Nutrition Guidelines for Pressure Ulcer Prevention and Treatment:
Featuring the 2014 NPUAP/EPUAP/PPPIA International Guidelines

New Nutrition Guidelines for Pressure Ulcer Prevention and Treatment

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Objectives


2. Implement the nutrition screening and assessment process to determine malnutrition risk; and apply the nutrition care process.

3. Provide some practical solutions for nutrition and hydration for prevention and treatment of pressure ulcers.

Defining Pressure Ulcers

A pressure ulcer is a localized injury to the skin and/or underlying tissue, usually over a bony prominence, as a result of pressure, or pressure in combination with shear. (NPUAP-EPUAP, 2009)

Normal Stage 1 Stage 2 Stage 3 Stage 4

Pressure Ulcer Points

Most common sites:
1. Pelvic girdle (sacrum, coccyx, greater trochanter, ischial tuberosities, and iliac crests) – 2/3 of all pressure ulcers
2. Posterior heel
3. Lateral malleolus (ankle bone)
4. Lateral edge (side) of the foot


General Guidelines

• The recommendations in this guideline are a general guide to appropriate clinical practice, to be implemented by qualified health professionals subject to their clinical judgment of each individual case and in consideration of the patient/consumer’s personal preferences and available resources.

• The guideline should be implemented in a culturally aware and respectful manner in accordance with the principles of protection, participation and partnership.

**Criteria**

**Inclusions**
- Study designs: Clinical controlled trials with a minimum of 10 subjects
- Systematic reviews with Cochrane methodology
- Meta-analyses
- Qualitative studies as appropriate to the topic

**Exclusions**
- Animal studies (unless other not available)
- Studies of chronic wounds - unless sub-group of >10 subjects with Pressure Ulcers was analyzed separately

Note: If treatment was proven effective in other chronic wounds, the treatment was recommended for use in pressure ulcers in the absence of studies of humans with pressure ulcers; SOE at C level.

**Level of Evidence Rating to Support Recommendations**

- **A** – Direct scientific evidence from properly designed and implemented controlled trials on PrU in humans (or humans at risk of PrUs), providing statistical results that consistently support the recommendation (level 1 studies/clear cut evidence)
- **B** – Direct scientific evidence from properly designed and implemented clinical series on PrU in humans (or humans at risk of PrUs) providing statistical results that consistently support the recommendation
- **C** – Indirect evidence (e.g., healthy humans, animal models and/or other types of chronic wounds and/or expert opinion)

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**Strength of Recommendations (SOR)**

Assists Health Professionals Prioritize Interventions

- **Strong positive recommendation:** definitely do it
- **Weak positive recommendation:** probably do it
- **No specific recommendation**
- **Weak negative recommendation:** probably don’t do it
- **Strong negative recommendation:** definitely don’t do it

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**Definitions: Adult Malnutrition**

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

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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 (strong research; cost effective)

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

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

Definitions: Adult Malnutrition

- Adult undernutrition: continuum of inadequate intake and/or increased requirements, impaired absorption, altered transport, and altered nutrient utilization.
- Weight loss can occur at multiple points along this continuum.
- May also have inflammatory, hypermetabolic, and/or hypercatabolic conditions.

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

Nutrition Screening (Guidelines)

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 - SOR = probably do it)

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Nutrition Screening (Guidelines)

2. Use a valid and reliable nutrition screening tool to determine nutritional risk. (Strength of Evidence = C, SOR = Probably do it)
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; SOR = probably do it.)

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Validated Screening Tools

MST Malnutrition
Valid and reliable for use in acute care and ambulatory care to identify malnutrition
(Pauley 2012)

MNA Mini-Nutritional Assessment
Validated in individuals with PUs
Validated and easy to use in older adults
(Pauley 2012)

MUST Malnutrition Universal Screening Tool
To identify risk of undernutrition (BAPEN 2008)
Validated for use in older adults admitted to acute care
http://www.bapen.org.uk/must_tool.html

Short Nutrition Assessment Questionnaire
Wt loss, appetite, supplements and TS are parameters
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Malnutrition Screening Tool (MST)

Step 1:
• Have you recently lost weight without trying?
• If yes, how much have you lost?
• Have you been eating poorly because of a decreased appetite?

