Nutrition Curriculum Guide for Training Physician
Practice Behavior Skills and Attitudes Across the Curriculum

NUTRITION ACADEMIC AWARD PROGRAM
Advancing nutrition, medical education, and clinical practice

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Preface/User's Guide

The purpose of this preface is to serve as both a brief introduction to this document and a User's Guide to assist readers in finding the information most useful to them.

Background and Introduction: In recognition of the need to develop and enhance undergraduate and graduate medical nutrition education, the National Heart Lung and Blood Institute (NHLBI) and the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) established the Nutrition Academic Award (NAA) Program in 1997 (www.nhlbi.nih.gov/funding/training/naa). The NAA Program provided 21 U.S. medical schools with five-year grants to support nutrition education programs for medical students, medical residents, and clinical faculty (Appendix). This *Nutrition Curriculum Guide for Training Physicians* represents the efforts of medical nutrition educators at these schools. The section topics were selected after reviewing the existing literature and curricula. Members of the NAA Curriculum Committee were then assigned the task of creating or reviewing first drafts of a given section.

Each section was written with four components: a brief list of content areas, consistent with previous curriculum recommendations for nutrition, and learning objectives written for knowledge, practice behavior skills, and attitudes. After each section was reviewed, the entire document was revised by Drs. Brian Tobin and Michael Smith at Mercer School of Medicine to ensure that the learning objectives used language consistent with Bloom's taxonomy and included objectives that represented each area of development of expertise (cognitive and problem-solving). At this point the objectives were submitted to a consensus-generating "Delphi" process with the assistance of Dr. Craig Scott, at the University of Washington School of Medicine.

Nutrition education spans the continuum for medical students, residents, and specialists and we have attempted to address this issue by listing objectives as appropriate for each of these levels. Learners at each level would be expected to have some degree of competency in those objectives listed for learners below their level. The Delphi process allowed us to prioritize objectives and we have done this by placing in **BOLD** type the items ranked in the top 1/3 of all objectives at each learner level. Objectives that follow are not in order of priority. Clearly, an individual programs' ability to accomplish these objectives depends upon many factors (educational priorities, resources, etc.).

This curriculum is designed to be used by medical educators and evaluators, curriculum committees, Deans offices, etc. to assist in creating, evaluating, modifying, and updating nutrition curricula at individual programs (medical schools, residency and fellowship training programs). We have organized the Chapters in a way that allows individual course leaders to rapidly identify those areas relevant to their course. Curriculum committees will be most interested in the global behavior and attitude

objectives listed first in this manual. These objectives were common themes across many of the individual sections.

The goal of any curriculum is to elucidate for teachers and learners the knowledge, practice behavior skills, and attitudes that are expected for competence and mastery. It also allows for specific evaluation strategies to be created. These objectives are already in use at many of the NAA schools to help define and refine teaching efforts. They have begun to appear in syllabi, chapter headings, lecture introductions, course summary guides, etc. Evaluation strategies have been (and will continue to be) developed to assist educators in assessing student's progress in meeting these objectives.

The National Board of Medical Examiners (NBME) who administers the USMLE Step 1, 2 and 3 exams has developed a nutrition sub-score for the Step 1 exam. The NBME has approved members of the NAA Program to review the Step 1, 2 and 3 exams in 2002 in order to assess the quantity and quality of the nutrition-related items. This process will also determine if it is appropriate to recommend a nutrition-subscore for the Step 2 and Step 3 exams. As schools modify their nutrition curriculum, they will be able to assess student progress through this mechanism.

Conclusion and Use of the Guide: On behalf of the entire NAA Curriculum Committee and Principal Investigators, we hope that the objectives in the *Nutrition Curriculum Guide for Training Physicians* will be as valuable a resource for our readers as we have found them to be in our teaching efforts. These objectives can be used by medical educators and evaluators involved in planning, implementing and evaluating nutrition curriculum across the continuum of medical education.

This effort represents a continuation of prior work in this field and is not intended to be the final work on this subject. This document will be revised as users provide feedback on it and as new medical information accumulates. A process for revising it has been created by the authors.

For a complete description of how the *Nutrition Curriculum Guide for Training Physicians* was developed, see Appendix 3.

Please visit the NAA Web site for additional nutrition education resources (www.nhlbi.nih.gov/funding/training/naa).

Lisa A. Hark, PhD, RD and Charles B. Eaton, MD
***and* Members of the Curriculum Committee**

Dedication

Elaine Stone, PhD, MPH served as the Project Officer for the Nutrition Academic Award during its first three years. Her support of awardees, enthusiasm for good nutrition, and commitment to professional education were essential to the creation of the Curriculum Guide. In recognition of her central role and contributions to the Nutrition Academic Award, we gratefully dedicate this *Nutrition Curriculum Guide for Training Physicians* to Elaine Stone, PhD, MPH.

A. Practice Behavior Skills and Attitudes Across the Curriculum

A.1 Practice Behavior Skills Across the Curriculum

A.2 Attitudes Across the Curriculum

A.1: Practice Behavior Skills Across the Curriculum

After training, the learner will be able to:

History
Take an appropriate patient medical history, including family, social, nutritional/dietary, physical activity, and weight histories; use of prescription medicines, over-the-counter medicines, dietary and herbal supplements; and consumption of alcohol and other recreational drugs.
Physical
Conduct an appropriate physical examination, including anthropometrics, evaluation of growth and development and signs of nutritional deficiency or excess.
Test Selection
Select and interpret the results of screening measures, laboratory tests, and diagnostic procedures appropriate to assess and manage a patient's nutrition.
Evaluation
Evaluate a patient's diet and current nutritional status based on the USDA Food Guide Pyramid. **Identify individuals who require medical nutritional therapy and lifestyle modification,.**
Integrate nutritional assessment information into an individualized nutritional management and physical activity plan for optimal health, risk factor reduction and common medical problems. .
Counseling
Effectively counsel patients to make informed nutritional decisions consistent with adopting and maintaining a healthy lifestyle and with establishing appropriate dietary, exercise and behavioral goals.
Effectively communicate with patients in a culturally competent manner to provide accurate nutritional information and dispel misinformation.
Employ effective counseling techniques matched to the patient's level of motivation and readiness for change, encouraging the use of goal setting, identification of barriers, problem solving, self-monitoring, self-reinforcement, and stimulus control.
Consultation and Referral
Consult with or refer to a registered dietitians or other credentialed healthcare professionals and refer to community nutrition resources as appropriate.

A.2: Attitudes Across the Curriculum

After training, the learner will be able to:

Attitude Objectives
Recognize that nutrition, physical activity, and health lifestyle behaviors can have direct, substantial, and long-term effects on growth and development, health maintenance, and disease prevention and treatment.
Demonstrate a commitment to interact with patients in a culturally competent manner that appropriately acknowledges the unique characteristics and nutritional needs of each individual.
Recognize how personal, environmental, and social factors interact and impact on eating behaviors and overall nutrition.
Demonstrate sensitivity to biomedical and nutritional changes as well as psychological, social, and ethical issued that affect patient care.
Recognize the importance of using a multi-disciplinary team approach in nutritional health care.
Recognize the importance of patient autonomy and shared decision making in the nutritional management of patients.
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Encourage physicians to serve as positive role model for patients regarding nutrition and healthly lifestyles.
Recognize the importance of attention to nutritional management to enhance a patient's quality of life
Encourage physicians to be involved in public health initiatives that promote community health regarding nutrition and physical activity

* Bold items were ranked in the top 1/3 of all objectives.

B. Overview and Nutrition Basics

* Bold items were ranked in the top 1/3 of all objectives.

B.1: Nutrition Principles

Content Areas
Fuels: Carbohydrates, proteins, and fats
Energy balance, body composition, body weight
Cholesterol and lipoprotein metabolism
Vitamins, minerals, and trace elements
Fiber: soluble and insoluble
Fluid and electrolyte balance
Food and nutrient deficiencies and excesses
Free radical injury
Food and nutrient requirements, recommendations and guidelines
Inborn errors of metabolism

After training, the learner will be able to:

Knowledge Objectives: Medical Students
Define a fuel; name the 3 classes of fuels in the human diet (carbohydrate, fat and protein). Distinguish among the classes according to their structural features and caloric content.
Outline the metabolic pathways involved in the generation of energy from fuel oxidation and explain how each pathway is regulated in response to cellular energy demand.
Describe crucial variation in the patterns of exogenous and endogenous fuel utilization among tissues.
Outline the metabolic pathways involved in fuel interconversion, fuel storage and fuel mobilization. Specify the tissues involved in synthesis and storage of fuels, and trace the pathway of transport among tissues.
Explain the concept of fuel homeostasis and use this concept to explain the changes of blood glucose, fatty acids and amino acid levels that occur in response to variations in timing, quantity, and type of dietary fuel intake and to variations in the intensity or duration of physical exercise.
Describe the role of individual hormones in regulating fuel homeostasis in response to variations of dietary and physiologic state; describe the specific mechanisms by which hormones regulate the individual metabolic pathways involved, including nutrient regulation of gene expression.
Define calorie, basal metabolic rate, respiratory quotient, and daily energy expenditure, and describe how these values are measured or calculated. Explain how each of these values is related to physical exercise, caloric balance, weight gain or loss, and the rate of fuel metabolism.
Describe the physiological mechanisms that relate hunger, satiety, and appetite to diet and physical exercise.
Define nitrogen balance and explain how it is affected by dietary intake and growth.
Describe the structural feature of each of the following lipids: cholesterol, fatty acids (including saturated, mono-, polyunsaturated, omega-6 and omega-3; short-, medium, long-chain; odd and uneven chain, essential fatty acids), and eicosanoids. Describe the mechanism of absorption and tissue distribution
Outline the pathways for synthesis and degradation of cholesterol, and explain the mechanisms that regulate these pathways in response to cholesterol intake, saturated fat, and other dietary components.

* Bold items were ranked in the top 1/3 of all objectives.

