The Role of Nutrition in Wound Care

Mary Ellen Posthauer, RD, CD, LD

Objectives

- Recognize the importance of screening and assessment to identify nutritional risk
- Define the role of the registered dietitian on the health care/wound care team
- Translate evidence-based nutrition guidelines for pressure ulcers into clinical practice
- Determine strategies for improving and/or maintaining nutritional status for people of all ages and sizes

People Come in All Shapes & Sizes

And ages... with all kinds of conditions and needs......

One size does not fit all when it comes to nutrition for pressure ulcer prevention and treatment

Evidence Based Guidelines

NPUAP-EPUAP Guidelines: Nutrition
- 2009 (4 years R&D)
- RCTs on humans with pressure ulcers
- Posthauer, Dorner, Thomas, Black

NPUAP White Paper: Nutrition
- 2009 Advances in Skin & Wound Care
- Dorner, Posthauer, Thomas

Academy of Nutrition & Dietetics EAL: Nutrition & Wound Care
- October 2011
- Dorner, Posthauer, Litchford, Collins, Munoz, et al

What are Clinical Guidelines

- Provide up-to-date scientific clinical evidence
- Goal is consistent & appropriate clinical practice
- Concise instruction for practice based on the best scientific evidence available
- Alert researchers to areas of practice in need of research
- Must be individualized

NPUAP/EPUAP Strength of Evidence

A. Supported by direct scientific evidence, controlled trials on PU in humans/statistical results support evidence

A. Direct scientific evidence from properly designed & implemented clinical series on PU in humans

A. Supported by expert opinion or indirect evidence
Pressure Ulcer Risk Factors

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

Pinchofsky; Lyder 1998; Dimant 1999; CMS F314 2004

Horn 2004; CMS 2008; Gilmore et al, 1995

Thomas noted that recent weight loss in the elderly was a key factor in mortality risk (2008)

Murden and Ainslie indicated that a 10% decline in weight over 6 months was a strong predictor of mortality in the elderly (1994)

2 studies supported the theory that individuals in LTC whose body weight declined by 5% in 30 days were at increased risk for death: (Ryan et al 1995; Sullivan et al 2004)

DOWNWARD SPIRAL OF GERIATRIC FAILURE TO THRIVE

Normal changes of aging PLUS physical, psychological and social precipitants

Every Pound Counts

<table>
<thead>
<tr>
<th>Loss of Weight</th>
<th>Complications</th>
<th>Associated Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>↓immunity, ↑infections</td>
<td>10%</td>
</tr>
<tr>
<td>20%</td>
<td>↓healing, weakness, infection</td>
<td>30%</td>
</tr>
<tr>
<td>30%</td>
<td>too weak to sit, pressure ulcers, pneumonia, no healing</td>
<td>50%</td>
</tr>
<tr>
<td>40%</td>
<td>DEATH, usually from pneumonia</td>
<td>100%</td>
</tr>
</tbody>
</table>

Lean Body Mass and Fat Mass

1. Pure Energy Store - Fat Mass 25%

2. 70% water, 20% protein, 10% mineral
   - Metabolically active
   - Size highly regulated
   - Skeletal and smooth muscles
   - Collagen (tissue/skin)
   - Cell structure
   - Enzymes, antibodies, growth factors
   - Visceral protein.
Aging & Nutrition Status

- Diseases/condition/meds cause anorexia
- Decline of 800-1200 calories/day
- Changes in taste, smell, satiety affect food intake
- Weight loss/sarcopenia/frailty
- Depression/cognitive decline

Dietary Intake

- Decreased ability to eat independently
- Risk for undernutrition and delayed healing

Horn 2004; Gilmore 1995

Under-Nutrition and Hydration Deficits

- Poor outcomes are associated with undernutrition
  - Including risk of morbidity and mortality
- Need to quickly identify and treat undernutrition when pressure ulcers are present (Thomas, 2007)
- Severely impaired organs (heart, lungs, kidneys, liver, etc.) may be unable to use nutrients effectively.
- An individual with a pressure ulcer who continues to lose weight either needs
  - Additional caloric intake or
  - Correction (where possible) of conditions that are creating a hypermetabolic state.

Under-Nutrition & Hydration Deficits

- Continuing weight loss
- Failure of a pressure ulcer to heal despite reasonable efforts to improve caloric and nutrient intake

Nutrition Screening & Assessment

May indicate that organs are severely impaired and unable to use nutrients effectively; or that the individual is in multi-system failure, end-stage or end-of-life condition.

