MEDICAL MANAGEMENT OF MALNUTRITION (UNDERNUTRITION)

Federal Bureau of Prisons

Clinical Guidance

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WHAT'S NEW IN THIS VERSION

In December 2018, a typo was corrected in *Appendix 1*, as follows:

- In **QUESTION 1** of the **Malnutrition Screening Tool (MST)**, the first option under "**If YES, how much weight have you lost?**" was corrected to "**2–13 pounds,"** (instead of "2–3 pounds").

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1. PURPOSE AND TERMINOLOGY

The Federal Bureau of Prisons (BOP) Clinical Guidance for the *Medical Management of Malnutrition (Undernutrition)* provides recommendations for the assessment and nutritional augmentation of inmates who are in a malnourished state. *Malnutrition*, which can be defined as inadequate and/or unbalanced nutritional intake, may arise in cases of either *undernutrition* (insufficient calories) or *overnutrition* (too many calories).

The term *undernutrition* applies to individuals who lack the calories, protein, or other nutrients needed for tissue maintenance and repair. Identification and treatment of adult undernutrition is a major concern in acute, chronic, and transition care settings. **For the purposes of these guidelines, therefore, the term *malnutrition* will be used to refer solely to *undernutrition*.**

2. IMPORTANCE OF EARLY INTERVENTION AND MONITORING

Malnutrition in adults is a major health problem that continues to go unrecognized and, therefore, untreated. It is both a cause and a consequence of ill health across many patient groups and healthcare settings. Current estimates of the prevalence of adult malnutrition range from 15% to 60%, depending on the patient population and the criteria used to identify its occurrence.

It is estimated that at least one-third of the patients admitted to the hospital in developed countries are malnourished; if their malnutrition is left untreated, approximately two-thirds of these patients will experience a further decline in their nutritional status during inpatient stay. Moreover, among patients who are not malnourished upon admission, approximately one-third may become malnourished while in the hospital. A variety of factors may contribute to a decline in nutritional status such as mental/cognitive status, illness-induced poor appetite, gastrointestinal symptoms, reduced ability to chew or swallow, or nil per os (NPO) status for diagnostic and therapeutic procedures.

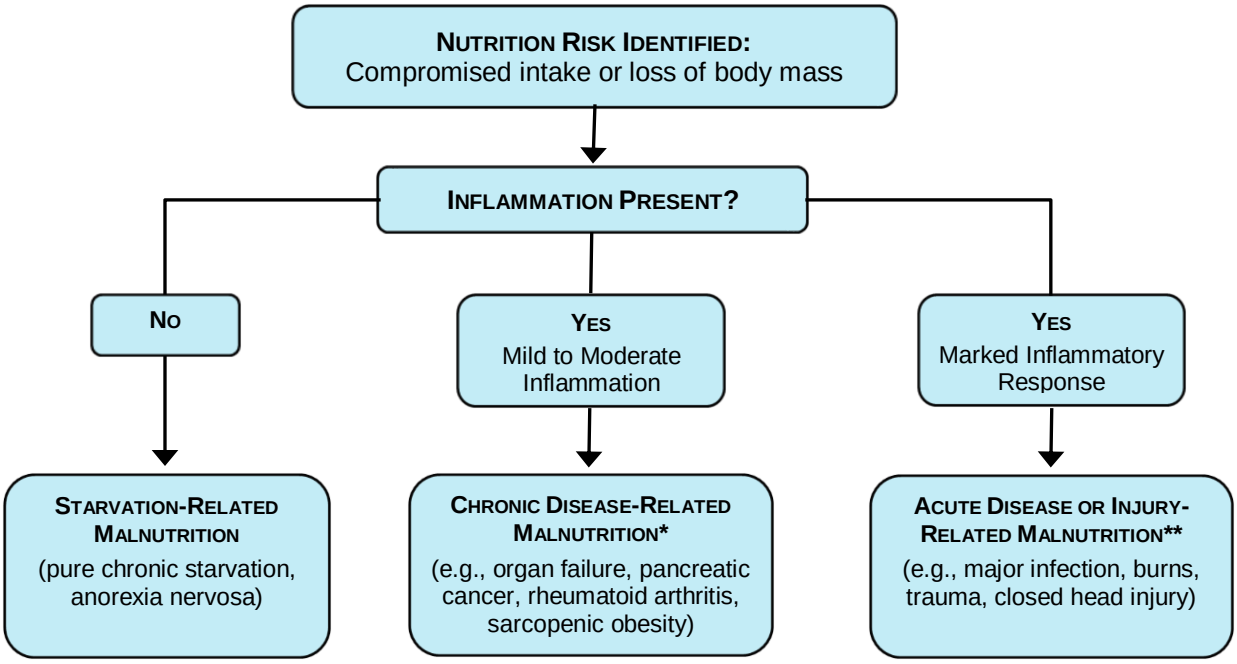
According to the American Society for Parenteral and Enteral Nutrition (ASPEN), although data vary across studies, available evidence shows that early nutrition intervention can reduce complication rates, length of hospital stay, readmission rates, mortality, and cost of care. Evidence-based recommendations support the screening, assessment, intervention, and monitoring of malnutrition.