Distinguish among the classes of lipoproteins involved in cholesterol and lipid transport in the blood, and explain how different genetic and dietary factors influence lipoprotein concentrations and composition.
Name the vitamins and relate the essential structural features of each vitamin to its stability, lipid solubility, transport, coenzyme form, and role in metabolism.
Name the minerals required in the human diet, and explain how each is absorbed, transported, and stored and how its turnover is regulated. Distinguish among macrominerals, microminerals, and trace elements.
Describe the role of each required vitamin and mineral in molecular and systemic physiology.
Explain how a daily vitamin or mineral intake that is greater than or less than the DRI causes common clinical symptoms or pathology.
Distinguish between the two types of dietary fiber, and explain the potential contributions of fiber to health maintenance.
Describe the pathways of alcohol metabolism in the liver in well individuals compared to chronic alcoholics.
Define fluid and electrolyte balance and explain how they are maintained. Identify dietary components and common physiological or pathological conditions that create imbalances, and explain the consequences of these imbalances.
Identify the major oxygen free radicals and reactive oxygen species (ROS) generated in human cells and explain how they are generated; describe the primary ways they injure cells.
Describe the natural defense mechanisms present in cells to protect against ROS generation and injury.
Define Recommended Dietary Allowance (RDA), Dietary Reference Intake (DRI), Adequate Intake (AI), Estimated Average Requirement (EAR); and Upper Limit (UL); explain how these values are established for different age groups; and identify the population groups to which they apply.
Using the US Dietary Guidelines and the Food Pyramid, describe the general characteristics of a healthy diet, including the recommended contribution of various food groups, good common sources of individual nutrients, foods to be consumed in limited amounts, and the carbohydrate: fat: protein distribution.
Identify types of individuals, populations or communities at risk for specific or general dietary vitamin and mineral deficiencies or imbalances as a result of genetic, environmental, or socio-cultural influences.
Knowledge Objectives: Residents
Access the most accurate current general and disease-specific nutritional information and recommendations.
Describe the changes in nutritional requirements that occur with aging and development.
Predict the consequences of a real or hypothetical inherited or acquired metabolic abnormality or hormonal imbalance on fuel utilization, fuel homeostasis, BMR and/or caloric balance.
Evaluate the quality of nutritional information provided in lay and medical literature.
Knowledge Objectives: Specialists
Name the dietary essential amino acids. Outline the pathways for the synthesis of nonessential amino acids and identify the tissues involved. Summarize the major physiologic roles and metabolic fates of each amino acid.
Explain the role of the free amino acid pool in the blood as a dynamic reservoir; describe the relationship of this pool of amino acids to protein turnover and to changes of dietary state, physiological state, infective stress and disease, development and pregnancy.
Given a particular dietary pattern or deficiency, predict its effect on the immune response.

* Bold items were ranked in the top 1/3 of all objectives.

Identify dietary components that affect the generation of ROS or the extent of free radical injury and explain the mechanism involved.
Identify the genetic, behavioral, socio-cultural, nutritional, and environmental factors that might influence hunger, satiety, eating behavior, and food choices of an individual.
Given a specific inborn error of metabolism, explain how the diet should be adjusted to accommodate the resultant changes of metabolite concentrations.
Practice Behavior Skills: Medical Students
Translate basic science information into clinically relevant principles that guide medical decision-making.
Practice Behavior Skills: Residents
Translate medical literature into lay terminology that could be used for counseling patients.
Attitudes: All Learners
Acknowledge that effective patient management requires an understanding of basic nutrition science principles/

* Bold items were ranked in the top 1/3 of all objectives.

B.2: Community and Population Health

Content Areas
Population-based disease prevention and health promotion
Epidemiological measures and tools
Community health assessment
Interaction of nutrition with lifestyle, environment, biology, and health care system
Food insecurity

After training, the learner will be able to:

Knowledge Objectives: Medical Students
Summarize the Dietary Guidelines for Americans and explain how they are important in patient care.
Describe the role of nutrition in health promotion and disease prevention, particularly as related to chronic diseases.
Identify the prevalence of individuals who are overweight, obese, or malnourished in the U.S.
List the food categories in the Food Guide Pyramid and the recommended number of servings in each.
Knowledge Objectives: Residents
Explain the interactions among lifestyle, environment, biology, and the health care system in the development of nutrition-related chronic diseases.
Compare and contrast the Dietary Guidelines for Americans with the nutrition guidelines promulgated by the American Heart Association and the American Cancer Society.
List at least four community agencies that commonly provide nutrition-related resources and describe the types of information and services that they provide.
Describe at least four food-borne illnesses, and outline the process of reporting and investigating outbreaks of these illnesses.
Knowledge Objectives: Specialists
Outline contemporary public health strategies aimed at reducing the burden of disease in the United States through nutrition education.
Define the basic measures and tools of epidemiology that are utilized in the identification, interpretation, and monitoring of diets and nutrition
Identify and summarize at least one nutrition-related example of the different types of epidemiological studies (e.g. case control, cohort, randomized intervention trial).
Outline the framework and processes required to conduct a comprehensive assessment of a community's health and nutrition needs.
Describe the *Healthy People 2010* Initiative, and summarize the nutrition-related objectives.
Describe the levels at which diet can be influenced (individual, family/household, organization, community setting, environmental, and public policy).
Distinguish among primary, secondary, and tertiary levels of prevention by giving the definition of each and nutrition-related examples of each.
Practice Behavioral Skills: Medical Students
Given a 24-hour dietary recall, assess the status of a patient's diet using the Food Guide Pyramid and Dietary Guidelines for Americans.

* Bold items were ranked in the top 1/3 of all objectives.

Provide nutritional counseling and dietary recommendations that appropriately take into account the patient's health status, the Food Guide Pyramid, and Dietary Guidelines for Americans.
Practice Behavioral Skills: Residents
Provide effective preventive nutrition counseling appropriate for any well or diseased individual.
Refer patients to community nutrition agencies, resources, and services as appropriate.
Practice Behavioral Skills: Specialists
Conduct a comprehensive community needs assessment that includes the following components: • Identification of ethnic, social, and cultural issues relating to the nutritional health and preventive medicine needs of the population; • Translation of epidemiological findings into specific interventions for the community; • Assessment of the nutritional status of the community and specific groups in that community; • Analysis of the morbidity and mortality trends of the community; • Design and evaluation of nutrition/preventive-oriented interventions targeted at reducing and eliminating community-based risk factors; and • Identification of the types and extent of community resources related to nutrition, disease prevention and health promotion that may complement individualized clinical care.
Access and evaluate a variety of print and electronic data sources used to assess the diets of community populations, and provide appropriate nutrition-related counseling based on this information.
Interact sensitively, effectively, and professionally with persons from diverse cultural, socioeconomic, educational, and professional backgrounds.
Attitude Objectives: All Learners
Recognize the importance of nutrition and community nutrition services in health promotion, disease prevention, and disease management.
Demonstrate a personal commitment to the importance of prevention in health care.
Exhibit a non-judgmental demeanor and sensitivity toward patients, families, and community members.

* Bold items were ranked in the top 1/3 of all objectives.

B.3: Behavioral Principles

Content Areas
Social and cultural determinants of eating behavior
Barriers to dietary change
Behavioral theory in nutritional counseling
Behavioral counseling
Lifestyle modification
Efficacy of behavioral treatments

After training, the learner will be able to:

Knowledge Objectives: Medical Students
List at least three common barriers to dietary change, and identify effective strategies for overcoming these barriers.
Describe common social, ethnic, cultural, and societal factors that contribute to the prevalence of nutritional problems and should be considered in their management.
Explain how to apply the Brief Counseling Model in the context of patient nutrition management.
Knowledge Objectives: Specialists
Compare and contrast the efficacy of the three most commonly employed behavioral approaches to nutrition counseling.
Practice Behavior Skills: Medical Students
Effectively counsel patients, employing behavior theory principles and specific effective counseling techniques including: goal setting, barrier identification, problem solving, and relapse prevention techniques, including self-monitoring, self-reinforcement, and stimulus control.
Practice Behavior Skills: Residents
Assess a patient's readiness for change and match the counseling intervention to the patient's current stage in the continuum of change.
Effectively counsel patients to set realistic nutritional goals and timelines for behavioral change.
Attitude Objectives: All Learners
Demonstrate a belief in his/her ability effectively to promote patient behavior change.
Recognize the preeminence of the patient's taking responsibility for his/her own nutritional health.
Recognize the importance of enabling patients to believe in their ability to change current behavior patterns.
Demonstrate a commitment to promote behavior change through establishing the best possible physician-patient relationship.

* Bold items were ranked in the top 1/3 of all objectives.

B.4: Nutrition Assessment

Content Areas
Overweight and obesity
Malnutrition
Diet history
Family, medical, and social histories
Review of systems
Physical examination
Functional status
Subjective global assessment
Laboratory data
Energy expenditure

After training, the learner will be able to:

Knowledge Objectives: Medical Students
Describe the metabolic and medical consequences of varying degrees of over- and under-nutrition.
Compare and contrast the "ABCD's" (anthropometric, biochemical, clinical, and dietary intake measures) of nutrition assessment.
Describe the impact of the altered nutritional status associated with five common acute and five common chronic diseases.
List the laboratory measurements commonly used to assess the nutritional status of patients.
Describe the food pyramid, explain how it could be used as a nutrition assessment tool, and give functional definitions of portion size in each category of the pyramid.
Outline a laboratory profile indicative of malnutrition, protein-energy malnutrition, iron deficiency anemia, or megaloblastic anemia.
Identify the likely physical examination findings associated with over- and under-nutrition and vitamin/mineral deficiencies or toxicities.
Knowledge Objectives: Residents
Compare and contrast use of Body Mass Index (BMI), waist circumference, skin fold thickness, mid-arm muscle circumference, and waist-hip ratio, and explain the usefulness of these measures in the clinical setting.
Knowledge Objectives: Specialists
Compare and contrast the utility, validity, and reliability of at least three commonly used dietary screening/assessment methods.
Summarize the American Dietetic Associations (ADA) recognized functions of a registered dietitian.

* Bold items were ranked in the top 1/3 of all objectives.

Practice Behavior Skills: Medical Students
Take an appropriate patient medical history of a standardized patient, including dietary and social histories.
Given height and weight, calculate the BMI, and interpret the BMI according to published NIH guidelines.
Practice Behavior Skills: Residents
Conduct an appropriate nutritional assessment on all ambulatory and hospitalized patients, including those with acute or chronic disease as well as healthy individuals of all ages.
Conduct an appropriate physical examination in a patient of any age, including anthropometrics; select appropriate laboratory tests and procedures to diagnose and treat nutritional conditions such as over- and under-nutrition in hospitalized and ambulatory patients. Identify appropriate nutritional therapies.
Effectively counsel patients about their nutrition, providing recommendations matched to the patient's age, sex, family history, chronic conditions, activity level, family, culture, and ethnicity.
Seek consultation with and refer patients to a registered dietitian or other credentialed nutrition professionals as appropriate.
Attitude Objectives: All Learners
Recognize the value of nutritional assessment in the comprehensive care of ambulatory and hospitalized patients.
Recognize the importance of nutrition in health maintenance, disease prevention, and management.
Demonstrate a commitment to utilizing a multidisciplinary approach to screening, assessing, and counseling individuals at nutritional risk.

* Bold items were ranked in the top 1/3 of all objectives.

B.5: Physical Activity

Content Areas

Energy expenditure, energy transfer
Body composition
Physiologic adaptation to physical activity
Risks and benefits of physical activity
Physical activity guidelines and recommendations throughout the lifecycle
Pre-participation screening and risk stratification
Social, behavioral, and attitudinal factors

After training, the learner will be able to:

Knowledge Objectives: Medical Students
Describe the beneficial effects of physical activity and the detrimental effects of inactivity on the cardiovascular, musculoskeletal, pulmonary, neurological systems.
Identify the relative contribution of basal and resting metabolism, dietary thermogenic influences, and physical activity to the total daily energy expenditure (TDEE). Differentiate between moderate and vigorous activity; classify various physical activities by their energy expenditure rates.
List the four compartments of the body used to determine body composition. Identify different regional patterns of adipose tissue deposition and the influence of caloric intake on body fat.
Describe the cardiovascular and metabolic responses to short-term and long-term physical activity.
Explain how varying levels of physical activity influence an individual's nutritional requirements.
Knowledge Objectives: Residents
For patients at any age, identify the appropriate type, intensity, quantity, frequency, and duration of physical activity as influenced by the energy balance requirements.
Classify individuals according to standardized levels of physical activity and physical fitness. List four measures commonly used to assess a patient's level of physical activity and physical fitness.
Knowledge Objectives: Specialists
Describe how differences in total skeletal muscle mass, total adiposity, and regional adiposity patterns can influence selected components of the total energy expenditure (TEE) and caloric balance. Explain how physical activity affects body composition and how body composition in turn affects health (e.g., insulin resistance, hyperlipidemia, atherosclerosis).
Summarize the 2000 American College of Sports Medicine (ACSM) Exercise Testing and Prescription Guidelines for pre-participation health screening and risk stratification for preventive and rehabilitative exercise programs.