This warrants assessment of overall condition.
## Early Identification and Referral

### Nutritional Screening & Assessment
- Essential to identify risk of undernutrition, PEM and UWL which may precipitate PrU development and/or contribute to delayed healing.

### Policies & Procedure
- Must be in place for adequate screening.
- Ensure early referral to RD when risk is identified or pressure ulcer is present.

### Define Roles
- RD/CDM
- Nursing staff
- Physical therapy
- Occupational therapy
- Additional team members

## Communication is Key
- Communication is key from one healthcare setting to another when action is required.
- Communicate with the team, individual and family.

## Screening and Assessment

### Prevention
Screen and assess nutritional status for every individual at risk of pressure ulcers in each healthcare setting. (SOE = C)
Use a valid, reliable and practical tool for nutritional screening that is quick and easy to use and acceptable... (SOE = C)

### Treatment
Screen and assess nutritional status for each individual with a pressure ulcer:
- at admission
- with each condition change
- and/or when progress toward pressure ulcer closure is not observed. (SOE = C)

## Nutrition Screening Tool
- Quick
- Easy to use
- Acceptable
- Validated

### Mini Nutritional Assessment®-SF (MNA®-SF)
- MNA®-Short Form
- Validated and easy to use in geriatric patients
- http://www.mna-elderly.com

## Prevention
Refer each individual with nutritional risk and pressure ulcer risk to a registered dietitian (SOE = C)

## Treatment
Refer all individuals with a pressure ulcer to the dietitian for early assessment and interventions of nutritional problems (SOE = C)
Mini Nutritional Assessment®-SF

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

Malnutrition Universal Screening Tool

MUST
To identify risk of undernutrition (BAPEN, 2008)

http://www.bapen.org.uk/must_tool.html

Simplified Nutrition Appetite Questionnaire

SNAQ
To predict weight loss in community-dwelling adults and LTC residents

http://www.ajcn.org/cgi/content/full/82/5/1074

Score of 14 indicates significant risk of at least 5% weight loss within 6 months.

Other Validated Screening Tools

Malnutrition Screening Tool (MST)
Subjective Global Assessment (SGA)
Nutrition Risk Screening (NRS-2002)
DETERMINE Your Health Checklist (DETERMINE)
Effectiveness and Costs

MNA screens 21.6% of people as “at risk” or “high risk”
- MUST ~58%
- DETERMINE ~71%
- Subjective Global Assessment ~70%

ESPEN Recommends:
- MNA for elderly
- MUST for community adults
- NRS-2002 for acute care

MNA score <17: Person was 3 times more likely to be transferred to a nursing home


Thomas, 2011

Braden Scale: Nutrition Sub-scores

<table>
<thead>
<tr>
<th>Sensory Perception</th>
<th>Moisture</th>
<th>Activity</th>
<th>Mobility</th>
<th>Nutrition</th>
<th>Friction &amp; Shear</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Completely limited</td>
<td>1: Constantly moist</td>
<td>1: Bedfast</td>
<td>1: Completely immobile</td>
<td>1: Very poor</td>
<td>1: Problem</td>
</tr>
<tr>
<td>4: No impairment</td>
<td>4: No impairment</td>
<td>4: Walks frequently</td>
<td>4: No limitation</td>
<td>4: Excellent</td>
<td></td>
</tr>
</tbody>
</table>

Braden Nutrition Sub-Score

Information must be accurate at the time completed!
- How often does a person admitted to acute or LTC eat every meal?
- Is the form completed prior to eating any meals?
- NPO & clear liquid diet?
- Can you verify amount of protein consumed?

From Barbara Braden, PhD, RN

Nutrition Subscale Score
Score of 2 or 1:
- Need a more in-depth nutrition assessment
Score of 3:
- May need further assessment and intervention particularly if they have co-morbidities that increase metabolic needs. Low dietary protein intake must be addressed immediately.