➔ *See Sections 3–7 of these guidelines for information on Etiologies, Screening, Advanced Clinical Assessment, Diagnosis, and Intervention.*

3. ETIOLOGIES

A recommended etiology-based approach to the diagnosis of adult malnutrition in clinical settings was endorsed in 2009 by ASPEN and the European Society for Clinical Nutrition and Metabolism (ESPEN). This approach (see *Figure 1* below) focuses on three etiologies: *starvation-related malnutrition, chronic disease-related malnutrition*, and *acute disease* or *injury-related malnutrition*. It also takes into consideration the role of inflammation as an important factor in the increased risk for malnutrition.

FIGURE 1. ETIOLOGY-BASED MALNUTRITION DEFINITIONS



Adapted from: White JV, Guenter P, Jensen G, Malone A, Schofield M. Consensus statement of the Academy of Nutrition and Dietetics/ASPEN: characteristics recommended for the identification and documentation of adult malnutrition (undernutrition). *J Acad Nutr Diet*. 2012;112(5):732. Available at: http://malnutrition.andjrnl.org/Content/articles/1-Consensus_Statement.pdf

* ***Other chronic diseases or conditions that can result in malnutrition:*** *Cardiovascular disease, cancer, celiac disease, chronic pancreatitis, chronic obstructive pulmonary disease, congestive heart failure, cystic fibrosis, dementia, diabetes mellitus, IBD, gastrointestinal and liver disease, hematologic malignancies, HIV and AIDS, metabolic syndrome, neurological disease, neuromuscular disease, obesity, old age, organ failure/transplant, poor dentition/oral condition, pressure wounds, renal disease, respiratory disease, solid tumors.*

** ***Other acute diseases/injuries that can result in malnutrition:*** *Adult respiratory distress syndrome, closed head injury, critical illness, major abdominal surgery, major infection/sepsis, multi-trauma, orthopedic injury, systemic inflammatory response syndrome, severe burns, severe acute pancreatitis.*

Patients with acute or chronic illness present a more complex challenge in determining the presence, etiology, and extent of malnutrition—and in determining the appropriate nutrition interventions.

PROGRESSION OF MALNUTRITION

According to the 2012 *Consensus Statement* published by ASPEN and the Academy of Nutrition and Dietetics (see *References* page), malnutrition in adults "typically occurs along a continuum of inadequate intake and/or increased requirements, impaired absorption, altered transport, and altered nutrient utilization. Weight loss can, and frequently does, occur at any one or more points along this continuum. Individuals may also present with inflammatory, hypermetabolic, and/or hypercatabolic conditions."

The *Consensus Statement* also noted "that inflammation is increasingly identified as an important underlying factor that increases risk for malnutrition, [one] that may contribute to suboptimal responses to nutrition intervention and increased risk for mortality. As such, individuals may exhibit a wide range of characteristics," starting with non-severe (mild to moderate) malnutrition—that if left unrecognized and unaddressed, is likely to progress to a severely malnourished state.