* Bold items were ranked in the top 1/3 of all objectives.

Practice Behavior Skills: Medical Students
Conduct an appropriate exercise history.
Practice Behavior Skills: Residents
Given a detailed medical history that includes a physical activity assessment, prescribe an appropriate regimen of diet and exercise for patients at varying levels of risk for cardiovascular disease (CVD).
Effectively counsel an individual to adopt and maintain a level of physical activity consistent with the 1999 Patient-Centered Assessment and Counseling for Exercise and Nutrition (PACE) guidelines.
Evaluate an individual's physical activity and physical fitness levels using the ASCM's Guidelines for Exercise Testing and Prescriptions (2000).
Practice Behavior Skills: Specialist
Given a detailed medical history for an individual that includes an eating disorder, heavy exercise, amenorrhea, and/or fad diet/nutritional supplement use, prescribe an appropriate regimen of diet and physical activity.
Attitude Objectives: All Learners
Recognize that physicians can have a substantial positive impact on an individual's level of physical activity.
Demonstrate a personal commitment to evaluate the physical activity needs of all patients and promote adequate levels of exercise to prevent disease and promote physical and mental health.
Demonstrate a commitment to discourage sedentary lifestyles in patients as well as to encourage simple physical activity (e.g., walking, gardening) for patients who are not compliant or for whom vigorous activity is inappropriate.
Demonstrate a personal commitment to serve as a positive role model for patients by maintaining a healthy personal lifestyle.

* Bold items were ranked in the top 1/3 of all objectives.

C. Lifespan

C.1 Pediatrics

C.2 Young Adulthood/Middle Age

C.3 Geriatrics

C.4 Women's Health

* Bold items were ranked in the top 1/3 of all objectives.

C.1: Pediatrics

Content Areas
Premature infants, infants, toddlers, children and adolescents
Growth and development
Breast feeding versus formula feeding
Introduction to solid foods
Food preferences and feeding problems
Vitamin and mineral requirements/deficiencies and recommendations
Failure to thrive, malnutrition
Iron deficiency anemia
Dental caries
Overweight and obesity
Eating disorders (anorexia and bulimia)
Special nutrition programs for children
Prevention and lifestyle modification
Physical activity

After training, the learner will be able to

Knowledge Objectives: Medical Students
Identify the nutritional, metabolic, immunologic, social, economic, and long-term health benefits of breast-feeding.
Describe at least one nutritional intervention effective for preventing each of the following pediatric diseases: dental caries, obesity, type 2 diabetes, and cardiovascular disease.
Summarize the short-term and long-term impacts of malnutrition on the physical and cognitive development of infants, children, and adolescents.
Summarize the recommendations for healthy nutrition of infants, children, and adolescents by age, gender, and activity level as proposed by relevant medical societies and governmental agencies.
Compare and contrast the complete nutritional needs of adolescents of varying levels of physical activity, particularly teens engaged in vigorous sports.
Knowledge Objectives: Residents
Compare and contrast the complete nutritional needs of well infants, children, and adolescents with those who have celiac disease, food allergies, type 1 diabetes, inflammatory bowel disease, or cystic fibrosis.
Compare and contrast the energy, protein, and mineral needs of premature, low-birth weight, and normal-birth weight infants.
Differentiate between anorexia and bulimia as to etiology, signs, symptoms, and nutritional treatment.

* Bold items were ranked in the top 1/3 of all objectives.

Practice Behavior Skills: Medical Students
Take an appropriate pediatric medical history, including growth parameters, dietary intake, level of physical activity, and family/social history.
Conduct a pediatric physical examination, including anthropometrics and evaluate the child for normal development and signs of nutritional deficiency or excess.
Evaluate the length/height, weight, head circumference, and Body Mass Index (BMI) of an infant, child, or adolescent over time against the appropriate growth charts published by the US Centers for Disease Control and Prevention (CDC).
Practice Behavior Skills: Residents
Given a detailed pediatric diet and medical history, evaluate the appropriateness of the child's diet and propose a diet consistent with maintaining health.
Select laboratory tests and diagnostic procedures appropriate to assess, support, and manage the nutrition of infants, children, and adolescents.
Effectively counsel families with children to develop and maintain healthy eating habits.
Refer families to the Women, Infants, and Children (WIC) Program or other pediatric nutrition counseling interventions to support the nutritional needs of their infants and children as appropriate.
Attitude Objectives: All Learners
Actively support the mother who chooses breast-feeding and refer the mother to support programs and lactation consultants as appropriate.
Recognize the need to attend to the unique behavioral, psychosocial, and developmental characteristics of children and adolescents in the design of nutritional interventions for these patients.
Demonstrate a commitment to utilizing a multi-disciplinary team approach to managing the nutrition of infants, children, and adolescents as appropriate.
Recognize that childhood nutrition can have both short-term and long-term, and sometimes irreversible, effects.
Demonstrate a commitment to encourage adolescents to adopt a pattern of appropriate lifelong physical activity.
Show sensitivity to the unique power of social influences on children and adolescents and to their special nutritional needs.
Recognize the need to take the family context into account when managing the nutrition of children and adolescents.

* Bold items were ranked in the top 1/3 of all objectives.

C.2: Young Adulthood/Middle Age

Content Areas
Food preparation
Vitamin and mineral requirements/deficiencies and recommendations
Preconception nutrition counseling
Nutrition counseling for the active adult
Nutritional effects of smoking and alcohol use
Prevention and lifestyle modification
Physical activity

After training, the learner will be able to

Knowledge Objectives: Medical Students
Identify at least four chronic diseases common to young and middle-aged adults, and identify at least one effective nutritional modification used to prevent and/or treat each.
Explain the metabolic and morphologic changes involved in growth and development during the transition from adolescence to adulthood.
Summarize the current US Dietary Guidelines and the USDA Food Guide Pyramid.
Cite the prevalence of alcohol and tobacco use among young adults, and describe the most common nutritional effects of tobacco and excessive alcohol use.
Compare and contrast the components of the Dietary Reference Intake (DRI), including Recommended Dietary Allowance (RDA), Adequate Intake (AI), and Upper Limit (UL); describe the appropriate use for each.
Knowledge Objectives: Residents
Identify the prevalence of eating disorders by age and gender. Identify at least four special populations (e.g., wrestlers and models) at high risk for eating disorders.
Knowledge Objectives: Specialists
Summarize the published nutritional recommendations for adults who engage in differing levels of physical activity according to the various governmental/professional medical/nutrition organizations.
Practice Behavior Skills: Medical Students
Take an appropriate medical and dietary history of a healthy young adult; evaluate the patient's nutritional status and identify any nutritional concerns.
Take a 24-hour diet recall history, assessing the appropriateness of food intake using the USDA Food Guide Pyramid and the US Dietary Guidelines.
Effectively demonstrate how to interpret a food label to a young or middle-aged patient.

* Bold items were ranked in the top 1/3 of all objectives.

Practice Behavior Skills: Residents
Effectively counsel young adult and middle-aged patients to make informed nutritional decisions consistent with maintaining a healthy lifestyle and preventing disease, establishing appropriate dietary, physical activity, and behavioral goals and adopting strategies to achieve and maintain these goals.
Given a medical history including a 24-hour dietary recall, evaluate the nutritional status of a woman of childbearing age, determine the potential risk to a fetus should conception occur, and provide appropriate nutritional recommendations.
Based on an accurate assessment of the physician's own knowledge and limitations, seek consultation with and refer young adult and middle-aged patients to a registered dietician other credentialed nutrition professionals as appropriate.
Provide effective individualized nutrition counseling to young adult and middle-aged patients, taking into account level of physical activity, dietary intake patterns, and general health status.
Interact sensitively, effectively, and professionally with persons from diverse cultural, socioeconomic, educational, and professional backgrounds.
Attitude Objectives: All Learners
Recognize that the influences of society during young adulthood (busy schedules, eating restaurant foods, etc.) have nutritional implications and may make optimum nutritional choices difficult.
Demonstrate a commitment to answer patients' nutrition-related questions and counsel young and middle-aged adults about the impact that daily nutritional choices can have on their long-term health and/or the health of their unborn children.
Recognize the importance of sound nutritional choices for both healthy and ill individuals.

* Bold items were ranked in the top 1/3 of all objectives.

C.3: Geriatrics

Content Areas

Physiologic changes in nutrient metabolism and absorption associated with aging
Alterations in nutrient requirements with aging
Functional status
Vitamin and mineral requirements deficiencies and recommendations
DETERMINE Your Nutrition Health Checklist
Subjective Global Assessment
Chronic diseases
Malnutrition
Obesity and overweight
Osteoporosis
Prevention and lifestyle modification
Physical activity
Medical nutrition therapy

After training, the learner will be able to

Knowledge Objectives: Medical Students
Describe the physiologic changes associated with aging and the effects of these changes on nutrient requirements, absorption, and metabolism.
Identify five common risk factors for poor nutritional status in older individuals.
List five pathophysiological conditions common among older individuals that affect nutritional status.
Describe the effects of malnutrition on physiologic function in geriatric patients.
Describe how the process of aging alters the nutritional needs and the functioning of the gastrointestinal tract of older individuals, especially the absorption of essential vitamins.
Knowledge Objectives: Residents
Compare and contrast pharmacological and non-pharmacological approaches to managing high blood pressure and diabetes in older patients.
Given any one of the four most common aging-related nutritional conditions, describe the appropriate nutrition management options.
Cite the prevalence of hunger and food insecurity among older individuals, and identify three locally available food programs that service this population.
Outline a typical medical, social, economic, psychological profile of an older patient with one of the four most common aging-related nutritional conditions.
Practice Behavior Skills: Medical Students
Take a thorough medical history and an assessment of functional status of an older patient, including alcohol use, abuse, and dependence.
Conduct a physical examination of an apparently healthy geriatric patient, employing instruments such as the “Mini Nutritional Assessment” (MNA), the “Subjective Global Assessment” (SGA), and the DETERMINE Your Nutritional Health Checklist.

* Bold items were ranked in the top 1/3 of all objectives.

Practice Behavior Skills: Residents
Given an elderly patient's medical and dietary history and functional status, physical examination, laboratory assays and other diagnostic tests, recognize extant malnutrition, and plan an appropriate nutrition and exercise intervention.
Given an older patient with a nutrition-related health problem, seek consultation with and refer patients to healthcare professionals as appropriate.
Propose, monitor, and revise as necessary an appropriate plan of treatment for a geriatric patient with a nutritional deficiency.
Compare and contrast the utility of a food-first approach to maintaining geriatric health and treating disease vs. the use of nutritional supplements and vitamin/mineral formulas.
Attitude Objectives: All Learners
Provide nutritional counseling that is sensitive to the physiologic, emotional, social, and monetary changes that occur with aging.
Demonstrate a commitment to identify malnutrition in older patients and to prescribe appropriate nutrition support.
Demonstrate a commitment to inquire about the nutritional health of older patients.