“Frankly, if I were writing policies, I would require RD consultation prior to instituting enteral feedings…..or on any patient who arrives at a facility with a feeding tube already in place.” 10/12/11

Referral to the RD

Refer to the RD based on screening results and/or if a pressure ulcer is present
- Be sure systems are in place for referrals
- Electronic medical records must also trigger RD referral

Nutrition Assessment

1.2. Assess weight status for each individual to determine weight history & significant weight loss from UBW (>5% change in 3 days or >10% in 180 days, SOE = C)

1.3. Assess the individual’s ability to eat independently. (SOE = C)

1.4. Assess the adequacy of total nutrient intake (food, fluid, oral supplements, enteral/parenteral feedings), (SOE = C)
What About Labs?

Labs are one component of a comprehensive nutrition assessment, but...

No lab test can specifically determine an individual’s nutritional status

What About Labs?

Serum albumin, prealbumin and other lab values may be useful to help establish overall prognosis by indicating severity of morbidity & mortality, but may not correlate well with clinical observation of nutrition status.

(Covinsky 2002, Ferguson 1993)

Albumin and Prealbumin

1. Serum protein levels may be affected by metabolic stress, inflammation, renal function, hydration and other factors

2. They do not accurately measure nutritional repletion (Myron Johnson, 2007)

3. Therefore, albumin and prealbumin are not recommended as markers of nutritional status

Inflammation and Stress

- Release of Cytokines
- Muscle Wasting
- Anorexia
- Decreased nitrogen retention
- Decreased albumin synthesis
- Extravasation of albumin from intravascular spaces
- Decreased circulating levels of albumin and cholesterol

Source: Council for Nutrition Clinical Strategies in LTC

General Recommendations

What Does the Evidence Suggest?
General Recommendations

The RD uses their 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 nutritional status
- acceptance of nutrition interventions
- clinical outcomes

What Does the Evidence Suggest?

Calories

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 (Clark 2004, AHCPR 1994)

The Non-healing Chronic Wound Failure to Heal by 12 Weeks

The Non-healing Wound
- Neutrophils
- Oxidation
- Catabolism
- Energy
- Protein Synthesis

The Healing Wound
- Wound contraction
- Filling
- Anabolism
- Energy
- Protein synthesis

Macronutrients
- Energy
- Store
- Protein
- Store

Provide sufficient calories. (SOE = B)

Calories

Provide 30-35 kcalories/kg body weight for individuals under stress with a pressure ulcer.
- Adjust formula based on weight loss, weight gain or level of obesity.
- Individuals who are underweight or who have had significant UWL may need additional kcalories to cease weight loss and/or regain lost weight. (SOE = C)

2.2. Revise or modify (liberalize) diet restrictions when limitations result in decreased food and fluid intake.

These adjustments are to be done by a dietitian or medical professional. (SOE = C)
2.3. Provide enhanced foods and/or oral supplements between meals if needed. (SOE = B)

2.4. Consider nutritional support (enteral or parenteral nutrition) when oral intake is inadequate.
   » This must be consistent with the individual’s goals. (SOE = C)

Nutrition Support

NPO >3 days
  » Hydration with IVs does not supply nutrients
  » Places individual at risk of undernutrition and pressure ulcer development

Enteral Feedings

Determine if patient actually receives TF as prescribed:
  • Is TF given as ordered (product, mLs/hr)?
  • Are flushes given as ordered (flushes, flushes with meds)?
  • Is the strength correct?
  • Is the individual tolerating the feeding?
  • Round the clock or intermittent (turned off)?

Note: Generally 75% water

What Does the Evidence Suggest?

Protein

35% of older adults eat less than the RDI for protein.

About 15% eat less than 75% of the RDI for protein.

(Roubenoff & Hughes 2000)
What Does the Evidence Suggest?

All stages require adequate protein

Increased protein levels have been linked to improved healing rates (Lee 2006, Breslow 1993)

Protein intake must be sufficient to prevent PEM, promote healing and a positive nitrogen balance (AHCPR 1994, EPUAP 2004)

3.0 Protein

3.1. Offer 1.25 – 1.5 grams protein/kg body weight for an individual with a pressure ulcer when compatible with goals of care, and reassess as condition changes. (SOE = C)

Note: Monitor healing and adjust as needed

3.2. Assess renal function to ensure that high levels of protein are appropriate for the individual. (SOE = C)

Evidence on Amino Acids

Arginine
- May become conditionally indispensable during acute stress
- Stimulates collagen synthesis
- May have some immune stimulating effects—controversial, primarily animal studies

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

Amino Acids

Additional research is needed to recommend arginine alone or combined with other nutrients (Langer et al—Cochrane Database 2007)
- Supplementation with glutamine has not been shown to improve healing of wounds
- More studies are needed to determine the impact of glutamine on pressure ulcer healing (McCauley)

Amino Acids

Meet total calorie/protein needs first...