4. MALNUTRITION SCREENING

ACUTE AND LONG-TERM CARE SCREENING

Comprehensive nutrition screening for all hospitalized patients should occur in the acute and long-term care settings within 24 hours of admission, to identify individuals who are at risk for malnutrition and allow for nutrition care planning. Malnutrition screening should be performed as part of Medical Referral Center (MRC) nursing admission assessments for inpatient, mental health, and long-term care units, using the Malnutrition Screening Tool (MST) (see *Appendix 1*). Repeat malnutrition screening for patients initially screened as low-risk should be performed according to the policies of the individual facility or as determined by the patient care team.

AMBULATORY CARE SCREENING

If malnutrition is suspected in patients seen in ambulatory care settings, screening can be performed by nursing staff, nursing assistants, administrative staff, physicians, or dietitians. In the ambulatory care setting, screening should be performed in accordance with the Mini Nutrition Assessment (MNA)® (see *Appendix 2*). If malnutrition is identified in ambulatory care patients, the physician, ideally in concert with a BOP registered dietitian, should provide advanced clinical assessment (see *Section 5* below). Dentists who suspect malnutrition should refer patients to the medical staff or a BOP registered dietitian for malnutrition assessment.

5. ADVANCED CLINICAL ASSESSMENT

If a patient is considered to be at-risk for malnutrition, the medical provider and an MRC dietitian should work together to determine the potential etiology—conducting a careful review of the patient's chief complaint, as well as the patient's systems; medical, nutrition, and psychosocial histories; mental health status; physical exam; laboratory markers of inflammation; anthropometric parameters; food intake; oral/dentition conditions, and functional status.

6. DIAGNOSIS

Since no single factor is conclusive in determining the presence of adult malnutrition, diagnosis should be based on identifying at least two of the following characteristics:

➔ *See Appendix 3 for more detail.*

(1) Insufficient energy intake

(2) Weight loss

(3) Loss of subcutaneous fat

(4) Loss of muscle mass

(5) Localized or generalized fluid accumulation, which may sometimes mask weight loss

(6) Diminished functional status, as measured by hand grip strength

Assessment of these characteristics aids in distinguishing between *non-severe (mild to moderate) malnutrition* (263.0: Malnutrition of a Moderate Degree) and *severe malnutrition* (262: Other Severe Protein Calorie Malnutrition). While these characteristics are assessed along a continuum, rather than as discrete variables, they are useful in formulating and documenting a diagnosis of malnutrition.

SERUM PROTEIN

Serum protein such as albumin and prealbumin are not included as defining characteristics of malnutrition. Recent analysis shows that serum levels of those proteins are not considered reliable or specific biomarkers for malnutrition.

7. INTERVENTION

The goals of intervention in cases of adult malnutrition are to:

- **Prevent decline in nutritional status and the onset of associated adverse outcomes** such as increased complications (including infections), incidence of pressure ulcer formation, and mortality.
- **Optimize nutrition status and other health outcomes** through improved total nutrient intake, body anthropometry, and other timely interventions geared to the patient's needs—in collaboration with a multidisciplinary team.

SEVERE MALNUTRITION

In cases of severe malnutrition, consideration should be given to the potential for *refeeding syndrome*. Identification of individuals at high-risk, clinical and biochemical monitoring, initiation of refeeding, and potential related clinical manifestations of electrolyte abnormalities should be managed as outlined in the BOP Clinical Practice Guidelines, *Medical Management of Inmates with Hunger Strike*.

➔ *See Appendix 4 for information on establishing and monitoring desired outcomes in cases of severe malnutrition.*

NUTRITION INTERVENTION

Nutrition intervention strategies represent a broad spectrum of options that fall into four categories:

(1) Food and/or nutrient delivery

(2) Nutrition education

(3) Nutrition counseling

(4) Coordination of nutrition care

Consultation with a BOP registered dietitian should be undertaken—locally at MRCs or via tele-health consultation at non-MRCs—to determine the appropriate, clinically indicated intervention strategies. The consultation should result in determination of whether a special diet, supplemental feeding, or dietary supplement is clinically indicated, in accordance with *Program Statement 4700.06, Food Service Manual, Program Statement 6031.03, Patient Care,* and *BOP National Formulary.* An individualized plan to address and monitor the patient's observed nutrition deficits should be developed, implemented, and revised as necessary until nutrition status is optimized.

