Malnutrition as a Precursor to Pressure Ulcers: Identification, prevention and treatment

Objectives

1. Accurately determine when an adult has malnutrition, using standardized nutrition screening tools
2. Review current research/guidelines about the role of nutrition in pressure ulcer prevention and treatment
3. Determine practical nutrition/hydration solutions for prevention/treatment of pressure ulcers - including the role of ONS and amino acids

Connections Between UWL, Undernutrition, PEM and Dehydration and the Development of Pressure Ulcers

- UWL, undernutrition, PEM and dehydration are known risk factors for pressure ulcer development
- Low BMI, reduced food intake and impaired ability to eat independently are also risk factors
- Fry noted malnutrition and/or weight loss correlated with a 4 fold higher risk of development of pressure ulcers

Malnutrition and Pressure Ulcers

- U.S.: Medicare adults ≥ 65 at risk of pressure ulcers: 76% were malnourished (2001)
- Australia: Odds ratio of having a pressure ulcer are higher with malnutrition in acute and LTC (2010)
- Japan: Home care study: ≥ 65, rate of malnutrition 58.7% with pressure ulcers compared to 32.6% without them (2010)

Definitions: Adult Malnutrition

- “Malnutrition is most simply defined as any nutritional imbalance.” (Dorland 2011)
- Undernutrition: lack of calories, protein or other nutrients needed for tissue maintenance and repair.
- Undernutrition and malnutrition can be used interchangeably.

Malnutrition Continuum

- Non-severe
- Severe

Adult Malnutrition

- Increases morbidity and mortality
- Decreases function and quality of life
- Increases frequency and length of hospital stay
- Increases health care costs

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Prevalence of Adult Malnutrition

<table>
<thead>
<tr>
<th>Hospitalized Older Adults</th>
<th>NH Residents</th>
<th>Home Care Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>~40–60% are malnourished or at risk of malnutrition (1)</td>
<td>40–85% are malnourished (1)</td>
<td>20–60% are malnourished (1)</td>
</tr>
<tr>
<td>Prevalence at Hospital D/C: 59% (2) &lt;3.5% coded as having malnut.</td>
<td></td>
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</tr>
</tbody>
</table>

Note: New malnutrition definition may make most data on prevalence of malnutrition irrelevant.

Inflammation and Malnutrition

Inflammation (d/t infection, injury, surgery, etc.) is an important underlying factor that increases risk for malnutrition.
May contribute to suboptimal response to nutrition intervention and increased risk of mortality. (Jensen 2010)

White J, J Acad Nutr Diet 2012;112:730-730

Etiology-Based Malnutrition Definitions

<table>
<thead>
<tr>
<th>Nutritional Risk Identified</th>
<th>Laboratory Signs of Inflammation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diminished intake or loss of body fluids</td>
<td>Decreased</td>
</tr>
<tr>
<td>Yes Mild to Moderate Degree</td>
<td>Increased</td>
</tr>
<tr>
<td>Yes Marked Inflammatory Response</td>
<td>C-reactive protein (↓d in liver failure)</td>
</tr>
<tr>
<td>Starvation-Related Malnutrition (pneumonia, starvation, anemia, no rice)</td>
<td>serum albumin</td>
</tr>
<tr>
<td>Chronic Disease-Related Malnutrition (organ failure, pancreatitis, cancer, rheumatoid arthritis, soroepoint obesity)</td>
<td>serum transferrin</td>
</tr>
<tr>
<td>Acute Disease or Injury-Related Malnutriptions (injury, infection, burn, traumatic closed head injury)</td>
<td>serum prealbumin</td>
</tr>
</tbody>
</table>

Diagnosing Malnutrition: 2009 Academy Workgroup (with ASPEN reps.)

