DETECTING ADULT MALNUTRITION THROUGH NUTRITION FOCUSED PHYSICAL ASSESSMENT: ELEVATING THE ROLE OF NUTRITION FOR IMPROVED PATIENT OUTCOMES

Medical Science Liaison
Abbott Nutrition
Medical Affairs
HOW TO BE ADDED TO THE ATTENDANCE LIST FOR TODAY’S PROGRAM:

• Please type your name and credentials into the chat box

• Let us know whether you are a:
  - RD
  - RN
  - Case manager
  - Physician
  - Other/Student/Intern
DISCLOSURE

• The content of this program has met the continuing education criteria of being evidence-based, fair and balanced, and non-promotional

• This educational event is supported by Abbott Nutrition Health Institute, Abbott Nutrition

• I am an employee of Abbott Nutrition
OBJECTIVES

1. Discuss the prevalence and identification of adult malnutrition
2. Identify the basics of physical assessment including functional status
3. Define and identify micronutrient deficiencies
4. Synthesize and practice the components of a comprehensive head-to-toe physical assessment
5. Discuss best practice strategies for improved patient outcomes including nutrition intervention
RECOMMENDED READINGS


PREVALENCE OF MALNUTRITION

<table>
<thead>
<tr>
<th>HOSPITAL ADMISSION</th>
<th>HOSPITAL STAY</th>
<th>HOSPITAL DISCHARGE</th>
<th>HOSPITAL READMISSION</th>
</tr>
</thead>
<tbody>
<tr>
<td>30% to 55% of hospital patients are malnourished upon admission(^1)-(^4)</td>
<td>33% of severely malnourished patients and 38% of well-nourished patients experience nutritional decline(^4)</td>
<td>Many patients continue to lose weight after discharge(^5)</td>
<td>Patients with weight loss are at increased risk for readmission(^1)</td>
</tr>
</tbody>
</table>

MALNUTRITION NEGATIVELY IMPACTS PATIENT OUTCOMES

NUTRITION FOCUSED PHYSICAL EXAM (NFPE)

Benefits:

- Contribute to more effective care plans
- Determine appropriate interventions
- Increase dietitian proficiency
CURRENT STATE OF MALNUTRITION DOCUMENTATION

- AND DNS Survey results of n=542 RDN respondents (24% response rate)

<table>
<thead>
<tr>
<th>Survey Questions</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>RDN diagnoses malnutrition</td>
<td>79%</td>
</tr>
<tr>
<td>RDN consistently performs NFPE</td>
<td>44%</td>
</tr>
<tr>
<td>Provider documents malnutrition</td>
<td>93%</td>
</tr>
<tr>
<td>Institutions codes for malnutrition when present</td>
<td>21%</td>
</tr>
<tr>
<td>Barriers to coding for malnutrition</td>
<td></td>
</tr>
<tr>
<td>Provider disagrees with diagnosis</td>
<td>35%</td>
</tr>
<tr>
<td>RDs lack NFPE training</td>
<td>33%</td>
</tr>
<tr>
<td>Providers documenting malnutrition incorrectly</td>
<td>42%</td>
</tr>
</tbody>
</table>
OUTCOMES ASSOCIATED WITH NFPE MALNUTRITION DOCUMENTATION – HOSPITAL PATIENTS

- Chart review of Veteran's Hospital August 2012 – December 2014 after implementation of Consensus Statement
- Statistical model predicted readmission or death in 84% of all cases

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Malnourished (n=202)</th>
<th>Nonmalnourished (n=202)</th>
<th>OR (95% CI) Unadjusted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Met composite endpoint†</td>
<td>108 (53%)</td>
<td>36 (18%)</td>
<td>5.30 (3.36-8.34)*</td>
</tr>
<tr>
<td>Readmit w/in 30d</td>
<td>63 (21%)</td>
<td>24 (12%)</td>
<td>3.36 (1.99-5.65)*</td>
</tr>
<tr>
<td>Died w/in 90d</td>
<td>65 (32%)</td>
<td>16 (8%)</td>
<td>5.52 (3.06-9.95)*</td>
</tr>
<tr>
<td>LOS &gt;7d</td>
<td>83 (41%)</td>
<td>28 (14%)</td>
<td>4.33 (2.66-7.06)*</td>
</tr>
<tr>
<td>DC nursing home</td>
<td>52 (26%)</td>
<td>24 (11.9%)</td>
<td></td>
</tr>
<tr>
<td>DC home</td>
<td>113 (56%)</td>
<td>165 (81.7%)</td>
<td></td>
</tr>
<tr>
<td>Mean LOS, d (SD)</td>
<td>9.8 (11.5)</td>
<td>4.4 (4.5)</td>
<td></td>
</tr>
</tbody>
</table>

† Readmitted within 30 days or die within 90 days of discharge
*P<0.001
Length of stay (LOS), Discharge (DC)
## OUTCOMES ASSOCIATED WITH NFPE MALNUTRITION DOCUMENTATION

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Mosquera(^1)</th>
<th>Guerra(^2)-(^3)</th>
<th>Hand(^4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>Surgical</td>
<td>In-patient</td>
<td>In-patient</td>
</tr>
<tr>
<td>Complications</td>
<td>↑ ~20%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe complications</td>
<td>↑ ~85%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOS</td>
<td>8 vs 6d</td>
<td>↑ ~35% w/ LOS ≥7d(^2)</td>
<td>√</td>
</tr>
<tr>
<td>Total costs</td>
<td>↑ ~50%</td>
<td>↑ ~20%(^3)</td>
<td>√</td>
</tr>
<tr>
<td>Readmission</td>
<td>↑ ~55%</td>
<td></td>
<td>√</td>
</tr>
<tr>
<td>Mortality</td>
<td>↑ ~200%</td>
<td></td>
<td>√</td>
</tr>
</tbody>
</table>

Length of stay (LOS)

VALIDATED SCREENING TOOLS¹⁻³

• Malnutrition Screening Tool (MST)
  – All patient use, quick and easy
  – Endorsed by AND
• Malnutrition Universal Screening Tool (MUST)
  – Community use in geriatrics
• Nutrition Risk Screening (NRS-2002)
  – Uses MUST components plus disease severity
  – Endorsed by European Society for Clinical Nutrition and Metabolism (ESPEN)
• Subjective Global Assessment (SGA)
  – Most validated tool for multiple disease settings
• Mini Nutrition Assessment (MNA)
  – Validated for use in age 65 or older

“It is the position of the Academy of Nutrition and Dietetics (AND) that, based upon current evidence, the Malnutrition Screening Tool should be used to screen adults for malnutrition (undernutrition) regardless of their age, medical history, or setting.”

## MALNUTRITION SCREENING TOOL (MST)

### STEP 1: Screen with the MST

1. **Have you recently lost weight without trying?**
   - **No** 0
   - **Unsure** 2

2. **If yes, how much weight have you lost?**
   - 2-13 lb 1
   - 14-23 lb 2
   - 24-33 lb 3
   - 34 lb or more 4
   - **Unsure** 2

   **Weight loss score:**

3. **Have you been eating poorly because of a decreased appetite?**
   - **No** 0
   - **Yes** 1

   **Appetite score:**

### STEP 2: Score to determine risk

- **MST = 0 OR 1**
  - **NOT AT RISK**
    - Eating well with little or no weight loss
    - If length of stay exceeds 7 days, then rescreen, repeating weekly as needed.

- **MST = 2 OR MORE**
  - **AT RISK**
    - Eating poorly and/or recent weight loss
    - Rapidly implement nutrition interventions. Perform nutrition consult within 24-72 hrs., depending on risk.

