Nutrition Focused Physical Assessment: Identifying Older Adult Malnutrition
(Raleigh, North Carolina)
by
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MPH Paper Advisor (signature & date)
Introduction

Malnutrition is a growing concern in hospitals and long-term care facilities in the United States. Being malnourished can increase the risk of mortality in patients, as well as their length of stay in and readmission to the hospital.\(^1\) Malnutrition is often thought of as a condition that only occurs in extreme poverty, developing countries, or in war-torn regions. While this certainly happens, malnutrition has a much broader scope than that; in fact, it is estimated that 30-50% of hospitalized patients in the United States are malnourished, and that up to 85% of older adults in long term care facilities have some degree of malnutrition.\(^1,2\)

In the 1970’s, researchers revealed how widespread malnutrition was in hospitalized adults in developed countries, and the medical community turned to malnourished children in developing countries to inform their malnutrition definitions and characterizations.\(^3\)–\(^5\) Marasmus is starvation without inflammation and is a deficiency in all macro and micronutrients. It can be used to describe one of the three current malnutrition classifications: starvation-related malnutrition, which is also referred to as malnutrition in the context of social or environmental circumstances. Kwashiorkor is inadequate protein intake in the presence of adequate calories. This is found in children in developing countries who do not have adequate access to protein-rich foods and is characterized by edema in underweight children. Although this condition has similarities to adults with malnutrition, such as hypoalbuminemia and a possible inflammatory response, kwashiorkor should only be used to describe pediatric patients in developing areas due to its unique characteristics.\(^5\)

Because historic definitions do not directly apply to adult populations, and malnutrition has become a greater priority in developed countries, there is a need to better define and describe the condition. In 2012, The Academy of Nutrition and Dietetics (AND) and the American Society
of Parenteral and Enteral Nutrition (ASPEN) released a joint statement for defining and diagnosing adult malnutrition. The purpose of the joint statement is to establish a universal set of guidelines for diagnosing malnutrition. By creating these standards, the organizations hope that clinicians will more quickly recognize malnutrition, patients will receive appropriate care, researchers can better estimate its prevalence and incidence, and health care providers will have more guidance on possible interventions and realistic expectations of the outcome.

**Defining Malnutrition**

In 1942 malnutrition was defined as, “a bodily condition, detectable by any method of examination, caused by a nutritional inadequacy.” The inadequacy could refer to consuming fewer than required nutrients or to the inability to absorb those nutrients. The methods of examination available at the time meant that tissue loss, biochemical values, and overt physical signs of deficiencies were used to diagnose the nutritional inadequacy. However, these findings were often of specific micronutrient deficiencies, such as low levels of plasma ascorbic acid or visible conditions such as pellagra, beriberi, scurvy, rickets, and ophthalma. The 2012 consensus statement recognized that malnutrition can occur during states of overnutrition or undernutrition, but the focus of the paper was the latter. As was recognized decades ago, the authors explained that undernutrition can occur as a result of inadequate intake and impaired absorption, but malnutrition can also include increased nutrient requirements and altered nutrient transport and utilization. The proposed definition in this document is a “decline in lean body mass with the potential for functional impairment,” and includes multiple functions that can be impaired: molecular, physiologic, and/or gross motor levels.
Prevalence

Due to the variability of malnutrition definitions, estimating the prevalence of the condition has been difficult. Researchers and clinicians have studied, diagnosed, and treated malnutrition despite the ambiguity and have long needed better data to support their work.

“Recent estimates of the prevalence of malnutrition in the United States have varied so greatly that the Food and Nutrition Board of the National Research Council has assigned to us, as a subcommittee, the task of evaluating existing evidence on this question. Among the reasons for the widely varying estimates is the lack of criteria for the diagnosis of malnutrition.”

“In the world public health arena malnutrition is frequently a result of famine secondary to natural disaster or conflict. By contrast, disease-related malnutrition that includes an inflammatory component is commonly observed in diverse clinical practice settings throughout the world. At present, there is no clear consensus on how malnutrition should be defined.”

These excerpts are from papers published 68 years apart, yet they discuss similar problems with identifying malnutrition. Although the prevalence and severity have changed over the years, it is still difficult to compare that data, as there have been multiple definitions and methods of diagnosing malnutrition. This has made it difficult to determine just how many people are actually malnourished.

The 1942 paper described a problem with hospital diagnoses that still occurs today. It is not uncommon for someone to be admitted to the hospital for one condition, while other issues go undiagnosed, unrecorded, and untreated. Their example was dental carries in Bellevue Hospital. The records indicated that only 0.68% of the patients in 1938 had them, yet close to 90% of the adult population at that time had dental carries. This is a striking example of how easily conditions can go overlooked. It doesn’t suggest a lack of caring on the part of clinicians, but maybe a lack
of incentive to diagnose the problems and inadequate resources to treat them. What if nearly 90% of patients had been diagnosed with dental carries? Did clinicians have the time to include this in their assessments? Would the hospital have received more money to treat the condition?