Identification of ≥2 of the following characteristics:
1. Insufficient energy intake
2. Weight loss
3. Loss of muscle mass
4. Loss of subcutaneous fat
5. Localized or generalized fluid accumulation that may sometimes mask weight loss
6. Diminished functional status as measured by hand grip strength

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### Characteristics of Non-Severe Malnutrition

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Acute Illness/Injury</th>
<th>I'll Tone</th>
<th>Social/Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Insufficient Energy Intake</td>
<td>&lt; 75% for &gt; 7 days</td>
<td>5% for &gt; 1 month</td>
<td>&gt; 75% for &gt; 1 month</td>
</tr>
<tr>
<td>2. Interpretation of Weight Loss</td>
<td>1-2%/1 week 5%/6 months 7.5%/8 months</td>
<td>1%/2 month 10%/6 months 20%/1 year</td>
<td>7.5%/1 month 10%/6 months 20%/1 year</td>
</tr>
<tr>
<td>3. Changes in Body Composition: Loss of Body Fat</td>
<td>Mild depletion</td>
<td>Mild depletion</td>
<td>Mild depletion</td>
</tr>
<tr>
<td>4. Changes in Body Composition: Accumulation of Fluid</td>
<td>Mild</td>
<td>Mild</td>
<td>Mild</td>
</tr>
<tr>
<td>5. Grip Strength</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>

### Characteristics of Severe Malnutrition

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Acute Illness/Injury</th>
<th>I'll Tone</th>
<th>Social/Environmental</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Insufficient Energy Intake</td>
<td>or = to 50% for &gt; 5 days</td>
<td>or = to 35% for or &gt; 1 month</td>
<td>or = to 50% for 1 month</td>
</tr>
<tr>
<td>2. Interpretation of Weight Loss</td>
<td>1-2%/1 week 5%/6 months 7.5%/8 months</td>
<td>1%/2 month 10%/6 months 20%/1 year</td>
<td>7.5%/1 month 10%/6 months 20%/1 year</td>
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<tr>
<td>3. Changes in Body Composition: Loss of Body Fat</td>
<td>Moderate depletion</td>
<td>Moderate depletion</td>
<td>Moderate depletion</td>
</tr>
<tr>
<td>4. Changes in Body Composition: Accumulation of Fluid</td>
<td>Moderate to Severe</td>
<td>Moderate to Severe</td>
<td>Moderate to Severe</td>
</tr>
<tr>
<td>5. Grip Strength</td>
<td>Markedly reduced</td>
<td>Markedly reduced</td>
<td>Markedly reduced</td>
</tr>
</tbody>
</table>

### Validated Screening Tools

- Mini Nutritional Assessment (MNA)
- Nutrition Universal Screening Tool
- Short Nutrion Assesment Questionnaire

### Mini Nutritional Assessment® (MNA)

Rate the following 0, 1, or 2:

A. Food intake, swallowing/chewing
B. Weight loss in past 3 months
C. Mobility
D. Psychological stress or acute disease in past 3 months
E. Neuropsychological problems (i.e. dementia)
F. BMI (<19 = higher risk)

Score: 12-14 Normal status
8-11 At risk 0-7 Malnourished

Note: At risk = Need for full NA to determine whether at risk

http://www.mna-elderly.com

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Braden Scale: Nutrition Subscores

<table>
<thead>
<tr>
<th>Sensory Perception</th>
<th>1 Completely limited</th>
<th>2 Very limited</th>
<th>3 Slightly limited</th>
<th>4 No impairment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moisture</td>
<td>1 Constantly moist</td>
<td>2 Very moist</td>
<td>3 Occasionally moist</td>
<td>4 No impairment</td>
</tr>
<tr>
<td>Activity</td>
<td>1 Bedfast</td>
<td>2 Chairfast</td>
<td>3 Walks occasionally</td>
<td>4 Walks frequently</td>
</tr>
<tr>
<td>Mobility</td>
<td>1 Completely immobile</td>
<td>2 Very limited</td>
<td>3 Slightly limited</td>
<td>4 No limitation</td>
</tr>
<tr>
<td>Nutrition</td>
<td>1 Very poor</td>
<td>2 Probably inadequate</td>
<td>3 Adequate</td>
<td>4 Excellent</td>
</tr>
<tr>
<td>Friction &amp; Shear</td>
<td>1 Problem</td>
<td>2 Potential problem</td>
<td>3 No apparent problem</td>
<td>4 Excellent</td>
</tr>
</tbody>
</table>

The Braden Scale Assessment Score Scale

Risk for developing a pressure ulcer:
- 15-18 = Mild
- 13-14 = Moderate
- 10-12 = High
- ≤9 = Very High Risk

Referrals

Refer to RDN, IDT, others as needed based on nutrition screening results:
- Be sure systems are in place for referrals (EMR set up to trigger RDN referral)
- Comprehensive nutrition assessment forms the basis for all nutrition interventions
- Early intervention is critical

Nutrition Focused Physical Assessment

Examine:
- Eyes, mouth, skin, nails, hair and extremities, overall appearance (robust, normal, underweight or cachectic)
- Oral: Dental condition, sore mouth, inflamed, swollen or bleeding gums
- Skin: pressure ulcers, skin tears, bruises, turgor, dryness
- Assess for edema

What about Lab Values?