PHARMACOLOGY

In addition to oral nutrition supplementation, medications to stimulate the patient's appetite—if appropriate—may be used to increase nutritional intake. BOP pharmacy staff should be consulted regarding available formulary options.

PARENTERAL AND ENTERAL NUTRITION

Enteral or parenteral nutrition may be indicated if other nutrition support fails; however, it is outside the scope of these guidelines to address the planning and administration of enteral or parenteral nutrition. The Regional Medical Director, a BOP dietician, or Medical Referral Center staff experienced in parenteral and enteral nutrition therapy should be consulted on a case-by-case basis, as needed.

REFERENCES

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Available at: *http://nutritioncaremanual.org/content.cfm?ncm_heading=&ncm_toc_id=144942*
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Available at: *http://malnutrition.andjrnl.org/Content/articles/1-Consensus_Statement.pdf*

APPENDIX 1: MALNUTRITION SCREENING TOOL (MST)

STEP 1: Ask screening questions to obtain score.

QUESTION 1: Have you recently lost weight without trying?

UNSURE = 2
NO = 0
If YES, how much weight have you lost?
2–13 lbs = 1
14–23 lbs = 2
24–33 lbs = 3
34 lbs or more = 4

WEIGHT LOSS SCORE: ☐

QUESTION 2: Have you been eating poorly because your appetite is decreased?

NO = 0
YES = 1

APPETITE SCORE: ☐

STEP 2: Assess score to determine risk of malnutrition.

MST SCORE
(WEIGHT LOSS SCORE + APPETITE SCORE): ☐

MST SCORE = 0–1 ➜ Not at risk
MST SCORE = 2 or more ➜ At risk

STEP 3: If at risk for malnutrition (MST SCORE of 2 or more), make referral to dietitian who can provide advanced malnutrition assessment and potential intervention.

APPENDIX 2: MINI NUTRITION ASSESSMENT (MNA®)

What is the MNA?

"The MNA is a validated nutrition screening and assessment tool that can identify geriatric patients age 65 and above who are malnourished or at risk of malnutrition. The MNA was developed nearly 20 years ago and is the most well validated nutrition screening tool for the elderly. Originally comprised of 18 questions, the current MNA now consists of 6 questions and streamlines the screening process. The current MNA retains the validity and accuracy of the original MNA in identifying older adults who are malnourished or at risk of malnutrition. The revised MNA Short Form makes the link to intervention easier and quicker and is now the preferred form of the MNA for clinical use."

> Source: *http://www.mna-elderly.com/*. Use this link for more information about the form, which is available in a variety of languages.

A copy of the MNA appears on the next page. To access the form directly, use the following link: *http://www.mna-elderly.com/forms/mini/mna_mini_english.pdf*

Mini Nutritional Assessment

MNA®

Nestlé Nutrition Institute

Last name: First name:

Sex: Age: Weight, kg: Height, cm: Date:

Complete the screen by filling in the boxes with the appropriate numbers. Total the numbers for the final screening score.

Screening

A Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties?
0 = severe decrease in food intake
1 = moderate decrease in food intake
2 = no decrease in food intake ☐

B Weight loss during the last 3 months
0 = weight loss greater than 3 kg (6.6 lbs)
1 = does not know
2 = weight loss between 1 and 3 kg (2.2 and 6.6 lbs)
3 = no weight loss ☐

C Mobility
0 = bed or chair bound
1 = able to get out of bed / chair but does not go out
2 = goes out ☐

D Has suffered psychological stress or acute disease in the past 3 months?
0 = yes 2 = no ☐

E Neuropsychological problems
0 = severe dementia or depression
1 = mild dementia
2 = no psychological problems ☐

F1 Body Mass Index (BMI) (weight in kg) / (height in m^2) ☐
0 = BMI less than 19
1 = BMI 19 to less than 21
2 = BMI 21 to less than 23
3 = BMI 23 or greater ☐

IF BMI IS NOT AVAILABLE, REPLACE QUESTION F1 WITH QUESTION F2.
DO NOT ANSWER QUESTION F2 IF QUESTION F1 IS ALREADY COMPLETED.

