Nutrition Focused Physical Exam (NFPE)

Ashley Strickland, RDN, LDN, CNSC
Indiana Academy of Nutrition and Dietetics Annual Conference
April 13, 2017
Course Objectives

- Discuss the importance of developing a competency process to deem clinicians competent to practice an NFPE.
- Review the A.S.P.EN/A.N.D Clinical Criteria used to identify malnutrition
- Understand how to assess muscle and fat sites for signs of wasting
Course Overview

Pre-Reading

• Each participant will read 4 Articles:

Initial Competency

• Review curriculum utilizing power point presentation
• Break Out Sessions (Fat, Muscle and Edema Assessment)
• Using the 3 case studies, complete a physical assessment simulation in order to determine if malnutrition diagnosis is appropriate
• Perform Head to Toe Exam based on A.S.P.E.N/Academy guidelines, and meet competency

1-3 Months & Annual competency

• Each Dietitian will complete 2 Physical Assessments identifying patients with Malnutrition. Validation will be completed by Subject Matter Experts
The following has been completed by the subject matter expert:

- Independent contractor for The Academy of Nutrition and Dietetics as a trainer to provide malnutrition workshops to dietitians across the nation.
- Attended a 2 day seminar, title “The Nutrition Focused Physical Examination” at Rutgers School of Health Related Professions. Competencies acquired were validated by a medical professional, upon completion of this seminar.
- Attended a 1 day seminar, titled “Diagnosing Malnutrition: Understanding the Role of Muscle and Fat Loss” at Novant Health Presbyterian Medical Center. Competencies acquired were validated by a medical professional, upon completion of this seminar.
- Completed an online education program, titled “Patient Simulation: Putting Malnutrition Screening, Assessment, Diagnosis, and Intervention into Practice”. 1 hour of continuing education was obtained, upon completion of this program.
- Completed multiple peer reviewed nutrition focused physical exams
Order Entry

Dietitian Consult
ONCE First occurrence: Today at 09:15, Routine

Frequency: ONCE
Starting: 1/10/2016
First Occurrence: Today 09:15
Scheduled Times: Hide Schedule

Priority: Routine

Questions:

1. Nutritional Assessment
   - Tube Feeding Assessment
   - Recommend Diet
   - Snack/Snack/Food Preferences
   - TPN Assessment
   - Malnutrition Evaluation
   - Family
   - Caloric Intake/Lower Education

2. * * * Diet Education, Specify
   - CHF, Diabetes: Newly Diagnosed
   - Diabetes: Pre-Existing
   - Heart Health
   - Food/Drug Interaction
   - Obesity/Obesity
   - Failure To Thrive
   - Cystic Fibrosis
   - ERAS Post-op Education
   - Transplant Recipient Education
   - Transplant Donor Education

Comments (65): Click to add text

[Options: Next Required, Link Order, Accept, Cancel]
Malnutrition Documentation
(Dietitian Note)

**Malnutrition Documentation**

**Nutrition Recommendations for Provider:**
1. Continue diabetic 2400 calorie diet
2. RDN modified Ensure Complete to chocolate flavor TID with meals, per pt preference and so as to send on trays (350 kcal, 13g protein per shake)
3. If pt unable to sustain adequate PO intake (which is anticipated), recommend Vital 1.5 @ 20ml/hr, increasing 10ml q6h toward goal rate of 55ml/hr to provide pt with 1800 kcal, 29g protein, 1003 ml free water, 132% RDIs. Recommend water flushes minimum of 50ml q6h. Continue concurrent PO diet with TFs to meet nutritional needs.
4. Pt meets criteria for severe protein-calorie malnutrition in the setting of chronic illness based on wt loss (11.2% wt loss x3 months) and energy intake (RDIN estimating pt meeting less than/equal to 75% of energy needs for greater than/equal to 1 month)