Serum protein levels:
- May reflect severity of the inflammatory process
- May be useful to help establish overall prognosis by indicating morbidity, mortality and severity of illness

Laboratory Values

No lab test can specifically determine an individual's nutritional status.

Important to:
- Assess for inflammation, anemia, and dehydration
- Monitor blood glucose levels

Nutritional interventions should be included in every pressure ulcer prevention or treatment plan

Goals:
- Improve quality of life
- Stabilize or reverse UWL and malnutrition; restore nutritional status
- Prevent/heal pressure ulcers

Treat nutrition problems:
- Adequate calories and protein, fluids, vits/min
- Least restrictive diets to optimize food/fluid intake

General Recommendations

Use your clinical judgment based on a thorough medical and nutritional assessment to make appropriate individualized recommendations.

Individualized care plan should focus on:
- Improving and/or maintaining overall nutritional status
- Acceptance of nutrition interventions
- Positive clinical outcomes

What Does the Evidence Suggest?

Energy Intake

There is a responsive increase in metabolic rate which increases caloric needs (triggered by PrU, infection, severe illness, trauma, etc.)

Energy is essential for pressure ulcer healing

Need to provide adequate calories to promote anabolism, nitrogen and collagen synthesis

Energy Intake

Butternut squash hash with fried egg (175), turkey chili (410), tortilla chips (120), water (0), coffee (2), chicken wings (280), berries with yogurt (130), orecchiette with chicken sausage and broccoli rabe (435), beer (155), ice cream with poached pear (370)


2000 Calories

Helping Individuals Meet Energy Needs

Real food first! Favorite foods, individualize diet, dining interventions

Medication adjustments (Interactions: anorexia, nausea, GI concerns, etc.)

Social/psychological interventions

Enhanced foods and/or Oral Nutritional Supplements help combat UWL and malnutrition

Calorie Boosters from Your Kitchen

Margarine, butter, mayonnaise or peanut butter added to appropriate foods

Whole milk or cream in pudding, soups, hot cereals, hot cocoa (in place of water)

- Cheese
- Fried foods
- Ice cream
- Honey or maple syrup
- Milkshakes
- High calorie/protein beverages, bars

Helping People Meet Calorie Needs: Choose the intervention that is acceptable to the individual

What Does the Evidence Suggest?

Protein: All stages require adequate protein
- Increased protein levels have been linked to improved healing rates (Lee 2006, Breslow 1993)
- Increased protein is required to prevent PEM, promote healing & positive nitrogen balance (AHCPR 1994, EPUAP 2004)
- Protein supplementation on improved healing rates compared to placebo. (Health Quality Ontario 2009)

Optimal Protein Intake for Older Adults
- Positive association between protein ingestion and muscle mass (PORT - AGE study group JAMDA 2013)
- Protein spread equally between breakfast, lunch, dinner (30 g each) (Paddon-Jones 2009)
- If needed, additional protein supplementation should be given between meals (Wilson MM 2002)

Protein Boosters from Your Kitchen
- Meat, poultry, fish, as tolerated
- Cheese or cheese sauce added to vegetables, casseroles, soups
- Eggs: scrambled, omelet, etc.
- Full fat cottage cheese, yogurt
- Double strength milk or milk or protein powder added to soups, hot cereals, puddings, mashed potatoes, etc.
- Whole milk or cream in soups, cereals, hot cocoa (in place of water)

Helping People Meet Protein Needs

Food Sources of Protein
- Half sandwich 8 oz. 2% milk 320 cal 18 gm pro
- 8 oz. Greek yogurt 140 cal 14 gms pro
- High protein bar 210 cal 12 gm pro

Oral Nutritional Supplements
- Significantly fewer hospital readmissions with high pro ONS
- High protein ONS increased total dietary intake and improved body weight
- ONS use is associated with decreased length of stay, episode cost, and 30-day readmission risk (ROI of $2.56 net savings due to averted 30-day readmissions for every $1.00 spent on ONS in the matched sample)

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Evidence on Amino Acids

**Arginine**
- May become conditionally indispensable during acute stress.
- Stimulates collagen synthesis.
- May have some immune stimulating effects

**Glutamine**
- Becomes conditionally indispensable during periods of stress.
- Some authors have noted its benefits in pressure ulcer healing.

