and annual AACE national meetings. Second, to establish a nucleus of clinical endocrinologists to create advanced educational programs in clinical nutrition.

Part 2: Nutrition Certification

There are several nutrition certification programs. Sponsoring groups include the American Board of Physician Nutrition Specialists (www.nutritioncare.org/ABPNS/ABPNS_Certification/Certification_Announcement/) and National Board of Nutrition Support Certification (www.nutritioncare.org/nbnsc/), the Certification Board for Nutrition Specialists (www.cbns.org), the American Board of Obesity Medicine (www.abom.org). It was believed that creation of a rigorous physician-only certification examination, such as the examination sponsored by the American Board of Physician Nutrition Specialists, would propel nutrition education and the supply of physician nutrition experts to a level commensurate with need. However, this has not been successful, primarily due to a lack of adequate nutrition education to fuel the exam with eligible candidates (13). This problem can only be resolved by recognizing and prioritizing the proximate component: lack of nutrition education.

AACE supports a nutrition certification process for clinical endocrinologists after an applicant's successful completion of a nutrition education program. AACE will provide a comprehensive nutrition education program focused on the needs of endocrinologists.

Part 3: Professional Society Collaboration

A significant challenge facing clinical nutrition is that nutrition falls in the domain of many specialties, represented by many professional medical and surgical societies. AACE has taken steps with other national societies to collaborate in this endeavor. These collaborations included developing an initial (2008) and updated (in progress) clinical practice guideline on the nonsurgical perioperative management of patients who undergo bariatric surgery cosponsored with The Obesity Society and the American Society of Metabolic and Bariatric Surgery (2008 version endorsed by the American Society of Parental and Enteral Nutrition) (14); developing initial clinical practice guidelines (in progress) on healthful eating with The Obesity Society; appointing an AACE member to participate on the American Board of Physician Nutrition Specialists' board; inviting members of other nutrition-related professional societies to participate in nutrition-related symposia at AACE annual meetings; and cosponsoring the 2009 Summit Addressing the Physician Shortage. At this summit meeting, North American nutrition physician leaders, representing a host of nutrition-related professional societies, convened to discuss the shortage of physician nutrition experts, to define and review the problems, and to develop strategies to correct the problem (15). Although many recommendations were made, including development of a framework for governance of an Intersociety Nutrition Council (INC) and creation of durable alliances between nutrition societies and clinical organizations, limited progress has occurred since the summit (16-19). Ultimately,

the time and commitment pressures of Summit attendees by their respective sponsoring societies took priority over time and commitment pressures to create the INC.

AACE proposes a renewed and focused effort on intersociety collaboration in nutrition-related activities to not only enhance the nutrition education and practice management tools available for clinical endocrinologists, but also to foster a critical mass of expertise across specialties to advance nutrition and health promotion in patient care. AACE will also seek to codevelop and/or participate in nutrition education, research, and advocacy programs with other professional societies. It is hoped that eventually, the concept of the INC can be resurrected and successfully implemented.

Part 4: Recognition of the Need for Physician-Directed Nutrition Practice

New models for nutrition teams that focus on value added must be investigated (20). Individual physicians and institutions have concerns that must be addressed since currently, endocrinology trainees and practicing endocrinologists are discouraged from developing a hospital nutrition practice. Current physician concerns include lack of a recognized medical team model to base a practice, practicing outside of the usual path of clinical endocrinologists, and significant coding and reimbursement issues (21). Institutions are understandably focused on the bottom line. Many do not recognize or support a clinical nutrition program as they look only at direct costs, rather than an economic model of cost avoidance related to appropriate use of nutrition support and downstream benefits, such as quality of life or clinical outcomes.

AACE proposes to develop strategies to optimize coding and reimbursement for nutrition practice, to define the value added by physician oversight, and to explore and propose new models for physician-directed practice in ambulatory and hospital settings.

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