These are all relevant questions for any secondary diagnosis, including malnutrition. Currently, the best estimate for the prevalence of malnutrition among those who are hospitalized in the United States is estimated to be at least 33% of the patients\textsuperscript{10}, yet the diagnosis rate has fallen far below this number. As malnutrition screening and diagnosing rates increase, we are likely to see a spike in the prevalence of malnutrition. This could make it appear that malnutrition is on the rise, rather than the diagnosing of it. Jolliffe and colleagues described a similar problem in 1942. At the time, the mortality rates from pellagra and beriberi were increasing, but the authors attributed this to better recognition of the condition, rather than an actual increased incidence in the population.\textsuperscript{8}

The following graph shows the total number of diagnoses of malnutrition in the United States according to HCUP, the Healthcare Cost and Utilization Project. The graph shows the trend of increasing malnutrition diagnoses in US hospitals, yet this total number is nowhere near the estimated prevalence of one third of hospitalized patients. Two dates are of note in the graph: 1996 was when the Joint Commission required that hospitals screen patients for nutrition risk within 24 hours of admission, and 2007 was when the Centers for Medicare and Medicaid Services (CMS) reworked its payment system to include comorbidities in the diagnosis. We can expect this trend to increase even more in the future. As shown in the table, only 3.2% of patients discharged from the hospital received a malnutrition diagnosis using ICD-9 codes 262 or 263.0-263.9\textsuperscript{6,11} This is 10 fold below the estimated prevalence of malnutrition in hospitalized patients.
2012 National statistics - all-listed

You have chosen all-listed diagnoses. The only possible measure for all-listed diagnoses is the number of discharges who received the diagnoses you selected. If you want to see statistics on length of stay or charges, go back and select "principal diagnosis."

**ICD-9-CM diagnosis codes 262, 263.0-263.9**

<table>
<thead>
<tr>
<th>ICD-9-CM diagnosis codes 262, 263.0-263.9</th>
<th>Total number of diagnoses</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>1,158,145</td>
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</table>

Weighted national estimates from HCUP National Inpatient Sample (NIS), 2012, Agency for Healthcare Research and Quality (AHRQ), based on data collected by individual States and provided to AHRQ by the States. Total number of weighted discharges in the U.S. based on HCUP NIS = 36,484,846. Statistics based on 10 or fewer weighted cases in the nationwide statistics (NIS and KID) are not reliable. These statistics are suppressed and are designated with an asterisk (*).
The next figure shows the percentage of discharged hospitalized patients who were diagnosed with malnutrition using ICD-9 codes indicated in the table below. This data was also collected from the HCUP as part of an analysis by Corkins and colleagues.\textsuperscript{11,12}

![Graph showing percentage of discharges with malnutrition diagnoses by year, United States.](image)

**Figure 1.** Percentage of hospital discharges with malnutrition diagnoses, by year, United States.

**Table 1.** ICD-9-CM Malnutrition Diagnosis Codes Used to Identify Malnutrition.

<table>
<thead>
<tr>
<th>Code</th>
<th>Diagnosis</th>
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<tbody>
<tr>
<td>260</td>
<td>Kwashiorkor</td>
</tr>
<tr>
<td>261</td>
<td>Nutritional marasmus</td>
</tr>
<tr>
<td>262</td>
<td>Other severe protein-calorie malnutrition</td>
</tr>
<tr>
<td>263.0</td>
<td>Malnutrition of moderate degree</td>
</tr>
<tr>
<td>263.1</td>
<td>Malnutrition of mild degree</td>
</tr>
<tr>
<td>263.2</td>
<td>Arrested development following protein-calorie malnutrition</td>
</tr>
<tr>
<td>263.8</td>
<td>Other protein-calorie malnutrition</td>
</tr>
<tr>
<td>263.9</td>
<td>Unspecified protein-calorie Malnutrition</td>
</tr>
<tr>
<td>579.3</td>
<td>Other and unspecified postsurgical nonabsorption</td>
</tr>
<tr>
<td>764.12-764.19</td>
<td>Light-for-date with signs of fetal malnutrition (500-2500g+)</td>
</tr>
<tr>
<td>764.20</td>
<td>Fetal malnutrition without mention of “light-for-dates” unspecified weight</td>
</tr>
<tr>
<td>764.21-764.29</td>
<td>Fetal malnutrition without mention of “light-for-dates” (&lt;500g-2500g+)</td>
</tr>
<tr>
<td>764.90</td>
<td>Fetal growth retardation, unspecified</td>
</tr>
<tr>
<td>764.91-764.99</td>
<td>Fetal growth retardation (&lt;500-2500g+)</td>
</tr>
<tr>
<td>995.52</td>
<td>Child neglect (nutritional)</td>
</tr>
<tr>
<td>995.84</td>
<td>Adult Neglect (nutritional)</td>
</tr>
</tbody>
</table>
Adding to the problem of multiple definitions of malnutrition, there have been numerous iterations of malnutrition screening tools over the years. These tools have attempted to help identify those with malnutrition so that health care professionals can intervene as early as possible. Using different malnutrition tools can result in different diagnoses, and even using the same tools by different practitioners can lead to different rates of diagnosing malnutrition. Most of the tools include questions about food intake and unintentional weight loss, but there has been no universally agreed upon tool.\textsuperscript{1,6,9}

