The Power of Nutrition in Pressure Injury Prevention

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NPUAP Mission

The National Pressure Ulcer Advisory Panel (NPUAP) serves as the authoritative voice for improved patient outcomes in pressure injury prevention and treatment through public policy, education and research.

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International Guideline

NPUAP – in collaboration with the European Pressure Ulcer Advisory Panel (EPUAP) and the Pan Pacific Pressure Injury Alliance (PPPIA) – has worked to develop a NEW pressure ulcer prevention and treatment Clinical Practice Guideline and a companion Quick Reference Guide.

Purchase your copy today at www.npuap.org

NPUAP Monograph

Released in November 2012, the 254-page, 24 chapter monograph, Pressure Ulcers: Prevalence, Incidence and Implications for the Future was authored by 27 experts from NPUAP and invited authorities and edited by NPUAP Alumna Dr. Barbara Pieper.

The monograph focuses on pressure ulcer rates from all clinical settings and populations; rates in special populations; a review of pressure ulcer prevention programs; and a discussion of the state of pressure ulcers in America over the last decade.

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• E-version $49
• Individual Chapters $19
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https://www.regonline.com/2016ResearchSymposium

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THE PERFECT STORM: Microclimate, Pressure, and Shear Forces in Pressure Injury

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MARCH 10–11
NEW ORLEANS, LA

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Faculty Disclosure

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  • Nutrition Focused Physical Assessment: Making Clinical Connections;
  • Laboratory Assessment of Nutritional Status: Bridging Theory & Practice
  • Nutrition & Pressure Injuries: Putting New Guidelines into Practice
  • Common Denominators of Declining Nutritional Status

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The planning committee members have listed no financial interest/arrangements that would be considered a conflict of interest.
Objectives

• Examine the undernutrition-malnutrition continuum and the impact of inflammation on risk for skin breakdown
• Describe the National Pressure Ulcer Advisory Panel (NPUAP) Clinical Practice Guideline specific to nutrition
• Examine innovative nutrition strategies useful in the prevention of pressure injuries

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Food for Thought…

If you were to guess…what percentage of your patients/residents were undernourished or malnourished at the time of admission?

- 10% or less
- Up to 50%
- Between 50-75%
- More than 75%
**Adult Malnutrition**

- 1.95 million hospital stays involved malnutrition
  - Cost: $42 billion
  - Risk of in-hospital death: 1.5 to 5 times higher than those without dx malnutrition
  - LOS 2 times longer and 47-71% didn't have routine discharge

  Weiss, AHRQ, Sept 2016

- ~1/3 had malnutrition that led to longer lengths of stay (LOS), higher average costs, poor outcomes during hospitalization, and greater likelihood for readmission.

  Lim, Clinical Nutrition, 2012

- Over 50% patients had malnutrition in two medical wards at Johns Hopkins.

  Somanchi, JPEN, 2011

**Food for Thought**

If you were to guess...what percentage of your re-admitted patients were undernourished or malnourished at the time of admission? For LTC consider residents who were re-admitted in less than 30 days after a hospitalization

- 10% or less
- Up to 50%
- Between 50-75%
- More than 75%

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Adult Malnutrition & Pressure Injuries

- Unintended weight loss (UWL), undernutrition, malnutrition, and dehydration are known risk factors for pressure injury development. Pinchofsky; Lyder 2001; Dimant 1999; CMS F314 2004

- US: Medicare adults ≥ 65 years of age at risk of pressure injury: 76% were malnourished. Lyder, 2001

- Low BMI, reduced food intake, and impaired ability to eat independently are also risk factors of pressure injury. Horn 2004; CMS 2008; Gilmore et al, 1995

- Fry noted malnutrition and/or weight loss correlated with a fourfold higher risk of the development of pressure injury. Fry 2010

Cost-Effectiveness of Nutrition Support for Prevention of Pressure Injuries


  - Year-long study in Australia comparing standard care with nutrition support care that included patient education, nutrition goal setting, and consumption of high-protein supplements.

  - Findings: Nutrition support care provided substantial cost savings. The probability of nutrition support being cost-effective was 87 percent.
Does Nutrition Really Make a Difference?

Two observations:
1. “Healing is a matter of time, but sometimes also a matter of opportunity.”
2. “Let food be thy medicine and medicine be thy food.”

Missed Opportunities

My patient/resident is losing weight…

My patient/resident won’t or can’t eat…

My patient/resident is too tired to eat…

My patient/resident has a pressure injury that isn’t healing…
**Undernutrition-Malnutrition Continuum**

- Poor dietary intake
- Increased nutrient needs
- Undernutrition & malnutrition
- Impaired nutrient transport

- Too tired to shop or cook
- Too tired to eat
- Limited food budget
- Illness
- Injury or surgery
- Loss of reserves

- Food intake
- Weight loss
- Fat stores
- Muscle mass
- Physical strength
- Organ function
- Food-Meds Issues


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**Inflammatory Response & Weight Loss**

Infection

- NF-kB
- Immune Response

- Cytokines
- IL-1β, IL-6, TNF

- Oxidants

- Loss of LBM

- Intake

- B cells
- T cells
- Macrophages
- Mast Cells

Adapted from Litchford MD. Common Denominators of Declining Nutritional Status. 2013.