### STEP 3: Intervene with nutritional support for your patients at risk of malnutrition.

**Notes:**

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ETIOLOGY-BASED DEFINITIONS OF MALNUTRITION

Nutrition Risk Identified
↓ intake or body mass

Inflammation Present?
No/Yes

NO

Starvation-Related Malnutrition
(e.g. Pure chronic starvation, anorexia nervosa)

YES

Mild to Moderate Degree

Chronic Disease-Related Malnutrition
(e.g. Organ failure, pancreatic cancer, rheumatoid arthritis, sarcopenic obesity)

YES

Marked Inflammatory Response

Acute Disease- or Injury-Related Malnutrition
(e.g. Major infection, burns, trauma, closed head injury)

### MARKERS OF INFLAMMATION

<table>
<thead>
<tr>
<th>Acute</th>
<th>Chronic</th>
<th>Abnormal vitals</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Swelling</td>
<td>- Similar to acute</td>
<td>- Vitals</td>
</tr>
<tr>
<td>- Erythema</td>
<td>- Lesser degree</td>
<td>- Biochemical markers</td>
</tr>
<tr>
<td>- Hyperthermia</td>
<td>- Longer duration of time</td>
<td>- Imaging studies</td>
</tr>
<tr>
<td>- Pain</td>
<td>- May lack ‘classic’ signs</td>
<td>- May not be related to nutrition status</td>
</tr>
<tr>
<td>- Elevated CRP</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Leukocytosis</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Acute – defense, clearance and adaption and repair response  
Chronic – low grade response to restore and achieve homeostasis  
Abnormal vitals – only consider supportive when determining etiology

## ANALYZING ACUTE PHASE PROTEINS

<table>
<thead>
<tr>
<th>Positive Acute Phase Proteins</th>
<th>Negative Acute Phase Proteins</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antibodies</td>
<td>Albumin</td>
</tr>
<tr>
<td>Complement</td>
<td>Transferrin</td>
</tr>
<tr>
<td>C-Reactive Protein</td>
<td>Prealbumin</td>
</tr>
<tr>
<td>Fibrinogen, Prothrombin</td>
<td>Retinol-binding protein</td>
</tr>
<tr>
<td>Cytokines: TNF-alpha, IL-6</td>
<td></td>
</tr>
<tr>
<td>Metallothionein</td>
<td></td>
</tr>
<tr>
<td>Ceruloplasmin</td>
<td></td>
</tr>
<tr>
<td>α1-acid glycoprotein</td>
<td></td>
</tr>
<tr>
<td>Haptoglobin</td>
<td></td>
</tr>
</tbody>
</table>

STARVATION-RELATED MALNUTRITION

• Caused by social/environmental factors
• Chronic
• No inflammation present
• Examples:
  – Poor food access
  – Cognitive dysfunction
  – Emotional disturbances
  – Physical impairment

CHRONIC DISEASE-RELATED MALNUTRITION\textsuperscript{1-2}

- Mild to moderate inflammation
- 3 months or longer
- Examples:
  - Rheumatoid arthritis
  - Diabetes
  - Cancer
  - Chronic pancreatitis
  - IBD, Celiac disease
  - Cardiovascular disease
  - Congestive heart failure
  - Lupus
  - Sarcopenic obesity

ACUTE DISEASE/INJURY-RELATED MALNUTRITION

• Severe inflammation
• Acute onset/duration
• Examples:
  – Sepsis
  – Major infection or surgery
  – Closed head injury
  – ARDS
  – Trauma
  – Burns

ARDS: Acute respiratory distress syndrome
**DIAGNOSING MALNUTRITION (AND/ASPEN)**

1. **Nutrition Risk Identified**
   - ↓ intake or body mass

   **Inflammation Present?**
   - No/Yes

   **NO**
   - **Starvation-Related Malnutrition**
     (e.g. Pure chronic starvation, anorexia nervosa)

   **YES**
   - **Mild to Moderate Degree**
     - **Chronic Disease–Related Malnutrition**
       (e.g. Organ failure, pancreatic cancer, rheumatoid arthritis, sarcopenic obesity)

   **YES**
   - **Marked Inflammatory Response**
     - **Acute Disease- or Injury-Related Malnutrition**
       (e.g. Major infection, burns, trauma, closed head injury)

---

DIAGNOSING MALNUTRITION (ESPEN 2015)

- BMI <18.5 kg/m²
  OR
- Weight loss (unintentional) > 10% indefinite of time, or >5% over the last 3 months combined with either
  - BMI <20 kg/m² if <70 years of age, or <22 kg/m² if 70 years of age or
  - FFMI <15 and 17 kg/m² in women and men, respectively. (FFMI: Fat Free Mass Index)

GLOBAL LEADERSHIP INITIATIVE ON MALNUTRITION (GLIM) CRITERIA FOR DIAGNOSING MALNUTRITION

Screening

Assessment

Diagnosis

Severity

Is the individual at risk for malnutrition?

Yes

Assess:

Phenotypic Criteria
- Unintended weight loss
- Low BMI
- Reduced muscle mass

Etiologic Criteria
- Reduced food intake
- Disease burden/inflammatory condition

If 1 phenotypic criteria and 1 etiologic criteria present, this individual meets criteria for a malnutrition diagnosis

Severity is determined based on phenotypic criteria

SIX CHARACTERISTICS FOR IDENTIFYING ADULT MALNUTRITION

- Insufficient Energy Intake
- Unintentional Weight Loss
- Subcutaneous Fat Loss
- Muscle Loss
- Fluid Accumulation
- Declining Functional Status

INCORPORATION OF ASSESSMENT

• History and Clinical Diagnosis
• Physical Exam/Clinical Signs
  – Weight loss, fluid status, muscle and/or fat loss, specific macro/micronutrient deficiencies
  – Inflammation, other signs of non-specific systemic inflammatory response
• Anthropometric Data
  – Unintended weight loss is a well validated indicator of malnutrition
• Laboratory Data
• Nutrient Intake
• Functional Assessment
  – Hand-grip strength should be used to document a decline in physical function, as appropriate to patient circumstance.

# SIX CHARACTERISTICS: INTAKE

<table>
<thead>
<tr>
<th>Malnutrition Type</th>
<th>Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Disease/Injury-related</td>
<td>$&lt; 75% \text{ EER}$  &gt; 7 days</td>
<td>$\leq 50% \text{ EER}$  \geq 5 days</td>
</tr>
<tr>
<td>Chronic Disease-related</td>
<td>$&lt; 75% \text{ EER}$  \geq 1 month</td>
<td>$\leq 75% \text{ EER}$  \geq 1 month</td>
</tr>
<tr>
<td>Social/Environment</td>
<td>$&lt; 75% \text{ EER}$  \geq 3 months</td>
<td>$\leq 50% \text{ EER}$  \geq 1 month</td>
</tr>
</tbody>
</table>

$\text{EER} = \text{estimated energy requirement}$

## SIX CHARACTERISTICS: WEIGHT LOSS

<table>
<thead>
<tr>
<th>Duration</th>
<th>Acute Disease/Trauma</th>
<th>Chronic Disease</th>
<th>Starvation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 week</td>
<td>1-2%</td>
<td>&gt;2%</td>
<td></td>
</tr>
<tr>
<td>1 month</td>
<td>5%</td>
<td>&gt;5%</td>
<td>5%</td>
</tr>
<tr>
<td>3 months</td>
<td>7.5%</td>
<td>&gt;7.5%</td>
<td>7.5%</td>
</tr>
<tr>
<td>6 months</td>
<td>10%</td>
<td>&gt;10%</td>
<td>10%</td>
</tr>
<tr>
<td>1 year</td>
<td>20%</td>
<td>&gt;20%</td>
<td>20%</td>
</tr>
</tbody>
</table>

- **Acute Disease/Trauma**: 1-2% = Moderate Malnutrition, >2% = Severe Malnutrition
- **Chronic Disease**: 5% = Moderate Malnutrition, >5% = Severe Malnutrition
- **Starvation**: 5% = Moderate Malnutrition, >5% = Severe Malnutrition

ASSESSING WEIGHT LOSS

• Be aware of:
  – Measurements vs. estimations
  – Fluid status (dehydrated vs. edematous)
  – Current disease state
  – Error (recall, equipment)
  – Alterations due to clothes/shoes and differences between scales

Weight loss is likely the most valid nutrition assessment parameter\textsuperscript{1,2}

GETTING STARTED:
4 TECHNIQUES USED DURING NFPE:

• Inspection
  – Visual observation of color, shape, texture and size

• Palpation
  – Touch to examine location, texture, size, temperature, tenderness and mobility. Use fingertips and pads to assess pulsation and tenderness. Use the back of hand to assess temperature

• Percussion
  – Tapping of the fingers against body surfaces, listening for sounds that reflect solids, fluids, or gas

• Auscultation
  – Listening to sounds that reflect the movement of fluid or air through organs and viscera

PREP FOR EXAM

Cleaning precautions:

• Wash hands
• Use gloves, mask, gown, etc. if appropriate
• Clean equipment with hospital-grade disinfectant

Talk with patient:

• Introduce yourself
• Explain what you will be doing & how long it will take
• Ask for permission to touch
SIX CHARACTERISTICS: FAT LOSS

• Orbital Region (Surrounding Eye)
  – Temporal Bone
  – Zygomatic Arch (Cheekbone)