* Bold items were ranked in the top 1/3 of all objectives.

C.4: Women's Health

Content Areas

Lifespan: pediatrics, adulthood, and geriatrics
Pregnancy, lactation, menopause
Immunology and breastfeeding
Vitamin and mineral requirements and recommendations
Bone health
Gender differences in common nutrition related diseases
Effects of diabetes
Gastrointestinal effects of female hormones
Complementary and alternative therapies
Prevention and lifestyle modification
Physical activity

After training, the learner will be able to:

Knowledge Objectives: Medical Students
Identify at least three common high-risk eating patterns (e.g., low calcium intake) that may negatively impact the growth and development of pediatric and adolescent females.
Describe the potential metabolic, immunologic, social, economic, and health benefits of breast-feeding.
Cite the current nutritional recommendations for adolescents and adult women during preconception, pregnancy, and lactation. Identify at least four types of foods or supplements that should be included or avoided in the diet during this period.
Describe how to assess the nutritional status of adolescent and adult women during preconception, pregnancy (including multiple gestation), post-partum, and lactation.
Summarize the physiological and biochemical changes that occur during and after menopause, and describe the nutrition effects of these changes.
Compare and contrast the patterns of body fat distribution and weight gain in males and females.
Differentiate between anorexia and bulimia as to etiology, signs, symptoms, effects on menstrual function and nutritional treatment.
Cite the prevalence of overweight and obese individuals and those with eating disorders in the U.S. by age, gender, and ethnicity.
Identify six nutrient and immunologic components of human breast milk, and describe the immune benefits to the breast-fed child.
Compare and contrast effective nutritional regimens for the prevention of chronic diseases in men vs. women.
Knowledge Objectives: Residents
Identify at least five medical conditions common to women that may increase medical and/or nutritional risk during pregnancy, and describe at least one intervention to effectively address the nutritional effects of each condition.
Summarize the health effects of oral and implant contraceptives, including their effects on lipid levels, body weight, and the risk of heart disease.
Summarize the American Diabetes Association (ADA) criteria used to diagnose type 1, type 2, and gestational diabetes, and outline the ADA principles for treating diabetes during pregnancy.
Summarize the dietary and endocrine effects of common strategies for the prevention and treatment of breast, cervical, endometrial, and uterine cancer.

* Bold items were ranked in the top 1/3 of all objectives.

Explain how energy balance and obesity are related to breast cancer development and reoccurrence.
Compare and contrast the physiological and biochemical changes that occur during pregnancy including multiple gestation, post-partum, and lactation for adolescents vs. adult women.
Compare and contrast the prevalence of the most common macronutrient and exercise-related anemias for men vs. women.
Knowledge Objectives: Specialists
Identify the effects of endocrine changes during pregnancy, lactation, and menopause on gastrointestinal function; describe the effects of hormone replacement on nutrient digestion and absorption.
Compare and contrast the incidence, etiology, and morbidity in men vs. women with rheumatic disease, and describe effective dietary interventions for these patients.
Practice Behavior Skills: Medical Students
Take an appropriate medical history and assess the nutritional status of an adolescent female or a pregnant and/or lactating woman, including family, social, nutritional/dietary, physical activity, and weight histories; use of prescription medicines, over-the-counter medicines and dietary supplements; and consumption of alcohol and other recreational drugs.
Given the pre-pregnancy height and weight, calculate a patient's Body Mass Index (BMI) and identify appropriate weight gain goals for normal-weight, underweight, and overweight pregnant women.
Given a detailed medical, obstetric, dietary, and social history of a female of any age and weight, evaluate the patient's risk of developing chronic disease.
Perform an appropriate history and physical examination of an overweight or obese female child, adolescent, or adult, and accurately assess her nutritional status.
Practice Behavior Skills: Residents
Effectively counsel female patients of any age and weight to make informed nutritional decisions consistent with maintaining a healthy lifestyle, establishing appropriate dietary and behavioral goals, and adopting strategies to achieve and maintain these goals.
Attitude Objectives: All Learners
Maintain due vigilance to recognize any early signs and symptoms of eating disorders in females.
Actively support women who choose to breast-feed.
Demonstrate a commitment to consider a diagnosis of cardiovascular disease in both men and women equally.
Demonstrate a commitment to counsel women of all ages about the impact of daily nutritional choices on their long-term health and/or the health of their unborn children.
Recognize the right of a pregnant woman to decide whether or not to breast-feed her infant.
Demonstrate a sensitivity to the unique physiological and behavioral characteristics of each female in your medical practice.

* Bold items were ranked in the top 1/3 of all objectives.

D.1: Hyperlipidemia/Atherosclerosis

Content Areas
Cholesterol
Lipoproteins
Hyperlipidemia
Metabolic Syndrome
Dietary fatty acids
Antioxidants
Vitamin and methionine influences on homocyst(e)ine levels
Fiber: soluble and insoluble
Complex carbohydrate
Alcohol
Plant sterols and stanol ester
Sodium
National Cholesterol Education Program and American Heart Association dietary guidelines
Prevention and lifestyle modification
Physicial activity
Medical nutrition therapy

After training, the learner will be able to:

Knowledge Objectives: Medical Students
Describe how fatty acids and cholesterol are absorbed in the intestine and how the body controls cholesterol absorption, including the role of the ABC protein.
Outline the pathways of cholesterol and triglyceride transport between tissues and identify sites of regulation that influence VLDL, LDL, and HDL levels.
Describe the role of the three major lipoprotein classes in atherogenesis.
Identify the effects of saturated, monounsaturated and polyunsaturated fatty acids on plasma LDL and cholesterol levels.
Identify at least three common foods that are high in cholesterol, saturated, monounsaturated and polyunsaturated fatty acids.
Compare and contrast the structure of saturated fatty acids and trans fatty acids and their differential effects on atherogenesis.
Identify at least three common foods high in *n*-3 fatty acids.
Evaluate the utility of lowering homocyst(e)ine levels to prevent atherosclerosis.
Outline homocyst(e)ine metabolism and the roles of folate, B_6 and B_{12}.
List at least two common foods high in folate, B_6, B_{12}, or methionine.
Distinguish between soluble and insoluble fiber.
Identify at least three common foods that are high in soluble and insoluble fiber.
Describe the effects of soluble and insoluble fiber on LDL and triglyceride levels.
Identify the effects of soluble and insoluble fiber on the absorption of bile acids and simple sugars.
Compare and contrast the effects of complex carbohydrates and simple sugars on plasma glucose and triglyceride levels.
Identify at least five common foods that are high in complex carbohydrates.

Items in this section are placed in sequential order according to topic rather than rank.

* Bold items were ranked in the top 1/3 of all objectives.

Describe the effect of the level of alcohol consumption on VLDL and HDL in normal and hypertriglyceridemic persons and any subsequent effect on atherosclerosis.
Describe how plant sterols and stanols influence cholesterol absorption and LDL levels.
Identify at least three common foods that are high in dietary sodium, calcium, and potassium.
Identify NCEP ATP-III criteria defining the metabolic syndrome.
Explain how weight loss affects LDL and HDL levels, insulin resistance, abdominal obesity, glucose intolerance, hypertriglyceridemia, and the risk of diabetes.
Summarize the Therapeutic Lifestyle Change (TLC) diet recommendation of the National Cholesterol Education Program (NCEP). Compare the TLC Diet with diets advocating extremely low or high fat intakes and the expected effects on levels of the major classes of lipoproteins.
Knowledge Objectives: Residents
Evaluate the utility of lowering homocyst(e)ine levels to prevent atherosclerosis.
Provide at least two examples of individual genetic variations affecting the efficacy of the nutritional management of cardiovascular disease.
Describe the gender-related differences in energy balance, diet-associated lipoprotein levels, and the incidence of CVD.
Describe the controversy surrounding the use of antioxidant vitamin supplements/foods to prevent CVD.
Knowledge Objectives: Specialists
Explain the effects of the metabolic pathways from N-6 and N-3 fatty acids to prostaglandins on vascular reactivity and platelet aggregation.
Explain the effects of N-3 fatty acids on plasma triglyceride levels and cardiac electrical conduction.
Describe the effects of altering dietary folate, B_6, B_{12}, or methionine on homocyst(e)ine levels and CVD risk.
Describe at least five dietary intervention clinical trials and five observational studies that demonstrated a reduction in the incidence of CVD, and identify the specific dietary constituents associated with cardiovascular health in each study.
Estimate and justify with scientific evidence the total quantitative benefit achievable from combining at least five diet and exercise modifications in the prevention of cardiovascular disease.
Describe the controversy regarding the vascular benefit of adding antioxidant vitamins and foods to the diet.
Take a comprehensive patient medical history, and identify any risk factors and symptoms of cardiovascular disease present.
Take an appropriate nutrition history to determine the intake of saturated fat, cholesterol, sodium, soluble fiber, fruits, vegetables, complex carbohydrates, alcohol and vitamin, mineral and herbal supplements.
Conduct a focused physical examination that includes assessment of abdominal obesity estimated by waist circumference and accumulation of cholesterol in the skin, tendons, and eyes.
Given a patient's medical history, select appropriate lipid laboratory tests to estimate CHD risk using the NCEP ATP III Guidelines.
Distinguish between normal and abnormal serum concentrations of total cholesterol, LDL cholesterol, HDL cholesterol, and triglycerides using NCEP ATP-III criteria.

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Assess a patient's risk using the Framingham Risk Assessment Tool for Estimating 10-year Risk of Developing CHD.
Given a patient's medical history and the results of appropriate lipid laboratory tests, propose an optimal set of goals for nutritional risk factor reduction using the NCEP and AHA guidelines for nutrition and exercise.
Recognize the cumulative significance of appropriate dietary fats and maintaining a diet in the prevention of CVD.
Demonstrate a commitment to promoting dietary and lifestyle modifications that can diminish the risk of cardiovascular disease.
Recognize the value of a cardiovascular disease prevention diet for nutritional health in general, including maintaining normal body weight.
Demonstrate a personal commitment to serve as a positive role model for patients by maintaining a healthy diet and active lifestyle consistent with reducing CVD risk.
Encourage fellow physicians to refer patients with CVD or CVD risk to registered dietitians or other credentialed healthcare professionals as appropriate to assist with medical nutrition therapy goals.

