

Nutrition Focused Physical Exam

Continuing Professional Education Program Self-Study Course

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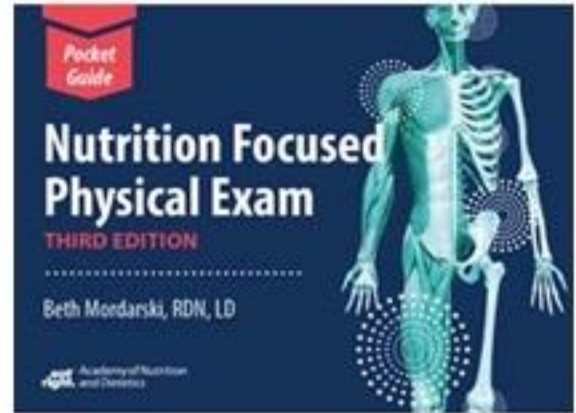
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Acknowledgements

Required Reading for This Course:

Mordarski B. Pocket Guide to Nutrition Focused Physical Exam, Third Edition. Chicago IL: Academy of Nutrition and Dietetics; 2022.



Disclaimer: The book associated with this course is required solely for the course taker to learn the underlying principles which they will apply in taking a case-study based exam. Neither the authors nor the publishers of the text/book have contributed to or endorsed this course.

Additional content on NFPE and Malnutrition was originally published in Dorner, B. Diet and Nutrition Manual: A Comprehensive Nutrition Care Guide. Dunedin FL: Becky Dorner & Associates, 2021.

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Carefully review the contents of this program. Keep in mind the practical applications it has for you in your individual setting. The focus is to increase your knowledge and application of the subject matter. For multiple choice questions select the one best answer from the choices given.

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Course Expiration Date Must be completed prior to this date	Continuing Education Hours	Profession for which CPE is Intended	CDR Level	CDR CPE Type	CDR Activity Number
May 31, 2024	8	RDN CDCES	2	720	168178

Course Description

This course is a self-study module, which assumes that the reader has carefully reviewed the *Nutrition Focused Physical Exam Pocket Guide*, Third Edition, by Beth Mordarski, RDN, LD. The book is a comprehensive guide to understanding how to use Nutrition Focused Physical Exam (NFPE) as part of a comprehensive nutrition assessment and a tool to help diagnose malnutrition. Included in the book are:

- Academy/A.S.P.E.N. clinical characteristics that the registered dietitian nutritionist (RDN) can use to support a diagnosis of malnutrition
- Sample PES statements
- Physical exam parameters, including pictures that help the clinician see the differences between well-nourished and malnourished individuals
- Clinical interpretations of micronutrient deficiencies (hair, skin, nails, etc.)
- Laboratory assessment of vitamin and mineral status.
- Assessment of edema

Supplemental information on the components of NFPE and malnutrition is included to expand on what is published in the Pocket Guide. Four case studies are presented, each with exam questions specific to that case study, which require the ability to practice implementation of the NFPE process.

While this module does not require hands on assessment, it is advisable to practice with a fellow health care professional to help establish competency in NFPE.

Course Learning Objectives

After completing this course, participants will be able to:

1. Integrate new knowledge and skills related to nutrition focused physical exam (NFPE) into practice.
2. Integrate new knowledge of disease states and clinical conditions identified by NPFE into practice.
3. Conduct nutrition focused physical examinations to determine nutritional status of clients.
4. Analyze and synthesize assessment data and findings to establish nutrition diagnosis.

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Suggested CDR Performance Indicators

- 1.1.5 Integrates new knowledge and skills into practice
- 8.2.4 Integrates new knowledge of disease states and clinical conditions into practice
- 10.2.5 Conducts nutrition-focused physical examinations to determine nutritional status of clients
- 10.2.14 Analyzes and synthesizes assessment data and findings to establish nutrition diagnosis

Note: Numerous Other Performance Indicators May Apply.

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Nutrition Focused Physical Exam

Nutrition-focused physical exam (NFPE) (sometimes referred to as nutrition focused physical assessment or NFPA) is an emerging area of nutrition and dietetics practice for registered dietitian nutritionists (RDNs). Although it is only one component of the nutrition assessment process, it can help identify causes of nutritional deficiency and characteristics of malnutrition.

Nutrition-focused physical exam goes beyond the traditional measurement of height, weight, body fat, arm and calf circumference and is considered an adjunct to traditional nutrition assessment. The NFPE combines a physical examination, vital signs, and anthropometrics with patient/resident interviews and data from the medical record (1). It is an important tool in the identification of malnutrition using the malnutrition guidelines as outlined by the Academy of Nutrition and Dietetics (Academy) and the American Society for Enteral and Parenteral Nutrition (A.S.P.E.N.) (2).

The *International Dietetics and Nutrition Terminology Reference Manual* defines nutrition focused physical findings as: “Findings from a nutrition-focused physical exam, interview, or the medical record including muscle and subcutaneous fat, oral health, suck/swallow/breathe ability, appetite, and affect” (3).

Performing a Nutrition Focused Physical Assessment

Nutrition focused physical assessment is a hands-on assessment that uses four steps (1), some of which require additional training:

1. **Inspection:** A general observation that progresses to a more focused observation using the senses of sight, smell, and hearing. Most RDNs already perform a general observation of an individual’s condition, and this should include things like noticing an odor that might indicate ketosis or alcohol use and observing visually for signs of undernutrition or wasting.
2. **Palpitation:** Touching the individual to feel the skin’s temperature, and presence of edema, and/or touching the abdomen to assess for tenderness, and superficial masses.
3. **Percussion:** Assessment of body sounds to detect gas in the abdomen, fluid in the lungs, or other issues.
4. **Auscultation:** Use of the ear or a stethoscope to listen to heart and lung sounds, bowel sounds, and blood vessels.

The assessment uses a systems approach by evaluating the factors in the table on page 9 (1,4,5).

