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Addressing Sarcopenia and Protein-Energy Malnutrition Through Dietary Management

Presented by:
Liz Friedrich, MPH, RDN, CSG, LDN, FAND

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The webinar will begin shortly.

About our speaker

Liz Friedrich, MPH, RDN, CSG, LDN, FAND
Addressing Sarcopenia and Protein-Energy Malnutrition Through Dietary Management

Liz Friedrich, MPH, RDN, CSG, LDN, FAND
June 27, 2017

Objectives

- State the criteria used to identify protein-energy malnutrition
- Define sarcopenia and sarcopenic obesity
- Understand protein needs for healthy older adults and older adults with diagnoses common in residents in long-term care
- State at least three interventions that can be used to increase protein available to residents in long-term care

Polling Question

What is your role?
A. RDN or NDTR in a skilled nursing, assisted living, CCRC, rehab, or hospice facility
B. Certified Dietary Manager in a skilled nursing, assisted living, CCRC, rehab, or hospice facility
C. Nursing Home Administrator or Residential Care/Assisted Living Administrator
D. RN, DON, ADON
E. Other
Protein Basics

- Are made up of amino acids (AA), which are attached to one another in long chains
- Do most of the work in cells
- Are required for the structure, function, and regulation of the body's tissues and organs

Protein Functions

- Build muscle, ligaments, skin cells, blood
- Draw fluid into the capillary bed
- Transport lipids, vitamins, minerals, and oxygen
- Form antibodies, which keep the immune system functioning
Protein Functions

- Maintain the body fluid balance by producing albumin and globulin.
- Without sufficient protein in the blood stream, edema can develop.
- Contribute to the acid-base balance by producing acids and bases, keeping the blood pH slightly alkaline (pH 7.35 to 7.45).

Dietary Protein as an Energy Source

- Dietary protein can be used as an energy source.
  - If a diet lacks enough carbohydrate, dietary protein can be used to synthesize glucose.

Under normal circumstances, dietary protein is used for protein synthesis in the body rather than for energy.

In periods of stress, 25-30% of the amino acids consumed are misused, going to produce fuel (energy) in the body rather than for protein synthesis.
Dietary Protein as an Energy Source

When dietary protein is used as an energy source rather than for protein synthesis, the result is a loss of lean body mass (LBM).


High Biological Value (HBV) Protein

The protein digestibility corrected amino acid score (PDCAAS) is an international standard for determining the quality of a protein.

- Represents the adequacy of its most limiting amino acid.
- Food and supplements with a PDCAAS of 1.0 or 100% are HBV proteins.


High Biological Value (HBV) Proteins

<table>
<thead>
<tr>
<th>Food Source</th>
<th>Biological Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whey protein</td>
<td>104</td>
</tr>
<tr>
<td>Egg</td>
<td>100</td>
</tr>
<tr>
<td>Cow’s milk</td>
<td>95</td>
</tr>
<tr>
<td>Beef</td>
<td>80</td>
</tr>
<tr>
<td>Fish</td>
<td>79</td>
</tr>
<tr>
<td>Casein</td>
<td>77</td>
</tr>
<tr>
<td>Soybean</td>
<td>74</td>
</tr>
</tbody>
</table>

Amino Acid Categories

- Indispensable (Essential)
  - Histidine
  - Isoleucine
  - Leucine
  - Lysine
  - Methionine
  - Phenylalanine
  - Threonine
  - Tryptophan
  - Valine

- Dispensable (Non-Essential)
  - Alanine
  - Aspartic acid
  - Asparagine
  - Glutamic acid
  - Serine

Conditionally Indispensable AA

- Arginine
- Cysteine
- Glutamine
- Glycine
- Proline
- Tyrosine

Branched-Chain Amino Acids (BCAA)

- BCAA are found in any food containing protein
- Leucine is being researched for its role in maintaining muscle mass and muscle protein synthesis


Information updated after the live event

Food Sources of Leucine

- Soybeans
- Beef
- Peanuts
- Salmon
- Wheat germ
- Almonds
- Chicken
- Eggs
- Legumes

Protein-Energy Malnutrition (PEM)

- Deficiency of both protein and energy (calories)
- Results in a defective utilization of nutrients
- Negative nitrogen balance
- Results in a loss of lean body mass

Lean Body Mass (LBM)