F2 Calf circumference (CC) in cm
0 = CC less than 31
3 = CC 31 or greater ☐

Screening score ☐☐
(max. 14 points)

12-14 points: ☐ Normal nutritional status
8-11 points: ☐ At risk of malnutrition
0-7 points: ☐ Malnourished

Save Print Reset

Ref. Vellas B, Villars H, Abellan G, et al. *Overview of the MNA® - Its History and Challenges*. J Nutr Health Aging 2006;10:456-465.
Rubenstein LZ, Harker JO, Salva A, Guigoz Y, Vellas B. *Screening for Undernutrition in Geriatric Practice: Developing the Short-Form Mini Nutritional Assessment (MNA-SF)*. J. Geront 2001;56A: M366-377.
Guigoz Y. *The Mini-Nutritional Assessment (MNA®) Review of the Literature - What does it tell us?* J Nutr Health Aging 2006; 10:466-487.
Kaiser MJ, Bauer JM, Ramsch C, et al. *Validation of the Mini Nutritional Assessment Short-Form (MNA®-SF): A practical tool for identification of nutritional status.* J Nutr Health Aging 2009; 13:782-788.

For more information: www.mna-elderly.com

APPENDIX 3: CLINICAL CHARACTERISTICS THAT SUPPORT A DIAGNOSIS OF MALNUTRITION

➔ ***A minimum of two characteristics is recommended for diagnosis of either severe or non-severe malnutrition.***

<table>
<tr><th>CLINICAL CHARACTERISTICS</th><th colspan="2">IN NON-SEVERE (MODERATE) MALNUTRITION</th><th colspan="2">IN SEVERE MALNUTRITION</th></tr>
<tr><td>(1) ENERGY INTAKE
Malnutrition is the result of inadequate food and nutrient intake or assimilation; thus, recent intake compared to estimated requirements is a primary criterion defining malnutrition.
The clinician may obtain or review the food and nutrition history, estimate optimum energy needs, compare them with estimates of energy consumed, and report inadequate intake as a percentage of estimated energy requirements over time.</td><td colspan="2"><75% of estimated energy requirement for ≥3 months</td><td colspan="2"><50% of estimated energy requirement for ≥1 month</td></tr>
<tr><td rowspan="5">(2) INTERPRETATION OF WEIGHT LOSS
The clinician may evaluate weight in light of other clinical findings, including the presence of under- or over-hydration. The clinician may assess weight change over time, reported as a percentage of weight lost from baseline.</td><td>TIME</td><td>%</td><td>TIME</td><td>%</td></tr>
<tr><td>1 mo</td><td>5</td><td>1 mo</td><td>>5</td></tr>
<tr><td>3 mo</td><td>7.5</td><td>3 mo</td><td>>7.5</td></tr>
<tr><td>6 mo</td><td>10</td><td>6 mo</td><td>>10</td></tr>
<tr><td>1 year</td><td>20</td><td>1 year</td><td>>20</td></tr>
<tr><td>(3) BODY FAT
LOSS OF SUBCUTANEOUS FAT: e.g., orbital, triceps, fat overlying the ribs.</td><td colspan="4">See Appendix 3a: Subcutaneous Fat Loss</td></tr>
<tr><td>(4) MUSCLE MASS
MUSCLE LOSS: e.g., wasting of the temples (temporalis muscle); clavicles (pectoralis and deltoids); shoulders (deltoids); dorsal interosseous muscles in the hand; scapula (latissimus dorsi, trapezious, deltoids); thigh (quadriceps); and calf (gastrocnemius).</td><td colspan="4">See Appendix 3b: Muscle Loss</td></tr>
<tr><td>(5) FLUID ACCUMULATION
The clinician may evaluate generalized or localized fluid accumulation evident on exam (extremities; vulvar/ scrotal edema or ascites). Weight loss is often masked by generalized fluid retention (edema), and weight gain may be observed.</td><td colspan="4">See Appendix 3c: Edema</td></tr>
<tr><td>(6) REDUCED GRIP STRENGTH
Consult normative standards supplied by the manufacturer of the measurement device.</td><td colspan="2">N/A</td><td colspan="2">Measurably reduced for age and gender.</td></tr>
</table>