Traditionally physicians, nurse practitioners, physician’s assistants, and nurses perform physical assessments. However, RDNs can embrace a hands-on approach and incorporate NFPE into their practices and/or review findings of another health care professional (1). Clinical judgment must be used to select indicators and determine the

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appropriate measurement techniques and reference standards (1). To successfully use the results of a NFPE, the practitioner must be able to interpret vital signs and physical findings and be familiar with how findings correlate with compromised nutritional status. Understanding these correlations is key to identifying and categorizing malnutrition.

Nutrition Focused Physical Exam and Scope of Practice

In 2017, the Academy of Nutrition and Dietetics (Academy) published a *Revised Scope of Practice for the Registered Dietitian Nutritionist*. Registered dietitian nutritionists must practice under the state statutes (practice acts) that may (but not always) outline the types of activities they can perform. Each individual is responsible for understanding the legal requirements they operate under in the state in which they practice.

The Academy's *Scope of Practice* indicates that "each RDN has an individual scope of practice that is determined by education, training, credentialing, experience, and demonstrated and documented competence to practice" (6). Demonstrating competency applies to all areas of nutrition and dietetics practice, including the NFPE.

It is imperative that RDNs who plan to conduct NFPE develop their assessment skills and demonstrate competence using a framework outlined by an employer or qualified agency. Reference standards that are outlined in facility policies and procedures should be used. For example, a hospital or nursing facility may have competency guidelines for nurses and nursing assistants for taking vital signs, listening to bowel sounds, etc.

A RDN could easily undergo facility training and demonstrate competency to perform these evaluations and interpret their results. RDNs that are learning the NFPE process should, with the agreement of their employer, shadow other professionals who perform assessments and participate in hands-on assessments as part of the training process.

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Systems Approach to Evaluating Physical Factors for Nutrition Focused Physical Exam (1,4,5)

<p>Physical Appearance</p> <ul style="list-style-type: none"> • Body size • Body type • Appearance of wasting or obesity • Level of consciousness • Paralysis or involuntary movement • Amputations or contractures • Affect • Condition of hair and nails 	<p>Nerves and Cognition</p> <ul style="list-style-type: none"> • Ability to communicate • Cognitive status • Reflexes • Ability to feel pain in extremities • Gross and fine motor skills
<p>Vital Signs</p> <ul style="list-style-type: none"> • Blood pressure • Heart rate • Oxygen saturation/respiratory rate • Temperature 	<p>Extremities, Muscles, and Bones</p> <ul style="list-style-type: none"> • Hand grip strength • Range of motion • Subcutaneous fat • Muscle mass • Edema • Ability to stand and walk
<p>Skin</p> <ul style="list-style-type: none"> • Skin turgor • Skin color • Presence of surgical wounds, pressure injuries, stasis ulcers, or diabetic foot ulcers • Poor or delayed wound healing 	<p>HEENT (Head, Eyes, Ears, Nose, and Throat)</p> <ul style="list-style-type: none"> • Ability to smell and taste • Loss of orbital (around the eye), buccal (around the cheeks), facial fat • Vision and hearing • Chewing or swallowing problems
<p>Digestive System</p> <ul style="list-style-type: none"> • Condition of teeth, presence of dentures and/or partials • Condition of oral cavity and tongue • Inflamed or bleeding gums • Bowel sounds • Abdominal pain 	<p>The Cardiopulmonary System</p> <ul style="list-style-type: none"> • Ability to breathe • Breath sounds • Regular heart rhythm

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Malnutrition

Introduction

Malnutrition (sometimes referred to as undernutrition) is a broad term often used to describe patients who appear to have compromised nutritional status, poor intake, unintended weight loss, pressure injuries, or cachexia. The Academy of Nutrition and Dietetics Nutrition Care Process Terminology (NCPT) defines malnutrition as “inadequate intake of protein and/or energy sufficient to negatively impact growth/development, and/or to result in loss of fat and or muscle stores” (3).

The causes of malnutrition are multiple and complex (7). In recent years, the diagnosis of and understanding of malnutrition has changed and it is now recognized as a complex syndrome that can be related to chronic disease, acute disease, or starvation (2). There is an ongoing international effort to diagnose adult malnutrition using nutrition screening and assessment.

Consequences of Malnutrition

Malnutrition is associated with many adverse outcomes, including loss of function, decreased quality of life, an increased risk of pressure injuries and/or impaired wound healing, longer length of hospital stay, higher hospital readmission rates, higher treatment costs, and increased mortality (2,8,9). Loss of lean body mass (LBM) may be an additional consequence. Nutrition screening, assessment, and early nutrition intervention can reduce these complication rates (10).

Nutrition Screening

Many hospitals and some long-term care facilities use a brief screening tool to help identify those at risk for or those who have malnutrition. Nursing staff usually completes the nutrition screen with referrals made to a RDN and/or nutrition and dietetics technician, registered (NDTR), as appropriate.

Historically, several validated nutrition screening tools have been used, including the *Malnutrition Screening Tool* (MST), *Mini-Nutrition Assessment*® (MNA®), *Malnutrition Universal Screening Tool* (MUST), *Nutritional Risk Screening* (NRS 2002) and *Short Nutritional Assessment Questionnaire* (SNAQ). A 2020 review of literature between January 1997 and July 2017 concluded that the Malnutrition Screening Tool (MST) should be used to screen adults for malnutrition regardless of the age, medical history, or setting (11). Many of the screening tools mentioned above are still used in clinical practice.

Diagnosing Malnutrition

Historically, protein energy malnutrition (PEM), or an inadequate intake of both calories and protein, was diagnosed using serum albumin and/or prealbumin. It is now understood that serum albumin and prealbumin are negative acute-phase reactants that decrease in response to acute and/or chronic inflammatory disorders (12), not protein intake. Conditions that lead to this decrease include (but are not limited to) infection, trauma, surgery, burns, tissue damage, cancer, strenuous exercise, and childbirth (12). Serum albumin and prealbumin will rise when the underlying condition has resolved

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(12). Low serum albumin and/or prealbumin may be an indicator of morbidity, mortality, or inflammation but not malnutrition or protein intake (2,14).