**Recommended Malnutrition Diagnosis:**
Severe Protein Calorie Malnutrition

---

**Nutrition Recommendations for Provider:**
1. If when TFs are initiated, recommend Jevity 1.5 @ 20ml/hr, increasing 10ml q6h toward goal of 35ml/hr to provide pt with 1280 kcal, 54g protein, 638ml free water, 84% RDIs. Recommend water flushes of 100ml q4h if NPs are d/c'd.
2. Continue AHA step 1 cardiac diet, encourage intake
3. Pt meets criteria for severe protein-calorie malnutrition in the setting of chronic illness based on energy intake (estimating pt has been meeting less than/equal to 75% of estimated energy requirements for greater than/equal to 1 month), severe muscle wasting (areas including temporal region, clavicle region, clavicle/acromion region, scapular region), and mild/moderate muscle wasting (areas including anterior thigh region, patellar region, posterior calf region)

**Recommended Malnutrition Diagnosis:**
Severe Protein Calorie Malnutrition
Scope of Practice in Nutrition Care for RDNs

• The RDN can conduct a nutrition focused physical examination
• “Nutrition-focused physical findings assessment (often referred to as clinical assessment): Assessed findings from evaluation of body systems, muscle and subcutaneous fat wasting, oral health, hair, skin and nails, signs of edema, suck/swallow/breath ability, appetite and affect.”
• Differentiate normal vs non-normal findings
• Assess and intervene in findings that are relevant to the patient’s care
• Refer and collaborate with the medical/Interdisciplinary team
Malnutrition Prevalence

- 1/3 hospitalized patients are malnourished upon admission
- A major contributor to increased morbidity and mortality, decreased quality of life, increased length of stay, and readmissions
- Nutrition interventions are low risk and cost effective

Tappenden et al. JPEN 2013
Goal for Inter-professional Approach to Address Malnutrition

- Create a culture where nutrition is valued
- Include multiple disciplines in nutrition care
- Identify and diagnose all patients with malnutrition or those that are at risk for becoming malnourished
- Implement comprehensive nutrition interventions
- Develop discharge nutrition care and education plans

Tappenden et al. JPEN 2013
Etiology-Based Malnutrition Definitions

Nutritional Risk Identified
Compromised intake or loss of body mass

Inflammation present? No/Yes

No
Starvation Related Malnutrition (pure chronic starvation, anorexia nervosa)

Yes
Mild-Moderate degree
Chronic Disease-Related Malnutrition (organ failure, pancreatic cancer, rheumatoid arthritis, sarcopenic obesity)

Yes
Marked Inflammatory response
Acute Disease or Injury-Related Malnutrition (major infection, burns, trauma, closed head injury)

Jensen GL. JPEN 2009;33:710
Malnutrition Etiologies

- Acute Illness/Injury
  - Severe inflammation

- Chronic Illness
  - Mild to moderate inflammation
  - **Occurring for 3 months or longer**

- Social/ Environmental Circumstances
  - Chronic starvation, NO inflammation
Acute Illness/Injury with Severe Inflammation

- Inflammation is acute and of severe degree
  - Examples:
    - Major infection/sepsis
    - ARDS, burns, trauma
    - Closed head injury
    - Major surgery (any surgery that involves a major organ)

Chronic Illness with Mild-Moderate Inflammation

- Inflammation is chronic and of mild-moderate degree
  - Examples:
    - Organ failure (kidney, liver, heart, lung, gut
    - Cancer
    - Rheumatoid arthritis
    - CHD
    - Cystic fibrosis
    - Celiac disease
    - IBD
    - CVA
    - Chronic pancreatitis
    - DM

Jensen GL. Malnutrition and Inflammation - “burning down the house.” JPEN, 2014.
Social or Environmental Circumstances
NO inflammation

- Chronic starvation without inflammation
  - Examples:
    - Depression (currently a questionable dx for this category)
    - Economic hardship
    - Cognitive or emotional impairment
    - Inability or lack of desire to manage self-care
    - Physical conditions: ingestion of foreign bodies
    - Anorexia nervosa
    - Poor oral/dental conditions