• Upper Arm Region
  – Triceps

• Thoracic and Lumbar Region
  – Ribs
  – Lower Back
  – Mid-axillary Line

<table>
<thead>
<tr>
<th></th>
<th>Moderate Malnutrition</th>
<th>Severe Malnutrition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acute Injury</strong></td>
<td>Mild</td>
<td>Moderate</td>
</tr>
<tr>
<td><strong>Chronic Illness</strong></td>
<td>Mild</td>
<td>Severe</td>
</tr>
<tr>
<td><strong>Social/Env.</strong></td>
<td>Mild</td>
<td>Severe</td>
</tr>
</tbody>
</table>

SIX CHARACTERISTICS: FAT LOSS$^{1-2}$

Orbital Region

- **Exam:** Visually assess for loss of fat under the eyes and lightly palpate above cheekbone

- **Findings:**
  - Severe loss – pronounced hollowness/depression, dark circles, loose saggy skin
  - Moderate loss – somewhat hollowness, slightly dark circles
  - No loss – slight bulging

EXAMPLES


EXAMPLES

**Orbital Fat Pads**

**TIP:** Look at patient straight on, observe area under eyes

**NOTE:** Water retention can mask subcutaneous fat loss in orbital fat pads

<table>
<thead>
<tr>
<th>Slightly bulged fat pads</th>
<th>Somewhat hollow look, slightly dark circles</th>
<th>Hollow look, eyes sunken, dark circles, lose skin</th>
</tr>
</thead>
</table>
SIX CHARACTERISTICS: FAT LOSS

Upper Arm Region

• Exam: Bend arm at 90 degrees, pinch arm at midpoint and roll down until free of muscle and only pinching fat

• Findings:
  – Severe loss – mostly skin
  – Moderate loss – some fat tissue, not ample
  – No loss – ample fat tissue

SUBCUTANEOUS FAT LOSS IN TRICEPS

Triceps & Biceps

TIP: Arm bent to 90° angle, do not include muscle in pinch, roll skin b/w fingers

<table>
<thead>
<tr>
<th>Normal</th>
<th>Mild-Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ample fat tissue between folds of skin</td>
<td>Fingers almost touch, some depth to pinch</td>
<td>Very little space between fingers or fingers touch</td>
</tr>
</tbody>
</table>

Used with permission from the Veterans Health Administration
SIX CHARACTERISTICS: FAT LOSS

Thoracic & Lumbar Region

- Exam: Visually examine lower back and mid-axillary line (are ribs visible?), have patient press against you and physically examine fat stores above iliac crest
- Findings:
  - Severe loss – ribs visible with prominent depressions, iliac crest prominent
  - Moderate loss – ribs visible with mild depressions, iliac crest somewhat prominent
  - No loss – chest is full, ribs not visible, iliac crest with little to no protrusion

EXAMPLES


EXAMPLES


**Anterior Ribs**

**TIP:** Examine the lower rib region for loss of fullness or loose skin

<table>
<thead>
<tr>
<th>Normal</th>
<th>Mild-Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ample fat tissue around ribs, fullness, taut skin</td>
<td>General loss of fullness, loose skin, ribs somewhat visible</td>
<td>Prominent, well-defined ribs; skin over ribs appears stretched</td>
</tr>
</tbody>
</table>

Used with permission from the Veterans Health Administration
SIX CHARACTERISTICS: MUSCLE LOSS

- Temple Region: Temporalis
- Clavicle Bone Region: Pectoralis Major, Deltoids, Trapezius
- Acromion Region: Deltoid
- Scapular Bone Region: Latissimus Dorsi, Trapezius, Supraspinatus, Infraspinatus
- Dorsal Hand Region: Interosseous
- Patellar Region & Anterior Thigh Region: Quadriceps
- Posterior Calf Region: Gastrocnemius

ANATOMY

Areas commonly assessed for muscle loss (in blue)

Figure adapted from Fischer M, et al. JPEN J Parent Enteral Nutr. 2015;30(2):239-248.
SIX CHARACTERISTICS: MUSCLE MASS$^{1-2}$

Temple Region

- Exam: Observe from front and side, touch temples in a cross-type motion, consider having patient bite down
- Findings:
  - Severe loss – deep hollowing/scooping, lack of muscle to touch, facial bones well define
  - Moderate loss – slight depression
  - No loss – can see/feel muscle, may look flat or bulged

EXAMPLES


**EXAMPLES**

**TIP:** Observe patient straight on, have them turn head to side to side

<table>
<thead>
<tr>
<th>Normal</th>
<th>Mild-Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well-defined muscle</td>
<td>Slight depression</td>
<td>Hollowing, scooping depression; brow bone prominent</td>
</tr>
</tbody>
</table>

Used with permission from the Veterans Health Administration
SIX CHARACTERISTICS: MUSCLE MASS$^{1-2}$

Clavicle Bone Region

- **Exam:** Have patient sit up straight, visually examine bone, physically examine surrounding muscle

- **Findings:**
  - Severe loss – protruding, prominent bone
  - Moderate loss – some protrusion, bone more visible
  - No loss – well defined muscle surrounding the bone, clavicle likely not visible in males, maybe in females

EXAMPLES


Clavicle

**TIP:** Inspect patient straight on with arms at their sides, look for prominent bone

<table>
<thead>
<tr>
<th>Normal</th>
<th>Mild- Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clavicle may protrude slightly, no area of depression behind bone</td>
<td>Some protrusion of clavicle, slight depression behind the clavicle</td>
<td>Clavicle very protruded, area behind clavicle significantly depressed</td>
</tr>
</tbody>
</table>

Used with permission from the Veterans Health Administration
SIX CHARACTERISTICS: MUSCLE MASS

Acromion Bone Region

- Exam: Patient may be sitting or standing and have arms at sides
- Findings:
  - Severe loss – squared shoulders, bones and acromion process protrusion prominent
  - Moderate loss – acromion may slightly protrude, some shoulder angling
  - No loss – rounded shoulder, curves at shoulder/neck

** EXAMPLES **

**Shoulder**

**TIP:** Inspect patient with arms at their sides, look for prominent bones, observe shape of shoulder

<table>
<thead>
<tr>
<th>Normal</th>
<th>Mild-Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nice curvature, roundness from neck to shoulder and down to arm</td>
<td>Acromion process may protrude slightly, shoulder may appear slightly squared-off</td>
<td>Bones prominent, significant squaring of shoulders, acromion process clearly visible</td>
</tr>
</tbody>
</table>

Used with permission from the Veterans Health Administration
SIX CHARACTERISTICS: MUSCLE MASS

Scapular Bone Region

- Exam: Patient may be sitting or standing, extend hands straight out and press against solid object
- Findings:
  - Severe loss – prominent bones, depressions easily visible between ribs, scapula, spine and shoulders
  - Moderate loss – mild depressions, bones may show slightly
  - No loss – bones not prominent, no significant depressions

EXAMPLES


**Scapula**

**TIP:** Have patient push hands against a solid object (such as a wall), look for prominent bones or depression between bones

<table>
<thead>
<tr>
<th>Normal</th>
<th>Mild-Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bone not prominent, no significant depressions</td>
<td>Mild depression or bone may show slightly</td>
<td>Prominent, visible bone; depressions between ribs, scapula &amp; shoulder, or spine</td>
</tr>
</tbody>
</table>
SIX CHARACTERISTICS: MUSCLE MASS

Dorsal Hand Region

• Exam: Observe hand, looking for depressions on the back of hand. Have patient make an ‘OK’ sign and feel for musculature
  
• Findings:
  – Severe loss – prominent depression
  – Moderate loss – slight depression
  – No loss – no depression

EXAMPLES

EXAMPLES

**Interosseous**

**TIP:** Observe back of patient’s hand, have them move thumb & forefinger back and forth

<table>
<thead>
<tr>
<th></th>
<th>Normal</th>
<th>Mild- Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Muscle</strong></td>
<td>Muscle protrudes, could be flat in well-nourished females</td>
<td>Slightly depressed or flat</td>
<td>Flat or depressed area between thumb and forefinger</td>
</tr>
</tbody>
</table>
SIX CHARACTERISTICS: MUSCLE MASS

Patellar Region

• Exam: Examine with knee bent
• Findings:
  – Severe loss – prominent bone, square looking, very little muscle definition around patella
  – Moderate loss – patella more prominent, less muscle definition around patella
  – No loss – muscles protrude around patella, difficult to see bone

EXAMPLES

EXAMPLES - KNEE

**Knee**

**TIP:** Have patient sit with legs propped up on low stool

<table>
<thead>
<tr>
<th></th>
<th>Normal</th>
<th>Mild- Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patella</td>
<td>Patella not prominent, muscles visible</td>
<td>Patella slightly prominent, muscles less obvious</td>
<td>Patella very prominent, areas along both sides depressed, muscle minimal or absent</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Used with permission from the Veterans Health Administration
SIX CHARACTERISTICS: MUSCLE MASS