**Diagnosing Malnutrition using Screening Tools**

The Centers for Medicaid and Medicare Services (CMS) requires nutrition screening to take place upon admission to all healthcare facilities in the United States that participate in Medicare. Registered Dietitians are often the clinicians who determine and oversee the screening process, as they are the ones who see nutritionally at-risk patients, but they do not typically conduct the screening.\textsuperscript{13}

Now that there is a clear definition of malnutrition, or undernutrition, along with guidance about how to diagnose it, dietitians and clinicians must incorporate this into their plan of work.\textsuperscript{10,14,15} It is important to review the existing screening tools before attempting to apply the consensus definition in practice.

An analysis of eleven different screening tools was published in 2012 in an effort to compare the tools and determine which are best to use in both acute care and hospital-based ambulatory care settings.\textsuperscript{13} The Mini Nutritional Assessment Short Form (MNA-SF) and the Malnutrition Screening Tool (MST) tools received the highest ratings for being sensitive and specific, and there was also data to support high reliability for the MST tool. Sensitivity is the
ability of a test to capture all those who have the condition, and specificity is not including those who do not have the condition. A sensitive test has a high proportion of true positives, and a specific test has a high rate of true negatives.\textsuperscript{13}

The Nutrition Risk Screening 2002 tool (NRS-2002) received the highest grade of those studied because the evidence demonstrated that it is valid and reliable. It was developed by The European Society for Clinical Nutrition and Metabolism (ESPEN) in 2002 with the goal of including the most relevant malnutrition and screening research.\textsuperscript{16} The developers analyzed the tool against published randomized controlled trials to determine its validity, and nutritionists and nurses tested it for two years in three Denmark hospitals. The tool aims to identify existing malnutrition upon hospital admission and to assess the risk for developing malnutrition during the hospital stay. The tool is brief, and as such, 99\% of admitted patients during the trial period were screened. It has four questions:

1. Is BMI <20.5?  
2. Has the patient lost weight within the last 3 months?  
3. Has the patient had a reduced dietary intake in the last week?  
4. Is the patient severely ill? (e.g. in intensive therapy)

If “no” is the answer to all of the questions, then the patient is monitored on a weekly basis or a care plan is initiated if the patients status could change quickly (if they are scheduled for a major operation, expected to be NPO [nothing passed orally] for several days, etc.). However, if any of the indicators are positive, then the actual body mass index (BMI), the \% of weight loss, and the \% reduction in food intake are all used to determine if the patient should get a 1, 2, or 3 added to their score. The disease state of the patient is also taken into account with adding 0, 1, 2, or 3 to their score. Once the numbers are totaled, if the patient received a 3 or more, they are considered at nutritional risk and a nutrition care plan should be put into place. If the patient receives less than a 3, then they should be screened on a weekly basis.\textsuperscript{16}
The MNA-SF was designed by Nestle to screen older adults for nutritional deficiencies. It includes the following six sections:

1. Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing, or swallowing difficulties? (severe, moderate, no loss)
2. Weight loss during last months? (>3kg, unsure, 1-3kg, no loss)
3. Mobility (bed/chair bound, able to get up but doesn’t go out, goes out)
4. Has suffered physical stress or acute disease in the past 3 months?
5. Neuropsychological problems?
6. BMI

If BMI is unavailable, the clinician can measure the calf circumference and assign the patient either 0 or 3, depending on the circumference. The answers to each section correspond to a number, and once all 6 numbers are tallied, the patient is classified as having normal nutritional status, being at risk of malnutrition, or being malnourished. The MNA-SF has six sections, which has been shortened from the 18 sections that were found in the Mini Nutritional Assessment (MNA). The MNA is currently considered the gold standard for evaluating malnutrition in older adults. The 18 question long form has been validated in hospitals and long-term care facilities and in hundreds of publications. It is fast, easy to use, reliable, and noninvasive. The MNA-SF is even faster to use, has been validated in ambulatory older adults, is available in many languages, and has been adapted by many other countries.17–20

Both the MNA-SF and the MNA classify patients as having normal nutrition status, being at risk for malnutrition, or experiencing malnutrition. If the patient is considered to have normal nutrition status, they should be rescreened again in 3 months if they are an inpatient, annually if they live in the community, or immediately after any acute event or illness. If the older adult is classified as having malnutrition, they should have a nutrition intervention that includes oral supplementation or food enhancers, their weight should be monitored, and more in-depth nutrition assessment should take place. The individual attention of a trained clinician is valuable in this
case. If the patient is considered to be at risk for malnutrition, they should receive weight monitoring and be rescreened every 3 months. However, if the at-risk patient has already lost weight, then they should also receive a more in-depth assessment and an individualized nutrition intervention.17-20