Food examples for some of knowledge objectives
Foods high in Cholesterol: egg yolks, shrimp, liver, kidney Saturated fat: Palm oil, coconut oil, whole milk and cheese, fatty red meat Monounsaturated fat: olive oil, avocado, canola oil, nuts Polyunsaturated fat: safflower oil, corn oil, soybean oil, sunflower oil N-3 fatty acids: salmon, herring, halibut, flax seed, nuts Folate: brewers yeast, orange juice, liver, legumes, leafy vegetables, fortified grain products Vitamin B_6: Meat, poultry, fish, green leafy vegetables, whole grains, legumes Vitamin B_{12}: Meat, poultry, fish, eggs, dairy products Methionine: whole grains, sesame seeds, sunflower seeds, brewer's yeast Sodium: canned, frozen and dehydrated foods, chips, restaurant food Potassium: Fruits and vegetables, milk, potatoes Calcium: dairy products, calcium-fortified foods (e.g. orange juice, cereals)
Examples of genetic variations/control of cholesterol levels:
2 examples Apo E4: raises LDL Apo A-IV polymorphisms: may reduce response to dietary cholesterol

Items in this section are placed in sequential order according to topic rather than rank.

* Bold items were ranked in the top 1/3 of all objectives.

D.2: Hypertension

Content Areas
Insulin resistance syndrome
Sodium
Potassium
Calcium
Magnesium
Alcohol
Prevention and lifestyle modification
Physical activity
Dietary Approaches to Stop Hypertension (DASH) Diet
Medical nutrition therapy

After training, the learner will be able to:

Knowledge Objectives: Medical Students
Explain the effects of abdominal obesity, insulin resistance, lack of physical activity, high sodium intake, and high alcohol consumption on blood pressure control in both hypertensive and non-hypertensive individuals; explain possible mechanisms for each effect.
Summarize the recommendations of the DASH-sodium diet.
Describe the metabolic and pathophysiologic consequences of hypertension including cardiovascular, cerebrovascular, and peripheral vascular disease. Identify those forms of hypertension that are responsive to nutritional management.
Explain how high intake of sodium and low intake of calcium, potassium, and magnesium affect the control of blood pressure in normal and hypertensive individuals.
List at least five common foods that contain large amounts of each of the following: sodium, calcium, potassium, and magnesium.
Knowledge Objectives: Residents
Summarize the scientific evidence evaluating the effectiveness of the DASH-sodium diet, and describe when it should be prescribed.
Compare and contrast the DASH-sodium diet with the National Cholesterol Education Program (NCEP) Therapeutic Lifestyle Changes (TLC) Diet.
Practice Behavior Skills: Medical Students
Take an appropriate medical history that includes family history of hypertension; duration of hypertension; recent weight change; sequelae of co-morbid conditions including cardiovascular, cerebrovascular, and renal diseases; and use of prescribed and over-the-counter medications and nutritional supplements.
Based on the current Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 6), differentiate between patients who, in addition to lifestyle modification, require medication and/or dietary modification for the control of blood pressure.
Take an appropriate social and dietary history, including an assessment of the patient's diet, exercise patterns, and weekly alcohol consumption, and identify areas of concern.

* Bold items were ranked in the top 1/3 of all objectives.

Practice Behavior Skills: Residents
Provide effective individualized dietary counseling for hypertensive patients, focusing on body weight, energy balance, and dietary intake of fruits, vegetables, sodium, potassium, calcium, magnesium, and total and saturated fat.
Consult with a registered dietitian as appropriate to prioritize dietary guidelines and lifestyle changes for hypertensive patients with or without other common chronic diseases.
Clearly explain to a patient what the DASH-sodium diet is and how it works; effectively support the patient who adopts the DASH-sodium diet.
Attitudes Objectives: All Learners
Recognize the value of a healthy diet and lifestyle in the prevention and treatment of patients with hypertension.
Demonstrate a commitment to utilize a multi-disciplinary team approach in medical care, seeking consultation with and referring patients to registered dietitians and other credentialed healthcare professionals as appropriate.

* Bold items were ranked in the top 1/3 of all objectives.

D.3: Heart Failure and Cardiomyopathy

Content Areas

Nutritional causes of cardiac failure
Pathophysiology of cardiac cachexia
Exercise regimens and restrictions
Herbal supplement-nutrient/drug interactions
Medical nutrition therapy

After training, the learner will be able to:

Knowledge Objectives: Medical Students
List at least eight physical signs and symptoms of congestive heart failure.
Summarize the dietary and hygienic modifications that should be recommended to patients with congestive heart failure.
Knowledge Objectives: Residents
Identify at least three nutritional deficiencies and two toxins that may precipitate heart failure; explain the mechanism of each effect.
Identify the two most common pharmacologic regimens used to treat heart failure, and identify the two most common drug-nutrient interactions.
Describe how heart failure may lead to cardiac cachexia.
Practice Behavior Skills: Residents
Take an appropriate nutrition history to determine whether a patient's heart failure is due at least in part to a nutritional cause, and evaluate the level of each of the following in the diet: alcohol, salt, potassium, calcium, magnesium, selenium, total and saturated fat, and herbal supplements.
Based on an accurate assessment of the physician's own knowledge and limitations, seek consultation with and refer patients to registered dieticians or other credentialed healthcare professionals as appropriate.
Attitude Objectives: All Learners
Recognize the importance of nutritional deficiencies as potential causes of heart failure.
Demonstrate a commitment to promoting a healthy diet and lifestyle modification in patients with congestive heart failure.

* Bold items were ranked in the top 1/3 of all objectives.

E. Metabolic/Endocrine Systems

E.1 Obesity

E.2 Diabetes Mellitus

* Bold items were ranked in the top 1/3 of all objectives.

E.1: Obesity

Content Areas
Diagnosis: BMI and waist circumference
NHLBI Obesity Guidelines
Metabolic and pathophysiology consequences
Epidemiology
Etiology
Treatment : behavioral, pharmacological, surgical, dietary
Fad diets
Prevention and lifestyle modification
Physical activity
Medical nutrition therapy

After training, the learner will be able to:

Knowledge Objectives: Medical Students
State the National Heart Lung and Blood Institute (NHLBI) guidelines used to classify a person as overweight and/or obese.
Describe the metabolic and pathologic consequences of being overweight or obese as associated with the following chronic disorders: hypertension, insulin resistance, and dyslipidemia. Explain the mechanism by which each disorder results in these effects.
Identify at least four effective changes to daily activity regimens that can be used to prevent excessive weight gain and at least two behavioral strategies for sustaining appropriate weight following weight reduction.
Describe the risks and benefits of the following non-traditional weight loss interventions: pharmaceutical treatments, very low calorie diets, the protein sparing modified fast, and surgical treatment.
Give at least four examples of specific changes in diet, exercise, and other behaviors (e.g., consuming smaller food portions) that promote optimal health, and explain how each change results in its specific effect.
Identify those stages of life when becoming overweight or obese is most likely to occur, and identify effective strategies that medical professionals can use to help patients prevent excess body weight.
Compare and contrast the clinical usefulness of each of the following measures in predicting morbidity and mortality: body weight and height, waist circumference, percent body fat, Body Mass Index (BMI), and body fat distribution.
Cite the prevalence of persons who are overweight or obese in the U.S. by age, gender, and ethnicity.
Identify at least three characteristics or behaviors of people who are most successful at maintaining appropriate weight after a weight loss regimen.
Knowledge Objectives: Residents
Outline and evaluate the evidence evaluating the short-term and long-term efficacy of various commonly adopted diets, such as the Zone, Atkins, Weight Watchers, LA Weight Loss, Sugar Busters, and Jenny Craig diets.
Given the weight, height, age, and sex of a child or adolescent, assess the patient's risk of becoming overweight or obese as an adult in the U.S. using the US Centers for Disease Control and Prevention (CDC) pediatric BMI growth charts.

* Bold items were ranked in the top 1/3 of all objectives.

Identify common metabolic and pathophysiologic consequences of specific nutritional regimens used to treat common obesity-related morbidity in ambulatory and inpatient (ICU and non-ICU) care, and explain the mechanism of each effect.
Knowledge Objectives: Specialists
Explain how an individual's genetic makeup, metabolism, diet, physical activity, and weight history affect body weight and responsiveness to dietary interventions.
Compare and contrast the CDC recommendations for the treatment of childhood obesity vs. the NHLBI recommendations for the treatment adults who are overweight or obese.
Practice Behavior Skills: Medical Students
Take an appropriate dietary and social history including family history of being overweight or obese, develop an appropriate differential diagnosis, and design an effective nutritional management plan.
Perform an appropriate physical examination for an overweight and/or obese child, adolescent, or adult; measure the patient's body weight and waist circumference, determine the percent body fat, calculate the BMI, estimate the patient's body fat distribution, and evaluate the patient for other signs and symptoms of weight related morbidity.
Effectively educate patients about the goals they can realistically expect to achieve, as well as the potential complications of common therapies for overweight or obese individuals.
Practice Behavior Skills: Residents
Appropriately refer overweight or obese patients for individualized nutrition therapy based on the NHLBI guidelines.
Identify the five dietary supplements most commonly used in weight reduction plans, and compare and contrast their efficacy.
Attitude Objectives: All Learners
Recognize that being overweight or obese has become a national epidemic of increasing prevalence in the United States, and appreciate the value of as little as a 10% decrease in weight on co-morbidities or even maintaining body weight for those likely to become more obese.
Demonstrate a commitment to utilizing a multi-disciplinary team approach to the medical care of overweight and/or obese patients.
Demonstrate sensitivity to the social, emotional, and psychological factors that may affect an individual's behavior and body image.
Demonstrate a commitment to interact with overweight and/or obese patients in a non-judgmental manner.

* Bold items were ranked in the top 1/3 of all objectives.

E.2: Diabetes Mellitus

Content Areas

Glucose metabolism
Insulin secretion and sensitivity
Diagnostic criteria and classification
Epidemiology
Hyperlipidemia
Prevention and lifestyle modification
Physical activity
Medical nutrition therapy

After training, the learner will be able to:

Knowledge Objectives: Medical Students
Identify the minimum components of a healthy diet and lifestyle for the prevention of Type 2 diabetes.
Describe the most common macrovascular, renal, retinal, and neural complications associated with diabetes mellitus and describe the role of glycemic control and diet in reducing the secondary complications of diabetes.
Explain how endocrine system control of nutrient metabolism maintains energy balance in normal and diabetic individuals.
Differentiate between the short-term and the long-term effects of macronutrients on insulin secretion and insulin sensitivity in diabetes mellitus.
Knowledge Objectives: Residents
Summarize the current Nutrition Recommendations and Principles for People with Diabetes Mellitus developed by the American Diabetes Association and American Dietetics Association, and compare and contrast the dietary goals for persons with Type 1 vs. Type 2 diabetes.
Describe and classify the hyperlipidemia seen in patients with diabetes mellitus, and explain how glycemic control, diet, and weight loss can be used to correct plasma lipid levels.
Explain how to choose an appropriate drug therapy on the basis of pharmacokinetics and endogenous insulin secretion and resistance.
Practice Behavior Skills: Medical Students
Take a thorough nutritional and physical activity history of a person with diabetes, including an assessment of the (a) family history of diabetes mellitus, (b) onset and duration of diabetes symptoms, and (c) evidence of complications, as well as the patient's (a) weight history, (b) usual dietary intake, (c) frequency, intensity, and duration of physical activity, and (d) use of medications, and (e) alcohol consumption, and identify any problem areas.
Conduct an appropriate physical examination for a patient with diabetes including assessments of height, weight, Body Mass Index (BMI), body fat, fundus, feet, vascular sufficiency and peripheral neuropathy.