Anterior Thigh Region

• Exam: Have patient sit with leg propped up and bent at knee. Grasp quads bilaterally

• Findings:
  – Severe loss – line/depression along thigh, thin
  – Moderate loss – mild depression of inner thigh
  – No loss – muscles protrude and are well-rounded and well developed, bones not visible

EXAMPLES

EXAMPLES - THIGH

**TIP:** Observe patient in supine position or sitting with feet propped up on low stool

<table>
<thead>
<tr>
<th>Normal</th>
<th>Mild- Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quadriceps well-rounded, no depressions</td>
<td>Mild depression along inner thigh, upper leg appears thin</td>
<td>Significant depression of inner thigh region, upper leg obviously thin</td>
</tr>
</tbody>
</table>

Used with permission from the Veterans Health Administration
SIX CHARACTERISTICS: MUSCLE MASS

Posterior Calf Region

- Exam: Grasp back of lower leg, observe/examine bilaterally
- Findings:
  - Severe loss – thin with very little definition/firmness
  - Moderate loss – some roundedness, slight firmness
  - No loss – well rounded, firm, well developed muscle

**Examples - Calf**

**Calf**

**TIP:** Observe patient in supine position with knees bent

<table>
<thead>
<tr>
<th>Normal</th>
<th>Mild-Moderate</th>
<th>Severe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well-developed bulb of calf muscle</td>
<td>Calf muscle not well-defined/well-developed</td>
<td>Thin, no muscle definition</td>
</tr>
</tbody>
</table>

Used with permission from the Veterans Health Administration
TIME FOR (VIRTUAL) PRACTICE!
Areas commonly assessed for subcutaneous fat loss (in magenta) and muscle loss (in blue)

Figure adapted from Fischer M, et al. JPNEN J Parent Enteral Nutr. 2015;30(2):239-248.
# SIX CHARACTERISTICS: FLUID ACCUMULATION

Types of Edema:

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ascites</td>
<td>Accumulation of fluid around the abdomen resulting in distention; percussed shifting dullness and fluid wave</td>
</tr>
<tr>
<td>Anasarca</td>
<td>Massive, general whole-body edema</td>
</tr>
<tr>
<td>Peripheral</td>
<td>Swollen lower extremities with tendency to accumulate in dependent areas and may interfere with ambulation</td>
</tr>
<tr>
<td>Pitting</td>
<td>Leaves indentation when pressure is applied for at least 5 seconds and reflects the movement of excess interstitial fluid</td>
</tr>
<tr>
<td>Non-pitting or brawny</td>
<td>No indentation after pressure is applied to edematous area, thickening, dark color, dry/scaly patches, induration, liposclerosis</td>
</tr>
</tbody>
</table>
**SIX CHARACTERISTICS: FLUID ACCUMULATION**

- Presentation of edema
  - Fluid movement into the third space
  - Gross deficiency of protein for a long period of time
  - Physiological responses to refeeding syndrome
- Rarely direct manifestation of malnutrition
- Usually is masking weight loss, as well as fat and muscle loss

<table>
<thead>
<tr>
<th></th>
<th>Moderate Malnutrition</th>
<th>Severe Malnutrition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute injury</td>
<td>Mild</td>
<td>Mod &gt; Severe</td>
</tr>
<tr>
<td>Chronic illness</td>
<td>Mild</td>
<td>Severe</td>
</tr>
<tr>
<td>Social/Env.</td>
<td>Mild</td>
<td>Severe</td>
</tr>
</tbody>
</table>

MEASURING EDEMA

• Locations to evaluate for edema
  – Face/neck – observation (swelling/distention of jugular)
  – Hands – observation, palpation
  – Feet/ankles – observation, palpation
  – Abdomen – observation, percussion

• Considerations
  – Patient conditions that are characterized by edema
  – I/Os and Labs that may confirm findings
  – Edematous areas may be sensitive

SIX CHARACTERISTICS: FLUID ACCUMULATION

• Pitting Edema
  – Apply pressure with pad of index finger to a bony prominence for ~5 seconds, release and examine for remaining indentation

<table>
<thead>
<tr>
<th>Edema Grade</th>
<th>Description</th>
<th>Depth</th>
<th>Refill Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>1+</td>
<td>Mild</td>
<td>0-1/4”</td>
<td>&lt;10 sec</td>
</tr>
<tr>
<td>2+</td>
<td>Moderate</td>
<td>¼-1/2”</td>
<td>10-15 sec</td>
</tr>
<tr>
<td>3+</td>
<td>Severe</td>
<td>½-1”</td>
<td>1-2 min</td>
</tr>
<tr>
<td>4+</td>
<td></td>
<td>&gt;1”</td>
<td>5 min or greater</td>
</tr>
</tbody>
</table>

• Non-pitting Edema
  – Skin is tight & firm, does not depress when pressure applied

Dehydration

• Skin Turgor (tenting)
  – Pinch skin on back of hand/forearm, skin should return to a normal flat position within 3 seconds

• Capillary Refill
  – Press fingernail until it is white, color should return within 3 seconds
## MEASURING PITTING EDEMA

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
<th>Time to Rebound</th>
</tr>
</thead>
<tbody>
<tr>
<td>1+</td>
<td>Barely detectable impression when finger is pressed into skin.</td>
<td></td>
</tr>
<tr>
<td>2+</td>
<td>Slight indentation.</td>
<td>15 seconds</td>
</tr>
<tr>
<td>3+</td>
<td>Deeper indentation.</td>
<td>30 seconds</td>
</tr>
<tr>
<td>4+</td>
<td>&gt; 30 seconds to rebound.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rating</th>
<th>Description</th>
<th>Time to Rebound</th>
</tr>
</thead>
<tbody>
<tr>
<td>1+</td>
<td>2mm depression, barely detectable.</td>
<td>Immediate rebound.</td>
</tr>
<tr>
<td>2+</td>
<td>4mm deep pit.</td>
<td>A few seconds to rebound.</td>
</tr>
<tr>
<td>3+</td>
<td>6mm deep pit.</td>
<td>10-12 seconds to rebound.</td>
</tr>
<tr>
<td>4+</td>
<td>8mm: very deep pit.</td>
<td>&gt;20 seconds to rebound.</td>
</tr>
</tbody>
</table>


EXAMPLES


SIX CHARACTERISTICS: FUNCTIONAL STATUS

Hand Grip Strength

- Recommended technique to measure functional status\(^1\)
- Measures\(^2\)
  - muscle functionality\(^2\)
  - poor protein intake
  - decreased musculature
  - decreased function
- Responds earlier to nutritional deprivation and repletion\(^2\)

<table>
<thead>
<tr>
<th></th>
<th>Moderate Malnutrition</th>
<th>Severe Malnutrition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute injury</td>
<td>N/A</td>
<td>Measurably reduced</td>
</tr>
<tr>
<td>Chronic illness</td>
<td>N/A</td>
<td>Measurably reduced</td>
</tr>
<tr>
<td>Social/ Env.</td>
<td>N/A</td>
<td>Measurably reduced</td>
</tr>
</tbody>
</table>

TECHNIQUES FOR USING DYNAMOMETERS\textsuperscript{1-2}

SET UP

\begin{itemize}
\item Patient should sit upright, shoulders supported with the chair; or sit on the edge of the bed with feet touching floor/stool
\item Arm should NOT be resting on the chair
\item Test dominant hand only or both hands; use appropriate normative values
\item Arm should be relaxed, elbow at 90° angle, wrist is neutral
\item Patient will hold the dynamometer with fingers lightly wrapped around the handle
\item Gently support the dynamometer at the base
\item Grip should be applied smoothly without wrenching or jerking motion
\end{itemize}

INSTRUCTIONS

\begin{enumerate}
\item Feedback should not be given to the patient during the test
\item “We will test your grip strength 3 times. I will tell you to squeeze and the let go, make sure to just release the squeeze”
\item “When I say squeeze, squeeze as hard as you can, but make sure not to jerk or wrench while you are squeezing”
\item “You will grip for about 3-5 seconds”
\item “Are you ready?”
\end{enumerate}

LIMITATIONS AND ALTERNATIVES

Limitations

• Characteristics used to measure functional status may expand\(^1\)
• No consensus on measurement protocols\(^2\)
• Measures upper limb strength only; cannot replace assessment of ADLs\(^2\)
• Reliable cut off values need to be proposed; validated to determine patients at risk\(^2\)