- Maintained by:
  - Genetic drive to maintain protein stores
  - Anabolic hormones that stimulate protein synthesis
  - Resistance exercise
  - Adequate protein in diet to meet demands
- Body weight is made up lean body mass and body fat
- A patient can be overweight but depleted of lean body mass
Loss of Lean Body Mass (LBM)

Leads to:

- Inability to heal and recover from surgery, illness, or disease
- Loss of independence
- Decreased strength and energy
- Increased risk of falls and fractures
- Impaired wound healing
- Reduced respiratory muscle strength in patients with COPD

Identifying PEM

- Lab values (albumin, prealbumin) are not good indicators of PEM because they:
  - Are negative acute-phase reactants
- Inflammation is a result of many acute and chronic medical conditions
- Many patients in LTC have conditions (both acute and chronic) that cause inflammation

Albumin and Prealbumin

- Do not automatically improve with nutrition intervention
- Are no longer considered accurate for identifying PEM
- Are indicators of increased morbidity and mortality
- Are still used by some clinicians to diagnose mild, moderate, and severe malnutrition
Polling Question

In your estimation, what percentage of the MDs, NPs, and PAs that you work with use albumin as an indicator of malnutrition?

A. 0-25%
B. 25-50%
C. 50-75%
D. 75-100%

Etiology-Based Malnutrition

- Pure chronic starvation without inflammation (ex: anorexia nervosa)
- Chronic diseases that impose inflammation (ex: organ failure, pancreatic failure, sarcopenic obesity)
- Acute disease or injury states (ex: major infection, burns, trauma)


2012 Update

- The American Society of Parenteral and Enteral Nutrition (ASPEN) and the Academy of Nutrition and Dietetics (Academy) released proposed criteria to identify malnutrition.
- Published simultaneously in JPEN and J Acad Nutr Diet in 2012

Malnutrition in the context of acute illness or injury

Malnutrition in the context of chronic disease

Malnutrition in the context of social/environmental circumstances


Outlines a standardized set of diagnostic criteria to identify and document adult malnutrition in routine clinical practice

1. Insufficient energy intake
2. Weight loss
3. Loss of muscle mass
4. Loss of subcutaneous fat
5. Localized or generalized fluid accumulation that could mask weight loss
6. Diminished functional status as measured by hand grip strength

Diagnosis is based on a comprehensive assessment that includes:

- History and clinical diagnosis
- Physical exam
- Anthropometric data
- Laboratory data
- Food/nutrient intake
- Functional assessment

Diagnosis of Malnutrition

A comprehensive nutrition assessment can be used to identify malnutrition

A comprehensive assessment should include, if possible:

– Nutrition focused physical assessment
– Diminished functional status, as measured by hand grip strength

Recommended Laboratory Data

• C-reactive protein
• White blood count (indicator of infection, trauma, etc.)
• Blood glucose
• Nitrogen balance
• Electrolytes and other indicators of dehydration

Every blood draw for lab results requires a patient to be stuck with a needle

Estimating Protein Needs

• Nitrogen balance
  – Compares nitrogen (protein) intake to output
  – Calculated using a 24-hour urine test
• Mathematical calculations

How do you estimate protein needs?
## Protein Needs

<table>
<thead>
<tr>
<th>Condition</th>
<th>Protein Needs (g/kg)</th>
<th>Protein Needs (g/kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy adult</td>
<td>0.8</td>
<td>Recent literature</td>
</tr>
<tr>
<td>Older adult &gt; 65 years</td>
<td>1.0</td>
<td>1.0-1.2* PROT-AGE study</td>
</tr>
<tr>
<td>Pressure injury</td>
<td>1.25-1.5</td>
<td></td>
</tr>
<tr>
<td>Liver disease/cirrhosis</td>
<td>1.2-1.6</td>
<td></td>
</tr>
<tr>
<td>CKD predialysis</td>
<td>&gt;0.6-0.8</td>
<td></td>
</tr>
<tr>
<td>CKD hemodialysis</td>
<td>1.2-1.3</td>
<td></td>
</tr>
<tr>
<td>CKD peritoneal dialysis</td>
<td>&gt;1.3</td>
<td></td>
</tr>
<tr>
<td>Critical illness</td>
<td>1.5-2.0</td>
<td></td>
</tr>
<tr>
<td>Sarcopenia</td>
<td>1.25-1.5** Morley</td>
<td></td>
</tr>
</tbody>
</table>

*Recent literature

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## Meal Distribution

- Research suggests that protein intake should be evenly distributed throughout the day to maximize protein synthesis

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## PROT-AGE Study Group

- Most older adults who have an acute or chronic disease need more dietary protein (1.2-1.5 g/kg/day)
- People with severe illness or injury or with marked malnutrition may need as much as 2.0 g/kg/day.
Older people with severe CKD (estimated GFR < 30 mL/min/1.73 m²) who are not on dialysis are an exception to the high-protein rule; these individuals need to limit protein intake.