* Bold items were ranked in the top 1/3 of all objectives.

Practice Behavior Skills: Residents
Given a detailed scenario describing a patient with diabetes, provide individualized dietary counseling that takes into account insulin regimen, type of diabetes, total calorie requirements for weight maintenance or weight loss, carbohydrate counting, glucose and lipid goals, and timing of eating.
Seek consultation with a registered dietitian, a certified diabetes educator, or other credentialed nutrition professionals as appropriate.
Attitude Objectives: All Learners
Demonstrate a personal commitment to the importance of diet and exercise in preventive medicine by serving as a positive role model for patients with diabetes.
Recognize the central importance of nutrition in the maintenance of health, and demonstrate a commitment to support patient adherence to the Nutrition Recommendations and Principles for People with Diabetes Mellitus accepted by the American Diabetes Association.
Recognize the importance of patient self-motivation and demonstrate a commitment to shared decision making with diabetic patients.
Recognize the value of utilizing a team approach in the treatment of diabetes mellitus that includes registered dietitians, certified diabetes educators, exercise physiologists, clinical psychologists/behavioral medicine specialists, nurse practitioners, and clinical pharmacists.

* Bold items were ranked in the top 1/3 of all objectives.

F.1: Gastrointestinal Disease

Content Areas

Overview of function: digestion and absorption
Peptic ulcer disease
Gastroesophageal reflux disease
Liver disease
Short bowel syndrome
Malabsorption
Dumping syndrome
Inflammatory bowel disease (Crohn's disease, ulcerative colitis, IBD)
Diverticulitis/diverticulosis
Pancreatitis
Constipation
Nutritional consequences of GI surgery
Fiber: soluble and insoluble
Prevention of colorectal cancer
Medical nutrition therapy

After training, the learner will be able to:

Knowledge Objectives: Medical Students
Explain how common GI diseases (Crohn's disease, ulcerative colitis, chronic pancreatitis, cystic fibrosis, and hepatic cirrhosis) affect a patient's nutrition health, including effects on appetite, digestion/absorption, weight loss, and vitamin and mineral levels.
Describe the processes of digestion and absorption of specific macro- and micronutrients, including the roles of different organs, regions, and cells in the GI tract, pancreatic and intestinal cell secretions, and the hepatobiliary circulation.
Identify dietary components that interfere with or enhance the digestion/absorption of specific nutrients (including those that influence GI transit time, affect gastric acid secretion, or cause irritation of the mucosa), and explain how each component affects nutritional status.
Describe the nutritional and metabolic consequences of small and large intestinal resection.
Describe the relationship between dietary habits and the risk of colorectal cancer, and identify those dietary and physical activity changes that appear to be the most efficacious in preventing this type of cancer.
Knowledge Objectives: Residents
Identify the four most common causes of diarrhea and constipation, outline the direct nutritional effects of each condition on patient nutritional status, and describe the nutritional treatment regimen most commonly used to treat each condition.
Explain how to determine when a patient's diet should be advanced from NPO to solid foods after major GI surgery.
List the indications for fecal fat, d-xylose, and hydrogen breath tests, and explain how to interpret the results of each test.
Identify the potential nutritional consequences of medications used to treat GI diseases.

* Bold items were ranked in the top 1/3 of all objectives.

Knowledge Objective: Specialists
Identify at least four diseases of the GI system that can be treated by specialized nutritional support, identify three specific nutrients utilized, and describe the scientific evidence that supports this approach.
Practice Behavior Skills: Medical Students
Given a patient complaining of constipation, identify the likely causes and make appropriate recommendations to correct the condition and prevent future episodes.
Practice Behavior Skills: Residents
Evaluate the nutritional status of a patient with a gastrointestinal complaint by taking his/her medical, diet and social histories, conducting a physical examination, and selecting appropriate laboratory tests and diagnostic procedures.
Effectively counsel patients to establish appropriate dietary and behavioral goals and to adopt strategies to achieve these goals. Develop a plan to monitor the patient's progress and elicit his/her commitment.
Based on an accurate assessment of the physician's own knowledge and limitations, seek consultation with and refer patients to a registered dietician or other credentialed healthcare professionals as appropriate.
Practice Behavior Skills: Specialists
Given the history of a patient with GI disease, develop an appropriate nutritional management plan that incorporates individualized nutritional recommendations based on a patient's nutritional status, food preferences, disease state, and socio- cultural-, and economic background.
Attitude Objectives: All Learners
Recognize the central importance of nutrition in the treatment and management of patients with GI disease and demonstrate a commitment to providing appropriate nutritional intervention (including dietary modification and enteral or parenteral nutrition therapy).
Recognize the importance of dietary and lifestyle factors in the prevention of GI diseases.

* Bold items were ranked in the top 1/3 of all objectives.

F.2: Hematology/Oncology

Content Areas

Nutritional epidemiology
Malignancy-associated malnutrition
Nutrition-related anemias
Nutritional consequences of cancer chemotherapy and radiation
Nutrition support in cancer patients
Complementary and alternative therapies
Prevention of cancer and anemia
Medical nutrition therapy

After training, the learner will be able to:

Knowledge Objectives: Medical Students
Distinguish among the various nutritional anemias, including those caused by deficiencies of iron, folate, Vitamin B_{12} , and pyridoxine.
List the appropriate laboratory tests used to assess the nutritional status of malnourished patients, and identify tests that distinguish between nutritional anemias and hematopoetic disorders.
Summarize the proposed mechanisms by which antioxidants protect against cancers. Identify the four antioxidants for which the evidence of efficacy is strongest.
Summarize the proposed mechanisms by which folate, fiber, and excess dietary fat increase or decrease the risk of specific cancers.
Summarize the American Cancer Society's Dietary recommendations.
Identify the vitamins and minerals that cause or ameliorate nutrition-related anemias, and explain how these effects arise.
List at least eight common foods that are high in bioavailable iron that are appropriate for inclusion in the diet of a patient with iron-deficiency anemia.
Knowledge Objectives: Residents
List the most prevalent drug and nutrient interactions associated with cancer chemotherapy, and explain how each intervention can reduce the efficacy of the other.
Explain how cancer causes malnutrition and cachexia.
Explain how common cancer treatments alter nutritional status.
List at least four common foods that are high in bioavailable folate and four that are high in Vitamin B_{12} that are appropriate for inclusion in the diet of a patient with a megaloblastic anemia.
List at least two foods and two common medications that can increase or decrease absorption of each of the following: iron, folate, Vitamin B_{12}.
Knowledge Objectives: Specialists
Identify the nutritional components known to enhance or prevent the initiation, promotion, and progression of carcinogenesis, and explain how these effects arise.
Summarize and evaluate the epidemiological, clinical, and basic science evidence linking nutrients, dietary intake, obesity, smoking and lifestyle with increased cancer risk.

* Bold items were ranked in the top 1/3 of all objectives.

Compare and contrast the strengths and limitations of randomized clinical trials, within-country case-control trials, and cohort studies as experimental designs for the study of the role of nutrition in cancer.
Define and explain how to use the Bradford-Hill criteria to evaluate the evidentiary support for the role of a specific nutrient in a specific type of cancer.
Compare and contrast the different methods used to assess dietary intake and nutritional status.
Practice Behavior Skills: Medical Students
Take a thorough medical history that includes social and dietary history, family history of cancer, history of recent weight change, and use of nutritional supplements and herbal therapies.
Given the height and weight of a patient with a common hematologic or oncologic disease, calculate the BMI, explain to the patient how their disease alters nutritional status, and make appropriate nutritional recommendations.
Practice Behavior Skills: Residents
Given the history of a patient with hematologic/oncologic disease, recommend therapies that may help to alleviate adverse chemotherapy and radiation effects including nausea, mouth sores, odynaphagia, dysaphagia, and diarrhea.
Effectively counsel patients patient with a strong family history of cancer or a precancerous lesion to make informed nutritional decisions consistent with maintaining a healthy lifestyle and decreasing cancer risk, establishing appropriate dietary and behavioral goals and adopting strategies to achieve and maintain these goals.
Identify oncology patients who would benefit from nutritional guidance and supplementation to increase energy and protein intake.
Practice Behavior Skills: Specialists
Provide individualized dietary counseling to a patient with a common hematologic or oncologic disease based on an assessment of dietary intake that focuses on total calories and protein, as well as fruits, vegetables, whole grains, and alcohol.
Conduct a Medline search focusing on the role of specific nutrients in the development of cancer, classify each study by type of design, and use the Bradford-Hill criteria to evaluate the strength of the evidence for the role of each nutrient in oncogenesis.
Attitude Objectives: All Learners
Recognize the value of early nutrition intervention during cancer treatment to reduce or delay the development of malnutrition.
Demonstrate a commitment to include nutritional assessment and therapy in routine patient care to prevent cancer and anemia.
Recognize the importance of nutrition and healthy lifestyle behaviors in the decreasing risk of cancer.
Recognize the value of utilizing a team approach in the treatment of cancer that includes registered dietitians and other credentialed nutrition professionals, as well as exercise physiologists, clinical psychologists/behavioral medicine specialists, nurse practitioners, and clinical pharmacists.

* Bold items were ranked in the top 1/3 of all objectives.

F.3: Immunology

Content Areas

Effect of nutrition and nutritional status on host defense mechanisms
Protein-energy malnutrition
Food allergy and intolerance
Protein, amino acids, and nucleic acids and immune function
Lipid peroxidation
Diet and HIV
Breast milk
Vitamins and minerals in immune function
Medical nutrition therapy

After training, the learner will be able to:

Knowledge Objectives: Medical Students
Explain how both protein and protein-energy malnutrition alter the rate of tissue repair and causes immunodeficiency.
Identify the nutrient and immunologic components of human breast milk, and describe the effects of these components on immune response in the breast-fed child.
Compare and contrast food allergies vs food intolerance, and describe two pathophysiological manifestations of each.
Explain how caloric intake influences immune competence.
Explain how antioxidants influence lipid peroxidation and thus immune function.
Knowledge Objectives: Residents
Identify changes in diet shown to decrease morbidity and mortality of HIV-positive patients.
Knowledge Objectives: Specialists
Describe the role of three vitamins and three micronutrients in the development and maintenance of a healthy immune system; name three common food sources of these nutrients.

Practice Behavior Skills: Residents
Evaluate a patient's diet and his/her current nutritional status, and identify patients whose immune function may improve with nutritional therapy, lifestyle modification, and/or medication.
Given the nutritional history of a patient, and the results of antigen skin testing, total lymphocyte count, and complete and differential blood counts, evaluate the nutritional status of the patient and prescribe an appropriate nutritional plan.
Effectively counsel patients to make informed nutritional decisions consistent with maintaining a healthy immune system, establishing appropriate dietary and behavioral goals and adopting strategies to achieve and maintain these goals.
Given a detailed medical history and the current pharmacologic regimen of a HIV-positive patient with or without full-blown AIDS, provide appropriate nutritional counseling.

* Bold items were ranked in the top 1/3 of all objectives.

Attitude Objectives: All Learners
Recognize the importance of nutrition and healthy lifestyle behaviors in maintaining a healthy immune system.
Demonstrate a commitment to life-long learning about the effectiveness of nutritional supplements, natural products, and herbal supplements on immune function.

