Nutrition and Pressure Ulcers: Current Thinking

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Faculty Disclosure

Lynn has listed no financial interest/arrangement that would be considered a conflict of interest.
Agenda

- Review risk factors related to nutrition status and pressure ulcers.
- Discuss the most current recommendations for medical nutrition therapy for pressure ulcer treatment and prevention.
- Identify the role of hepatic proteins as indicators of nutrition status in wound healing.
- Describe the current thinking of the role of amino acids, vitamins, minerals and micronutrients in wound healing.

Prevalence of Pressure Ulcers

- NPUAP Prevalence and Incidence Monograph
  - 5% to 32% in acute care
  - 4% to 33% in home care
  - 5-21% in LTC
  - 2010 cost - $3.85 million
Pressure Ulcers: Regulations

- 2008 CMS Hospital Regulations
  - Stage III and Stage IV pressure ulcers are “reasonably preventable”
  - Reimbursement changed for hospital acquired pressure ulcers
- 2010 CMS Revisions F314
  - Addressed unavoidable pressure ulcers
  - Necessary treatment and services
  - Civil money penalties
- 2012 CMS Hospital Readmissions Reduction Program

Pressure Ulcers and Quality of Care

- Perception of pressure ulcers
  - Substandard Care
- Quality of Care indicator
  - Public and government
  - Healthy People 2020
- Viewed as modifiable
Risk Factors for Development of Pressure Ulcers

- Urinary and/or fecal incontinence
- Impaired/decreased functional ability
- Impaired circulation
- Co-morbid conditions-diabetes, renal failure

- Malnutrition/undernutrition/dehydration
- Obesity

- Medications
- Advanced age
- History of pressure ulcers

Factors Affecting Wound Healing

- Decreased mobility
- Co-morbid conditions
- Drug therapies
- Non-compliance with care plan
- Infection

- Loss of Lean Body Mass/weight loss
- Undernutrition, malnutrition, hydration deficits
- Hyperglycemia
Nutrition Risk Factors

Protein Energy Malnutrition (PEM)
- Deficiency of energy (calories) and protein
- Most common cause of malnutrition
- Synonymous with undernutrition

Loss of Lean Body Mass (LBM)
- All body tissue except fat
- Metabolically active

Unintended Weight Loss
- 5% in 30 days, 7.5% in 90 days, 10% in 180 days
- Can be insidious

Loss of LBM/Weight Loss

Sarcopenia
- Loss of muscle mass and strength with age
- Happens to everyone with normal aging

Cachexia
- Involuntary loss of LBM and fat mass
- Driven by hypercatabolism and hypermetabolism

Starvation
- Involuntary loss of weight
- Inadequate nutrition and anorexia
Importance of LBM

- Wound Healing
- Skin integrity
- Metabolically active
- All of Body’s Protein
- Metabolic processes
- 75% of normal body weight

Loss of Lean Body Mass

10%

- Wound healing has priority for protein

20%

- Restoration of LBM competes with wound healing process

30%

- Restoration and maintenance of LBM is most important. Wound healing stops

40%

- Death
Malnutrition/Undernutrition

2012 Academy of Nutrition and Dietetics and American Society for Parenteral and Enteral Nutrition Consensus Statement on Malnutrition

Role of Stress Response

Fight or Flight Response
Occurs with acute illness or chronic conditions
Leads to inflammation

Hormonal response to inflammation

<table>
<thead>
<tr>
<th>Increased</th>
<th>Decreased</th>
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</thead>
<tbody>
<tr>
<td>Catecholemines</td>
<td>Anabolic hormones</td>
</tr>
<tr>
<td>Cortisol</td>
<td>Testosterone</td>
</tr>
<tr>
<td>Glucagon</td>
<td>Growth hormone</td>
</tr>
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</table>
Role of Stress and Inflammation

**Increased catabolism**
- Progressive loss of LBM

**Hypermetabolism**
- Increased energy demands

**Metabolic Changes**
- Anorexia, GI changes

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Metabolic Response to Inflammation

<table>
<thead>
<tr>
<th>Normal</th>
<th>Stress</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein → protein synthesis (LBM)</td>
<td>Protein → energy production first</td>
</tr>
<tr>
<td>CHO → energy production</td>
<td>CHO → energy production</td>
</tr>
<tr>
<td>Fat → energy storage</td>
<td>Fat → used for energy</td>
</tr>
</tbody>
</table>
Loss of Lean Body Mass

- Wound healing has priority for protein
- Restoration of LBM competes with wound healing process
- Restoration and maintenance of LBM is most important. Wound healing stops
- Death

Hepatic Proteins

- Albumin
- Prealbumin
- Transferrin

Historically linked to nutritional status

Negative acute phase proteins
- Decrease in response to infection, injury, wounds
- Increase with recovery
Hepatic Proteins