With an understanding of the relationship of serum hepatic proteins to inflammation, the definition and diagnosis of malnutrition began to change. Despite the changes in our understanding of malnutrition, some doctors, nurse practitioners, physician's assistants, nurses, and RDNs still order albumin levels to evaluate nutritional status.

It is clear that malnutrition is a complex syndrome that manifests in different ways and that diagnosing malnutrition based on serum albumin or prealbumin levels alone is no longer applicable. In an attempt to clarify the definition of malnutrition, an international consensus committee met and in 2010 proposed that malnutrition be categorized in three ways (15).

1. Starvation-related malnutrition: chronic starvation without inflammation (for example, medical conditions like anorexia nervosa or economic conditions that result in lack of food intake).
2. Chronic-disease-related malnutrition: when chronic diseases or conditions that impose sustained inflammation of a mild to moderate degree are present, (such as organ failure, pancreatic cancer, rheumatoid arthritis, or sarcopenic obesity).
3. Acute disease or injury-related malnutrition: when inflammation is acute rather than chronic (for example, major infection, burns, trauma, or closed head injury).

In 2012, the Academy of Nutrition and Dietetics and the American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.) released a consensus statement on the identification and documentation of malnutrition. The authors support the three-pronged approach to identifying malnutrition mentioned above and then suggests 6 characteristics for diagnosing malnutrition. The characteristics are outlined below.

Proposed Clinical Characteristics Used to Categorize Malnutrition (2)

1. **Energy intake:** monitor meal intake and compare with energy needs.
2. **Interpretation of weight loss:** evaluate weight loss in light of clinical condition and assess weight changes over time.
3. **Loss of body fat,** particularly subcutaneous fat.
4. **Loss of muscle mass,** including wasting of the temples, clavicles, shoulders, scapula, thigh, or calf.
5. **Fluid accumulation:** localized or generalized edema which often masks weight loss.
6. **Reduced grip strength** as measured by a dynamometer.

The consensus statement proposes specific criteria within each of the 6 categories to further diagnose malnutrition as non-severe or severe

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Many acute and post-acute care facilities have developed protocols for diagnosing malnutrition based on the A.S.P.E.N./Academy criteria. RDNs can help educate staff in their facility about the changes in diagnosis of malnutrition, discourage use of serum hepatic proteins to identify malnutrition, and encourage facilities to adopt the new criteria.

Global Leadership Initiative on Malnutrition

In 2016 the Global Leadership Initiative on Malnutrition (GLIM) convened to build a global consensus around the diagnostic criteria for malnutrition in adults in all clinical settings (14). GLIM developed a proposed set of criteria that identified 5 criteria as follows:

Phenotype Criteria	Etiology-Based Criteria
<ul style="list-style-type: none">• <u>Weight loss</u>• <u>Low body mass index (BMI)</u>• <u>Reduced muscle mass</u>	<ul style="list-style-type: none">• <u>Reduced food intake or assimilation</u>• <u>Disease burden/inflammation</u>

Like the Academy/A.S.P.E.N. Guidelines, GLIM sets thresholds for moderate and severe malnutrition based on degrees of weight loss, low BMI, and reduced muscle mass. GLIM is a work in progress whose next steps are to secure endorsements from leading nutrition professional societies, to identify overlaps with syndromes like cachexia and sarcopenia, and to promote dissemination, validation studies, and feedback. The Academy of Nutrition and Dietetics indicates that GLIM is fully congruent with the Academy/ A.S.P.E.N. criteria and that either set of criteria or the Subjective Global Assessment can be used to diagnose malnutrition (16).

Nutrition-focused physical exam is one key to identifying malnutrition because it helps identify loss of body fat or muscle mass, fluid accumulation, and reduced grip strength. Evaluation of current weight, weight history, and food and fluid intake are also key. Over time, it is likely that national and/or international guidelines for the diagnosis of malnutrition will continue to evolve.

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Malnutrition and the Patient Driven Payment Model (PDPM)

The Patient Driven Payment Model (PDPM) adopted by the Centers for Medicare and Medicaid Services (CMS) and adopted by skilled nursing facilities in October 2019 includes malnutrition as a diagnosis that can increase payment to facilities (17). Clinicians should use criteria accepted by their facility, including validated nutrition screening tools and/or a comprehensive nutrition assessment to support a malnutrition diagnosis (17,18).

Nutrition Interventions to Address Malnutrition

Potential interventions to improve nutritional status will vary depending on the etiology of the individual's malnutrition, comorbidities, goals, and care plan. The benefits of nutrition intervention to improve clinical outcomes have been well-documented (10). Specific nutrition interventions might include (10,19,20):

- Additional food or snacks for those who are eating well.
- Individualizing a diet to remove restrictions that might be undesired or result in unpalatable food.
- Fortifying foods and/or beverages with protein, calories, and other nutrients.
- Adding oral nutritional supplements (ONS) for those whose intake is not meeting their estimated needs.
- Modifying food texture or beverage consistency in response to chewing or swallowing problems.
- Providing adaptive feeding equipment to facilitate self-feeding.
- Providing finger foods if appropriate and accepted.
- Making changes in dining environment to provide a more or less stimulating environment.
- Conducting a medication review and recommending changes if appetite appears to be affected by medications.
- Providing enteral feeding if indicated and desired.
- Providing nutrition counseling during a stay at a facility and prior to discharge.
- Referring to appropriate resources in the community at discharge.

Malnutrition, Failure to Thrive, and Loss of Lean Body Mass

Nutritional status has a significant impact on a person's ability to resist infection, recover from illness, injury or surgery, and have the strength and energy to rehabilitate. Malnourished older adults and those with failure to thrive (FTT) have diminished muscle strength, which can lead to weakness, decreased independence, and falls. They may also have slower recovery from illness or acute episodes, a tendency toward poor healing, increased risk of pressure injuries, unintended weight loss, infection, immune dysfunction, anemia, weakness, fatigue, and ultimately illness and death.