Use clinical judgment to determine protein needs of those with CKD who are not on dialysis.

PROT-AGE Recommendations

Patients with CKD, Non-dialysis

<table>
<thead>
<tr>
<th>Non-Dialysis</th>
<th>Hemodialysis</th>
<th>Peritoneal Dialysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe CKD (GFR &lt; 30): &gt;0.8 g/kg/day</td>
<td>&gt;1.2 g/kg/day, up to 1.5 g/kg/day</td>
<td>&gt;1.2 g/kg/day, up to 1.5 g/kg/day</td>
</tr>
<tr>
<td>Moderate CKD (GFR 30–&lt;60): &gt;0.8 g/kg/day, monitor GFR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mild CKD, GFR &gt; 60: Increase protein as needed</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For obese critically-ill patients, the Academy Pocket Guide for Nutrition Assessment recommends

- 1.9 g/kg IBW obesity class I or II with trauma
- 2.5 g/kg IBW obesity class III with trauma

Critically ill patients are in a controlled environment so nitrogen balance can be monitored.
Practical Advice BMI ≥ 30

- Using actual body weight results in a very high number of grams/day
- Using **adjusted** body weight, **desirable** body weight, or **ideal** body weight may seem logical but is not supported by research

![Image: What does that number really mean?]

Practical Advice BMI ≥ 30

Use clinical judgement, based on comorbidities and goals of care

- Document the method used to estimate protein needs
- Indicate that due to obesity, needs may be difficult to determine

![Image: What does that number really mean?]

Conditions in LTC that May Affect Protein Needs

- Chronic kidney disease
- Liver disease
- Adult failure to thrive/anorexia of aging
- Protein-energy malnutrition
- Pressure injuries and other wounds
- Sarcopenia

Sarcopenia

“Loss of muscle mass that occurs with aging”

“Syndrome characterized by progressive and generalized loss of skeletal muscle mass and strength with a risk of adverse outcomes such as physical disability, poor quality of life, and death.”


Sarcopenia

Definitions proposed by the European Working Group on Sarcopenia in Older People

- Primary sarcopenia
  - Refers to muscle wasting related to aging
- Secondary sarcopenia
  - Refers to muscle loss related to disuse, inflammation, or malnutrition


Sarcopenia

- 5-13% of 60-70 year olds
- 11-50% in those ≥ 80 years old
- Over 50% of healthy, ambulatory, community-dwelling adults over 80

Associated with catabolism

Can be aggravated by low-grade production of inflammatory cytokines in chronic disease (malnutrition of chronic disease)

Sarcopenia

- No specific biomarkers or clinical indices to diagnose
- Anthropometric assessment may overlook the diagnosis
- Characterized by low muscle mass plus low muscle strength or low physical performance

Identification:
- Measurement of walking speed in the elderly with muscle mass and hand grip strength
- DEXA (dual-energy x-ray absorptiometry), CT (computed tomography) or MRI (magnetic resonance imaging)


Sarcopenic Obesity

Describes obese persons with muscle loss resulting from disease or lack of use

With aging, lean body mass decreases while fat mass increases

Excess energy intake, physical inactivity, low-grade inflammation, insulin resistance, and hormonal changes play a role

Obesity and sarcopenia together can cause physical impairment, metabolic disorders, and mortality


Management of Sarcopenia

- As per Morley, Argiles, et al:
  - 1.0 to 1.5 grams protein/kg body weight/day
  - Leucine-enriched essential amino acids
  - Vitamin D replacement
  - Resistance exercise to improve gait and speed
  - Aerobic exercise to improve quality of life

**Exercise Recommendations PROT-AGE**

- **Endurance exercise**: 30 minutes per day at levels that are safe and tolerated.
- **Include progressive resistance training** when possible; consider 2-3 times per week for 10-15 minutes or more per session.
- **Increase dietary protein intake or provide supplemental protein** as needed to achieve total daily intake of at least 1.2 g/kg/day.
- **Consider prescribing a 20-g protein supplement** after exercise sessions.