Severe Malnutrition: Must have at least 2 categories

<table>
<thead>
<tr>
<th>ICD-10: E44</th>
<th>Severe Malnutrition in the context of Acute Illness/Injury</th>
<th>Severe Malnutrition in the context of Chronic Illness</th>
<th>Severe Malnutrition in the context of Social/Behavioral/Environmental Circumstances</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weight Loss</strong></td>
<td>Weight Loss  &gt;2% in 1 week &gt;5% in 1 month &gt;7.5% in 3 months</td>
<td>Weight Loss &gt;5% in 1 month &gt;7.5% in 3 months &gt;10% in 6 months &gt;20% in 12 months</td>
<td>Weight Loss &gt;5% in 1 month &gt;7.5% in 3 months &gt;10% in 6 months &gt;20% in 12 months</td>
</tr>
<tr>
<td><strong>Intake</strong></td>
<td>Energy Intake ≤50% energy intake compared to estimated energy needs for ≥ 5 days</td>
<td>Energy Intake ≤75% energy intake compared to estimated energy needs for ≥1 month</td>
<td>Energy Intake ≤50% energy intake compared to estimated energy needs for ≥1 month</td>
</tr>
<tr>
<td><strong>Body Fat</strong></td>
<td>Body Fat Moderate depletion</td>
<td>Body Fat Severe depletion</td>
<td>Body Fat Severe depletion</td>
</tr>
<tr>
<td><strong>Muscle Mass</strong></td>
<td>Muscle Mass Moderate depletion</td>
<td>Muscle Mass Severe depletion</td>
<td>Muscle Mass Severe depletion</td>
</tr>
<tr>
<td><strong>Fluid Accumulation</strong></td>
<td>Fluid Accumulation Moderate to Severe</td>
<td>Fluid Accumulation Severe</td>
<td>Fluid Accumulation Severe</td>
</tr>
<tr>
<td><strong>Grip Strength</strong></td>
<td>Reduced Grip Strength for age and gender or Regressed Functional Status</td>
<td>Reduced Grip Strength for age and gender or Regressed Functional Status</td>
<td>Reduced Grip Strength for age and gender or Regressed Functional Status</td>
</tr>
</tbody>
</table>
Moderate Malnutrition - Must have at least 2 categories

<table>
<thead>
<tr>
<th></th>
<th>Moderate Malnutrition in the context of Acute Illness/Injury</th>
<th>Moderate Malnutrition in the context of Chronic Illness</th>
<th>Moderate Malnutrition in the context of Social/Environmental Circumstances</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Weight Loss</strong></td>
<td>Weight Loss 1-2% in 1 week 5% in 1 month 7.5% in 3 months</td>
<td>Weight Loss 5% in 1 month 7.5% in 3 months 10% in 6 months 20% in 12 months</td>
<td>Weight Loss 5% in 1 month 7.5% in 3 months 10% in 6 months 20% in 12 months</td>
</tr>
<tr>
<td><strong>Intake</strong></td>
<td>Energy Intake &lt;75% energy intake compared to estimated energy needs for &gt;7 days</td>
<td>Energy Intake &lt;75% energy intake compared to estimated energy needs for ≥1 month</td>
<td>Energy Intake &lt;75% energy intake compared to estimated energy needs for ≥3 months</td>
</tr>
<tr>
<td><strong>Body Fat</strong></td>
<td>Body Fat Mild depletion</td>
<td>Body Fat Mild depletion</td>
<td>Body Fat Mild depletion</td>
</tr>
<tr>
<td><strong>Muscle Fat</strong></td>
<td>Muscle Mass Mild depletion</td>
<td>Muscle Mass Mild depletion</td>
<td>Muscle Mass Mild depletion</td>
</tr>
<tr>
<td><strong>Fluid Accumulation</strong></td>
<td>Fluid Accumulation Mild</td>
<td>Fluid Accumulation Mild</td>
<td>Fluid Accumulation Mild</td>
</tr>
<tr>
<td><strong>Grip Strength</strong></td>
<td>Reduced Grip Strength Not applicable</td>
<td>Reduced Grip Strength Not applicable</td>
<td>Reduced Grip Strength Not applicable</td>
</tr>
</tbody>
</table>
Albumin/Prealbumin

- Albumin/prealbumin:
  - Not good indicators of nutritional status!

- “[Albumin and prealbumin], although probable indicators of inflammation, do not specifically indicate malnutrition and do not typically respond to feeding interventions in the setting of active inflammatory response. Thus, the relevance of laboratory tests of acute phase protein levels, as indicators of malnutrition, is limited”.

