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)

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

- 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. JPN. 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.


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

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.

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?

ASPEN 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

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.

Arginine & Glutamine Supplements

- ArgiMent: 7.5g Arg + 10g Gin
- ArgiMent AT: 7g Arg + 7g Gin + 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 Gin
- Juven: 7g Arg + 7g Gin + 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.
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.

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 alcohol (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

Dysphagia & ASPIRATION

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 Stress, Multiple Medications, Delayed TF Initiation
- Bowel medications = diarrhea, held 24-48 hours, may constipate, Malnutrition, contamination

Continuing to feed with bowel impaction can lead to aspiration

Foot Layers of linen & pads reduce effectiveness of specialty beds.

Dysphagia & ASPIRATION
Diarrhea and Constipation

**Diarrhea**

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

**Constipation**

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

**Management**

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

**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)

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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.

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**In the End**

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