Alternatives\(^3\)

• 30-second chair stand
• Stair climb
• 4x10 meter fast-paced walk
• Timed up-and-go
• 6-minute walk test

---
PUTTING IT ALL TOGETHER

Nutrition Screening

Nutrition Assessment
- Subjective Data
- Labs/Tests
- Nutrition Focused Physical Exam

Nutrition Diagnosis
## PUTTING IT ALL TOGETHER

### Etiology of Malnutrition:
Acute Illness/Injury or Chronic Illness or Social/Environmental

<table>
<thead>
<tr>
<th>Body area</th>
<th>Finding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temple</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
</tr>
<tr>
<td></td>
<td>Unable to determine</td>
</tr>
<tr>
<td>Orbital area</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
</tr>
<tr>
<td></td>
<td>Unable to determine</td>
</tr>
<tr>
<td>Clavicle</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
</tr>
<tr>
<td></td>
<td>Unable to determine</td>
</tr>
<tr>
<td>Shoulders/deltoid</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
</tr>
<tr>
<td></td>
<td>Unable to determine</td>
</tr>
<tr>
<td>Scapula</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
</tr>
<tr>
<td></td>
<td>Unable to determine</td>
</tr>
<tr>
<td>Thoracic/lumbar</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
</tr>
<tr>
<td></td>
<td>Unable to determine</td>
</tr>
<tr>
<td>Triceps</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
</tr>
<tr>
<td></td>
<td>Unable to determine</td>
</tr>
<tr>
<td>Interosseous</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
</tr>
<tr>
<td></td>
<td>Unable to determine</td>
</tr>
<tr>
<td>Quadriceps</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
</tr>
<tr>
<td></td>
<td>Unable to determine</td>
</tr>
<tr>
<td>Calf</td>
<td>Normal</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
</tr>
<tr>
<td></td>
<td>Unable to determine</td>
</tr>
</tbody>
</table>

**Edema Present:** Normal or Moderate or Severe

**Overall Muscle loss:** Normal or Moderate or Severe

**Overall Fat Loss:** Normal or Moderate or Severe

**Handgrip:** Normal or Reduced
## PUTTING IT ALL TOGETHER

<table>
<thead>
<tr>
<th></th>
<th>Acute Illness/Injury</th>
<th>Chronic Illness</th>
<th>Social/Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Moderate</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight Loss</td>
<td>1-2% 1 wk 5% 1 m 7.5% 3 m</td>
<td>5% 1 m 7.5% 3 m 10% 6 m 20% 12 m</td>
<td>5% 1 m 7.5% 3 m 10% 6 m 20% 12 m</td>
</tr>
<tr>
<td>Energy Intake</td>
<td>&lt;75% EER for &gt;7d</td>
<td>&lt;75% EER for ≥1 m</td>
<td>&lt;75% EER for ≥3 m</td>
</tr>
<tr>
<td><strong>Severe</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight Loss</td>
<td>&gt;2% 1 wk &gt;5% 1 m &gt;7.5% 3 m</td>
<td>&gt;5% 1 m &gt;7.5% 3 m &gt;10% 6 m &gt;20% 12 m</td>
<td>&gt;5% 1 m &gt;7.5% 3 m &gt;10% 6 m &gt;20% 12 m</td>
</tr>
<tr>
<td>Energy Intake</td>
<td>≤50% EER for ≥5d</td>
<td>≤75% EER for ≥1 m</td>
<td>≤50% EER for ≥1 m</td>
</tr>
</tbody>
</table>

ANHI
ABBOTT NUTRITION
HEALTH INSTITUTE
CASE STUDY #1

54 y.o. male with worsening liver failure over past 3-4 months. Patient states he has been hospitalized past few months on several occasions with multiple issues due to liver disease. States about 50% of intake from most meals past few months. Patient thinks they lost weight around 15 kg past 6 months, but hard to tell with fluid in abdomen area and lower extremities. (Pitting 3+ edema found on exam).

- PMHX: Cirrhosis (2014)
- Labs: Albumin 1.7, Pre-Albumin 13.2, Glucose 96
- Ht: 167.6cm, Wt: 50kg, UBW: 64kg

- Exam findings: unable to determine fat loss as patient is edematous. Wasting of temples noticed with hollowing/scooping appearance. Also noted protruding and prominent clavicle bone. Measurably reduced grip strength.
WHICH ETIOLOGY APPLIES TO THIS CASE?

Nutrition Risk Identified
↓ intake or body mass

Inflammation Present?
No/Yes

NO

Starvation-Related Malnutrition
(e.g. Pure chronic starvation, anorexia nervosa)

YES

Mild to Moderate Degree

Chronic Disease–Related Malnutrition
(e.g. Organ failure, pancreatic cancer, rheumatoid arthritis, sarcopenic obesity)

YES

Marked Inflammatory Response

Acute Disease- or Injury-Related Malnutrition
(e.g. Major infection, burns, trauma, closed head injury)

IS THIS MODERATE OR SEVERE MALNUTRITION?
DIAGNOSING MALNUTRITION (AND/ASPN\textsuperscript{1-2})

Nutrition Risk Identified
down intake or body mass

Inflammation Present?
No/Yes

NO

Starvation-Related Malnutrition
(e.g. Pure chronic starvation, anorexia nervosa)

YES

Mild to Moderate Degree
Chronic Disease–Related Malnutrition
(e.g. Organ failure, pancreatic cancer, rheumatoid arthritis, sarcopenic obesity)

YES

Marked Inflammatory Response
Acute Disease- or Injury-Related Malnutrition
(e.g. Major infection, burns, trauma, closed head injury)

Is this Moderate or Severe Malnutrition?

## IDENTIFICATION & DOCUMENTATION OF MALNUTRITION

<table>
<thead>
<tr>
<th>Clinical characteristics</th>
<th>Malnutrition in the Context of Acute Illness or Injury</th>
<th>Malnutrition in the Context of Chronic Illness</th>
<th>Malnutrition in the Context of Social or Environmental Circumstances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy intake</td>
<td>&lt;75% of estimated Energy requirement for &gt;7 days</td>
<td>&lt;75% of estimated Energy requirement for ≥1 month</td>
<td>&lt;75% of estimated Energy requirement for ≥3 months</td>
</tr>
<tr>
<td></td>
<td>≤50% of estimated Energy requirement for ≥5 days</td>
<td>≤75% of estimated Energy requirement for ≥1 month</td>
<td>≤50% of estimated Energy requirement for ≥1 month</td>
</tr>
<tr>
<td></td>
<td>≤50% of estimated Energy requirement for ≥1 month</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>≤50% of estimated Energy requirement for ≥3 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight loss</td>
<td>%</td>
<td>%</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>Time</td>
<td>Time</td>
<td>Time</td>
</tr>
<tr>
<td></td>
<td>1-2</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>1 wk</td>
<td>1 mo</td>
<td>1 mo</td>
</tr>
<tr>
<td></td>
<td>&gt;2</td>
<td>&gt;5</td>
<td>&gt;5</td>
</tr>
<tr>
<td></td>
<td>1 wk</td>
<td>1 mo</td>
<td>1 mo</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>3 mo</td>
<td>3 mo</td>
</tr>
<tr>
<td></td>
<td>1 mo</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>&gt;5</td>
<td>&gt;7.5</td>
<td>&gt;7.5</td>
</tr>
<tr>
<td></td>
<td>1 mo</td>
<td>3 mo</td>
<td>3 mo</td>
</tr>
<tr>
<td></td>
<td>7.5</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>3 mos</td>
<td>6 mo</td>
<td>6 mo</td>
</tr>
<tr>
<td></td>
<td>&gt;7.5</td>
<td>&gt;20</td>
<td>&gt;20</td>
</tr>
<tr>
<td></td>
<td>3 mos</td>
<td>1y</td>
<td>1y</td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>&gt;20</td>
<td>&gt;20</td>
</tr>
<tr>
<td></td>
<td>1 y</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body fat</td>
<td>Mild</td>
<td>Moderate</td>
<td>Mild</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Severe</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mild</td>
</tr>
<tr>
<td>Muscle mass</td>
<td>Mild</td>
<td>Moderate</td>
<td>Mild</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Severe</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mild</td>
</tr>
<tr>
<td>Fluid accumulation</td>
<td>Mild</td>
<td>Moderate to Severe</td>
<td>Mild</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Severe</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Mild</td>
</tr>
<tr>
<td>Reduced grip strength</td>
<td>N/A*</td>
<td>Measurably reduced</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Measurably reduced</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Measurably reduced</td>
</tr>
</tbody>
</table>

*A minimum of two of the six characteristics above is recommended for diagnosis of either severe or non-severe malnutrition. Height and weight should be measured rather than estimated to determine body mass index. Usual weight should be obtained in order to determine the percentage and to interpret the significance of weight loss. Basic indicators of nutritional status such as body weight, weight change, and appetite may substantively improve with refeeding in the absence of inflammation. Refeeding and/or nutrition support may stabilize but not significantly improve nutrition parameters in the presence of inflammation. The National Center for Health Statistics defines “chronic” as a disease/condition lasting 3 months or longer. Serum proteins such as albumin and prealbumin are not included as defining characteristics of malnutrition because recent evidence analysis shows that serum levels of these proteins do not change in response to changes in nutrient intake.