The DETERMINE checklist is a 10 statement tool that patients can self-administer. The DETERMINE acronym identifies topics that correlate with the statements; the relevant topics are:

D: Disease  
E: Eating Poorly  
T: Tooth loss/mouth pain  
E: Economic hardship  
R: Reduced social contact  
M: Multiple medicines  
I: Involuntary weight loss/gain  
N: Needs assistance in self care  
E: Elder years above age 80

The tool itself asks about eating habits, weight loss, disease states, and medications. Patients answer yes or no to the following statements:

1. I have an illness or condition that made me change the kind and/or amount of food I eat. (D)  
2. I eat fewer than two meals per day. (E)  
3. I eat few fruits or vegetables, or milk products. (E)  
4. I have three or more drinks of beer, liquor, or wine almost every day. (E)  
5. I have tooth or mouth problems that make it hard for me to eat. (T)  
6. I don’t always have enough money to buy the food I need. (E)  
7. I eat alone most of the time. (R)  
8. I take three or more different prescribed or over-the-counter drugs a day. (M)  
9. Without wanting to, I have lost or gained 10 pounds in the last six months. (I)  
10. I am not always physically able to shop, cook, and/or feed myself. (N)  
11. I am more than 80 years old. (E)

A “yes” response is given a value from a 1-3 and the scores are tallied so a risk assessment can be applied to the patient. If a patient scores between 0-2, they are considered at low risk, are provided with education, and are screened again in 6 months. If they receive between 3-5, they are classified as moderate risk, are referred to an education program, health care professional, or
community resource, and then they are rescreened in 3 months. A patient with a score of 6 or higher is diagnosed as high nutritional risk, and they should be seen by a dietitian or physician.

The SGA, or Subjective Global Assessment, is another comprehensive screening tool. It is divided into two sections; the first has four components that focus on the patient’s recent history:

1. Weight change (as recently as the past two weeks to the last six months)
2. Dietary intake (any change from usual, and what kind of change)
3. Gastrointestinal Symptoms (nausea, vomiting, diarrhea, or anorexia for >2 weeks)
4. Functional Capacity (any dysfunction in Activities of Daily Living and for how long)

The second section includes a physical examination portion that asks about loss of subcutaneous fat, muscle wasting, ankle edema, and ascites. This section asks the clinician to rank the patient in each of these areas from normal to severe. The SGA differs from most tools, as it does not assign a numerical value to each component; rather, it relies on the judgment of the clinician to determine the nutritional status of the patient. The three ratings are: well nourished, moderately malnourished (or suspected of being malnourished), and severely malnourished. This technique has good success at having inter-rater reliability and rarely classifies well-nourished patients as malnourished, but it may miss those experiencing mild malnutrition.21

Current Practice: The ABCD’s of Nutrition

Anthropometrics

Anthropometric measurements include the height and weight of the patient and comparing it to the ideal measurements for their age. This information is used, along with other data, to estimate energy needs of patients. The nutrition focused physical assessment (NFPA) can be conducted as part of this, but this paper includes the NFPA in the clinical section.

Obtaining an accurate height for the patient is an important piece in estimating their needs. Height may be found in the medical record or obtained in the hospital. If the patient is able to
stand and the equipment is available, a stadiometer can be used to measure height. The patient should stand with their back to the wall, look straight ahead, and inhale before the measurement is taken. If this is not possible, then height can be estimated by using knee height or wing span.

Ideally, the health care facility will include both the height and the weight in the patient’s chart. Weight can be obtained by a bedside scale or by a scale on the hospital bed itself. It is important that the bed scale is properly zeroed; everything that is on the bed should be on the bed during each subsequent measurement. Ideally, the bed scale could be tared with a hospital gown, blanket, and one pillow to minimize discomfort to the patient while weight is collected. Obtaining weight during the hospital stay is important so any shifts in body fluid can be monitored and weight fluctuations recorded and prevented.

In addition to obtaining patient weight in the health care facility, it is vital to know if any weight changes have occurred prior to admission. The percentage of weight loss as well as the time in which the weight loss has occurred are both relevant data points. Because malnutrition in the context of acute illness or injury can occur within days or weeks, the relevant time for weight change within that diagnosis is 1 week to 3 months. Malnutrition in the context of chronic illness or in the context of social or environmental circumstances can occur during a period of weeks to years, so the relevant time for weight change in those instances can range from 1 month to one year.