Step 2: Score to determine risk

Step 3: Intervene with nutritional support for your patients at risk of malnutrition


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

http://www.mna-elderly.com

Malnutrition Universal Screening Tool

MUST To identify risk of undernutrition (BAPEN, 2008)

BMI
Weight loss past 3-4 months
Acute disease (no intake >5 days)

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

Braden Scale: Nutrition Subscores

Sensory Perception
1 Completely limited
2 Very limited
3 Slightly limited
4 No impairment

Moisture
1 Constantly moist
2 Very moist
3 Occasionally moist
4 No impairment

Activity
1 Bedfast
2 Chairfast
3 Walks
4 Walks frequently

Mobility
1 Completely immobile
2 Very limited
3 Slightly limited
4 No limitation

Nutrition
1 Very poor
2 Probably inadequate
3 Adequate
4 Excellent

Friction & Shear
1 Problem
2 Potential problem
3 No apparent problem

Referral

Refer to IdT and individual practitioners as appropriate.

Refer to the RDN based on nutrition screening results.

• Be sure systems are in place for referrals.
• Electronic medical records must also trigger RDN referral.
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Comprehensive Nutrition Assessment

Academy’s Nutrition Care Process
Nutrition:
1. Assessment
2. Diagnosis
3. Intervention
4. Monitoring and Evaluation

Purchase the NCPT online at NCP@webauthor.com

Focus of Nutritional Assessment for PrU

- Evaluation of:
  - Energy intake
  - UWL (including insidious weight loss, obese individuals are also at risk)
  - Effect of psychological stress or neuropsychological problems (depression, dementia, etc.)
  - Food intake
  - Ability to eat independently
- Determination of the individual’s caloric, protein and fluid requirements.

Serum Albumin/Prealbumin

Serum albumin, prealbumin and other lab values:
- Appear to reflect severity of the inflammatory process.
- Do not specifically indicate malnutrition.
- Do not accurately measure nutritional repletion (Myron Johnson, 2007)
- Do not respond to nutrition interventions during the active inflammatory response.
- May be useful to help establish overall prognosis by indicating severity of morbidity and mortality.

Laboratory Parameters-Inflammation

Decreased
- serum albumin
- serum transferrin
- serum prealbumin
- platelet count OR increased white blood cell count

Increased
- C-reactive protein (↓’d in liver failure)
- blood glucose
- percentage of neutrophils in the CBC
- Marked negative nitrogen balance

Care Planning (Guidelines)

1. Develop an individualized nutrition care plan for individuals with or at risk of a pressure ulcer. (SOE = C, SOR = Probably do it)

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. (SOE = C, SOR = Probably do it)
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General Recommendations

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

What Does the Evidence Suggest?

Energy Intake

Responsive increase in metabolic rate which increases caloric needs (triggered by PUs, infection, severe illness, trauma, etc.)

Energy is essential for pressure ulcer healing

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

Sugil 2011, Yamamoto 2009

Energy Intake (Guidelines)

1. Provide individualized energy intake based on underlying medical condition and level of activity. (SOE = B, Probably do it)
2. Provide 30 to 35 kcalories/kg body weight for adults at risk of a pressure ulcer who are assessed as being at risk of malnutrition. (SOE = C, SOR= Probably do it)
3. Provide 30 to 35 kcalories/kg body weight for adults with a pressure ulcer who are assessed as being at risk of malnutrition. (SOE = C, SOR= Definitely do it)

Energy Intake (Guidelines)

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. (SOE = C, SOR= Definitely do it)
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 registered dietitian whenever possible. (SOE = C, SOR= Probably do it)

Energy Intake (Guidelines)

6. Offer fortified foods and/or high calorie, high protein oral nutritional supplements between meals if nutritional requirements cannot be achieved by dietary intake. (SOE = B, SOR= Definitely do it)
7. Consider nutritional support (enteral or parenteral nutrition) when oral intake is inadequate. This must be consistent with the individual’s goals. (Strength of Evidence = C, SOR= Probably do it)

Protein: 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)

Protein supplementation improved healing rates compared to placebo. (Health Quality Ontario 2009)
What Does the Evidence Suggest for Optimal Protein Intake for Older Adults