Loss of muscle mass may be a result of malnutrition and/or failure to thrive (FTT) and is an indicator of protein energy malnutrition (PEM). Sarcopenia, the loss of muscle mass associated with aging, can exacerbate the difficulties that challenge the health of an

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older adult, above and beyond issues related to FTT or malnutrition.

The stress response can also cause loss of lean body mass (LBM). The stress response is a hormonal response (i.e.: a heightened “fight or flight” response) that increases energy needs, causes the body to break down proteins and LBM, and can lead to PEM. It can occur due to catabolic illness such as wounds, trauma, surgery or infection (21).

LBM makes up 75% of body weight mostly in the form of muscle, bone and tendon and provides the majority of the body’s protein. Unfortunately, the rate of recovery of LBM is much slower during the recovery stage, than the rate of loss during the inflammatory stage. Loss of just 10% LBM decreases immune response and increases risk of infection. At 15% or more loss of LBM, the rate of wound healing reduces and weakness increases. At 30% loss of LBM, pressure injuries may develop, and healing response is non-existent. A 40% LBM loss usually results in death (often due to pneumonia) (21).

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Nutrition Focused Physical Exam (NFPE) Pocket Guide

The *Nutrition Focused Physical Exam Pocket Guide* is a product of the Academy of Nutrition and Dietetics. The pocket guide utilizes “clinical characteristics” jointly endorsed by the Academy of Nutrition and Dietetics and the American Society of Parenteral and Enteral Nutrition (A.S.P.E.N.) to substantiate a malnutrition diagnosis (2). To reiterate, these six characteristics include:

- Energy intake
- Interpretation of weight loss
- Physical findings-body fat
- Physical findings-muscle mass
- Physical findings-fluid accumulation
- Physical findings-reduced grip strength

On pages 1-2 of the Pocket Guide, the clinical characteristics are arranged in a grid initially segregating malnutrition in the context of acute illness or injury, from malnutrition in the context of chronic illness, or malnutrition in the context of social or environmental circumstances. The practitioner will determine which of the areas of context apply by a review of the patient’s/resident’s medical record and interview.

Serum albumin and pre-albumin are not considered indicators of malnutrition, but rather are an acute phase response indicative of inflammation. In using the nutrition focused physical exam (NFPE), these lab values may be useful in merely determining that the patient/resident experienced either an acute or chronic inflammatory process, or if there has been a change in inflammatory process (based on these lab values increasing or decreasing), and not used as determinants of a state of malnutrition.

Inflammation may be present in malnutrition in both acute and chronic illness, but not in the context of social or environmental circumstances. Social/environmental circumstances are factors that impact access to food or adequate food intake. Examples may include depression, financial issues, a disordered eating pattern such as anorexia, and/or dental problems.

Once context for malnutrition has been determined, the practitioner will evaluate energy intake as it relates to current estimated energy requirements, including any recommended injury factors. This provides the practitioner with the ability to determine whether the energy intake is “severe” or “non-severe” within each of the three context areas (see page 1-2 of the Pocket Guide, clinical characteristic of “energy intake”, and each of the three context areas of acute illness or injury, chronic illness, or social or environmental circumstances).

Following review of energy intake, the practitioner will interpret weight loss, again within one of the three areas of context, ultimately determining whether it too is “severe” or “non-severe”, utilizing the tables on page 1-2 of the Pocket Guide (see “interpretation of weight loss”).

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Moving to the area of “physical findings”, the practitioner should now be prepared to conduct a physical exam for assessment of changes in body fat, muscle mass, fluid accumulation, and grip strength. This phase requires the practitioner to glove up and become hands on. Here, explaining what is to be done, followed by obtaining permission from the patient/resident is vital. Note that much of this process is done without special equipment, merely the practitioner’s hands. The assessment of grip strength does employ an assessment device such as a dynamometer. A review of pages 5-6 of the Pocket Guide will give the practitioner useful hints to perform each step (such as positioning of the patient/resident), along with a categorization of findings as to “severe malnutrition”, “mild-moderate malnutrition”, or “well nourished” status. Pages 7-30 in the Pocket Guide provide visual representations of each of these physical indicators. It should be noted that as to the clavicle region, well-nourished individuals, particularly females, will show some bony prominence. As with energy intake and weight loss, the practitioner places findings within one of the three areas of context, and further subdivides into a non-severe or severe category (page 1-2 table in the Pocket Guide).

Fluid accumulation is assessed by searching for evidence of pitting edema. Any assessment of edema should be considered against a diagnosis such as renal failure or congestive heart failure. Findings are ranked within the area of context and severity as with other findings above (table on page 2 in the Pocket Guide). Page 61 of the Pocket Guide indicates assessment and degree of edema.

Further consideration may include findings from examination of skin, hair, eyes, mouth, lips, gums, teeth, and nails, which may point to micronutrient deficiencies (see pages 31-42 of the Pocket Guide). However, these must be examined against existing medical diagnosis in which such observations are typically present. The practitioner may consider requesting lab work for confirmation. In similar fashion, the ability of the patient to chew, swallow, and retain food may be indicative of the social and environmental context, and as such should also be assessed by the practitioner.

Once all six clinical characteristic components have been assessed, the practitioner places findings within the three context areas, coding as either severe or non-severe. At least two characteristics must exist within the “severe” column of any of the three context areas for a diagnosis of “severe malnutrition”. Likewise, at least two characteristics must exist within the “moderate malnutrition” column of any of the three context areas for a diagnosis of “non-severe” or “moderate malnutrition”.

Assumptions for the CPE Continuing Education Self-study Case Studies

When completing the CPE exam for this course, the exam questions will be based on some basic assumptions. In consideration of how energy needs are to be calculated, the questions here will be based upon use of the Mifflin-St. Jeor equation for resting energy needs. Additional calculations for activity and injury, protein and fluid needs for adults are based upon recommendations published in the *Diet and Nutrition Care Manual* (2021) by Becky Dorner & Associates, Inc. Because there are variations in how

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any practitioner determines activity, injury levels, as well as protein and fluid needs, these calculated estimates are included in the case studies.