Weight loss history can be obtained upon admission to the hospital or long-term care facility; this information can also be found in the medical record or by interviewing the patient or their family. Because this information may be self-reported and based on different scales than the hospital uses, there is room for error in this characteristic. Therefore, it is important to assess the other malnutrition components.
Once height and weight have been obtained, the clinician can calculate BMI. Older adults are at a greater risk for malnutrition than the general population when their BMI is in the low range of normal. The normal BMI range for adults is between 18.5 and 24.9, but for older adults, it is between 24 and 27. Because of the changing body composition in older adults, it is important to include BMI as one of many data points when evaluating the nourished state of the patient.

**Biochemical data**

Another goal of the joint statement was to discourage using laboratory values in the diagnosis of malnutrition, as many of them can be dramatically affected by inflammation.\textsuperscript{22,23} This is crucial, as inflammation and malnutrition are often present simultaneously. Prealbumin and albumin have historically been used to help evaluate the nutrition status of patients, yet these are negative acute phase proteins; they are reduced in the presence of inflammation.\textsuperscript{6,14,24} Additionally, they have been shown to remain relatively stable during periods of starvation in the absence of inflammation.\textsuperscript{24} Therefore, these laboratory values are better used as part of the larger clinical picture of the patient and to evaluate the presence of inflammation, rather than malnutrition.\textsuperscript{22}

Not only did the joint statement describe how the inflammatory process alters clinical markers, but it also made the presence of inflammation an important consideration in determining the type of malnutrition the patient may be experiencing. Indeed, of the three malnutrition definitions, two of them include inflammation: chronic-disease related malnutrition and acute disease or injury-related malnutrition. The third classification is starvation-related malnutrition.\textsuperscript{6}

Chronic disease-related malnutrition may occur in the presence of cancer, arthritis, COPD, sarcopenic obesity, and other conditions that result in a low level of inflammation. Acute disease-
related malnutrition often happens quickly and can be the result of a major infection, burns, closed head injury, or other trauma.\textsuperscript{1,6,9} The state of inflammation is often high, but may be resolved once the trauma or injury is healed. Patients who have chronic diseases may experience acute assaults, so it is possible to experience both forms of malnutrition simultaneously.\textsuperscript{1}

**Clinical Information**

Clinical information can give a dietitian important clues to the health of the patient and provide insight into all the aspects of assessing malnutrition. For example, a person with a diagnosis of congestive heart failure might be prone to fluid accumulation, which could mask any fat or muscle loss if their weight remained stable. Additionally, many diagnoses, such as cancer or arthritis, could indicate the presence of inflammation in the patient. This could influence the type of malnutrition they may be experiencing, and it should affect their nutrition prescription and treatment.

Reading the patient’s chart and discussing the patient with the medical team are important steps to getting the full clinical picture. Additionally, four of the six characteristics used to identify malnutrition can only be obtained by physical assessment, which can be included in the clinical picture. The four characteristics are: loss of body fat, loss of muscle mass, fluid accumulation, and reduced grip strength.

Because evaluating these characteristics is so important, Jensen and colleagues conducted a study in tertiary hospitals in Pennsylvania to determine how feasible the implementation of the malnutrition guidelines are in our current hospital structure.\textsuperscript{15} The dietitians were able to gather most of the needed information by using the electronic and paper medical records, patient or family interview, and by physical exam. This data was available for over half of the patients at each
hospital, and different categories were more readily available depending on the hospital. The authors had hypothesized that the clinicians would not be able to determine food intake and weight loss history in the majority of the patients, yet they were able to do so in both hospitals in the ICU and non-ICU settings.\(^\text{15}\)

The biggest piece of missing information was grip strength. Because dynanometers were not available at the two hospitals, hand grip strength could not be determined. This reveals a need to increase supply of these tools at hospitals and long term care facilities as well as the need for training clinicians on their use. Another important piece of data from this study was the finding of 39% prevalence of malnutrition in the study population. It is important to collect more data points such as this one to better estimate the actual prevalence of malnutrition in the US and elsewhere.\(^\text{15}\)

**Nutrition Focused Physical Assessment**

Obtaining hand grip strength requires the use of equipment, but identifying loss of body fat, loss of muscle mass, and fluid accumulation can be done by performing a physical exam. A virtual course by Abbott details three body areas that are important to include when evaluating possible muscle loss: the temples, collar bone, and shoulder.\(^\text{25}\) These are important areas to evaluate for muscle tone, as skeletal muscle serves as the largest storage side for protein in the body, and it is the place in the body most affected by protein malnutrition.\(^\text{5}\) The practitioner should always follow facility guidelines for patient contact during the exam, explain the purpose of the exam to the patient, and ask for permission before beginning.