**Albumin**
- Half-life of 18-21 days
- Low sensitivity for changes in protein status
- Reflective of inflammation
- Affected by hydration status

**Prealbumin**
- Half-life of 48-72 hours
- More sensitive than albumin
- Less affected by hydration
- May reflect inflammation

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What We Know About Hepatic Proteins

- Decrease in presence of inflammation
- Increase as inflammation decreases regardless of protein intake
- Useful indicators of severity of illness
- Can help to identify persons as risk for malnutrition
- Do not accurately measure nutritional repletion
The Real Truth About Albumin and Prealbumin

- Are not indicators of nutritional status
- Indicate morbidity, mortality and recovery for acute and chronic illness
- Shouldn’t be used to evaluate changes in protein status when acute or chronic inflammatory conditions exist

Biochemical Data

- How recent is the lab data?
  - Too old?
  - Too frequent?
- Recent blood transfusion?
- Used as part of a nutrition focused assessment
Diagnosis of Malnutrition

Presence of 2 or more:
- Insufficient energy intake
- Weight loss
- Loss of muscle mass
- Loss of subcutaneous fat
- Localized or generalized fluid accumulation
- Diminished functional status

Medical Nutrition Therapy

Goals
- Provide adequate nutrients on a daily basis
  - Calories
  - Protein
  - Fluids
  - Vitamins and Minerals
- Maintain and/or restore weight and LBM
- Determine need for adjunctive therapy
  - Amino Acids
Best Practice

USE EVIDENCE-BASED CLINICAL PRACTICE GUIDELINES

NPUAP/EPUAP Pressure Ulcer Guidelines
Address prevention and treatment
Released in 2009.

General Recommendations

Screen and assess nutritional status for each individual with a pressure ulcer at admission and with each condition change and/or when progress toward pressure ulcer closure is not observed.

- Have nutrition screen protocols in place
- Use a valid, reliable, practical screening tool that is easy to use.
General Recommendations

- Screen and assess nutritional status
- Refer all individuals with a pressure ulcer to the dietitian for early assessment and intervention of nutritional problems.
- Assess weight status for each individual to determine weight history and significant weight loss from usual body weight.
- Assess ability to eat independently.
- Assess adequacy of total nutrient intake (food, fluid, oral supplements, enteral/parenteral feedings).

Nutrition Screening Tools

- Mini-Nutritional Assessment (MNA)
- Malnutrition Universal Screening Tool (MUST)
- Subjective Global Assessment (SGA)
- Braden Risk Assessment Tool
Nutrition-Focused Nutrition Assessment

- Completed by Registered Dietitian
- Food/nutrition related history
- Anthropometric measures
- Biochemical data
- Medical Tests and Procedures
- Nutrition Focused Physical Finding
- Client History
- Nutrition Diagnosis/Interventions/Monitoring

Calories

- Provide 30-35 Kcalories/kg body weight. Adjust formula based on weight loss, weight gain or level of obesity.
- Liberalize dietary restrictions when limitations result in decreased food and fluid intake.
- Provide enhanced foods and/or oral supplements between meals if needed.
- Consider nutritional support (enteral or parenteral nutrition) when oral intake is inadequate, consistent with individual goals.
Protein

- Study by Paddon-Jones and Rasmussen in 2009
- 25-30 gm protein per meal stimulates muscle synthesis
- Implications for practice?

Fluid

- Provide and encourage adequate daily fluid intake for hydration.
- Monitor individuals for signs and symptoms of dehydration.
- Provide additional fluid for individuals with dehydration, elevated temperature, vomiting, profuse sweating, diarrhea or heavily draining wounds.

- 30 ml/kg/day or 1 ml/calorie per day

Vitamins and Minerals

- Provide adequate vitamins and minerals
- Encourage consumption of a balanced diet which includes good sources of vitamins and minerals
- Offer vitamin and mineral supplements when dietary intake is poor or deficiencies are confirmed or suspected
Vitamins/Minerals – Vitamin A

➢ Vitamin A
  - Fat soluble vitamin
  - Promotes collagen formation
  - Enhances cell proliferation
  - Needs may increase w/corticosteroids

➢ DRI-10000 IU

Vitamins/Minerals – Vitamin C

• Vitamin C
  ➢ Water soluble vitamin
  ➢ Enhances cell proliferation
  ➢ Stimulates collagen synthesis
  ➢ Supports immune function
  ➢ Important for iron absorption
  ➢ Additional needed for smokers
  ➢ Contraindicated with kidney stones and renal failure
Vitamins/Minerals - Zinc

- Zinc
  - Trace mineral
  - Protein synthesis
  - Cellular growth
  - Immune function
  - Transported by albumin
  - Deficiency may occur with draining wounds, poor dietary intake, excessive GI losses
  - Prolonged use may impair copper absorption