It is important to also consider that with all instances of assessment, there are some variations in lean body mass with aging, as well as with the prior fitness level of the person being assessed. For example, the loss of lean body mass in aging is expected, and thus anthropometrics can be difficult to assess. Malnutrition can exist even in overweight or obese individuals, and evaluation of weight loss is still critical in these individuals.

After reviewing the *Nutrition Focused Physical Exam Pocket Guide*, it is advisable to practice the assessment skills with another professional to gain proficiency in each of the components. Practicing on another healthy adult could be the first step, although the likelihood of observing actual evidence of malnutrition is very low. Following practice with another professional, the practitioner could work in conjunction with someone already trained in the nutrition focused physical exam (NFPE) on actual patients/residents until comfortable and competent with this skill set. Universal precautions should be used by the practitioner engaged in a nutrition focused physical exam (NFPE), including the use of gloves with all exams.

The acronym NFPE will be utilized in CPE exam in place of Nutrition Focused Physical Exam.

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Please note additional references in the *Nutrition Focused Physical Exam Pocket Guide, Third Edition*.

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Continuing Professional Education Self-Assessment Test

General Questions about Nutrition Focused Physical Exam (NFPE)

1. A comprehensive nutrition focused physical exam (NPFE) includes but is not limited to a physical exam, vital signs, anthropometrics, and
 - a. meal intake reporting.
 - b. patient interview.
 - c. weight history over time.
 - d. drug/nutrient interactions.

2. The Academy of Nutrition and Dietetics 2017 Revised Scope of Practice for the registered dietitian nutritionist (RDN) indicates that RDNs who practice NPFE should
 - a. get approval from a physician before using NFPE.
 - b. demonstrate competence in the NPFE.
 - c. use a nutrition screening tool as part of the NFPE.
 - d. demonstrate proper infection control practices before performing NFPE.

3. Under which step of the Nutrition Care Process does the nutrition focused physical exam (NFPE) belong?
 - a. Assessment
 - b. Diagnosis
 - c. Intervention
 - d. Evaluation

4. The findings of the NFPE can be used for
 - a. determination of medical diagnosis.
 - b. confirming a micronutrient deficiency.
 - c. documentation of adult malnutrition.
 - d. writing a progress note.

5. Which of the following statements about malnutrition is based upon current research and evidence-based practice?
 - a. While serum albumin is an acute phase protein, it is still a great indicator of malnutrition.
 - b. Both serum albumin and prealbumin should be used in assessment of malnutrition.
 - c. Serum albumin and prealbumin are indicators of inflammation and are still used to assess for malnutrition.
 - d. Serum albumin and prealbumin are indicators of inflammation and are not considered indicators of malnutrition.

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6. When engaged in the Nutrition Focused Physical Exam, which of the following is recommended?
 - a. The RDN can do it with bare hands.
 - b. No equipment is needed.
 - c. The RDN should always wear personal protective equipment, including a mask, gown, and gloves.
 - d. The RDN should follow universal precautions, including the use of gloves, with all exams.

7. How many areas of clinical characteristics help determine malnutrition as outlined by the A.S.P.E.N/Academy Guidelines?
 - a. Three
 - b. Four
 - c. Five
 - d. Six

8. The choices of context within which a diagnosis of malnutrition can be made include the context of acute illness or injury, chronic illness, and
 - a. long term health.
 - b. acute stress.
 - c. home health care concerns.
 - d. social or environmental circumstances.

Case Study 1

Mr. H is an 80-year-old male, who was living in an independent living apartment within a large Continuing Care Retirement Community (CCRC) when he suffered a fall, fracturing his right femur. During his hospitalization, he underwent open reduction and internal fixation (ORIF) of the femur. Following his surgery, he experienced poor appetite and intake, lost 15 pounds over a two-week period in the hospital, and experienced noticeable signs of depression. He was admitted to the long-term care unit at the CCRC, to begin therapy, with a goal to eventually return to independent living.

Both physician and nursing notes indicate that the surgical site is healing without redness, irritation, warmth or drainage. He will be receiving physical and occupational therapy (PT and OT). The staff are quite concerned that his intake has remained poor, and that without improvement, it will be difficult to improve his functional status, and allow him to return to independent living. He may require either skilled care or at best, assisted living for the remainder of his life. The PT and OT are concerned that without improved intake, he may not progress in therapy. The certified dietary manager (CDM) has referred him to the RDN for further assessment and a plan of care. The RDN has completed a nutrition assessment and nutrition focused physical exam with the following findings:

- Medical diagnosis: Fracture of right femur with ORIF, history of hypertension, hyperlipidemia, depression
- Height: 69” Admission Weight: 145# Prior Normal Weight: 160#

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- Estimated needs: 2600 kcal, 95 grams of protein, 1980 ml of fluid
- Diet: Regular with 240 ml high calorie/protein oral nutritional supplement (ONS) twice a day
- Intake: Average of 50% of regular diet and ONS
- Cognitive function: Generally clear with occasional confusion
- Labs: Hgb and Hct 10.0 g/dl and 38.0%, Glu 102 mg/dl, BUN 26 mg/dl, Creatinine 0.66 mg/dl, Cholesterol 188 mg/dl, Triglycerides 135 mg/dl, Na 136 mmol/L, K 4.4 mmol/L, Albumin 3.4 g/dl
- Medications: Atenolol (Tenormin) 50 mg/day, atorvastatin (Lipitor) 20 mg/day, oxycodone hydrochloride (Oxycontin) 5 mg PRN for pain, and 15 mg of mirtazapine (Remeron) for both appetite and depression.