* Bold items were ranked in the top 1/3 of all objectives.

F.4: Rheumatology

Content Areas

Osteo and rheumatoid arthritis
Physical activity limitations and/or interventions
Herbal supplement-nutrient/drug interactions
Complementary and alternative therapies
Physical activity
Medical nutrition therapy

After training, the learner will be able to:

Knowledge Objectives: Residents
Compare and contrast the pathophysiology of osteoarthritis and rheumatoid arthritis and explain the relative influence of nutritional status on the progression of each disease.
List the common pharmacologic agents used to treat rheumatoid arthritis, and identify the most common drug-nutrient interactions.
Given a patient history that includes rheumatoid disease the use of nutrient and herbal supplements, evaluate the appropriateness of this dietary regimen, and provide evidence-based nutritional advice about their chosen supplements.
Effectively communicate with patients with rheumatoid disease to provide accurate nutritional information and dispel misinformation, including information about dietary supplements and fad diets.
Monitor weight changes in a patient with rhematologic disease and recommend a diet and physical activity plan to maintain a healthy weight.
Identify the most commonly used dietary supplements and diets used by patients with rheumatoid diseases, and evaluate the scientific evidence for the efficacy of each.
Cite at least three examples of dietary supplements for which there is sufficient scientific evidence to warrant their use in the treatment of rheumatic disease.
Describe the changes in body composition and eating behavior typically associated with active rheumatic disease.
Evaluate the evidence that supports the use of complementary and alternative medicine to treat patients with rheumatoid disease.
Summarize the benefits of incorporating physical activity in the treatment of patients with rheumatoid disease.
Knowledge Objectives: Specialists
Describe how to tailor a nutritional management plan to the physical limitations and rehabilitation program of patients with ankylosing spondylitis, polymyositis and osteoarthritis.
Explain how schleroderma and ALS alter nutritional status.
Practice Behavior Skills:
Given a patient with rheumatic disease, employ specific effective counseling techniques matched to the patient's status, including assessing stage of change, goal setting, problem solving, self monitoring, positive reinforcement, and stimulus control.
Attitude Objectives: All Learners
Demonstrate appropriate sensitivity to rheumatic disease patients with physical limitations.

* Bold items were ranked in the top 1/3 of all objectives.

* Bold items were ranked in the top 1/3 of all objectives.

F.5: Pulmonary Disease

Content Areas

Respiratory quotient
Chronic obstructive pulmonary disease
Mechanical ventilation
Obstructive sleep apnea syndrome
Cystic fibrosis
Medical nutrition therapy

After training, the learner will be able to:

Knowledge Objectives: Medical Students
Explain the association between obesity and sleep apnea, and outline the nutritional regimen recommended for these patients.
Explain how acute lung injury and chronic lung diseases alter a patient's nutritional requirements.
Knowledge Objectives: Residents
Outline the clinical evidence supporting the efficacy of nutrition therapy for malnutrition associated with lung disease.
Identify recommended nutritional interventions for patients with respiratory insufficiency that includes $C0_2$ retention and enhanced ventilatory drive; explain how these interventions alter the respiratory quotient (RQ).
Identify two common nutritional side effects of the three medications most commonly used in the treatment of pulmonary disease.
List the three most common respiratory complications of malnutrition among patients with chronic lung disease; propose an appropriate treatment plan for these patients.
Knowledge Objectives: Specialists
Define the nutrient composition of enteral nutrition formulas designed for critically ill patients on mechanical ventilation. Explain the mechanism of action of each of the primary constituents of these formulae.
Outline the recommended nutritional regimen for patients with cystic fibrosis.
Identify the immune factors that mediate inflammatory response in malnourished patients with chronic lung disease, and explain how response to these factors alters nutritional requirements.
Practice Behavior Skills: Medical Students
Given a patient with pulmonary disease, take an appropriate medical, social, diet, and weight history that includes an evaluation of current nutritional status, and conduct a thorough physical examination.
Practice Behavior Skills: Residents
Given a patient with pulmonary disease, design an appropriate set of individualized dietary intake and weight goal recommendations.

* Bold items were ranked in the top 1/3 of all objectives.

Attitude Objectives: All Learners
Recognize the importance of healthy lifestyle behaviors in the prevention and management of pulmonary disease.
Demonstrate a commitment to utilizing a multi-disciplinary team approach to the treatment of pulmonary disease, consulting with registered dietitians, nurses, and clinical pharmacists as appropriate.

* Bold items were ranked in the top 1/3 of all objectives.

F.6: Renal Disease

Content Areas

Sodium
Potassium
Calcium
Phosphorous
Fluid and electrolytes
Acute renal failure
Chronic renal failure (pre-dialysis)
Dialysis
Renal Transplantation
Nephrotic Syndrome
Nephrolithiasis
Herbal supplement-nutrient/drug interactions
Dyslipidemia or (hyperlipidemia)
Medical nutrition therapy

After training, the learner will be able to:

Knowledge Objectives: Medical Students
Describe the nutritional, metabolic, and clinical consequences of chronic renal failure.
Explain the interrelationships of renal disease and dietary factors such as protein, sodium, potassium, calcium, magnesium, phosphorus, and water; identify which patients need to restrict these nutrients.
List the three most useful laboratory tests used to recognize nutritional causes and consequences of renal impairment.
Explain how protein restriction or other changes in the nutrient composition of the diet can alter the progression of renal disease in patients with chronic renal failure.
List three common foods that are relatively high in each of the following: sodium, calcium, potassium, and phosphate; identify which patients with renal disease need to restrict these foods.
Knowledge Objectives: Residents
Identify the nutritional deficiencies typically found in patients with chronic renal failure (CRF); compare and contrast the nutritional needs of those receiving maintenance hemodialysis with those receiving continuous ambulatory peritoneal dialysis.
Identify the proper modification of dietary sodium, calcium, phosphorus, protein and fluids for patients with recurrent nephrolithiasis, and explain how each modification decreases morbidity.
Compare and contrast the nutritional goals of therapy for patients with end-stage renal disease receiving dialysis and those not receiving dialysis.
Knowledge Objectives: Specialists
Identify the specific lipid abnormalities typically associated with CRF, renal transplantation, and the nephrotic syndrome and outline the recommended nutritional regimens for these patients.

* Bold items were ranked in the top 1/3 of all objectives.

Practice Behavior Skills: Medical Students
Take an appropriate medical history, including weight change, history of renal disease, co-morbid conditions that can impact renal disease, and use of prescribed and over-the-counter medications and nutritional supplements.
Take an appropriate social and dietary history, including an assessment of the patient's exercise patterns.
Conduct an appropriate physical examination for a patient with renal disease, including height and weight; calculate the BMI and determine the fluid status.
Practice Behavior Skills: Residents
Consult with a registered dietitian as appropriate to provide individualized dietary counseling based on an assessment of a patient's dietary intake, including total calories, protein, total and saturated fat, sodium, potassium, calcium, phosphorus, magnesium, and fluid intake.
Prioritize dietary guidelines and lifestyle changes for patients with chronic renal disease or recurrent nephrolithiasis, with or without other chronic diseases.
Evaluate the diet of a patient on dialysis and refer to a registered dietitian as appropriate.
Practice Behavior Skills: Specialists
Evaluate the diet of a renal transplant patient before and after surgery, and develop a nutritional plan for the patient with particular focus on the likely effects of immunosuppressive therapy.

Attitude Objectives: All Learners
Demonstrate a commitment to utilizing a multi-disciplinary team approach to the treatment of renal disease, consulting with registered dietitians, clinical psychologists/behavioral medicine specialists, nurse practitioners, physician assistants, and clinical pharmacists as appropriate.
Demonstrate a commitment to promote appropriate nutrition and lifestyle modifications for patients with acute or chronic renal disease, nephrotic syndrome, or nephrolithiasis.
Recognize the importance of healthy lifestyle behaviors in the treatment and management of renal disease.
Demonstrate an awareness of the impact of co-morbid conditions of patients with renal diseases that may influence compliance with recommended changes in diet and lifestyle.

* Bold items were ranked in the top 1/3 of all objectives.

F.7: Bone Health

Content Areas
Bone mass
Calcium
Vitamin D
Phosphate
Magnesium
Dietary supplements
Osteoporosis and osteomalacia
Rickets
Prevention and lifestyle modification
Physical activity
Medical nutrition therapy

After training, the learner will be able to:

Knowledge Objectives: Medical Students
List at least three widely available dietary and supplemental sources of calcium and vitamin D. Compare and contrast the sources in terms of its bioavailability, convenience, and cost.
Describe at least three lifestyle changes that can reduce the risk of osteoporosis.
Identify the RDI for calcium and Vitamin D, the AI for calcium, the RDA for Vitamin D, and describe how an individual can meet these recommendations according to the USDA food guide pyramid, and the Dietary Guidelines for Americans.
Identify at least four classes of individuals at risk for developing osteoporosis, and compare and contrast the rationales used to explain the relationship of each to osteoporosis.
Explain the nutritional basis of the homeostatic mechanisms that maintain adequate bone mass, and describe three common pathophysiological conditions that reduce bone mass.
List at least three medical conditions and at least three medications that typically result in secondary osteoporosis.
Identify at least three good sources of dietary Vitamin D, and evaluate the limitations of sun exposure for meeting the Vitamin D requirement.
Explain how physiological aging typically affects the intake and metabolism of nutrients related to bone health.
Identify at least three sources of calcium and Vitamin D appropriate for a patient with lactose intolerance.
Knowledge Objectives: Residents
Identify at least four classes of individuals at risk for developing osteoporosis, and compare and contrast the rationales used to explain the relationship of each to osteoporosis.
List at least two physical diagnostic tests used to identify osteoporosis.
Knowledge Objectives: Specialists
Identify at least four examples of dietary constituents that, when in excess, may increase the need for calcium.
Practice Behavior Skill: Medical Students

* Bold items were ranked in the top 1/3 of all objectives.

Effectively counsel pre-and post-menopausal women to maintain a level of calcium in the diet adequate to reduce their risk of osteoporosis.
Practice Behavior Skill: Residents
Effectively counsel patients of all ages to make informed nutritional decisions that maintain current bone health, establishing appropriate dietary and behavioral goals and adopting strategies to prevent future osteoporosis.
During a physical examination, recognize common physical manifestations of late stage osteoporosis.
Using the American College of Sports Medicine and NIH guidelines, effectively counsel a healthy adolescent or adult patient to adopt an appropriate exercise regimen to reduce the risk of osteoporosis, especially in females.
Conduct an appropriate physical examination of a patient at risk of osteoporosis, including an assessment of bone mass.
Seek out and accurately interpret information from a wide variety of nutrition-related medical and lay literature, and apply that knowledge appropriately to maintain the bone health of all patients.
Practice Behavior Skill: Specialists
Identify and evaluate the dietary sources of calcium in a patient's diet and evaluate the sufficiency of dietary calcium.
Given a set of detailed medical and dietary histories, identify those patients that would benefit from calcium supplementation, and design an appropriate medical nutrition therapy plan for each.