Images from Dreamstime Photos

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2014 NPUAP-EPUAP & Pan Pacific Pressure Injury Alliance (PPPIA) CPG

Nutrition Recommendations

• Nutrition screening
• Nutrition assessment
• Care planning
• Energy intake
• Protein intake
• Hydration
• Vitamins and minerals

Image by Dreamstime

Change in NPUAP Nomenclature

• In April 2016, NPUAP announced a change from ‘ulcer’ to ‘injury’ in the Consensus driven Staging System updates.
• The 2014 Clinical Practice Guideline uses the term ‘ulcer.’
• For details:
• www.npuap.org
1. Screen nutritional status for each individual at risk of or with a pressure ulcer:
   - At admission to a health care setting;
   - With each significant change of clinical condition; and/or
   - When progress toward pressure ulcer closure is not observed.

(Strength of Evidence = C; Strength of Recommendation = )

2. Use a valid and reliable nutrition screening tool to determine nutritional risk.
   (Strength of Evidence = C; Strength of Recommendation = )

3. Refer individuals screened to be at risk of malnutrition and individuals with an existing pressure ulcer to a registered dietitian or an interprofessional nutrition team for a comprehensive nutrition assessment.
   (Strength of Evidence = C; Strength of Recommendation = )
Determining Who is Malnourished

Valid Screening Tools

Mini Nutrition Assessment (MNA)
http://mna-elderly.com/default.html

Malnutrition Universal Screening Tool (MUST)
http://www.bapen.org.uk/pdfs/must/must_full.pdf

Nutrition Risk Screening (NRS-2002)
http://www.nutritotal.com.br/icnso/aspen/?acao=bu&categoria=2&id=76

Short Nutrition Assessment Questionnaire (SNAQ)
http://www.fightmalnutrition.eu/fileadmin/content/malnutrition/Screening_tools/SNAQ_Engels.pdf

2014 NPUAP-EPUAP & PPPIA CPG

Nutrition Recommendations

Nutrition Assessment

1. Assess the weight status of each individual to determine weight hx. Then identify significant weight loss (= 5% in 30 days or = 10% in 180 days).
   (Strength of Evidence = C; Strength of Recommendation = )

2. Assess the individual’s ability to eat independently.
   (Strength of Evidence = C; Strength of Recommendation=  )

3. Assess the adequacy of total nutrient intake (i.e., food, fluid, oral supplements, and enteral/parenteral feeds).
   (Strength of Evidence = C; Strength of Recommendation=  )
Nutrition Recommendations

Care Planning

1. Develop an individualized nutrition care plan for individuals with or at risk of a pressure ulcer.
   (Strength of Evidence = C; Strength of Recommendation = )

2. Follow relevant and evidence-based guidelines on nutrition and hydration for individuals who exhibit nutritional risk and who are at risk of pressure ulcers or have an existing pressure ulcer.
   (Strength of Evidence = C; Strength of Recommendation = )

Energy Intake

1. Provide individualized energy intake based on underlying medical condition and level of activity.
   (Strength of Evidence = B; Strength of Recommendation = )

2. Provide 30 to 35 kcalories/kg body weight for adults at risk of a pressure ulcer and malnutrition.
   (Strength of Evidence = C; Strength of Recommendation = )
Nutrition Recommendations
Energy Intake

3. Provide 30 to 35 kcalories/kg body weight for adults with a pressure ulcer who are assessed as being at risk of malnutrition.

(Strength of Evidence = B; Strength of Recommendation = ⭐⭐)

4. Adjust energy intake based on weight change or level of obesity. Adults who are underweight, or who have had significant unintended weight loss, may need additional energy intake.

(Strength of Evidence = C; Strength of Recommendation = ⭐⭐)

5. Revise and modify/liberalize dietary restrictions when limitations result in decreased food and fluid intake. These adjustments should be made in consultation with a medical professional and managed by a RDN whenever possible.

(Strength of Evidence = C; Strength of Recommendation = ⭐)

6. Offer fortified foods and/or high calorie, high protein oral nutritional supplements between meals if nutritional requirements cannot be achieved by dietary intake.