RDN NFPE findings found to be outside of normal for age/gender are:

- Orbital region: somewhat hollow appearance
 - Upper arm: some fat loss noted
 - Clavicle bone: bone visible but not prominent
 - Dorsal hand: slight depression noted
 - Examination: Very pale skin, with mild 1+ edema around ankles and feet, and noted dyspnea upon minimal exertion (sitting up for assessment); alopecia
 - Wound: healing without redness, irritation, drainage, warmth per nursing and physician assessment
9. Mr. H's overall condition upon admission to the long-term care facility would be considered a
- a. state of acute illness.
 - b. state of acute injury.
 - c. state of chronic illness.
 - d. condition of social/behavioral/environmental circumstances.

Based upon your answer to question #9, answer the following questions accordingly.

10. Considering the NFPE, Mr. H's weight loss over the two-week time frame would be considered
- a. minor.
 - b. something to monitor.
 - c. severe.
 - d. moderate.

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11. Mr. H's energy intake as it compares to estimated need would be considered
 - a. poor to fair.
 - b. something to monitor.
 - c. indicative of severe malnutrition.
 - d. moderate.

12. Which of the following provides evidence of loss of subcutaneous fat tissue?
 - a. Thighs
 - b. Upper arms
 - c. Clavicle bone
 - d. Calves

13. Which of the following provides evidence of muscle wasting?
 - a. Orbital area
 - b. Upper arms
 - c. Clavicle bone
 - d. Calves

14. How would Mr. H's edema be rated?
 - a. Confirmation that the problem is the low albumin.
 - b. Evidence of mild to moderate fluid accumulation
 - c. Clear evidence of inadequate protein intake.
 - d. Evidence of severe fluid accumulation.

15. How would the RDN document functional assessment?
 - a. Use PT/OT statements that he has severe loss of functional status.
 - b. Use a device that measure hand-grip strength.
 - c. Estimate a moderate loss based upon PT/OT comments.
 - d. Conduct a series of sit/stand, walk, and balance tests to assess functional status.

16. Which of the following is an indicator of any potential micronutrient deficiencies to note or request further follow up on?
 - a. Edema and muscle loss
 - b. Pale skin and alopecia
 - c. Muscle loss and dyspnea
 - d. Fat loss and edema

17. How would the RDN utilize the diagnosis of hypertension, hyperlipidemia, and depression in assessing Mr. H?
 - a. As a component of the NFPE.
 - b. As a component of the PES statement.
 - c. As a component of the nutrition assessment.
 - d. As a driver of the care plan.

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18. As a component of the NFPE, how would the RDN utilize the lab values in assessing Mr. H?
- As the driver of the PES statement.
 - As a component of the nutrition assessment.
 - As part of the nutrition intervention.
 - As a component of the PES statement.
19. How would the RDN utilize the physician ordered medications in assessing Mr. H?
- As a driver of the NFPE.
 - As a component of the PES statement.
 - As a component of the nutrition assessment.
 - As part of the nutrition intervention.
20. The problem in Mr. H's PES statement is
- moderate malnutrition in context of injury related to inadequate protein-energy intake.
 - severe malnutrition related to inadequate protein-energy intake with increased protein energy needs.
 - moderate malnutrition in context of injury with poor protein-energy intake and increased needs along with fat loss.
 - severe malnutrition in context of chronic illness related to inadequate protein-energy intake.

Case Study 2

Mrs. A is an 85-year-old female that resides in a Continuing Care Retirement Community. She has been diagnosed with Stage II non-small cell lung cancer. The diagnosis was made while she was hospitalized with pneumonia, as her recovery appeared to be difficult and slow. During her hospitalization, she received several rounds of antibiotics, resulting in some nausea and diarrhea. She also developed a UTI, causing confusion in the hospital setting, with some occasional confusion now. Over the course of her 2 week hospitalization, her intake was limited to 50%, and she experienced a 5 pound weight loss.

She has now been transferred to the rehabilitation unit, with a goal of restoring her to her prior functional status so that she can return home and undergo a workup for chemotherapy and/or radiation therapy for her lung cancer. Her diet was changed to a soft diet as nursing staff thought it would be easier for her to consume soft, "comfort" foods. With this change her intake has improved somewhat, and she is now consuming 75% of her diet, but she is refusing the oral nutritional supplement (ONS) that was ordered following her admission.

Mrs. A has lost another 2 pounds over the last 2 weeks in the rehab facility. Her husband is concerned that she is "still very weak, pale, and thinner". He is bringing in some of her favorite foods from a local restaurant. She is accepting these better than

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her meal tray, but still does not consume more than 75%. She reports being glad to have some weight loss, and does not wish to necessarily re-gain the lost weight. The RDN has determined that a nutrition focused physical exam would be helpful in determination of a PES statement and plan of care, particularly with her cancer workup pending.

- Medical diagnosis: recent pneumonia, new diagnosis of stage II non-small cell lung cancer, mild hypertension, GERD, antibiotic induced diarrhea, history of iron deficiency anemia, hypothyroidism
- Height: 63" Admission Weight: 143# Prior Normal Weight: 150#
- Estimated Needs: 2088 kcal, 78 grams of protein, 1950 ml of fluid
- Diet: Soft and bite-sized with 240 ml ONS PRN
- Intake: 75% of diet, whether from facility or from outside. Chooses not to drink the ONS
- Cognitive function: confused only occasionally, at times presents as possibly depressed per nursing staff notes
- Physical functioning: weak from pneumonia and diarrhea, but getting up for meals, shower, some activities. Reports she is slowly feeling stronger.
- Labs: Hgb/Hct 10.8 g/dl and 34.3%, Glucose 130 mg/dl, BUN 14 mg/dl, Creat 0.75 mg/dl, Cholesterol 200 mg/dl, Triglycerides 135 mg/dl, Na 142 mmol/L, K 4.6 mmol/L, Albumin 3.1 g/dl, Vitamin D-25 hydroxy 40 ng/ml, TSH 2.42 mU/L
- Medications: Prilosec (omeprazole) 20 md/day, generic verapamil ER 120 mg/day, Synthroid (levothyroxine sodium) 75 mcg/day, Culturelle Probiotic Caps 1 twice a day, Multivitamin complex 1 daily, Iron Sulfate 325 mg per day, Vitamin D 1000 IU/day