- “Serum proteins such as serum 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”.

17
Severity of Malnutrition

• “Mild Malnutrition”

Evidence is lacking to be able to distinguish between mild and moderate malnutrition in the clinical setting, therefore there is no standard definition of mild malnutrition.
Be familiar with your patient’s anatomy!

Prior to performing an NFPE on your patient, it is important to be familiar with their general anatomy, line placements, ostomies, etc..

- Does the patient have a PICC?
- Male versus female
- Age
- Are there any ostomies or lines that would inhibit you from taking their gown or blankets off?
- Is the patient stable to reposition?
- Is there any prior injury, surgery, or non-nutrition related issue, that would cause your patient to have an abnormal presentation of an area on their body (i.e. amputations, arthritis, previous surgery, cupital tunnel and carpal tunnel syndrome, paralysis, etc...)
BODY FAT
### Assessment: Body Fat Loss

**Orbital Region**

<table>
<thead>
<tr>
<th>Exam area</th>
<th>Tips</th>
<th>Severe Malnutrition</th>
<th>Mild - moderate malnutrition</th>
<th>Well - nourished</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orbital region - surrounding the eye</td>
<td>View patient when standing directly in front of them, touch above cheekbone</td>
<td>Hollow look, depressions, dark circles, loose skin</td>
<td>Slightly dark circles, somewhat hollow look</td>
<td>Slightly bulged fat pads. Fluid retention may mask loss</td>
</tr>
</tbody>
</table>
Facial Muscles
Orbital Region (Orbital fat pads)

- Normal
- Mild-Moderate
- Severe
# Assessment: Body Fat Loss

## Upper Arm Area

<table>
<thead>
<tr>
<th>Exam area</th>
<th>Tips</th>
<th>Severe malnutrition</th>
<th>Mild - moderate malnutrition</th>
<th>Well-nourished</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper arm region - triceps/bicep</td>
<td>Arm bent, roll skin between fingers, do not include muscle in pinch</td>
<td>Very little space between folds, fingers touch</td>
<td>Some depth pinch, but not ample</td>
<td>Ample fat tissue obvious between folds of skin</td>
</tr>
</tbody>
</table>
Triceps/Bicep Muscles
Triceps

Normal

Mild-Moderate

Severe
<table>
<thead>
<tr>
<th>Exam area</th>
<th>Tips</th>
<th>Severe malnutrition</th>
<th>Mild - moderate malnutrition</th>
<th>Well-nourished</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thoracic and lumbar region - ribs, lower back, midaxillary line</td>
<td>Have patient press hands hard against a solid object</td>
<td>Depression between the ribs very apparent. Iliac crest prominent</td>
<td>Ribs apparent, depressions between them less pronounced. Iliac crest somewhat prominent</td>
<td>Chest is full, ribs do not show. Slight to no protrusion of the iliac crest</td>
</tr>
</tbody>
</table>
Thoracic/Lumbar Region and Midaxillary Line
Thoracic/Lumbar Region and Midaxillary Line

Normal

Mild-Moderate

Severe
MUSCLE
## Assessment: Muscle Loss

### Temple Region

<table>
<thead>
<tr>
<th>Exam area</th>
<th>Tips</th>
<th>Severe malnutrition</th>
<th>Mild - moderate malnutrition</th>
<th>Well-nourished</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temple region/Temporalsis muscle</td>
<td>View patient when standing directly in front of them, ask them to turn head side to side</td>
<td>Hollowing, scooping, depression</td>
<td>Slight depression</td>
<td>Can see/feel well-defined muscle</td>
</tr>
</tbody>
</table>
Temple region/ Temporalis muscle
Temporal Region

- Normal
- Mild-Moderate
- Severe
## Assessment: Muscle Loss (Clavicle Bone Region)

<table>
<thead>
<tr>
<th>Exam area</th>
<th>Tips</th>
<th>Severe malnutrition</th>
<th>Mild - moderate malnutrition</th>
<th>Well-nourished</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clavicle bone region - Pectoralis major, deltoid, trapezius muscles</td>
<td>Look for prominent bone. Make sure patient is not hunched forward</td>
<td>Protruding, prominent bone</td>
<td>Visible in male, some protrusion in female</td>
<td>Not visible in male, visible but not prominent in female</td>
</tr>
</tbody>
</table>