(Strength of Evidence = B; Strength of Recommendation = ⭐⭐)
Nutrition Recommendations

Energy Intake
7. Consider enteral or parenteral nutritional support when oral intake is inadequate. This must be consistent with the individual’s goals.
(Strength of Evidence = C; Strength of Recommendation = )

Protein Intake
1. Provide adequate protein for positive nitrogen balance for adults assessed to be at risk of a pressure ulcer.
(Strength of Evidence = C; Strength of Recommendation = )

2. Offer 1.25 to 1.5 gms protein/kg body weight daily for adults at risk of a pressure ulcer and malnutrition when compatible with goals of care, and reassess as condition changes.
(Strength of Evidence = C; Strength of Recommendation = )
Nutrition Recommendations

Protein Intake

3. Provide adequate protein for positive nitrogen balance for adults with a pressure ulcer.

(Strength of Evidence = B; Strength of Recommendation = ♣)

4. Offer 1.25 to 1.5 gms protein/kg body weight daily for adults with an existing pressure ulcer and who are assessed to be at risk of malnutrition when compatible with goals of care, and reassess as condition changes.

(Strength of Evidence = B; Strength of Recommendation = ♣)

Protein Sources are Not Nutritionally Equal

<table>
<thead>
<tr>
<th>Incomplete Protein</th>
<th>Complete</th>
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<tbody>
<tr>
<td>Pork skins</td>
<td>Fish</td>
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</tbody>
</table>
Food For Thought

Which menu promotes tissue synthesis?

- Menu 1 (no B, light L, heavy S)
- Menu 2 (equal at each meal)
- Menu 3 (light B, light L, heavy S)
- No difference in outcomes

Leucine Triggers Tissue Synthesis

Source Protein in Dietary Supplements per Selected Manufacturers’ Websites & USDA Nutrient Analysis Database
Nutrition Recommendations

Protein Intake

5. Offer high calorie, high protein nutritional supplements in addition to the usual diet to adults with nutritional risk and pressure ulcer risk if nutritional requirements cannot be achieved by dietary intake.

(Strength of Evidence = A; Strength of Recommendation = )

6. Assess renal function to ensure that high levels of protein are appropriate for the individual.

(Strength of Evidence = C; Strength of Recommendation =  )

7. Supplement with high protein, arginine, and micronutrients for adults with a pressure ulcer Category/Stage III or IV or multiple pressure ulcers when nutritional requirements cannot be met with traditional high calorie and protein supplements.

(Strength of Evidence = B; Strength of Recommendation = )

Images from Dreamtime Photos
Nutrition Recommendations

Hydration

1. Provide and encourage adequate daily fluid intake for hydration for an individual assessed to be at risk of or with a pressure ulcer. This must be consistent with the individual’s comorbid conditions and goals.

   (Strength of Evidence = C; Strength of Recommendation = ★★)

2. Monitor individuals for signs and symptoms of dehydration, including change in weight, skin turgor, urine output, ↑ serum Na, and/or calculated serum osmolality.

   (Strength of Evidence = C; Strength of Recommendation = ★★)

3. Provide additional fluid for individuals with dehydration, elevated temperature, vomiting, profuse sweating, diarrhea, or heavily exuding wounds.

   (Strength of Evidence = C; Strength of Recommendation = ★★)
Nutrition Recommendations

Vitamins & Minerals

1. Provide/encourage individuals assessed to be at risk of pressure ulcers to consume a balanced diet that includes good sources of vitamins and minerals.

   (Strength of Evidence = C; Strength of Recommendation =  )

2. Provide/encourage an individual assessed to be at risk of a pressure ulcer to take vitamin and mineral supplements when dietary intake is poor or deficiencies are confirmed or suspected.

   (Strength of Evidence = C; Strength of Recommendation = )

3. Provide/encourage an individual with a pressure ulcer to consume a balanced diet that includes good sources of vitamins and minerals.

   (Strength of Evidence = B; Strength of Recommendation =  )

4. Provide/encourage an individual with a pressure ulcer to take vitamin and mineral supplements when dietary intake is poor or deficiencies are confirmed or suspected.

   (Strength of Evidence = B; Strength of Recommendation = )
NPUAP Pressure Injury Prevention Points: Nutrition

- Consider hospitalized individuals as at risk for undernutrition and malnutrition from their illness or as NPO for diagnostic testing.
- Use a valid and reliable screening tool to determine risk of malnutrition, such as the Mini Nutritional Assessment.
- Refer all individuals at risk for pressure injury from malnutrition to a registered dietitian/nutritionist.
- Assist the individual at mealtimes to increase oral intake.
- Encourage all individuals at risk for pressure injury to consume adequate fluids and a balanced diet.
- Assess weight changes over time.
- Assess the adequacy of oral, enteral, and parenteral intake.
- Provide nutritional supplements between meals and with oral medications, unless contraindicated.


Case Study

Jed, 68 yr old, retired tobacco farmer; lives with his son, hospitalized 7 days ago d/t smoke inhalation (he set the house on fire) and pneumonia. Currently inpatient rehab. Goal to return to son’s home.