CASE STUDY #1 ANSWER

<table>
<thead>
<tr>
<th>Clinical characteristics</th>
<th>Malnutrition in the Context of Acute Illness or Injury</th>
<th>Malnutrition in the Context of Chronic Illness</th>
<th>Malnutrition in the Context of Social or Environmental Circumstances</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Non-severe (moderate) malnutrition</td>
<td>Severe malnutrition</td>
<td>Non-severe (moderate) malnutrition</td>
</tr>
<tr>
<td></td>
<td>&lt;75% of estimated Energy requirement for &gt;7 days</td>
<td>≤50% of estimated Energy requirement for ≥5 days</td>
<td>&lt;75% of estimated Energy requirement for ≥1 month</td>
</tr>
<tr>
<td>Energy intake</td>
<td>%</td>
<td>Time</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>1-2</td>
<td>1 wk</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>5</td>
<td>1 mo</td>
<td>7.5</td>
</tr>
<tr>
<td></td>
<td>7.5</td>
<td>3 mos</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt;7.5</td>
<td>20</td>
</tr>
<tr>
<td>Weight loss</td>
<td></td>
<td>1 wk</td>
<td>1 mo</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥2</td>
<td>&gt;5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 mo</td>
<td>≥5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 mos</td>
<td>&gt;7.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥3 mos</td>
<td>&gt;10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>≥1 moz</td>
<td>&gt;20</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>≥1 y</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Body fat</td>
<td>Mild</td>
<td>Moderate</td>
<td>Mild</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Severe</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Muscle mass</td>
<td>Mild</td>
<td>Moderate</td>
<td>Mild</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Severe</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluid accumulation</td>
<td>Mild</td>
<td>Moderate to Severe</td>
<td>Mild</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Severe</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduced grip strength</td>
<td>N/A*</td>
<td>Measurably reduced</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Measurably reduced</td>
</tr>
</tbody>
</table>

*A minimum of two of the six characteristics above is recommended for diagnosis of either severe or non-severe malnutrition. Height and weight should be measured rather than estimated to determine body mass index. Usual weight should be obtained in order to determine the percentage and to interpret the significance of weight loss. Basic indicators of nutritional status such as body weight, weight change, and appetite may substantively improve with refeeding in the absence of inflammation. Refeeding and/or nutrition support may stabilize but not significantly improve nutrition parameters in the presence of inflammation. The National Center for Health Statistics defines “chronic” as a disease/condition lasting 3 months or longer. Serum proteins such as albumin and prealbumin are not included as defining characteristics of malnutrition because recent evidence analysis shows that serum levels of these proteins do not change in response to changes in nutrient intake.

WHAT ABOUT NFPE FOR PEDIATRIC PATIENTS?
# Adult vs. Pediatric Malnutrition Indicators

<table>
<thead>
<tr>
<th></th>
<th>Adult</th>
<th>Pediatric</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong># Diagnostic Criteria</strong></td>
<td>≥ 2 indicators present</td>
<td>1 or more indicators present</td>
</tr>
<tr>
<td><strong>Severity Levels</strong></td>
<td>Moderate; Severe</td>
<td>Mild; Moderate; Severe</td>
</tr>
<tr>
<td><strong># of Etiology Based Definitions</strong></td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td><strong># of Indicators</strong></td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td><strong>Energy Intake &amp; Weight Loss Indicators</strong></td>
<td>Over specified amount of time</td>
<td>No time range necessary/specifed</td>
</tr>
</tbody>
</table>

ASSESSING FOR MICRONUTRIENT DEFICIENCIES USING THE NFPE
RECOMMENDED READINGS


NUTRITION FOCUSED PHYSICAL EXAM

• The 6 characteristics used to identify the adult patient with malnutrition do not take into consideration micronutrients

• A nutrition focused physical exam should be part of an overall comprehensive assessment

• Examine patient from head-to-toe to consider possible micronutrient deficiencies

MICRONUTRIENT DEFICIENCIES FREQUENT SCENARIOS

• Geriatric Patients
• ETOH Abuse
• Cancer and/or Malignancies
• Altered GI Structure/Function
  – Short Bowel Syndrome, Fistulas, Small Bowel Bacterial Overgrowth, Diarrhea, Severe and Chronic Nausea/Vomiting, and s/p Bariatric Surgery
• Liver Disease
• Renal Disease with RRT
• Immune Deficiencies

## SITE OF MICRONUTRIENT ABSORPTION

<table>
<thead>
<tr>
<th>Site of Absorption</th>
<th>Nutrients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stomach</td>
<td>Copper, Iodine, Fluoride, Molybdenum</td>
</tr>
<tr>
<td>Duodenum</td>
<td>Calcium, Phosphorus, Magnesium, Iron, Copper, Selenium, Thiamin, Riboflavin, Niacin, Biotin, Folate, Fat-Soluble Vitamins (A, D, E, K)</td>
</tr>
<tr>
<td>Jejunum</td>
<td>Thiamin, Riboflavin, Niacin, Pantothenic Acid, Biotin, Folate, Vitamin B6, Vitamin C, Fat-Soluble Vitamins (A, D, E, K), Calcium, Phosphorus, Magnesium, Iron, Zinc, Chromium, Manganese, Molybdenum</td>
</tr>
<tr>
<td>Ileum</td>
<td>Vitamin C, Folate, Vitamin B12 (Needs Intrinsic Factor Produced in the Stomach), Vitamin D, Vitamin K, Magnesium, Others (depending upon transit time)</td>
</tr>
<tr>
<td>Colon</td>
<td>Vitamin K, Biotin, Sodium, Chloride, Potassium</td>
</tr>
</tbody>
</table>

MICRONUTRIENT DEFICIENCIES PRESENT IN MANY AREAS OF THE BODY

- Skin
- Nails
- Hair
- Head/Neck
- Oral Cavity
- Eyes
- Nose
- Face
SKIN

• Reflect vitamin and mineral deficiencies

Assess for:
- Temperature
- Turgor
- Moisture
- Color
- Bruises
- Rashes
- Ulcers
- Hygiene

Skin is the largest organ and often shows vitamin/mineral deficiencies. Abnormalities can show up in 10-30 days due to rapid turnover of skin cell.
## SKIN

<table>
<thead>
<tr>
<th>Physical Signs</th>
<th>Possible Nutrient Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paleness: Pallor</td>
<td>Iron</td>
</tr>
<tr>
<td>Poor, delayed wound healing</td>
<td>Protein, Zinc, Vitamins C &amp; A</td>
</tr>
<tr>
<td>Xerosis: abnormal dryness</td>
<td>Vitamin A, Essential Fatty Acids</td>
</tr>
<tr>
<td>Follicular hyperkeratosis: plaque</td>
<td>Vitamin A, C, Essential Fatty Acids</td>
</tr>
<tr>
<td>Perifolliculitis: pigmented plaque</td>
<td>Vitamin C</td>
</tr>
<tr>
<td>Petechiae, ecchymosis: hemorrhagic spots on skin, membranes</td>
<td>Vitamins K &amp; C</td>
</tr>
<tr>
<td>Dermatitis</td>
<td>Zinc, Essential Fatty Acids</td>
</tr>
<tr>
<td>Pellagrous dermatitis: hyperpigmentation on areas sun exposed</td>
<td>Niacin, Tryptophan</td>
</tr>
<tr>
<td>Flaky paint dermatosis: hyperpigmented patches (back of thighs, buttocks) that peel off to reveal hyper pigmented skin</td>
<td>Protein</td>
</tr>
</tbody>
</table>

VITAMIN C DEFICIENCY

Swollen Gums

Ecchymosis (Bruising)

Petechia

PERIFOLLICULAR HEMORRHAGES - SCURVY

PELLAGROUS DERMATITIS – NIACIN DEFICIENCY

May also be seen with Tryptophan or vitamin B6 deficiency or those with Psoriasis or skin/chemical burns

FOLLICULAR HYPERKERATOSIS – VITAMIN A OR C DEFICIENCY

ZINC DEFICIENCY RELATED DERMATITIS

Figure. Generalized alopecia and erythematous, scaly rash involving face and scalp.