- Positive association between protein ingestion and muscle mass (PREDICT-ACE study group JAMA 2013)
- Protein spread equally between breakfast, lunch, dinner (30 g each) (Position Ioso 2009)
- If needed, additional protein supplementation should be given between meals (Altman JM 2002)

Protein Intake (Guidelines)

1. Provide adequate protein for positive nitrogen balance for adults assessed to be at risk of a pressure ulcer. (SOE = C, SOR = Probably do it)
2. Offer 1.25 to 1.5 grams protein/kg body weight daily for an adult at risk of a pressure ulcer who is assessed to be at risk of malnutrition when compatible with goals of care, and reassess as condition changes. (Strength of Evidence = C), SOR = Probably do it
3. Provide adequate protein for positive nitrogen balance for an adult with a pressure ulcer. (Strength of Evidence = B, Probably do it)

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Protein Intake (Guidelines)

4. Offer 1.25 to 1.5 grams protein/kg body weight daily for adults with an existing pressure ulcer who is assessed to be at risk of malnutrition when compatible with goals of care, and reassess as condition changes. (SOE = C, SOR = Probably do it)
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. (SOE = A, SOR = Probably do it)

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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

Ready-to-drink, high-protein, arginine-enriched nutritional supplement

Nutrients per 200 mL serving:
- 20 g protein
- 3 g L-arginine
- 250 kcal
- Vitamins and micronutrients including:
  - 250 mg vitamin C
  - 38 mg vitamin E (α-TE)
  - 9 mg zinc
  - 1.5 mg carotenoids

Specific Nutritional Support Accelerates Wound Healing: Conclusions of Trial

- Supplementation with additional protein, arginine, and micronutrients accelerated pressure ulcer healing in non-malnourished patients.
- The number of wound dressings, as well as the time needed for changing the dressings, was lower with specific nutritional support over the period of 8 weeks.
- Specific nutritional support can be cost-saving by reducing overall health care costs.
- With specific nutritional support more nursing time is available for other relevant patient care related activities.
- These results warrant further health economics investigations into the benefits of specific ONS.

Oligo Element Trial Study

Ingredients in 100 mL:

<table>
<thead>
<tr>
<th>Standard/control</th>
<th>Intervention</th>
</tr>
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<tbody>
<tr>
<td>• 10 gm</td>
<td>• Protein 10 gm</td>
</tr>
<tr>
<td>• 0</td>
<td>• Arginine-L 1.5 gm</td>
</tr>
<tr>
<td>• 2.3 mg</td>
<td>• Zinc 4.5 mg</td>
</tr>
<tr>
<td>• 338 mg</td>
<td>• Copper 675 mg</td>
</tr>
<tr>
<td>• 19 mg</td>
<td>• Vitamin C 125 mg</td>
</tr>
<tr>
<td>• 2.3 mg</td>
<td>• Vitamin E 19.0 mg</td>
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</tbody>
</table>


Oligo Element Trial Study: Results

- 69.9% in intervention formula group had 40% or greater reduction in PU size compared to 54.1% in control.
- The efficacy of these nutrients in wound healing is likely synergistic because there is no evidence supporting an independent effect when given alone.
- This nutritional intervention may be beneficial when added to optimized local wound care for the treatment of pressure ulcers in malnourished patients.

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

Protein Intake (Guidelines)

7. Supplement with high protein, arginine and micronutrients for individuals 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. (SO E = B, SOR= Probably do it)

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Hydration (Guidelines)

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. (SOE = C, SOR = Definitely do it)

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Hydration (Guidelines)

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

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

Methods of Calculating Fluid Needs

<table>
<thead>
<tr>
<th>1 mL/calorie consumed</th>
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<tbody>
<tr>
<td>30 mL/kg BW/day</td>
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</tbody>
</table>

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.

Vitamins and Minerals: What Does the Evidence Suggest?

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.

Vitamins and Minerals (Guidelines)

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. (SOE = C, SOR = Definitely do it)

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. (SOE = C, SOR = Probably do it)

Vitamins and Minerals (Guidelines)

3. Provide/encourage an individual with a pressure ulcer to consume a balanced diet that includes good sources of vitamins and minerals. (SOE = B, SOR = Definitely do it)

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. (SOE = B, SOR = Probably do it)

Vitamin C

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

- In 2010 NPUAP defined an unavoidable PU as one that may occur even though providers have evaluated the individual’s clinical condition and PU risk factors have been evaluated and defined and interventions have been implemented that are consistent with individual needs, goals, and recognized standards of practice.
- Occurs even though providers have monitored and evaluated the impact of preventive interventions and revised these approaches as appropriate.