It is advisable to begin with the temple of the patient, as it is the least invasive area and may help gain the trust of the patient. This area evaluates the temporalis muscle. The dietitian
should begin by sweeping the fingers horizontally across the temple from the hairline to the eye socket (temporal line) and palpate over both the sphenoid bone and the temporal line. The next step is a vertical motion from the sphenoid bone across the frontal bone, in between the hairline and the eye socket. The third motion is from the sphenoid bone to the parietal bone, in a diagonal motion from the hairline to the eye socket. Each of these areas should be evaluated first by an overall sweeping motion, then by pressing with the finger. A healthy muscle will feel like pressing on the crease of a folded leather belt, while lean tissue deterioration or wasting may feel a bit watery, like a water balloon or a tube of toothpaste. If the temporal line is visible, that is not necessarily indicative of malnutrition. It is important to actually touch the patient to evaluate any wasting. The following diagram shows the bones used as reference point for the palpations.

Once the temple has been evaluated, the dietitian should move on to the collarbone. Again, the visibility of the bone should not be a flag for muscle loss, as the collar bone is visible in many well-nourished individuals, particularly females. The goal for this portion of the exam is to evaluate the health of the trapezius and pectoralis muscles. This exam begins with palpating the
The trapezius muscle from behind the ear to the clavicle, moving down the patient’s neck. The trapezius muscle should make a 45 degree angle if a line were drawn between the two shoulders. It should feel like a leather belt, without stringiness or looseness. Next, the trapezius (anterior to the clavicle) and the pectoralis (posterior to the clavicle) should be evaluated around the clavicle by palpating around the bone, moving distally from the sternum to the shoulder. The muscle should again feel like a leather belt, and the clavicle should disappear into tissue and the trapezius as you move distally. In a patient who is malnourished, the ribs may be easily visualized or felt, and the muscle may feel stringy, much like yarn tightly wrapped around a wooden block.25

The third region to be evaluated for muscle loss is the shoulder. It is easy to access and is often quite different between those who are well nourished and those who are not. Like the clavicle, it may be normal to see protruding bone; in this case, the acromion process may be visible. However, bone should not be felt under this protrusion. Instead, the deltoid should be felt under the skin. This region should not feel watery; the textures in the deltoid region are again like the leather belt, but also like flour and a balloon in areas. The shoulder of someone who has muscle wasting may feel more like a deflated water balloon with some water still remaining.25
The Subjective Global Assessment suggests evaluating the quadriceps for muscle wasting, so if feasible, evaluating the muscle tone in the legs of the patient can also be included in the physical exam. In addition to evaluating these areas for muscle tone, the practitioner may palpate these areas to evaluate possible fat loss. Fat is commonly lost first in the face, upper arm, and over the ribs, so assessing for muscle and fat loss may occur simultaneously. If there has been significant fat loss in the shoulders, they will look squared off rather than rounded. Fat loss in the hands can also be identified, but this should be interpreted with caution; it is common for well-nourished older adults to have decreased fat mass in their hands.

Evaluating the patient for fluid accumulation is another key component for identifying malnutrition. Edema is commonly included in the doctor’s and nurse’s notes, but it is important for the dietitian to also look for any swelling. Edema associated with malnutrition is most common in the extremities, and malnutrition related to liver disease may result in fluid accumulation in the abdominal region, known as ascites. The clinician should evaluate the presence of pitting edema, which occurs when the swollen area is pressed by a finger and a pit remains for more than 5 seconds.
While considering fluid accumulation, the dietitian should evaluate the hydration status of the patient. There are several laboratory values, such as sodium and blood urea nitrogen, that can provide information about hydration status, but physical findings can also be used. If a patient has normal hydration status, they should be alert, have a capillary refill time of less than 2 seconds, and have moist mucus membranes, normal tear production, normal skin turgor, normal appearing eyes, and normal urine output. Mild to severe dehydration can cause changes in cognitive state ranging from lethargy to unresponsiveness. Capillary refill time can be assessed by pressing on the patient’s nail and releasing. If the nail color does not change from white to pink within two seconds, the patient could be experiencing dehydration. Skin turgor can be evaluated by gently lifting the patient’s skin to visualize how quickly it returns to normal; a severely dehydrated patient will have tenting in the lifted area. Additionally, sunken eyes and decreased urine output can be signs of dehydration. Other information about hydration status can be obtained in the patient’s room or in the physician or nursing charts: heart rate, respiratory rate, blood pressure, and pulse.\textsuperscript{24}

It is valuable to understand how the identification of malnutrition and the resulting nutrition care plan has progressed once patient follow up occurs. One of the most important aspects of correcting undernutrition is to support wound healing, so evaluating skin integrity at the initial and follow up visits is vital. This information is usually found in the nurses charting notes, as they often describe wounds after dressings are changed. Even though the dietitian may not evaluate or treat wounds, it is important to monitor their healing. Pressure ulcers are a huge economic burden to hospitals and there are clear relationships between healing and adequate nutrition. There are four stages of pressure ulcers, so their presence and stage should be noted during evaluation and follow up visits. Other breaks in the skin, such as recent incisions, should also be taken into
account and included in the patient’s medical record, as they likely increase the energy needs of the patient.\textsuperscript{10} Skin should also be evaluated for discoloration, bruising, and translucency.\textsuperscript{24}