Findings of the RDN on the NFPE:

- Orbital region: normal with slight bulging
- Upper arm: normal
- Thoracic lumbar: normal
- Temporalis muscle: normal
- Clavicle: visible but not prominent
- Scapula: normal
- Dorsal hand: flat without depression
- Patellar: normal
- Posterior calf: normal
- Presence of edema/ascites: mild 1+ edema in feet and ankles
- Examination of skin, nails, eyes, lips, mouth, tongue, gums: lips chapped but otherwise normal
- Hand grip: not assessed

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21. Mrs. A's overall condition upon admission to the long-term care facility would be considered a
- state of acute illness
 - state of acute injury
 - state of chronic illness
 - condition of social/behavioral/environmental circumstances

Based upon your answer to question #21, answer the following questions accordingly.

22. Considering the NFPE, Mrs. A's total weight loss over the 4-week time frame from hospital admission to present time, would be classified as
- minor.
 - something to monitor.
 - severe.
 - indicative of moderate malnutrition.
23. Considering the NFPE, Mrs. A's energy intake of 75%, in her current setting, would be classified as
- poor to fair.
 - something to monitor.
 - severe.
 - indicative of moderate malnutrition.
24. How would Mrs. A's edema be classified?
- Confirmation that the problem is the low albumin.
 - Evidence of mild to moderate fluid accumulation.
 - Clear evidence of inadequate protein intake.
 - Evidence of a severe fluid accumulation.
25. How would the RDN utilize the diagnosis of non-small cell lung cancer, mild hypertension, and hypothyroidism in assessing Mrs. A?
- As a component of the NFPE.
 - As a component of the PES statement.
 - As a component of the nutrition assessment.
 - As a driver of the care plan.
26. How would the RDN utilize the lab values in assessing Mrs. A?
- As a component of the NFPE.
 - As the driver of the PES statement.
 - As a component of the nutrition assessment.
 - As a driver of the nutrition monitoring and evaluation.

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27. How would the RDN utilize the medications in assessing Mrs. A?
- As a driver of the NFPE.
 - As a component of the PES statement.
 - As a component of the nutrition assessment.
 - As a driver of the nutrition monitoring and evaluation.
28. Based upon the indicators, the problem in the PES statement for Mrs. A is as follows: moderate malnutrition related to inadequate oral intake in context of
- acute illness.
 - chronic illness.
 - social circumstances.
 - environmental circumstances.
29. Mrs. A makes a full recovery from her pneumonia, staying at the facility for 2 weeks to build up her strength. She then moves to the community's assisted living facility while she undergoes treatment for the stage II lung cancer. Treatment includes chemotherapy and radiation, and she experiences another 10# weight loss, a sore mouth with cracks in the corners, loss of appetite, taste changes, and extreme weakness. All staff are concerned about Mrs. A. What is the best course of action for the RDN at this point?
- Assume that her state of moderate malnutrition continues in the context of acute illness.
 - Change her care plan to reflect severe malnutrition in the context of acute illness.
 - Perform another NFPE as a part of overall nutrition assessment and develop a new PES statement and plan of care.
 - Change her care plan to reflect moderate malnutrition in the context of chronic illness.

Case Study 3

Mrs. B is a 55-year-old-female who experienced a severe stroke and was admitted to the hospital with a blood pressure of 180/110, heart rate of 110, and a severe headache that did not respond to NSAIDS treatment at home. She was treated using a stroke protocol, stabilized, and admitted to critical care initially, and eventually to a step-down unit, where she now resides. She was NPO initially and has subsequently been assessed by the speech-language pathologist (SLP). The results of that assessment show that she has significant swallowing impairment, requiring a pureed diet with mildly-thick liquids. Her diet was also restricted in sodium, but this restriction was lifted due to her poor intake.

Mrs. B has developed a stage 2 pressure injury on her coccyx. She is being assessed by PT and OT as she demonstrates right side hemiparesis. Currently she is in bed except when she is involved in therapy. She is right-handed. She has experienced periods of agitation and refuses to eat at those times. Upon admission in ER, she had 3+ pitting edema in her hands, sacral area, and lower extremities, but this has improved

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to intermittent 1+ pitting edema in feet. Some of her weight loss may be fluid related but she is considered close to a dry weight. Her prior weight is the weight recorded in physician's office, available from the electronic medical record. She had been encouraged to lose weight but had not been successful in doing so. She has been in the hospital for a total of 14 days.

- Medical diagnosis: CVA with right side hemiparesis and pharyngoesophageal dysphagia, hypertension, obesity
- Height: 65" Prior Normal Weight: 220# (from MD office record)
Current Weight: 190#
- Blood pressure: averaged 140/80 in hospital over the last 5 days
- Diet: Pureed diet with mildly thick liquids
- Intake: 50% of PO diet at best, often refuses diet altogether when agitated
- Cognitive function: alert but becomes agitated
- Labs: Hgb/Hct 11.0 g/dl and 36%, Glu 180 mg/dl, BUN 14 mg/dl, Creat 0.75 mg/dl, Cholesterol 220 mg/dl, Triglycerides 165 mg/dl, Na 145 mmol/L, K4.6 mmol/L, Albumin 2.9 g/dl,
- Medications: Lasix (furosemide) 20 mg BID, Ativan (lorazepam) 1 mg prn for anxiety

Findings of the RDN on the NFPE:

- Orbital region: slightly bulging fat pads
- Upper arm (Triceps): moderate fat loss evident
- Thoracic lumbar: ribs not visible, no protrusion of iliac crest
- Temporalis muscle: well defined muscle
- Clavicle: protrusion visible but not prominent
- Scapula: Mild depression of scapula noted
- Dorsal hand: slight bulge in dorsal region
- Patellar: Patellar prominent with little muscle
- Posterior calf: calf muscle not well developed
- Presence of edema/ascites: mild 1+ edema in feet only
- Examination of skin: stage 2 pressure injury on coccyx
- Hand grip: not assessed

30. Mrs. B's overall condition in the step-down unit would be considered
- a. a state of acute illness.
 - b. a state of acute injury.
 - c. a state of chronic illness.
 - d. a condition of social/behavioral/environmental circumstances.