Adapted from: White JV, Guenter P, Jensen G, Malone A, Schofield M. Consensus statement of the Academy of Nutrition and Dietetics/ASPEN: characteristics recommended for the identification and documentation of adult malnutrition (undernutrition). *J Acad Nutr Diet*. 2012;112(5):734–735.
Available at: http://malnutrition.andjrnl.org/Content/articles/1-Consensus_Statement.pdf

APPENDIX 3A: SUBCUTANEOUS FAT LOSS

EXAM AREAS	TIPS	SEVERE MALNUTRITION	MILD-MODERATE MALNUTRITION	WELL-NOURISHED
ORBITAL REGION – surrounding the eye	View patient while standing directly in front of him/her; touch face above cheekbone.	Hollow look; depressions, dark circles, loose skin around the eyes.	Slightly dark circles; somewhat hollow look.	Slightly bulged fat pads; fluid retention may mask loss.
UPPER ARM REGION – triceps/biceps	With patient's arm bent, roll skin between your fingers; do not include muscle in pinch.	Very little space between folds; your fingers touch.	Some depth to the pinch, but not ample.	Ample fat tissue is obvious between folds of skin.
THORACIC AND LUMBAR REGION – ribs, lower back, midaxillary line	Have patient press hands hard against a solid object.	Depression between the ribs is very apparent; iliac crest is very prominent.	Ribs are apparent; depressions between them are less pronounced; iliac crest is somewhat prominent.	Chest is full; ribs do not show; slight-to-no protrusion of the iliac crest.

Source: "Physical Exam – Parameters Useful in Assessment of Physical Status" developed by White J, Merriman L, Scollard T, Cleveland Clinic Center for Human Nutrition. Malnutrition coding. In Biesemeier C, ed. *Nutrition Care Manual*. Academy of Nutrition and Dietetics; 2013.
Available at http://fnce.eatright.org/fnce/uploaded/635126818215788680-179%20Barrocas%202.pdf.

APPENDIX 3B: MUSCLE LOSS

EXAM AREAS	TIPS	SEVERE MALNUTRITION	MILD-MODERATE MALNUTRITION	WELL-NOURISHED
Upper Body				
TEMPLE REGION – temporalis muscle	View patient while standing directly in front of him/her; ask patient to turn head side to side.	Hollowing, scooping, depression.	Slight depression.	Well-defined muscle can be seen/felt.
CLAVICLE BONE REGION – pectoralis major, deltoid, trapezius muscles	Look for prominent bone; make sure the patient is not hunched forward.	Protruding, prominent bone.	Visible in male; some protrusion in female.	Not visible in male; visible, but not prominent, in female.
CLAVICLE AND ACROMION BONE REGION – deltoid muscle	With patient's arms at side, observe shape.	Shoulder-to-arm joint looks square; bones are prominent; acromion protrusion is very prominent.	Acromion process may protrude slightly.	Rounded curves at arm/shoulder/neck.
SCAPULAR BONE REGION – trapezius, supraspinus, infraspinus muscles	Ask patient to extend hands straight out and push against a solid object.	Prominent, visible bones; depressions between ribs/scapula or shoulder/spine.	Mild depression or bone may show slightly.	Bones are not prominent; no significant depressions.
DORSAL HAND – interosseous muscle	Look at thumb-side of the hand; look at pads of the thumb, with tip of the forefinger touching tip of the thumb.	Depressed area on thumb-side of the hand, between thumb and forefinger.	Slightly depressed area.	Muscle bulges, although could be flat in some well-nourished people.
Lower Body (Less Sensitive to Change)				
PATELLAR REGION – quadriceps muscles	Ask patient to sit with leg propped up, bent at the knee.	Bones prominent; little sign of muscle around the knee.	Knee cap is less prominent, more rounded than in severe malnutrition.	Muscles protrude; bones are not prominent.
ANTERIOR THIGH REGION – quadriceps muscles	Ask patient to sit; prop up leg on low furniture. Grasp quads to determine amount of muscle tissue, differentiating from fat tissue.	Depression/line on inner thigh; obviously thin.	Mild depression on inner thigh.	Well-rounded, well-developed inner thigh.
POSTERIOR CALF REGION – gastrocnemius muscle	Grasp the calf muscle to determine amount of tissue.	Thin; minimal to no muscle definition.	Muscle not well-developed.	Well-developed bulb of muscle.