Specific Nutritional Support Accelerates Wound Healing

- Supplementation with additional protein, arginine, and micronutrients accelerated pressure ulcer healing in non-malnourished patients (1)
- Greater reduction in PU size in malnourished patients (2)
- The efficacy of these nutrients in wound healing is likely synergistic because there is no evidence supporting an independent effect when given alone


Fluids: What Does the Evidence Suggest?

- Dehydration is a risk factor for pressure ulcer development
- Hydration needs must be met to assure proper prevention and healing

Methods of Calculating Fluid Needs

- 1 mL/calorie consumed
- 30 mL/kg BW/day

- In generally healthy individuals that are adequately hydrated, food accounts for >20% of total fluid intake (DRI 2004)
- Total fluid needs include water content of food

Helping Individuals Meet Fluid Needs

1. Offer sips at every interpersonal contact
2. Encourage favorite fluids between meals (including pudding, ice cream, sherbet)
3. Extra fluids at med pass

Vitamin C

- Involved in the synthesis of collagen
- Acts on fibroblast proliferation and cellular immunity

There is no support for vitamin C above the DRI unless a deficiency is diagnosed or suspected.
Zinc

• Zinc: contributes to protein and DNA synthesis; immune function and cellular proliferation
• Zinc requirements can be met by 2 servings/day of animal protein.

A multivitamin/mineral supplement daily (15 mg zinc) may be adequate. (DRI 2004)

No research has demonstrated an effect of zinc supplementation on improved pressure ulcer healing.

When clinical signs of zinc deficiency are present, zinc should be supplemented at <40 mg elemental zinc/day (UTL).

– Doses >40 mg/day can adversely affect copper status and possibly result in anemia.
– High serum zinc levels may inhibit healing. (Thomas 1997, Reed 1985, Dimant 1999, Goode 1992)

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MNT Goals for Palliative Care

Individual’s desire is the primary guide for treatment

Promote quality of life.

Treatment goals:
• Person centered
• Respect individual’s unique values/personal decisions
• Shared decision making in compliance with the law

2014 NPUAP Unavoidable Pressure Injury State of the Science Consensus Conference

Individuals with malnutrition in combination with multiple comorbidities are at increased risk for the development of unavoidable pressure ulcers. 91%

Individuals with cachexia are at increased risk for the development of unavoidable pressure ulcers. 100%


Obese Individuals

There are no evidence based guidelines available related to the nutritional needs of the obese person with pressure ulcers.

• Adequate calories, protein, fluids and nutrients are needed for healing.
  – General consensus is that diets should be liberalized to promote healing.
  – Once the pressure ulcer is completely healed, diet restrictions may be gradually implemented as needed.
• Monitor skin integrity and coordinate with RDN (ongoing).

Implications for Practice

• Malnutrition can be a precursor to pressure ulcers
• Refer to the RDN as soon as risk of confirmation of malnutrition or pressure ulcer is identified
• Early nutrition interventions can prevent and/or delay malnutrition and hydration deficits and their impact on pressure ulcer development and/or healing

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Steps to Successful Nutrition Care

1. Screen and Assess Nutrition Status
   • Individualize interventions and POC

2. Diet based on estimated needs, consider fortified foods
   • Supplements between meals if intake is inadequate

3. Consider ONS fortified with arginine, vitamins/minerals if needs not met with high calorie/protein supplement
   • Consider EN/PN based on individual’s wishes, when needs cannot be met orally

Essential Ingredients

1. Individualize interventions to meet nutritional requirements
2. Focus on improving overall nutrition status
3. Nutrition interventions must be acceptable to the individual
4. Diets should be as liberal as possible

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