During the physical assessment of the patient, the dietitian should evaluate the patient’s hair and nails and take note of any irregularities. Someone experiencing inadequate nutrition may have thinning hair, discoloration on the strands, or the hair may be removed from the scalp without pain.\textsuperscript{21} Similar to hair and skin, nails contain rapidly dividing cells, so irregularities can be indicators of deficiencies.\textsuperscript{14} Discolored or brittle nails or marked ridges in the nails could all be signs of a deficiency.\textsuperscript{21}

**Dietary assessment**

It is important to keep in mind the six characteristics that can be used to diagnose malnutrition when assessing a patient: their energy intake, weight loss, body fat, muscle mass, fluid accumulation, and grip strength. Gathering information about the patient’s recent energy intake is a logical first step in the evaluation.\textsuperscript{6,15,21}

The patient should indicate if they have had any recent changes in their food or fluid intake and what those changes are – they may have reduced or increased their intake, begun to eat less solid foods and more liquids, or they may not have consumed much of anything recently. It is important to note the duration of abnormal intake in days or weeks. Clinicians should also ask patients about any nausea, vomiting, diarrhea, or constipation that they have experienced. The SGA only asks about gastrointestinal symptom lasting longer than two weeks, but it is important to gather any gastrointestinal information about the patient as soon as possible so any changes at follow up can be evaluated.\textsuperscript{21}
Assessing energy intake in the hospital can be cumbersome and difficult for the clinician and the accuracy can vary based on the hospital. If the patient is consuming foods and beverages orally, the percentage of intake may be recorded in the nursing chart. It is important to compare the percentage of food consumed to the meal that was actually ordered or delivered to the patient. Consuming 100% of one muffin is much different than consuming 50% of a breakfast of oatmeal, eggs, and fruit, so it is vital to understand the composition of the meals consumed. When undernutrition is suspected, it is most important to gather information on the amount of protein rich foods the patient is consuming. If the patient is receiving oral nutrition supplements, there may not be information about how much of each supplement is consumed; this information could be gathered by speaking with the patient’s nurse, by interviewing the patient or the family, and by taking note of any unopened supplements in the patient’s room. Discussing the importance of gathering this information with the other clinicians, such as nurses, can help improve the accuracy of evaluating energy intake.

Treatment

Defining and properly identifying malnutrition has been a decades-long process in the United States. It has been difficult to educate the medical team on the importance of the issue and how addressing and treating malnutrition can impact many health outcomes. Not only has the diagnosing of this condition been a journey, but determining proper treatment has also been an issue. This can be a tricky situation, as the type of malnutrition, as well as the wishes of the patient, determine the course of treatment and the type of nutrition intervention.

If a patient is diagnosed with starvation-related malnutrition, or malnutrition in the context of social or environmental circumstances, then the probability for complete rehabilitation after
nutrition intervention is high. The goal, therefore, is recovery. Because inflammation is not present, treating these patients involves nutritional resuscitation. Long term maintenance of adequate nutrition depends on the circumstances that lead to the malnutrition. This depends on the patient’s goals, and this information must be gathered from the patient or the patient’s family. A treatment plan should be made as part of the larger medical team. Counseling and community services are vital to the survival of patients in this situation.

A patient who has chronic disease-related malnutrition, or malnutrition in the context of chronic illness, does not have a black and white treatment plan. Malnutrition in this context can be twofold: the patient may experience reduced dietary intake due to decreased appetite, and they may have lost lean body tissue due to the presence of chronic inflammation. Inadequate nutrition can lead to greater lean tissue loss, but appropriate nutrition cannot reverse the effect inflammation has on lean tissue. Patients who are experiencing this type of malnutrition need medical nutrition therapy in concert with medical treatment for their underlying condition. Nutrition alone cannot restore their body reserves unless comorbidities are addressed.5 As with malnutrition in the absence of inflammation, patients who do have inflammation should be counseled and educated on the benefits of adequate nutrition and the improvements it can have on their prognosis. Finding nutrient and protein dense foods that the patient is willing to consume is the ideal scenario. The patient should also be encouraged to have smaller, more frequent meals to achieve adequate intake. If the patient is not able to meet their needs with food alone, or if they are having trouble with or are not interested in solid foods, then oral nutrition supplements would be appropriate. Foods and supplements can be used together and can help the patient regain their strength and potentially their ability to meet their needs through food.
When treating a patient with acute disease or injury-related malnutrition, also referred to as malnutrition in the context of acute illness or injury, the goal is to preserve the functioning and integrity of their organs and body systems, particularly the immune system, while the patient is being treated for the acute event. Oral nutrition is always the first line of defense, but a critically ill patient is more likely to require enteral or parental nutrition than other patients.