Source: "Physical Exam – Parameters Useful in Assessment of Physical Status" developed by White J, Merriman L, Scollard T, Cleveland Clinic Center for Human Nutrition. Malnutrition coding. In Biesemeier C, ed. *Nutrition Care Manual*. Academy of Nutrition and Dietetics; 2013. Available at http://fnce.eatright.org/fnce/uploaded/635126818215788680-179%20Barrocas%202.pdf

APPENDIX 3C: EDEMA

EXAM AREAS	TIPS	SEVERE MALNUTRITION	MILD-MODERATE MALNUTRITION	WELL-NOURISHED
Rule out other causes of edema; determine patient's dry weight.	View scrotum or vulva in activity-restricted patient; examine ankles in mobile patient.	Deep to very deep pitting; depression lasts a short to moderate time (31–60 seconds); extremity looks swollen (3–4+).	Mild to moderate pitting; slight swelling of the extremity; indentation subsides quickly (0–30 seconds).	No sign of fluid accumulation.

Source: "Physical Exam – Parameters Useful in Assessment of Physical Status" developed by White J, Merriman L, Scollard T, Cleveland Clinic Center for Human Nutrition. Malnutrition coding. In Biesemeier C, ed. *Nutrition Care Manual*. Academy of Nutrition and Dietetics; 2013.
Available at http://fnce.eatright.org/fnce/uploaded/635126818215788680-179%20Barrocas%202.pdf

APPENDIX 4: RECOMMENDED OUTCOME MEASURES FOR SEVERE MALNUTRITION

OUTCOME	MEASURE
Improved nutrition knowledge	Measure knowledge gained, behavioral changed, and adherence to plan.
Improved nutrient intake: • Energy • Protein • Fluid	• Monitor intake, using direct observation and quantitative dietary intake methods, especially intake of energy and protein. • Monitor fluid balance. • Review progress towards nutrient goals; set criteria for commencing interventions such as higher energy diets.
Improved nutrition anthropometry	Monitor body weight.
Improve nutritional biochemistry	Caution should be exercised when monitoring and interpreting the patient's biochemistry, particularly in the acute care setting; consideration should be given to the burden of testing on the patient.
Prevention of pressure ulcers	As outlined in BOP Clinical Guidance on *Wound Care Management*.
Improved wound healing	As outlined in BOP Clinical Guidance on *Wound Care Management*.
Reduced infections and use of antibiotics	Monitor at population level.
Increase peak expiratory flow	To be performed by appropriate health professional.
Decreased nausea, vomiting, and/or diarrhea	Intervene with early feeding when necessary. Review tolerance to formula/feeding regimen to ensure achievement of goals.
Improved physical function	Monitor handgrip strength.
Improved life expectancy	Monitored at population level.

Source: Watterson C, Fraser A, Banks M, Isenring E, Miller M, et al. (2009). Evidence based practice guidelines for the nutritional management of malnutrition in adult patients across the continuum of care. Nutrition and Dietetics. 2009;66:S1–S34.