The Role of Nutrition in Hospital Acquired Pressure Ulcers Injuries
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Objectives

• Discuss the relationship between inflammation, malnutrition and hospital acquired pressure ulcers.
• Describe the benefit of early adequate and appropriate nutrition on pressure ulcer prevention and wound healing.
• List at least 3 nutritional interventions that can help in the reduction or management of hospital acquired pressure ulcers.
Hospital Acquired Pressure Injuries
Includes the costs of malnutrition

• Costs
  • ~ $70,000 to 130,000 to heal a Stage III/IV
  • $1 to $5 Billion per year
  • 60,000 deaths per year
  • $850 - $1450 per patient per week for wound care
  • 50% of Stage II and 95% of Stage III/IV Pressure Injuries Do Not Heal in 8 weeks

• Cost of nutrition intervention

Who Are Our Patients? U.S. Population

• 65 years or older with at least 2 or more chronic conditions
  • Obesity, heart disease, diabetes, hypertension, kidney disease, arthritis, cancer (same as risks for HACs)

Acute Illness, Trauma, Surgery

Chronic Disease

ICU weakness, Pressure Ulcers, Infection risk,

Acute Inflammatory Response 2-25 days post injury

Acute on Chronic Stress response

Insulin Resistance, Altered nutrient utilization, Malnutrition,
Common Risk Factors
Malnutrition - Pressure Injuries and Infections

1. Recent Illness or Trauma
2. History of Pressure Injuries
3. Advanced Age > 65y
4. Poor nutritional status
   • Underweight, Recent Involuntary Weight Loss
   • Obesity
   • Poor Glycemic Control
   • Inadequate Intake, Dysphagia
   • Dehydration
5. Comorbidities
   • Diabetes, Heart Disease
   • Arthritis, Hypertension
   • Kidney Disease, Cancer
   • Poor Circulation
   • Immobility
   • Incontinence
6. Malabsorption
   • Bowel Diseases
   • Diarrhea
   • Malnutrition

HACs
Making the Connection

Malnutrition is associated with:
• Altered immune function, weakness
• Increased risk of infections
• A 200-500% higher risk for Pressure injuries among other conditions
• Patients who develop HACs are
  • 2 to 3 times more likely to die,
  • 60% more likely to be in an ICU,
  • Have increased nutritional needs & higher risk of malnutrition

Consequences of Inflammatory Response

• Hyperglycemia even in non-diabetics
• Increased nutrient needs – Especially Protein
• Arginine & glutamine deficiency within 24 hrs of acute condition.
• Change in protein synthesis leads to low serum albumin resulting in edema which masks weight loss.
• Anorexia due to inflammatory cytokines.

SCCM and ASPEN Critical Care Nutrition Guidelines. JPEN. 2009; http://pen.sagepub.com/content/33/3/277.

Consequences of Hyperglycemia

• Delayed wound healing,
• Risk of infection (BG >140 mg/dL)
• Weight loss – mostly muscle wasting, weakness
• Risk of UTI due to presence of sugar in the urine
• Dehydration due to increased urination & diarrhea
• Nausea, vomiting and constipation---- malnutrition....

Importance of Adequate Protein

• Adequate stores modulate inflammation
  • Improved immune function, response to illness/injury, and improved outcomes
• Deficiency can affect all phases of healing/recovery
  • Prolonged inflammatory state
  • Delayed healing
  • Greater risk of infection
• Higher protein intake requires adequate fluid intake.


Nutritional Interventions

Goal
Adequate, Appropriate & On Time

• Early Intervention to maintain gut integrity
• Team approach to meeting nutritional needs
• Good tolerance
  • Glycemic control,
  • Close to normal BMs, even with tube feedings.
  • Transition to 100% oral intake as appropriate.
Early Intervention: RD-RN Connection

- Rational
  - Modulates the underlying disease process
  - Supports GI structure and function
  - Prevents gut from becoming pro-inflammatory organ
- Nutrition Screening on admission (within 24 hours) to assess for risk or presence of malnutrition and code for reimbursement.
- Must have immediate corresponding intervention.