Vitamins/Minerals – Zinc Supplementation

If deficiency, use ≤ 40 mg.
Consider “stop” order

<table>
<thead>
<tr>
<th>Supplement</th>
<th>Dose</th>
<th>Elemental Zinc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zinc Sulfate</td>
<td>110 mg</td>
<td>25 mg</td>
</tr>
<tr>
<td></td>
<td>220 mg</td>
<td>51 mg</td>
</tr>
<tr>
<td>Zinc Gluconate</td>
<td>110 mg</td>
<td>16 mg</td>
</tr>
<tr>
<td></td>
<td>220 mg</td>
<td>31 mg</td>
</tr>
<tr>
<td>Zinc Chloride</td>
<td>110 mg</td>
<td>53 mg</td>
</tr>
</tbody>
</table>
Amino Acids

- Indispensable
  - Essential

- Disposable
  - Non-essential

- Conditionally indispensable
  - Conditionally essential

Amino Acids - Arginine

- May be conditionally indispensible
- Supports protein formation in cells
- May help support immune function
- Substrate for nitric oxide synthesis
- No definitive studies on wound healing
- More research needed
**Amino Acids - Glutamine**

- Conditionally indispensable w/stress
- Supports gut integrity
- Fuel source for cells needed for healing
- No definitive studies to show improved wound healing
- More research needed

**Other Supplements?**

- **Leucine**
  - Branched –chain amino acid
  - Regulates protein synthesis
  - Helps maintain nitrogen balance
- **HMB (beta hydroxy- beta-methylbutyrate)**
  - Metabolite of amino acid leucine
  - Precursor for the manufacture of cholesterol
  - Helps regulate muscle synthesis and degradation
  - Supports immune function
Nutrition Care Plan

Formulated by nutrition professional

Based on
- Severity of nutritional compromise
- Rate of weight loss or appetite decline with reason
- Causes/prognosis/projected clinical course
- Patient and family wishes
Nutrition Support

150# male with stage 2 pressure ulcer

- 2040-2380 calories
- 82-102 gm protein
- 2040 ml fluid

Meal intake
- 2 cups milk; 9-12 oz meat, eggs
- 8-9 cups fluid

Nutrition Support

120# female with stage 2 ulcer

- 1650-1925 calories
- 68-82 gm protein
- 1650 ml fluid

Meal intake
- 2 cups milk; 7-10 oz meat, eggs
- 6-7 cups fluid
Nutrition Support

Consider
- Enhanced foods
- Oral nutrition supplements
- Modular protein supplements
- Modular calorie supplements

Litigation

- 87% of verdicts and out of court settlements against facilities were awarded to the plaintiffs
- Average monetary recovery more than $13.5 million
- Awards of up to $312 million
- Highest awards given for PU caused by single factor—ineffective nutrition
Avoiding or Defending Litigation

Failure to implement facility policies and to be diligent with documentation procedures increases a facility’s exposure to liability.

Keys to Reduce Liability
- Development and implementation of facility policies
- Comprehensive documentation in the medical record

Use Recognized Clinical Practice Guidelines

- NPUAP International Guidelines
- Academy of Nutrition & Dietetics Evidence Analysis Library
- American Medical Director’s Association
- Academy of Nutrition and Dietetics Nutrition Care of the Older Adult
- American Society of Parenteral and Enteral Nutrition (ASPEN)
Comprehensive Documentation

Include all aspects of nutrition care

- Evaluation of weight status
- Evaluation of contributing factors that may affect wound healing
- Assessment of nutrient needs
- Comparison of needs vs. food and fluid consumption
- Specific nutrition interventions
  - If you have a negative outcome, was it clinically unavoidable?

Comprehensive Documentation

Refusal of recommendations and reason

Acceptance or refusal of diet, meals, nutritional interventions
Use Nutrition Care Process

NUTRITION DX: Increased need for energy and protein related to increased demands for healing as evidenced by the presence of a stage IV pressure ulcer

GOAL: Resident will consume calculated needs of 2000-2100 calories, 75-80 gm protein, 1500-1800 ml fluid daily

INTERVENTIONS: Serve Mechanical Soft Diet for approx. 2400 calories, 80 gm protein, 1740 ml fluid.
Offer high calorie supplement of 60 ml qid for 480 calories, 20 gm protein
Consult physician with request to add vitamin/mineral supplement

MONITORING/EVALUATION: Monitor intake of meals and supplements of resident. Monitor pressure ulcer healing using facility skin monitoring weekly report

NPUAP Resources

NPUAP website    www.npuap.org
• International Guidelines for Prevention and Treatment
• The Role of Nutrition in Pressure Ulcer Prevention and Treatment: National Pressure Ulcer Advisory Panel White Paper, 2009
• Pressure Ulcer Prevention Points, 2007
• Pressure ulcer staging diagrams
• Select Treatment & Prevention Topics Slide Sets
Thank You