Zinc

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.

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2013 NPUAP Unavoidable Pressure Injury State of the Science Census 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%
- Cachexia is cytokine-associated wasting of protein reserves & energy stores due to the effect of diseases such as cancer, cardiac cachexia, ESRD, COPD, cystic fibrosis, and rheumatoid arthritis.
- Cytokines directly cause feeding suppression and a lower intake of nutrients and is almost always accompanied by anorexia.

Palliative Care (Guidelines)

1. Strive to maintain adequate nutrition and hydration compatible with the individual’s condition and wishes (SOE=C; SOR= Definitely to it)
2. Offer nutritional supplements when ulcer healing is the goal. (SOE=C; SOR= Definitely do it)

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Academy’s Position

- “Individuals have the right to request or refuse nutrition and hydration as medical treatment.”
- Generally takes precedence over the beliefs or wishes of health care providers.
- Each patient approaches death with different religious, philosophical, and personal attitudes and values

MNT Goals: Ethical Issues

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 law


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).

Medical Nutrition Therapy

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

Steps to Successful Nutrition Care

1. Screen and Assess Nutrition Status
   - Individualize interventions and develop POC

2. Provide diet based on estimated needs, consider fortified foods
   - Offer supplements between meals if intake is inadequate

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

Food and Nutrition Interventions

- Real food/first choice foods, individualize diet, dining interventions
- Medication adjustments (Interactions: anorexia, nausea, GI concerns, etc.)
- Social/psychological interventions
- Supplements, enhanced foods, and food fortifiers to combat UWL and malnutrition

Protein Needs: 150#

<table>
<thead>
<tr>
<th>Protein Values</th>
<th>Healthy: 0.8 gms/kg (1.0 older adult)</th>
<th>Pressure Ulcer: 1.25-1.5 gms/kg</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>54.5 - 68 grams</td>
<td>85 - 102 grams (+30-47 g)</td>
</tr>
<tr>
<td>Food needed to achieve protein values</td>
<td>Breakfast: 1 egg, 8 oz milk (15) Lunch: 2oz meat, 4oz milk (18) Dinner: 3oz meat, 4oz milk (25)</td>
<td>Breakfast: 2 eggs, 8 oz milk (+7) Lunch: 2oz meat, 8oz milk (+4) Dinner: 3 oz meat, 8 oz milk (+4) Snack: 8 oz shake (+8)</td>
</tr>
</tbody>
</table>

Can your patients eat all this food?

- Total (+ starches, veg. 21= 79) 102 Total

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 dollar spent on ONS in the matched sample.)

Implications for Practice

- Poor health outcomes may be associated with UWL and malnutrition.
- 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.

Most Important

Focus the individual care plan on improving overall nutrition status through accepted nutrition interventions to create positive outcomes.

New 2014 NPUAP-EPUAP and Pan Pacific Injury Alliance Guidelines

- **Clinical Practice Guideline**: comprehensive version of the guideline, a detailed analysis and discussion of available research, critical evaluations and description of the methodology used to develop guideline.
- [www.npuap.org](http://www.npuap.org) to order copies

New Resources

- [The Complete Guide to Nutrition Care For Prevention and Treatment of Pressure Ulcers](http://www.beckydorner.com/products/22)
- [The Role of Nutrition for Pressure Ulcer Management: National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel, and Pan Pacific Pressure Injury Alliance White Paper](http://www.beckydorner.com/products/22)

Alliance to Advance Patient Nutrition

- Alliance includes: The Academy of Medical-Surgical Nurses, The Academy of Nutrition and Dietetics, The Society of Hospital Medicine, and Abbott Nutrition.
- Represents over 100,000 dietitians, nurses, hospitalists and other physicians from all 50 states.
- Mission to transform patient care through the power of prescriptive nutrition; Raising awareness about the positive impact proper nutrition has on patients' medical outcomes and providing hospitals with tools and resources to advocate for effective nutrition practices in their organizations.

Thank you!

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