NAILS

• Nail plate is composed of keratin, fibrous protein, and should be firmly adherent to the nail bed, feel smooth and appear uniformly thick and symmetric

• Inspect for:

  - Color
  - Length
  - Cleanliness
  - Symmetry
  - Configuration
NAILS

• Color or hue of nails can assess for circulation or capillary refill time
• Normal nails are translucent, with a pink hue from the complex capillary system underneath the nail plate

• To assess for refill time:
  – Palpate the nail by squeezing between thumb and forefinger
  – The nail blanches white and should return to original pinkish color almost immediately
  – Refill time is less than 3 seconds
# NAILS

<table>
<thead>
<tr>
<th>Physical Signs</th>
<th>Possible Nutrient Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Koilonychia: thin, concave nails, raised edges (spoon shaped)</td>
<td>Iron with or without anemia, Protein</td>
</tr>
<tr>
<td>Lackluster, dull</td>
<td>Protein</td>
</tr>
<tr>
<td>Mottled, pale, poor blanching</td>
<td>Vitamins A &amp; C</td>
</tr>
<tr>
<td>Splinter hemorrhages: distal ends of nails, multiple</td>
<td>Vitamin C</td>
</tr>
<tr>
<td>Ridging, transverse: more than one extremity (Beau’s lines)</td>
<td>Protein, Calcium</td>
</tr>
<tr>
<td>Flaky nail plates</td>
<td>Magnesium, Selenium</td>
</tr>
</tbody>
</table>
MALNUTRITION’S EFFECTS ON NAILS

Koilonychia

Possible iron deficiency with or without anemia, protein deficiency. Also seen in patients with lupus or hypothyroidism

Splinter Hemorrhages

Possible vitamin C deficiency. Also seen in patients with trichinosis, vascular disease or bacterial endocarditis

MALNUTRITION’S EFFECTS ON NAILS

Muehrcke’s Lines:
Hypopigmentation

Possible hypoalbuminemia or chronic liver/renal disease

Beau’s Lines:
Horizontal Ridges

Possible severe zinc deficiency; protein deficiency; hypocalcemia or severe illness; immunosuppressive therapy

Image credits:
Poor hair qualities are often associated with protein, zinc, essential fatty acid and biotin deficiencies. Hair should be shiny, smooth and resilient.

<table>
<thead>
<tr>
<th>Physical Signs</th>
<th>Possible Nutrient Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Easily plucked, thin, sparse, lackluster</td>
<td>Protein, Essential Fatty Acids</td>
</tr>
<tr>
<td>Alternating bands of depigmentation</td>
<td>Protein</td>
</tr>
<tr>
<td>Corkscrew hair, looped hair arms/leg in elderly (related to follicular hyperkeratosis)</td>
<td>Copper, Vitamin C (scurvy)</td>
</tr>
<tr>
<td>Depigmentation of normal hair</td>
<td>Protein, Copper</td>
</tr>
<tr>
<td>Hypertrichosis (a.k.a. lanugo)</td>
<td>Energy deficiency (anorexia and/or bulimia)</td>
</tr>
<tr>
<td>Alopecia</td>
<td>Zinc, Protein, Biotin</td>
</tr>
</tbody>
</table>
MALNUTRITION’S EFFECTS ON HAIR

Lanugo

Corkscrew hair

Calorie deficiency

Vitamin C or copper deficiency, Menkes syndrome

Exam of the face, eyes, lips and oral cavity can reveal deficiencies and correlate with findings from skin, hair and nails.

<table>
<thead>
<tr>
<th>Physical Signs</th>
<th>Possible Nutrient Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eyes: Night blindness, Bitot’s spots, abnormal dryness in cornea, progressed to keratomalacia, or hazy, dry, softened corneas</td>
<td>Vitamin A</td>
</tr>
<tr>
<td>Angular palpebritis: inflammation of lid margins/corners</td>
<td>B2, Niacin, B6</td>
</tr>
<tr>
<td>Cheilosis (dry, swollen, or ulcerated lips)</td>
<td>B6, B2, Niacin, Severe Iron Deficiency</td>
</tr>
<tr>
<td>Mouth: Glossitis (inflammation of the tongue) possible magenta/purple color</td>
<td>B2, B6, B12, Niacin, Folate, Severe Iron Deficiency</td>
</tr>
<tr>
<td>Angular stomatitis (lesions in corners of the mouth)</td>
<td>B2, B6, Niacin, Iron</td>
</tr>
</tbody>
</table>

**Vision Impairment**

- Nyctalopia (Night Blindness) or Blindness: Vitamin A and/or Zinc
- Photophobia: Riboflavin

**Conjunctiva (Eye Lid)**

- Conjunctival Xerosis: Vitamin A
- Pale: Iron, Folate, and/or Vitamin B12
- Blepharitis: Riboflavin, Vitamin B6, Biotin, and/or Zinc

**Cornea**

- Corneal Xerosis (dull, milky or opaque) or Keratomalacia (softening): Vitamin A
- Corneal Vascularization: Riboflavin

**Movement**

- Ophthalmoplegia: Thiamin
- Nystagmus: Thiamin and/or Vitamin E

**Sclera**

- Bitot’s spots (foamy white spots), Dry/Dull or Rough Appearance: Vitamin A

---

BITOT’S SPOTS – VITAMIN A DEFICIENCY

Taste

Dysguesia, Hypoguesia/Aguesia: Zinc

Texture/Appearance

Atrophic Lingual Papillae or Glossitis (smooth, slick, loss of papillae):
Riboflavin, Niacin, Vitamin B6, Vitamin B12, Folate, Biotin, Iron, and/or Vitamin C

Color

Magenta Tongue (Beefy Red Tongue):
Riboflavin, Folate, and/or Vitamin B12

Sensation

Burning:
Thiamin, Riboflavin, Vitamin B6, Vitamin B12, Folate, and/or Zinc


Geographic tongue

GLOSSITIS

May be related to Riboflavin, Niacin, Vitamin B6, Vitamin B12, Folate, Biotin, Iron, and/or Vitamin C

Alternative causes: Crohn's, Uremia, Trauma, Anti-cancer therapy

PAPILLARY HYPERTROPHY – VITAMIN A DEFICIENCY

Mucosa of Mouth/Gums

- **Pallor:** Iron, Vitamin B12, and/or Folate
- **Hyperemia and Edema of Pharyngeal and Oral Mucosa:** Riboflavin
- **Dryness:** Vitamin E
- **Bleeding, Inflammation:** Vitamin C

Lips

- **Cheilosis, Cheilitis, or Angular Stomatitis (bilateral cracks on corners):** Riboflavin, Niacin, Vitamin B6, Vitamin B12, and/or Folate

ANGULAR STOMATITIS

Sign of riboflavin, niacin, vitamin B6, vitamin B12, iron deficiency or vitamin A toxicity

Alternative causes: dry skin, dehydration, herpes
# MUSCULOSKELETAL

<table>
<thead>
<tr>
<th>Physical Signs</th>
<th>Possible Nutrient Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rickets; knock knees, bow leg</td>
<td>Vitamin D, Calcium, Phosphate</td>
</tr>
<tr>
<td>Epiphyseal enlargement (ends of long bones)</td>
<td>Vitamin D (painless) Vitamin C (painful)</td>
</tr>
<tr>
<td>Swollen, painful joints</td>
<td>Vitamin C</td>
</tr>
<tr>
<td>Dwarfism/Hypogonadism</td>
<td>Zinc</td>
</tr>
</tbody>
</table>

Rickets due to vitamin D deficiency

CDC Public Health Image Library.