...before trying specialized interventions
What Does the Evidence Suggest?

**Fluids**

Dehydration is a risk factor for pressure ulcer development.

Hydration needs must be met to assure proper prevention and healing.

**4.0 Fluids**

Provide and encourage adequate daily fluid intake for hydration. (SOE = C)

Monitor individuals for S/S dehydration: changes in weight, skin turgor, urine output, elevated serum sodium or calculated serum osmolality. (SOE = C)

Provide additional fluid for individuals with dehydration, elevated temp, vomiting, profuse sweating, diarrhea or heavily draining wounds. (SOE = C)

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

Needs increase according to insensible water loss

Needs may decrease for CHF, renal failure
What Does the Evidence Suggest?

Micronutrients

Most nutrient needs can be met through a healthy diet

However, individuals with pressure ulcers may not be consuming an adequate diet to meet established nutritional reference standards

5.0 Vitamins and Minerals

5.1. Encourage consumption of a balanced diet which includes good sources of vitamins and minerals. (SOE = B)

5.2. Offer vitamin and mineral supplements when dietary intake is poor or deficiencies are confirmed or suspected. (SOE = B)

©2009 NPUAP-EPUAP Pressure Ulcer Prevention and Treatment Guidelines

Zinc

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

©2009 NPUAP-EPUAP Pressure Ulcer Prevention and Treatment Guidelines

Zinc

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)

©2009 NPUAP-EPUAP Pressure Ulcer Prevention and Treatment Guidelines

Zinc

Zinc requirements can be met by 2 servings/d of animal protein

- Meat
- Liver
- Milk
- Eggs
**Zinc**

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

---

**Essential Ingredients**

1. Individualize interventions to meet nutritional requirements
2. Interventions must be acceptable to the individual
3. Diets should be as liberal as possible

---

**Oral Nutritional Supplements**

Clearly have a positive impact on mortality

**RCT, 3021 subjects (hospital elderly patients)**

Mean weight gain 2.3% (1.3 kg)

26% decrease in relative risk of death

28% decrease in mortality in undernourished subjects


---

**Food & Nutrition Interventions**

- Food First! Favorite foods, liberalize diet, dining interventions
- Medication adjustments (interactions)
- Social/ psychological interventions
- Nutritional supplements, enhanced foods, and food fortifiers can help combat UWL, undernutrition & PEM

---

**Nutrition Supplement (High cal & pro)**

- Milkshakes
- Puddings
- Bars

1.0 cal/mL

1.2 cal/mL

1.5 cal/mL

2.0 cal/mL
Appetite Stimulants

May encourage increased food and fluid intake

Anabolic steroids may preserve &/or increase LBM

Additional research needed to determine effectiveness

Should be recommended after all other avenues of nutrition intervention have been exhausted.

Case Study

Mr. Smith

Mr. Smith’s Journey
UWL, Malnutrition, Pressure Ulcers

- Admit to SNF 6’2” and 162.1#
- UWL 23.5% past 6 months (66% of IBW, Stage II Rt buttock, PEG placed)
- Readmit 7 days before RD addresses a TF that was below Mr. Smith’s nutrient needs
- UWL : Another 12%
- RD recommended more appropriate TF
- Facility failed to obtain TF for 3 wks
- Stage IV R Hip
- Stage I-II Lt Hip, with drainage & infection
- Death

Mr. Smith’s Right Hip:
Stage IV Pressure Ulcer 4-10

Photo: NPUAP Slide Series

Mr. Smith’s Caloric Needs/Intake

The facility only met 48% of Mr. Smith’s caloric needs. This led to development of PEM, unintended weight loss, pressure ulcers, and death.