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**Resistance Exercise**

- Use rubber bands, light weights, or body weight.
- Must conform to abilities of each individual.

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**Exercise and Protein Supplement**

Evidence supports the combination of exercise and protein/amino acid supplements for prevention and treatment of muscle loss in certain debilitating conditions and for chronic diseases such as COPD and heart failure.

Protein or Amino Acid Supplements for Sarcopenia Management

Dietary enrichment with leucine or a mixture of branch-chain amino acids may help enhance muscle mass and muscle function; further studies are needed.

8-Hydroxymethyl buterate (HMB) may attenuate muscle loss and increase muscle mass and strength in older people; further studies are needed.

Creatine supplementation may be justified for older people, especially those who are creatine-deficient or at high risk of deficiency.


*Information updated after the live event

Translating Evidence Into Practice

- 80 year old woman, 159 pounds, with sarcopenia, who dislikes chicken and fish
- At 1.0-1.5 g/kg body weight she needs 72-109 grams protein/day
- Can those needs be met without a supplement?
- What can you do to help her meet those needs?

Protein needs:

- Decreased intake associated with aging ("anorexia of aging")
- Difficulty with shopping, food prep, etc.
- Difficulty eating, chewing, or swallowing
- Cognitive issues that might affect food intake

Obtain food and lifestyle preferences; involve patient/surrogate in selecting diet
- Individualize diet
- Remove therapeutic and/or texture restrictions

Increase protein, especially at breakfast, to space protein evenly throughout the day

Provide HBV sources of protein at meals (milk, yogurt, large portions of meat and eggs)

- Increase protein, especially at breakfast, to space protein evenly throughout the day
- Provide HBV sources of protein at meals (milk, yogurt, large portions of meat and eggs)

- Increase amount of protein in sandwiches
- Add non-fat dry milk to soup, pudding, cooked cereal, scrambled eggs, casseroles, etc.

Provide foods fortified with protein using commercial protein

Estimate calorie and protein needs, review intake, and provide medical foods and supplements as needed

- Consider protein and calorie content per volume of supplements
- Taste test various supplements for acceptance

Provide oral nutritional supplements (ONS) and medical foods as needed
- Serve a form of ONS and/or medical foods that the patient will consume

- Involve patient and/or their surrogates in selecting supplements
- Involve patient and/or their surrogates in selecting supplements

Use milk instead of water to prepare hot chocolate, cream soups, and hot cereal

- Increase amount of protein in sandwiches
- Add non-fat dry milk to soup, pudding, cooked cereal, scrambled eggs, casseroles, etc.
Timing of ONS

- ONS are generally suggested to be given between meals rather than with meals.
- Supplement with meals to equalize protein intake throughout the day.

Choosing ONS

- ONS have been shown to improve strength outcomes in malnourished older adults with sarcopenia.
- To manage sarcopenia, consider an ONS with additional branch-chain amino acids such as leucine, if it is acceptable to the patient.

Monitor and evaluate effectiveness of supplement:
- Change timing or form of supplement to meet patient’s needs.
- Change flavor to avoid flavor fatigue.

Document if an individual declines nutrition interventions.

Update care plan to reflect changes.
Polling Question

What does your facility use to assure your residents are meeting their protein needs?
A. Medical food (low-volume, protein-dense)
B. 4 or 8 fl oz oral nutritional supplement
C. Protein powder
D. Fortified foods and/or “homemade” supplements
E. Other

Regulatory Requirements in LTC

New CMS rules (March 2017) have a more intense focus on patient-centered care and care planning.

State Operations Manual Appendix PP - Guidance to Surveyors for Long Term Care Facilities (Rev. 168, 03-08-17)

Surveyors will be looking for evidence of:
- Resident and/or their surrogate being involved in nutrition care decisions
- Resident exercising their right to make choices and/or refuse care
- Include residents in decisions regarding diet and ONS
- Document conversations regarding a resident’s choices in medical record
References

Questions?

CEU/CPE Instructions

To receive your CEU/CPE Certificate:

1. Complete the webinar survey at [https://www.surveymonkey.com/r/sarcopeniaPEM](https://www.surveymonkey.com/r/sarcopeniaPEM)
2. Obtain the webinar code found at the end of the survey
3. Go to [www.NutriciaLearningCenter.com](http://www.NutriciaLearningCenter.com) and click on “CE Credit Request”
4. Enter the webinar code obtained
5. Certificate will be visible for download on your NLC dashboard