Triggers for Intervention*

- Recent metabolic stress/illness/surgery
- Braden score: High or Nutrition score <3
- Recent Involuntary Weight Loss at any level of BMI
- Poor po intake for >5 days
- Dehydration risk: <1500 mL/d, diarrhea, ileostomy, heavy wound exudate, incontinence
- Constipation or diarrhea > 2-3 days
- Chewing or swallowing problems
- Extensive assistance required for eating

* Screen within 24 hours of admission or if change in status. Adapted from Nutrition Management Protocol for Pressure Ulcers: www.nutritioncaremanual.org Accessed 4/09
Early Intervention Strategies

- RD & SLP ER coverage & ER meal service,
- More rapid diet advance,
- Reduced time for pre/post-op diets,
- Earlier protein & oral supplement use,
- Earlier and more feeding tube placements
  - Delay removal of feeding tube until adequate intake is verified
  - Ability to swallow does not always mean ability to eat
- Provide feeding assistance – Solids & Liquids

General Intervention Tips
Appropriate Nutrition = Patient Specific

- Food first as able
  - The body heals best with food both physically and emotionally.
  - High calorie supplements can decrease appetite for foods and should be given after a meal not before.
  - Less processed foods and meet patient food preferences as able
- No “one size fits all” supplement exists.
  - Sugar content, sugar alcohols (glycerol), dysphagia, organ function, allergies, hydration status?
Protein Recommendations

NPUAP: 1.25 to 1.5g/kg for risk of or with PrI & risk of malnutrition. Adjust for obesity, but how?

AS PEN Critical Care Guidelines

- 1.2 to 2.0 g/kg ABW for BMI < 30*
- ≥ 2.0 g/kg IBW for BMI 30-40 kg m²
- ≥ 2.5 g/kg IBW for BMI > 40 kg m²
- Adjust based on renal function

*Protein needs may be higher in burns and multiple trauma
* ASPEN Critical Care Guidelines 2016, NPUAP Guidelines 2014

Recommendations for Individual Amino Acids

Arginine

- Now recommended by NPUAP for Stage 3 & 4 pressure injuries
- Ideal dose is unknown. Daily food intake in healthy adult is 5-6 g/d
- Studies with 6 to 9 g/day used to support NPUAP recommendation
- Support nitric oxide formation needed for: Immune function, collagen formation, and wound profusion. NO levels decreased in diabetics.

Glutamine

- No recommendations for wound healing at present
- Important for preservation and restoration of lean body mass, anti-inflammatory functions and maintenance of gut integrity
- Contraindicated with impaired renal or liver function.

NPUAP Guidelines 2014
### Arginine & Glutamine Supplements

* ArgiMent: 7.5g Arg + 10g Gln  
* ArgiMent AT: 7g Arg + 7g Gln + 10g Whey + VM + GOS prebiotic  
* Arginaid: 4.5g Arg  
* Arginaid Extra: 4.5g Arg + 10g Pro + 52g CHO + VM  
* ArgiTein: 4.5g Arg + 5g Whey + VM  
* GlutaMent: 10g Gln  
* Juven: 7g Arg + 7g Gln + 1.2g HMB  
* Many liquid proteins offer option with added arginine

### Protein Tips: Look for foods and products that

- Meet various needs, are easy to give, easy to consume:
  - Dysphagia, Food allergies and Diet restrictions,  
  - Fortify patients favorite foods – need to get food preferences  
  - Protein dense: Greek yogurt, Liquid protein  
    - Liquid proteins provide more protein in less volume of fluid,  
    - Are easy to take by mouth or through a feeding tube and  
    - Can be mixed with foods and beverages for variety.  
    - Available in Plus and sugar free, variety of flavors and allergy free options  
- Combination supplements, such as arginine plus protein means fewer supplements to dispense and for the patient to take.
Calories

NPUAP Rx: up to 35 kcals/kg for Prls
Never a “one size fits all” approach to calories

Obesity and Pressure Injury Risks

• Decreased vascular supply in adipose tissue,
• Difficulty in turning & repositioning, immobility, Unsafe equipment, greater pressure
• Moisture within skin folds, Skin-on-skin friction,
• Poor nutrition…

Consider using, IBW for BMI>30 (check for edema)

Blood glucose level 140-180 mg/dL*

• Hyperglycemia & Overfeeding
  • Loss of LBM, Dehydration, Impaired immunity
  • Infection risk, Poor wound healing
• May need to underfeed at first, adjust meds, then increase calories as able / as appropriate
• ICU insulin protocols for all patients & more patients on insulin in secondary care facilities without h/o diabetes – demands on staff greatly increased.