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31. Considering the NFPE, Mrs. B's total weight loss over the 2-week time frame from hospital admission to present time, would be considered
- minor.
 - something to keep an eye on.
 - indicative of severe malnutrition.
 - moderate.
32. Considering the NFPE, Mrs. B's energy intake of 50%, in her current setting, would be considered
- poor to fair.
 - something to monitor.
 - moderate.
 - indicative of severe malnutrition.
33. Considering the NFPE, which component(s) indicates loss of subcutaneous fat in Mrs. B?
- Temple region
 - Upper arm (triceps)
 - Slightly visible clavicle
 - Upper thighs
34. A NPFE of Mrs. B's patellar, scapula, and posterior calf might indicate
- loss of subcutaneous fat.
 - loss of muscle mass.
 - edema.
 - weight loss.
35. Considering the NFPE, how would the edema be evaluated?
- Confirmation that the problem is the low serum albumin.
 - Evidence of mild to moderate fluid accumulation.
 - Clear evidence of inadequate protein intake recently.
 - Evidence of a severe fluid accumulation.
36. How would the RDN utilize the diagnosis of dysphagia in assessing Mrs. B?
- As a component of the NFPE.
 - As a component of the PES statement.
 - As a component of the nutrition assessment.
 - As a driver of the care plan.
37. How would the RDN utilize the diagnosis of obesity in assessing Mrs. B?
- As a component of the NFPE.
 - As the driver of the PES statement.
 - As a component of the nutritional assessment.
 - As a driver of the care plan.

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38. Based upon the indicators, what would the problem in a PES statement be for Mrs. B?
- Severe malnutrition related to inadequate oral intake in context of acute illness.
 - Moderate or non-severe malnutrition in context of injury combined with poor PO intake.
 - Moderate malnutrition in context of chronic illness combined with limited PO intake.
 - Severe malnutrition in context of chronic illness combined with poor PO intake.

Case Study 4

Mr. J is a 35-year-old male who receives care via the local health department's HIV clinic. He was diagnosed with HIV infection 8 years ago. He comes to the clinic on a quarterly basis each year, where he has labs drawn and is examined by the Infectious Disease medical residents from the medical center nearby.

Through a special medication program, Mr. J also receives his medications for free, a 3-in-1 medication that only requires he take one pill per day. Mr. J has living conditions that are not very secure, floating between family members, due to mental health issues. He has managed quite well through the years, but the physician has noted weight loss.

Knowing that the RDN in the health department does nutritional assessments, the physician refers Mr. J there. The RDN determines that this nutritional assessment should include a nutrition focused physical exam.

- Medical Diagnosis: HIV infection, H/O pneumocystis carinii pneumonia (PCP), H/O cytomegalovirus, oral candida infection
- Height: 68" Prior normal weight: 170# 6 months ago Current weight: 145#
- Diet: Regular diet, lactose free
- Intake: 50% of estimated calories and protein needs over the last month
- Labs: Hgb/Hct 13.0 g/dl and 38%, Glucose 90 mg/dl, BUN 15 mg/dl, Creat 0.85 mg/dl, Cholesterol 180 mg/dl, Na 140 mmol/L, K 4.2 mmol/L, Albumin 3.0 g/dl,
- Medications: Atripla (efavirenz + emtricitabine + tenofovir) one tab/day

Findings of the RDN on the NFPE:

- Orbital region: has a hollow look, significant loss of fat pads, skin loose, eyes appear sunken
- Upper arm (triceps): significant loss of subcutaneous fat
- Thoracic lumbar: ribs very apparent
- Temporalis muscle: area of temples is very depressed and hollow
- Clavicles: very prominent
- Scapulas: protrude and shoulders are squared
- Dorsal hand: depression noted in dorsal hand region
- Patellar: patellar prominent as knee is bent
- Posterior calf: thin, without muscle tone

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- Presence of edema/ascites: 2+ pitting edema in lower extremities
 - Examination of skin: dry and somewhat scaly, cracks noted in corners of mouth (stomatitis)
39. Based upon the NFPE, the weight loss experienced by Mr. J would be considered as
- a. severe within an acute illness.
 - b. moderate within acute illness
 - c. severe within a chronic illness.
 - d. severe within the context of social/behavioral/environmental circumstances.
40. Based on the NFPE, how many different indicators of fat loss are evident in the list above?
- a. One
 - b. Two
 - c. Three
 - d. Four
41. Based on the NFPE, how many different indicators of muscle loss are evident in Mr. J?
- a. Three
 - b. Four
 - c. Five
 - d. Six
42. What might the observations of the skin indicate?
- a. Macronutrient deficiencies
 - b. Micronutrient deficiencies
 - c. Fluid inadequacy
 - d. Protein deficiency
43. How would an oral candida infection play into the nutrition focused physical exam for Mr. J?
- a. It would not impact the exam at all.
 - b. May present as fissures at the corner of the mouth.
 - c. May present as a swollen, red tongue.
 - d. May present as soreness or burning in the mouth.
44. Based on the indicators of the Nutrition Focused Physical Exam, the problem in a PES statement for Mr. J would best be classified as what type of malnutrition?
- a. Mild
 - b. Mild to moderate
 - c. Moderate
 - d. Severe

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45. Which ICD-10 code would be most appropriate for Mr. J?
- a. Unspecified protein-calorie malnutrition
 - b. Moderate protein-calorie malnutrition
 - c. Mild protein-calorie malnutrition
 - d. Severe protein-calorie malnutrition