Nutrition in Clinical Practice 28 (6): 639-650
Clavicle bone region, Pectoralis Major, Deltoid, Trapezius Muscles
Clavicle Region

NORMAL

MILD-MODERATE

SEVERE
Assessment: Muscle Loss  
(Acromion Bone Region-Deltoid Muscle)

<table>
<thead>
<tr>
<th>Exam Area</th>
<th>Tips</th>
<th>Severe Malnutrition</th>
<th>Mild-Moderate Malnutrition</th>
<th>Well Nourished</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clavicle &amp; Acromion bone region - Deltoid muscle</td>
<td>Patient arms at side; observe shape</td>
<td>Shoulder to arm joint shape looks square. Acromion protrusion very prominent</td>
<td>Acromion process may slightly protrude</td>
<td>Rounded, curves at arm, shoulder, neck</td>
</tr>
</tbody>
</table>
Acromion Bone region-Deltoid Muscle
Acromion Bone Region-Deltoid Muscle

NORMAL

MILD-MODERATE

SEVERE
### Assessment: Muscle Loss

Scapular Bone region, Trapezius, Supraspinatus, Infraspinatus muscles

<table>
<thead>
<tr>
<th>Exam Area</th>
<th>Tips</th>
<th>Severe Malnutrition</th>
<th>Mild-Moderate Malnutrition</th>
<th>Well Nourished</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scapular bone region - Trapezius, supraspinatus infraspinatus muscles</td>
<td>Ask patient to extend hands straight out, push against solid object</td>
<td>Prominent, visible bones, depressions between ribs/scapula or shoulder/spine</td>
<td>Mild depression or bone may show slightly</td>
<td>Bones not prominent, no significant depressions</td>
</tr>
</tbody>
</table>
Scapular Bone region, Trapezius, Supraspinatus, Infraspinatus Muscles
Scapular Bone region, Trapezius, Supraspinatus, Infraspinatus Muscles

- Normal
- Mild-Moderate
- Severe
**Assessment: Muscle Loss**  
**Dorsal Hand-Interosseous Muscle**

<table>
<thead>
<tr>
<th>Exam Area</th>
<th>Tips</th>
<th>Severe Malnutrition</th>
<th>Mild-Moderate Malnutrition</th>
<th>Well Nourished</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dorsal hand - Interosseous muscle</td>
<td>Look at thumb side of hand; look at pads of thumb when tip of forefinger touching tip of thumb</td>
<td>Depressed area between thumb and forefinger</td>
<td>Slightly depressed</td>
<td>Muscle bulges, could be flat in some well nourished individuals</td>
</tr>
</tbody>
</table>

White et al, J AcadNutr Diet 2012
Dorsal Hand-Interosseous Muscle
Assessing Dorsal Hand-Interosseous Muscle
Assessing Dorsal Hand-Interosseous Muscle

Normal  Mild  Severe
## Assessment: Muscle Loss in the Lower Body - Quadriceps

<table>
<thead>
<tr>
<th>Exam Area</th>
<th>Tips</th>
<th>Severe Malnutrition</th>
<th>Mild-Moderate Malnutrition</th>
<th>Well Nourished</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anterior thigh region - Quadriceps muscle</td>
<td>Ask patient to sit, prop up leg on low furniture. Grasp quads to differentiate amount of muscle tissue from fat tissue</td>
<td>Depression/line on thigh, obviously thin</td>
<td>Mild depression on inner thigh</td>
<td>Well rounded, well developed</td>
</tr>
</tbody>
</table>
Quadriceps (Anterior Thigh)
Assessment: Quadriceps

Normal

Mild-Moderate

Severe
### Assessment: Muscle Loss in the Lower Body-Patellar Region

<table>
<thead>
<tr>
<th>Exam Area</th>
<th>Tips</th>
<th>Severe Malnutrition</th>
<th>Mild-Moderate Malnutrition</th>
<th>Well Nourished</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patellar region - Quadriceps Muscle</td>
<td>Ask patient to sit with leg propped up, bent at knee</td>
<td>Bones prominent, little sign of muscle around knee</td>
<td>Knee cap less prominent, more rounded</td>
<td>Muscles protrude, bones not prominent</td>
</tr>
</tbody>
</table>