http://pen.sagepub.com/content/33/3/277.
Glycemic Control Tips

- Adequate, not excessive calories
- Provide consistent CHO throughout the day (45-60 g CHO per meal as appropriate)
- More options for lower CHO foods and supplements, limit sugar alcohols (glycerin)
- Give water, not juice, with meds & dysphagia diets
- Avoid high fructose corn syrup (HFCS)
- Perform “walking program” for pressure relief/mobility after meals to reduce post meal BG


Diarrhea and Loss of Tissue

Tolerance to Pressure

- Head
- Foot

Layers of linen & pads reduce effectiveness of specialty beds.

- Moisture, Fungal Infection, Excoriation, Wound Contamination
- Sheering from frequent clean ups
- Dehydration & Malnutrition from fluid & nutrient losses
- Diarrhea = Zinc Deficiency = Diarrhea!
- ALB ≤ 2.5 = Malabsorption Diarrhea

Good tolerance to intervention?!!
Before Diarrhea is often Constipation
Constipation-Diarrhea Cycle

- Laxatives, even when used as directed, often result in diarrhea. Anti-diarrhea agents then result in constipation, and so on. In the institutionalized elderly, laxative use is reported to be as high as 74%.
- CMS is encouraging the use of non-medication interventions to avoid this cycle when able.
- 10-20g of soluble, fermentable fiber recommended by ASPEN
- Insoluble fiber such as soy fiber can be constipating – check fiber source & amount before using fiber tube feeding.

The Relationship Between Tube Feeding, Bowel Management, Skin Breakdown and Aspiration

Acute Illness, Multiple Medications, Delayed TF Initiation

Bowel medications = diarrhea, Hold TF ‘til bowels clear, Malnutrition continues/worsens

Continuing to feed with bowel impaction can lead to aspiration

Diarrhea, Malnutrition, Skin Breakdown

Bowel impaction due to insoluble fiber TF formula\(^1,2\)

Diarrhea and Constipation

Diarrhea

- Sorbitol/Glycerin/High osmolality
- Lactose, Mag Oxide
- Medications (antibiotics)
- Laxatives
- Malnutrition

Management
- Yogurt, Kefir®
- Banana Flakes, Soluble Fiber
- Prebiotics
- Probiotics
- Medications (antibiotics)
- Malnutrition

Constipation

- Medications (pain meds)
- Immobility
- Low fiber diet
- Dehydration
- Malnutrition

Management
- Fluids
- Fiber-Containing Foods
- Soluble fermentable Fiber Supplements
- Prebiotics
- Probiotics
- Ambulation

Diarrhea/Fungal Infection/Skin Breakdown

Patient with chronic diarrhea despite use of different TFs available to dietitian at transferring hospital.

Diarrhea resolved within 3 days of admission with change to fiber free formula and 3 days of banana flakes, then transitioned to soluble fiber supplement (12g BID)
Inappropriate use of high fiber feeding can cause bowel impaction and increase risk of aspiration

84 yr. old female with C6 spinal injury c/o “tasting TF” on admit

Patient NPO on high fiber standard enteral tube feeding

On admission, abdominal X-ray reveals bowel impaction

Intervention

- Magnesium citrate and bowel routine
- IVF to correct dehydration and allow access for risk of hypoglycemia (insulin given prior to transfer)
- Fiber free TF at low rate until constipation resolved.
- Order to “Hold TF for c/o N/V/Reflux or tasting of TF”.
- Once bowels cleared and tolerating goal rate of TF, 12g BID of soluble fiber added. Only bowel routine meds still needed due to neurogenic bowel.
- Soluble fiber can help with both diarrhea & constipation. For diarrhea, we start with banana flakes, then transition to soluble fiber supplement as the stool becomes formed.
Nutrition an **Equal Part** of Prevention? Follow the money.........

- Clinically not cost based protocols needed.
- Specialized wound care supplements should be included with medications.
- Early intervention requires Appropriate RD to patient ratio

In the End........

Early recognition of malnutrition along with adequate and appropriate nutrition intervention is key to improving patient outcomes and reducing costs.