Mr. Smith’s Protein Needs/Intake

The facility only met 56% of Mr. Smith’s protein needs. This led to development of protein deficits, malnutrition, pressure ulcers, and death.
Obesity Rates in Older Adults

<table>
<thead>
<tr>
<th>Age/Gender</th>
<th>Percentage of Obesity 2007-2008</th>
<th>Rate of Increase Since 1988-1994</th>
</tr>
</thead>
<tbody>
<tr>
<td>65-74 All</td>
<td>32%</td>
<td>45%</td>
</tr>
<tr>
<td>65-74 Men</td>
<td>40%</td>
<td>67%</td>
</tr>
<tr>
<td>65-74 Women</td>
<td>35%</td>
<td>30%</td>
</tr>
<tr>
<td>&gt;75 Men</td>
<td>26%</td>
<td>100%</td>
</tr>
<tr>
<td>&gt;75 Women</td>
<td>27%</td>
<td>42%</td>
</tr>
</tbody>
</table>

Screening Tools for Individuals Who are Obese

None of the screening tools has been validated for use with obese individuals.

Ex. MUST: The cut off of measurement of BMI is lower than obesity levels

<table>
<thead>
<tr>
<th>Will weight loss reduce risk for other complications?</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Will weight loss prolong life?</th>
</tr>
</thead>
</table>

Is weight loss appropriate for obese individuals with pressure ulcers?
Will weight loss reduce risk for other complications?

Will weight loss prolong life?

What are the risks associated with obesity treatment?

Will a restricted diet reduce the individual's ability to consume adequate nutrients to maintain health?

Is weight loss appropriate for obese individuals with pressure ulcers?

Carefully weigh the risks vs benefits of obesity treatment in adults with pressure ulcers

Weight loss is NOT appropriate for fragile older adults with pressure ulcers or other serious medical conditions that threaten mortality

Obese Individuals with Pressure Ulcers

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
- Liberalized & individualize diet to promote healing
  - Once the PrU is completely healed, diet restrictions may be gradually implemented as needed
- Monitor skin integrity and coordinate with RD (ongoing)
### Nutrition Assessment

**For Obese Individuals with Pressure Ulcers**

### Calculation of Nutritional Needs

Not enough evidence-based research to suggest that one method of calculations will meet the estimated needs for all obese individuals (including older adults)

Recommendations will continue to evolve as EBR evolves

### Protein

Limited research is available to provide specific guidelines for the obese individual

<table>
<thead>
<tr>
<th>Renal status</th>
<th>Presence of a pressure ulcer or wound</th>
<th>Presence of hepatic disease</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General recommendation:</strong> 1.0 gm/kg (older adults)</td>
<td><strong>Lower caloric diet → higher percentage of cals from protein</strong></td>
<td></td>
</tr>
</tbody>
</table>

Protein needs vary depending on a number of factors, including:

- Hydration status (dehydration or over-hydration)
- Renal status
- Presence of hepatic disease
- Presence of severe edema or ascites

### Fluids

Limited research is available to provide specific guidelines for the obese individual

General recommendation is 1 mL/calorie consumed or 30 mL/kg BW

### Fluids

Fluid needs may vary depending on:

- Hydration status (dehydration or over-hydration)
- Renal status
- Presence of hepatic disease
- Presence of severe edema or ascites

### Practical Nutrition Interventions

**For Obese Individuals with Pressure Ulcers**
A Calorie is NOT Just a Calorie!

2 oz. candy bar 260 cal, 0 protein
+ 20 oz. soda 240 cal, 0 protein
= 500 cal, 0 protein

Better Choices: ↑Protein

1. 16 oz. Greek yogurt 280 cal, 28 gms pro
2. High protein bar 210 cal, 12 gm pro
3. Half sandwich and 8 oz. low fat milk 310 cal, 18 gm pro

Implications for Practice

Nutrition & hydration have a positive impact on quality of life
- Poor health outcomes may be associated with even small amounts of UWL
- Protein energy malnutrition can occur in any patient (regardless of weight)

Implications for Practice

Refer to the RD as soon as risk is identified or upon identification of a pressure ulcer
- Early nutrition interventions can prevent and/or delay undernutrition, protein energy malnutrition and hydration deficits and their impact on risk of pressure ulcer development

Important

Focus the individual care plan on improving overall nutritional status through accepted nutrition interventions & positive outcomes

Assure that nutrition deficits are corrected

References


References


Langer, G; Schloemer, G; Knerr, A; Kuss, O; Behrens, J. Nutritional interventions for preventing and treating pressure ulcers. The Cochrane Database of Systematic Reviews Volume (1), 2007.


References

2009 NPUAP-EPUAP Pressure Ulcer Prevention and Treatment Guidelines  www.NPUAP.org


Guidelines Can Improve Care