Nutrition in Clinical Practice 28 (6): 639-650
Assessing for Muscle Loss-Patellar Region
Assessment: Patellar Region

Normal

Mild-Moderate

Severe
### Assessment: Muscle Loss in the Lower Body-Posterior Calf (Gastrocnemius)

<table>
<thead>
<tr>
<th>Exam Area</th>
<th>Tips</th>
<th>Severe Malnutrition</th>
<th>Mild-Moderate Malnutrition</th>
<th>Well Nourished</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posterior calf region - Gastrocnemius muscle</td>
<td>Grasp the calf muscle to determine amount of tissue</td>
<td>Thin, minimal to no muscle definition</td>
<td>Not well developed</td>
<td>Well developed bulb of muscle</td>
</tr>
</tbody>
</table>
Posterior Calf (Gastrocnemius)
Assessment: Posterior Calf (Gastrocnemius)

Normal

Mild-Moderate

Severe
EDEMA
Considerations: Edema

- Supportive criteria in the diagnosis of malnutrition
- Rarely a direct result of malnutrition
- Falsely elevates weight/masks weight loss
- Interferes with ability to assess muscle and fat wasting
## Assessment: Edema

<table>
<thead>
<tr>
<th>Exam Area</th>
<th>Tips</th>
<th>Severe Malnutrition</th>
<th>Mild-Moderate Malnutrition</th>
<th>Well Nourished</th>
</tr>
</thead>
<tbody>
<tr>
<td>View scrotum/vulva in activity restricted patient; ankles in mobile patient</td>
<td>Rule out other causes of edema, patient at dry weight</td>
<td>Deep to very deep pitting, depression lasts a to moderate time (31-60 seconds) extremity looks swollen (3-4+)</td>
<td>Mild to moderate pitting, slight swelling of the extremity, indentation subsides quickly (0-30 seconds), 1-2+</td>
<td>No sign of fluid accumulation</td>
</tr>
</tbody>
</table>

Nutrition in Clinical Practice 28 (6): 639-650
## Assessment: Edema

<table>
<thead>
<tr>
<th>Method</th>
<th>Measurement and Rebound</th>
</tr>
</thead>
<tbody>
<tr>
<td>+1</td>
<td>2 mm depression, barely detected, immediate rebound</td>
</tr>
<tr>
<td>+2</td>
<td>4 mm deep pit, a few seconds to rebound</td>
</tr>
<tr>
<td>+3</td>
<td>6 mm deep pit, 10 - 12 seconds to rebound</td>
</tr>
<tr>
<td>+4</td>
<td>8 mm very deep pit, &gt; 20 seconds to rebound</td>
</tr>
</tbody>
</table>

Edema: Legs, Ankles, Feet
Edema: Scrotum, Vulva
Hand Dynamometer

- The means are generated by the manufacture and come with the dynamometer.
- Reduced grip strength is defined as 2 standard deviations below the norm.
- Reduced handgrip strength is often times, one of the first things to decline with malnutrition and is usually detected before fat and muscle wasting is present.
- Important to work with therapist (OT/PT) to understand how to properly position your patients, as well as what patients are most applicable for using a hand dynamometer.
Summary

- Identification of and timely, effective interventions for malnutrition are important due to the adverse outcomes associated with malnutrition.
- Nutrition-focused physical exam is an essential component of a nutrition assessment and assists with identifying malnutrition and other nutritional problems.
References

- Gabay C & Kushing I. Acute-Phase Proteins and Other Systemic Responses to Inflammation. NEJM. 1999 Feb; 340 (6): 448-454
- Jensen GL. Malnutrition and Inflammation - “Burning Down the House”: Inflammation as an Adaptive Physiologic Response versus Self-Destruction? JPEN. 2014 Apr
Acknowledgements

- Njeri Njuguna, MS, RDN, LDN, CPT
- Kimberly Chandra, RDN, LDN