**Discussion**

The 2012 malnutrition consensus statement was a call to action for dietitians and other health care professionals. The evidence has been building that previous ways of identifying malnutrition were incomplete and sometimes inaccurate. By following universal, evidenced-based, and validated guidelines, more widely accepted screening tools can be used, and malnutrition can be identified more efficiently and accurately. Faster diagnosis can improve patient care by expediting nutrition interventions, which in turn has the potential to reduce hospital length of stays, readmission rates, and mortality. It is imperative for dietitians to become proficient at nutrition-based physical assessments so the profession can include malnutrition diagnosis in its scope of practice and streamline patient care.

Clinicians are already comfortable assessing many other anthropometric and clinical components, so it is important for them to begin to include evaluation of muscle, fat, and fluid status in their patients. Comfort with physical assessment and confidence in training are not the only obstacles that clinicians may face with regard to Nutrition Focused Physical Assessments. They must manage these increased measurements with their limited time and lack of funding. Dietitians are not able to bill for time spent conducting physical assessments, so obtaining these measurements has to be a priority for the health care facility. Institutions should support thorough
assessments that can reveal a diagnosis like malnutrition. By treating patients with suboptimal nutrition, the patients can receive better care and the hospitals can potentially spend less money.

Correctly diagnosing malnutrition in a timely manner is also important for the health of the patient, as the faster those with malnutrition are identified, the quicker their nutrition needs can be addressed. Not only does this improve their health by reducing length of stay, readmission rate, and mortality, but it also saves money for the health care facilities by reducing the burden of caring for patients longer term.\textsuperscript{10} There is a huge opportunity for dietitians if they include this diagnosis in their practice, not only because it fits into their scope and expertise\textsuperscript{7}, but also because malnutrition diagnosis can increase the reimbursement for a hospital. The consensus publication specifies that the patient must have at least two of the six characteristics to be diagnosed with the condition, so it is imperative that dietitians be trained on adequately judging all of these parameters.\textsuperscript{6}

Including malnutrition in the scope of care for pediatric patients is not as complicated for practitioners; the growth charts serve as valuable tools for tracking the growth of pediatric patients. This allows comparisons to other children of the same age, height, and pubertal status, and they can also include data points throughout the child’s life. Easy to use charts such as the weight-for-height and height-for-age charts give a visual tool for clinicians and parents to reference and a reason for moving forward to address nutrition issues. In the adult population, however, assessing adequate nutrition is not as straightforward. The progression of malnutrition is harder to track in adults, as it can take place so slowly that the patient adapts to the changes. There are no longer growth curves, developmental milestones, or the structure of the school system. Older adults may live independently in the community and not notice gradual changes in their appetite, weight, and muscle tone. Furthermore, because nutrition screening is only required upon admission to
healthcare facilities, we must screen the adults who are living in the community. Waiting until an inpatient setting may be too late for correcting the nutrition status in these patients, so we must make it a priority in the community and in the physician’s office. This should be done in conjunction with increasing awareness of malnutrition in the hospital, and clinicians in all settings should be trained to screen for it.

Along with growth curves and BMI percentiles, nutrition and eating habits are discussed with pediatric patients, but these topics may fall under the radar as we age. Visits with doctors may be filled with discussing a new diagnosis or strategies to deal with an existing one. Patients and physicians may begin to view proper nutrition as secondary to medical conditions, rather than integral to their treatment. Doctors and other outpatient and community clinicians should be encouraged, trained, and compensated for identifying and addressing malnutrition and to treat those at risk for developing it as early as possible. By pushing for better screening in the community, we may see better nourished patients in the hospital who could have improved clinical outcomes.

Establishing awareness of malnutrition in the community is vital to successful treatment once patients are discharged from the hospital. Once malnutrition has been identified, treatment in the inpatient setting should proceed as previously described; however, dietitians and other clinicians should be able to refer patients to resources once they leave the hospital. With the creation of facilities like Transition Care Clinics to reduce hospital readmissions, the model for remaining connected to the patient and the support from the Centers for Medicare and Medicaid has been established. It is vital to establish relationships with other community partners, such as congregate meal sites, meal delivery services, and financial assistance programs. Hospitals
should create an environment that encourages the entire patient care team, from the dietitians to the discharge planners, to connect the patient to community resources.

Making these connections between the hospital and the outpatient setting is another example of how our health care system excels with the pediatric population, yet falls short with its older adult patients. Just as new mothers may leave the hospital with supplies for their newborn, such as diapers and formula, patients with malnutrition should leave the hospital with a voucher for groceries, if not with actual food. Patients who require enteral products may have the financial support of insurance coverage, so it is not unreasonable to hope that the cost of food be covered as treatment for malnutrition. As we work towards increasing the recognition and diagnosing of malnutrition, we must focus greater effort on treating and preventing this condition. Our current model of treating a patient and sending them home without addressing the root cause or without providing more resources for ongoing treatment is not working. As part of the medical team, dietitians should lead the efforts for more aggressive care. We have a responsibility to our profession and to our patients.
Works Cited


27. Community-based Care Transitions Program | Center for Medicare & Medicaid Innovation.