Attitude Objectives: All Learners
Identify at least one psychosocial factor that commonly affects the intake of nutrients related to bone health at each stage of the life cycle.
Demonstrate a commitment to encourage patients of all ages, especially adolescents, to maintain a proper diet adequate to sustain normal bone growth and development and prevent bone loss.
Identify the toxic dose of vitamin D and describe the biological consequences of a vitamin D overdose.
Demonstrate a commitment to promote sound nutritional decision-making and appropriate levels of physical activity for all patients regardless of health status.

* Bold items were ranked in the top 1/3 of all objectives.

G. Other Areas

G.1 Nutrition Support

G.2 Contemporary Trends

* Bold items were ranked in the top 1/3 of all objectives.

G.1: Nutrition Support

Content Areas

Energy and substrate metabolism in health and disease
Starvation and malnutrition
Assessment of nutritional status
Enteral nutrition
Total parenteral nutrition
Enteral feeding formulas and selection of products
Routes of administration
Indications and contraindications
Monitoring and complications
Drug-nutrient interactions
Refeeding syndrome
Hypermetabolic injury response

After training, the learner will be able to:

Knowledge Objectives: Medical Students
Compare and contrast energy and substrate metabolism in postprandial, well-fed, short-term and long-term starvation states.
Define malnutrition; describe its environmental and biological causes and clinical consequences.
Knowledge Objectives: Residents
Differentiate between the indications for enteral and parenteral nutrition support as well as the indications for potential delivery sites for each type of support.
Give six examples of drug-nutrient interactions or incompatibilities that commonly occur among patients receiving either enteral or parenteral nutrition support.
Identify at least three measures used to monitor patients for complications of enteral and parenteral nutrition support; describe when each is appropriate.
Explain the refeeding syndrome, identify the type of patient at risk for this syndrome, and outline the most appropriate feeding strategy to minimize metabolic complications.
Summarize the potential metabolic consequences that result from overfeeding calories, fat, carbohydrate, or protein to enterally and parenterally fed patients.
Identify the medical and social services necessary to provide effective home nutrition support, and outline at least four factors that should be considered before discharging a patient on nutrition support.
Knowledge Objectives: Specialists
Explain how neuro-endocrine and immunologic factors mediate the hypermetabolic injury response, and explain how catabolic stress affects organ and whole body nutrient utilization.
Practice Behavior Skills: Residents
Given a patient diagnosis, nutritional regimen, and on-going laboratory data, evaluate the effectiveness of the current nutritional treatment and appropriately manage the delivery of enteral or parenteral nutrition support.

* Bold items were ranked in the top 1/3 of all objectives.

Given the results of a detailed history and physical examination of a hospitalized patient, assess the patient's nutritional status and ability to take nutrition by mouth to determine the need for enteral or parenteral support.
Accurately interpret information from a wide variety of medical and lay literature related to commonly available commercial products for nutrition support, and apply that knowledge appropriately to the care of patients.
Attitude Objectives: All Learners
Recognize the adverse impacts of malnutrition on disease and the associated benefits of providing appropriate nutritional support.
Recognize the importance of correcting any malnutrition in patients before surgery.
Carefully attend to the ethical issues involved in the provision of nutritional support in palliative care and in settings where patients cannot provide consent.
Demonstrate a commitment to utilizing a multi-disciplinary team approach to the management of patients receiving enteral or parenteral nutrition.

* Bold items were ranked in the top 1/3 of all objectives.

G.2: Contemporary Trends

Content Areas
Dietary guidelines
Vitamins, minerals, and herbal supplements
Food fads, fad diets, and weight loss
Vegetarianism
Dietary supplements
Food safety

* Bold items were ranked in the top 1/3 of all objectives.

Knowledge Objectives: Medical Students
Summarize the current American Heart Association (AHA), American Diabetes Association (ADA), National Cancer Institute (NCI), USDA, and USDHHS dietary guidelines for healthy Americans.
Knowledge Objectives: Residents
List the likely nutritional benefits and consequences of a vegetarian diet, and describe the typical clinical presentation of a vegetarian patient with a nutritional deficiency.
Knowledge Objectives: Specialists
Evaluate the evidentiary basis of efficacy for the five most commonly used commercial weight reduction diets.
List at least five of the most commonly used dietary supplements, and identify their bioactive components.
Define the terms phytochemical, phytonutrient, and nutraceutical, give at least three examples of each, and evaluate the scientific evidence for the use of these supplements to prevent disease.
Given a patient's nutrition history and disease status, predict two potential Deleterious and two beneficial effects associated with each of five common dietary supplements.
Define the term functional foods; evaluate the scientific evidence for or against incorporating functional foods into the diet for the prevention and treatment of chronic diseases.
Practice Behavior Skills: Medical Students
Take an appropriate and culturally sensitive diet history that includes an assessment of use of fad foods and herbal and dietary supplements.
Practice Behavior Skills: Residents
Effectively communicate with patients the benefits and effects of various popular dietary supplements, complementary and alternative medicines, and commonly used weight reduction programs.
Effectively communicate with patients to provide accurate nutritional information and dispel misinformation, including information about dietary supplements, nutraceuticals, functional foods, and fad diets for weight loss or disease prevention and treatment.
Effectively counsel patients to make informed decisions about the use of food supplements and adoption of commonly used weight reduction diets and programs.
Accurately interpret contemporary nutrition information from a wide variety of scientific and lay literature and apply that knowledge appropriately to the care of patients.
Attitude Objectives: All Learners
Demonstrate an accurate awareness of the limitations of his/her knowledge of nutrition.
Demonstrate a willingness to seek out the best available medical knowledge relevant to the nutrition of patients.

* Bold items were ranked in the top 1/3 of all objectives.

Nutrition Curriculum Guide For Training Physicians

Appendices

Appendix 1: Nutrition Academic Award Program Principal Investigators

Appendix 2: *Nutrition Curriculum Guide for Training Physicians* Contributors

Appendix 3: Description of How the *Guide* Was Developed

* Bold items were ranked in the top 1/3 of all objectives.

Appendix 1. NHLBI/NIDDK Nutrition Academic Award (NAA) Program

Principal Investigators

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Appendix 2: *Nutrition Curriculum Guide for Training Physicians* Contributors

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Charles B. Eaton, MD, MS	**Brian W. Tobin, PhD**
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Nutrition Curriculum Guide for Training Physicians
Appendix 3: How The Guide Was Developed

Year One: During the first year of the Nutrition Academic Award (NAA) Program, it was determined that a Curriculum Committee should be established, with the goal to develop curriculum objectives for dissemination to other medical schools. Dr. Charles B. Eaton (Brown University) and Dr. Lisa Hark (University of Pennsylvania) were named as co-chairs and education experts from each NAA institution were appointed by the Principal Investigators. The document was entitled *Nutrition Curriculum Guide for Training Physicians* and consists of nutrition-related knowledge, practice behavior skills and attitudinal objectives covering the field of nutrition. The entire process was completed over a five year period from 1998 to 2003.

Initial discussions identified the topics that would be included in the *Guide*. Several key research studies and consensus reports of medical educators served as the foundation for these decisions. These included the 1995 American Medical Student Association (AMSA) national consensus report which identified 92 content areas as "Essential for Nutrition Education in Medical Schools" (1) as well as the American Society for Clinical Nutrition (ASCN) Committee on Medical/Dental School and Residency Nutrition Education which prioritized 40 nutrition content areas within medical school curriculum (2). Finally, the landmark 1985 "*Nutrition Education of US Medical Schools: "Curriculum Guidelines for Incorporating Nutrition in Medical Education*" published by the Food and Nutrition Board, Council on Life Sciences, National Research Council was also an important resource (3).

The 40 and 92 content areas in the AMSA and ASCN documents were cross-referenced and organized into 23 topics or chapters, as listed in the table of contents. Additional content areas felt to be important in each of the major topics were added as needed. A team of multidisciplinary content specialists from each of the 21 NAA schools contributed nutrition-related knowledge, practice behavior skills and attitudinal objectives for each content area within a specific topic area. The majority of the initial contributors and reviewers were members of the NAA Curriculum Committee (Appendix). Ongoing drafts underwent multiple rounds of review and revision by other NAA members as well.

Year Two: During year two, Dr. Brian Tobin and Dr. Michael Smith at Mercer University School of Medicine were appointed the task of editing all of the objectives in order to produce a single, consistent format with behavioral objectives that were educationally sound and measurable in keeping with Mager (4). The goal has been to produce a set of learning objectives that aimed to promote higher levels of thinking by writing objectives that included an appropriate mix at both lower levels of Bloom's Taxonomy (knowledge and comprehension) and objectives at higher levels (e.g., synthesis and evaluation) (5). Less than one quarter of the current set of objectives are at the knowledge level, and approximately one third are at Bloom's synthesis or evaluation

* Bold items were ranked in the top 1/3 of all objectives.

level. In addition to cognitive, knowledge-centered objectives, the *Guide* also includes learning objectives for student attitudes and practice behavior skills. Thus, each section includes four components: a brief list of content areas consistent with previous national curriculum recommendations for nutrition, knowledge objectives, practice behavior skill objectives, and attitudinal objectives.

Year Three: During year three, the revised objectives were resubmitted to the NAA contributors for a final review and it was determined that the objectives spanned medical students, residents, as well as advanced level practitioners or specialists. Therefore, the NAA Curriculum Committee determined that it was critical for each objective to be ranked according to the level of the learner (medical student, resident or specialist), in order to prioritize the extensive list of objectives. To accomplish this task, a modified Delphi technique was successfully implemented under the direction of Dr. Craig Scott, at the University of Washington School of Medicine, who established a Web-based process to accomplish this arborous task. A team from each NAA school was responsible for categorized each objective as either a) core or essential for medical students , b) recommended for medical students who want more training in nutrition, c) appropriate for residents, or d) appropriate for specialists in post-GME programs. In addition, within each of these categories, reviewers were asked to rate each objective according to its importance in clinical medicine. Objectives that more than 50 percent of the reviewers rated as clinically important are bolded in order to be distinguished among the list.

Year Four: During year four, the NAA Curriculum Committee agreed on the best possible way to list the objectives as well as dissemination strategies. It was decided that all objectives would be included in the first distribution of the document, since the nutrition content at medical schools may be at different levels and the nutrition faculty may be also responsible for graduate medical education as well. The medical student, resident and specialists objectives were also grouped together within each topic in order to help educators incorporate these objectives into their curriculum.

Year Five: A Web-based version was the top priority for the *Nutrition Curriculum Guide for Training Physicians*, as we agreed that this method would be the most accessible and utilization could also be easily tracked. The entire document can be downloaded or a single topic area of interest using the links established from the table of contents versions in either PDF and HTML format to meet individual user's needs. The Web-based version of the *Guide* can be used not only by US medical and health professional schools, but also by all medical schools worldwide. In addition, The *Guide* will be disseminated by a variety of professional publications and presentations (6,7) such as the Annual Meetings of the Association of American Medical Schools, American Society of Clinical Nutrition, Society of Teachers of Family Medicine and the American Dietetic Association.

Lisa A. Hark, PhD, RD, Charles B. Eaton, MD and the Curriculum Committee

* Bold items were ranked in the top 1/3 of all objectives.

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* Bold items were ranked in the top 1/3 of all objectives.