## NEUROLOGIC

<table>
<thead>
<tr>
<th>Physical Signs</th>
<th>Possible Nutrient Deficiency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower extremity motor weakness</td>
<td>Thiamine</td>
</tr>
<tr>
<td>Mental confusion, hyperirritability, apathy</td>
<td>Protein</td>
</tr>
<tr>
<td>Peripheral neuropathy: weakness, ataxia</td>
<td>Thiamine, B12 and B6, Copper</td>
</tr>
<tr>
<td>Tetany: lips, tongue, fingers, feet; generalized muscle aching; carpopedal, facial musculature spasm</td>
<td>Calcium, Vitamin D</td>
</tr>
<tr>
<td>Bilateral calf tenderness</td>
<td>Thiamine</td>
</tr>
<tr>
<td>Dementia</td>
<td>Niacin, Vitamin B-12</td>
</tr>
</tbody>
</table>

OTHER DEFICIENCIES THAT MAY RESULT IN NEUROPATHY

- Copper
- Vitamin B₁₂
- Pyridoxine (B₆)
- Vitamin E
- Riboflavin (B₂)
- Biotin
- Niacin (B₃)
- Pantothenic Acid
NUTRITION SUPPORT IS ASSOCIATED WITH POSITIVE PATIENT OUTCOMES

- 27 studies with 6803 participants with malnutrition or at-risk for malnutrition
  - 5 studies were published between 2015-2019 (Included NOURISH (n=652) and EFFORT (n=2,028))

- Results: Nutritional support when compared with no support was associated with:
  - ↓ mortality (8.3% vs. 11.0%, OR: 0.73 (95%CI, 0.56-0.97) \(P=0.03\)).
  - ↓ hospital readmissions (14.7% vs. 18.0%, OR: 0.76 (95%CI, 0.60-0.96) \(P=0.02\))
  - ↑ protein intake during hospital admission (1618 kcal vs. 1331 kcal, \(P<0.00001\))
  - ↑ energy intake during hospital admission (59g vs. 48g, \(P<0.00001\))
  - ↑ body weight (+0.63kg vs. -0.19kg, \(P=0.0004\))
  - No difference in infection rates, LOS, or functional outcome.

NOURISH: Nutrition Effect on Unplanned Readmissions and Survival in Hospitalized Patients
EFFORT: Effect of early nutritional support on Frailty, Functional Outcomes, and Recovery of malnourished medical inpatients Trial
MANAGING MALNUTRITION THROUGHOUT THE CONTINUUM OF CARE

- Admission
- Screening
- Assessment
- Intervention
- Discharge
## STATE OF THE NUTRITION CARE PROCESS IN US HOSPITALS

<table>
<thead>
<tr>
<th>Description</th>
<th>N</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients admitted</td>
<td>107,106</td>
<td>100</td>
</tr>
<tr>
<td>Patients screened of those admitted</td>
<td>96,377</td>
<td>89.98</td>
</tr>
<tr>
<td>Patients identified as at-risk for malnutrition of those screened</td>
<td>27,691</td>
<td>28.73</td>
</tr>
<tr>
<td>Of those identified as at-risk for malnutrition, those receiving oral nutrition supplement order</td>
<td>18,507</td>
<td>66.83</td>
</tr>
<tr>
<td>Of those identified as at-risk for malnutrition, those with a RDN consult</td>
<td>17,370</td>
<td>62.73</td>
</tr>
<tr>
<td>Of those identified as at-risk for malnutrition, those with a malnutrition diagnosis</td>
<td>3,977</td>
<td>14.36</td>
</tr>
<tr>
<td>Of those identified as at-risk for malnutrition, those with a discharge recommendation/prescription for oral nutrition supplement</td>
<td>2,467</td>
<td>8.91</td>
</tr>
</tbody>
</table>

### QUALITY IMPROVEMENT STUDY EXAMPLE

#### Study Design
Multi-site, 2-group, pre-post QIP study

#### Patient Population
(N=1269*; 45.2% at risk for malnutrition)
- Older adults; mean age of 66.6 ± 17.2 years
- Most were white/Caucasian (70.4%)
- Admitted for a primary medical diagnosis (77.3%)

#### Study Scheme
- Two hospitals implemented a QIP-basic program—QIP-b
- Two hospitals implemented a QIP-enhanced program—QIP-e

#### Study Hypothesis:
- Nutrition-focused QIP **will decrease 30-day readmission rate** compared with existing ONS protocol in patients at risk/malnourished

---

*2,808 patients were screened with 1,269 patients enrolled. Quality Improvement Program-basic (QIP-b), Quality Improvement Program-enhanced (QIP-e) Sriram K, et al. JPEN J Parenter Enteral Nutr. 2017;41(3):384-391.*
### DIFFERENCES BETWEEN BASELINE, QIP-E AND QIP-B PROTOCOLS

<table>
<thead>
<tr>
<th></th>
<th>Pre-QIP</th>
<th>QIP-b</th>
<th>QIP-e</th>
</tr>
</thead>
<tbody>
<tr>
<td>MST is a part of EMR</td>
<td>-</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>RN completes MST</td>
<td>-</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>ONS selection via automatic drop-down menu by RN</td>
<td>-</td>
<td>-</td>
<td>√</td>
</tr>
<tr>
<td>ONS ordered by MD, RN, or RD</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>RD consultation</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Time to RD consultation: &lt;24 hours</td>
<td>-</td>
<td>-</td>
<td>√</td>
</tr>
<tr>
<td>Time to ONS delivery (in hours)</td>
<td>-</td>
<td>24 – 48 h</td>
<td>1 – 24 h</td>
</tr>
<tr>
<td>Discharge planning instructions</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Discharge materials including coupons and literature</td>
<td>-</td>
<td>-</td>
<td>√</td>
</tr>
<tr>
<td>Standard post-discharge phone calls (24-72 hours)</td>
<td>-</td>
<td>√</td>
<td>√*</td>
</tr>
<tr>
<td>Nutrition-focused post-discharge phone calls (N=4)</td>
<td>-</td>
<td>-</td>
<td>√*</td>
</tr>
</tbody>
</table>

MST=Malnutrition Screening Tool  
EMR=Electronic Medical Record  
*Nutrition-focused questions were incorporated in the standard post-discharge phone calls.

QIP ACHIEVED REDUCTIONS IN READMISSIONS & LOS

**Pre-QIP**

<table>
<thead>
<tr>
<th>Screening</th>
<th>Intervention</th>
<th>Education</th>
<th>Post-Discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-validated screening tool</td>
<td>No early intervention</td>
<td>No formalized nutrition discharge education</td>
<td>Follow up post-discharge phone calls</td>
</tr>
</tbody>
</table>

**QIP-Basic**

- **Reduction in Readmission Rate:** 25.8%
- **Reduction in LOS:** 25% (1.8 days)
- Validated screening tool (MST) integrated into EMR
- ONS intervention within 24-48 hours
- No formalized nutrition discharge education
- Follow up post-discharge phone calls

**QIP-Enhanced**

- **Reduction in Readmission Rate:** 29.4%
- **Reduction in LOS:** 26.4% (1.9 days)
- Validated screening tool (MST) integrated into EMR
- ONS intervention within 24 hours
- Formal nutrition discharge education with coupons
- Post-discharge phone calls
- Assessed ONS adherence

QIP-E PROGRAMS REDUCED READMISSIONS, LOS, AND COSTS¹,²

All-cause 30-day Readmissions¹

-29%*

Length of Hospital Stay¹

-26%*

QIP-e, including ONS therapy, reduced all cause 30-day readmission rates by 29% vs pre-QIP

QIP-e, including ONS therapy, reduced length of hospital stay by 26% (1.9 [± 3.6] days) vs pre-QIP

Costs²

Estimated 6-Month Savings:

$4,896,758

A Healthcare Quality Outcomes Study that included interventions with Abbott Nutrition formulary for the QIP hospitals during a 6-month period reduced healthcare costs from avoided readmissions and reduced LOS†

*Data from QIP-e intervention, percentage expressed as relative risk reduction (RRR) compared to pre-QIP.
†Data from baseline comparison cohort: 6-month hospital savings for the 4 QIP hospitals was $5,452,309 (when QIP program cost is subtracted).

3 STEPS FOR ADDRESSING MALNUTRITION:

1. Recognize and Assess
   - All patients at risk of loss of lean body mass

2. Rapidly Implement Nutrition Interventions
   - Nutritional supplements, amino acids, bioactive metabolites; and continue to monitor patient

3. Develop a Discharge Plan
   - For ongoing patient nutrition care and intervention
THINGS TO CONSIDER

• Those at high risk may not be malnourished
• Signs of malnourishment may be present in those who aren’t malnourished
  – 80-90 year old patient who habitually consumes “less than recommended calories” and maintains a stable weight and able to function well
  – Weight loss in patients with various forms of nerve injury/muscular dystrophy who are consuming adequate nutrition
• Context important!
  – Assess whole patient
  – Watch trends
• Frequent re-assessment key, especially when patient is changing clinically
• Lots of practice helps

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THANK YOU,
QUESTIONS?