Health Hx: HTN, prediabetes, emphysema, ASCVD, Smoker, alcohol abuse; pneumonia 4 wk ago resolved. 70 inches, 134 lbs (BMI 19)
Meds: furosemide 40 mg 2X d, atorvastatin 40 mg 2Xd, albuterol 2.5 mg 3Xd
2 L continuous Oxygen at HS

Nutrition Rx: Regular, prefers ground meats
Intake < 50% at 8 out of 21 meals reviewed
## Case Study

### Historic data
03/10/14

- **Ht in/Wt #**: 70/158 (71 kg)
- **BP /HR**: 140/93; 88
- **Na mEq/L**: 132
- **Cl mEq/L**: 96
- **Glu mg/dL/A1c**: 120/NA
- **BUN/cr mg/dL**: 20/1.1
- **ALP/AST/ALT U**: NA
- **H/H/MCV Gm/dL, %, fL**: 15/45%/97
- **Alb/PAB g/dL, mg/dL**: 4.0/NA

### Hospital admission 9/2/15

- **Ht in/Wt #**: 70/145 (66 kg)
- **BP /HR**: 112/60; 104
- **Na mEq/L**: 148
- **Cl mEq/L**: 103
- **Glu mg/dL/A1c**: 133/NA
- **BUN/cr mg/dL**: 39/1.3
- **ALP/AST/ALT U**: NA
- **H/H/MCV Gm/dL, %, fL**: 16%/48/100
- **Alb/PAB g/dL, mg/dL**: 3.5/15

### Rehab data 09/11/15

- **Ht in/Wt #**: 70/134 (61 kg)
- **BP /HR**: 128/57; 90
- **Na mEq/L**: 140
- **Cl mEq/L**: 92
- **Glu mg/dL/A1c**: 132/7.3
- **BUN/cr mg/dL**: 37/1.2
- **ALP/AST/ALT U**: 123 /46/39
- **H/H/MCV Gm/dL, %, fL**: 13.5/40.5%/95
- **Alb/PAB g/dL, mg/dL**: 2.8/10

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### Case Study

Based on what you know about Jed, are there any nutrition risk indicators that increase his risk for pressure injuries?

- **Probably not**
- **Yes, state why**

**Nutrition Rx**: Regular, thin liquids, prefers ground meats
## Case Study

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<tr>
<td><strong>• Review wts and labs for potential risk for skin breakdown and indicators of nutrient deficiencies.</strong></td>
<td><strong>• Changes in H/H, BUN consistent with dehydration.</strong></td>
</tr>
<tr>
<td><strong>• Insidious wt loss (9% in 6 mos) with BMI in normal wt range ▶️ risk for malnutrition &amp; pressure injuries</strong></td>
<td><strong>• ALB and PAB reflect inflammatory stress of pneumonia and inflammation of chronic conditions</strong></td>
</tr>
<tr>
<td><strong>• Respiratory diagnosis associated with elevated energy requirements</strong></td>
<td><strong>• Glucose and A1c reflect poor blood glucose control d/t stress of recent illness</strong></td>
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## Case Study

- Mealtime observation: Food and water intake: 25% of meals and water, has skipped breakfast 2 out of 3 days.
- States: ‘too tired to eat’

### NFPA observations:
- Oral exam - dentures are ill-fitting
- Mild muscle wasting in upper body and hands
- Skin very dry, lips peeling

### Weekly Skin assessment:
- new 2.6 cm x 3.8 cm open area with yellow slough on sacrum
Case Study

As the RDN, what would you recommend for Jed?

- Current diet provides 2000 Kcal and 80-85 gm pro.
- Energy: Mifflin St. Jeor 1515-1650 Kcal
- Protein 1-1.2 g/kg
- 61-73 gm

NPUAP/EPUAP/PPPIA
- Energy: 1830-2135 Kcal
- Protein : 77-92 gm

Goals:
- Meet hydration, energy & protein requirements; stabilize weight
- Provide meals with macronutrient distribution designed to optimize tissue synthesis and manage BG
- Consider oral supplement containing arginine
- Consider Vitamin D supplement

Time To Take Action

“Healing is a matter of time, but sometimes also a matter of opportunity.”
—Hippocrates
Resources: NPUAP-EPUAP & PPPIA

- **Clinical Practice Guideline:** A comprehensive version of the guideline, including detailed analysis and discussion of available research, critical evaluations, and methodology used to develop the guideline.
- **Quick Reference Guide:** A summary of the recommendations and excerpts of the supporting evidence for pressure ulcer prevention and treatment. [www.npuap.org](http://www.npuap.org) to order copies

NPUAP Resources

- **NPUAP Pressure Injury Stages**
  - Updated 2016
- **Pressure Injury Prevention Points**
- **Pressure Injury Staging Illustrations**
References


References


Questions?

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