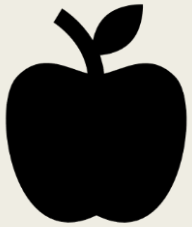
THE ROLE OF NUTRITION IN PRESSURE INJURIES

MCKENZIE MOORE MBA,MS,RD,LD

Objectives

To identity populations at risk of developing pressure injuries



To identify nutrients that aid and promote wound healing

To list common factors that compromise wound healing

Populations at Risk

- Limited Mobility/Immobility[1]
- Poorly fitting prosthetics[1]
- Elderly (immobility, dementia, poor dentition)[1]
- Medical conditions affecting blood flow – Uncontrolled Diabetes, Vascular Disease [1]
- Lack of sensory perception[1]
- Critical Care[1]
- Malnourished/Dehydrated[1]

Identifying Malnutrition[1,3,4]

Acute injury or illness vs chronic illness

Must Identify 2 or more of the following in Nutrition Focused Physical Exam (NFPE):

Insufficient energy intake	Weight loss	Loss of muscle mass	Loss of subcutaneous fat	Fluid accumulation masking weight loss	Diminished Functional status

Identifying Malnutrition

- Anthropometric Parameters – Weight, Height, BMI[1,2,3,4,5]
- Laboratory Markers
  - *The Academy and ASPEN do not recommend the use of albumin or pre-albumin to determine malnutrition. Albumin and pre-albumin are serum proteins that decrease during the acute phase of the inflammatory response – such as in the presence of wounds/pressure injuries.* [1,2,3,4,5]
- Best to use combination of NFPE, anthropometric measures, and clinical judgement. [1,2,3,4,5]
- Also consider the presence of signs and symptoms of vitamin deficiencies (tingling in limbs, mental confusion, bleeding gums, anemia, dry eyes, brittle hair, fatigue, paleness, brittle nails)[7]

Macronutrients

Carbohydrates[3,4]

Primary energy source

35-55% of energy source

*Consider keeping to the ratio of carbs closer to 35% for patients with diabetes

Needed for collagen synthesis

Protein[1,3,4,5]

Cell structure

Fibroblast proliferation in dermis

Collagen synthesis

Fats[3,4]

Cell function

Provides concentrated source of energy – in other words, calories.

No specific recommendations based on pressure ulcer stage

Amino Acids

- Amino acids that may become conditionally essential in catabolic states [1]
  - *Arginine – Increase blood flow and oxygen to wound, increase collagen formation, reduced inflammation, detoxification of ammonia*[1,3,4,5]
  - *Glutamine – stimulate collagen production (wound contraction), regulate nitrogen metabolism, supports immune system*[1,3,4,5]

Estimated Energy Needs of a Healthy Adult[1,6]

25-30 kcal/kg

* Needs will need to be adjusted based on BMI

0.8 g protein/kg

30 ml/kg

Estimated Energy Needs of an Adult with Pressure Injuries

30-35 kcal/kg[1,2,3,4,5]

- 35-40 kcal/kg for patients who are underweight with wounds.
- Needs may need to be adjusted to use ideal body weight if patient is overweight or obese

1.2-1.5 g protein/kg[1,2,3,4,5]

- Up to 2 g protein for pressure injuries stage III or IV
- Consider renal injuries or hepatic disease
- Consider increased protein needs may put patients w/inadequate fluid intake at risk for dehydration
- Protein needs may be a higher in the diet for patients who are obese

Increased Fluid Needs[1,2,3,4,5]

- 1-1.5 ml/kcal
- Consider other conditions such as CHF, CKD, urine output, GI losses, diarrhea

Comparison of Needs:

150 lb.(68.2 kg)
5 feet 7 inches (175 cm)
BMI of 22.3 (Normal)

EEN for Average Healthy Adult

- *25-30 kcal/kg*
  - 1705-2046 kcal/day
- *0.8 g protein/kg*
  - 55 g protein/day
- *30 ml/kg*
  - 2046 ml/day

EEN for Adult with Pressure Injuries

- *30-35 kcal/kg*
  - 2046-2387 kcal/day
- *1.2-1.5 g protein/kg*
  - 82-102 g protein/day
- *1-1.5 ml/kcal*
  - 2046-2387 ml/day

REMEMBER, WOUND HEALING STARTS FROM THE INSIDE! ADEQUATE CALORIE INTAKE IS IMPORTANT SO THAT PROTEIN CAN BE USED FOR WOUND HEALING INSTEAD OF ENERGY. LACK OF NUTRITION CAUSES DELAYED WOUND HEALING! [1,2]

Improving Intake of Calories and Protein

- Encourage PO Intake[1,2]
  - *Protein rich snacks*
  - *Fortified foods*
  - *Double protein portions*
  - *Liberalizing the diet*

Quality Protein Sources[6]

Animal Protein

Lean Beef

Pork

Seafood

Low Fat Cheese

Milk (Almond and Cashew Milk are not animal proteins!)

Yogurt and Cottage Cheese

Eggs

Plant Based Protein

Beans

Peas

Soy Products

Nuts

Nut Butters

Improving Calorie and Protein Intake

- Oral Nutrition Supplements (ONS) and Protein Supplements
  - *Factors to consider*[1]
    - Comorbidities
      - *Specialized formula for diabetes, renal disease, Etc.*
    - Nutrition Status
      - *Protein needs, wound size, malnourishment*
    - Caloric Intake
      - *Is the patient eating well?*

Improving Calorie and Protein Intake

- Amino Acid Supplementation
  - *Wounds are 3 times more likely to heal with zinc, arginine and antioxidant supplementation for 4 weeks (High Quality Level 1 Study from NPUAP)* [2]

4.10	Provide high-calorie, high-protein, arginine, zinc and antioxidant oral nutritional supplements or enteral formula for adults with a Category/Stage II or greater pressure injury who are malnourished or at risk of malnutrition.	B1	↑

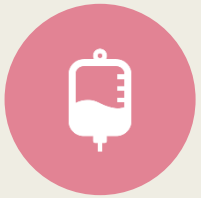
Micronutrients

Vitamin A – Maintains skin integrity, stimulated fibroblasts and collagen synthesis[1,4]

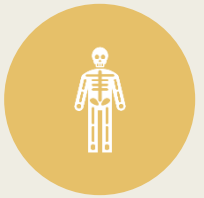
Vitamin C – Collagen synthesis, fibroblast formation, immune function [1,3,4,5]

B Vitamins – Collagen Synthesis [1]

Zinc – DNA synthesis, protein synthesis, cell proliferation[1,3,4]



Vitamin K – Blood clotting[1]



Copper – Collagen and elastin cross-linking [1,3]

Iron – Collagen cross-linking [1]

Food Sources of Micronutrients[1,6]

Vitamin A – sweet potatoes, carrots, leafy green vegetables
Vitamin C – Citrus fruits, berries, broccoli, tomatoes, guava
B Vitamins - Fortified grains, pasta, milk, poultry, fish, eggs, legumes
Zinc – red meat, oysters, almonds, peanuts, fortified grains
Vitamin K – dark leafy greens, broccoli
Copper – organ meats, fish, cashews, sunflower sees, fortified grains
Iron – meat, poultry, eggs, fortified grains, legumes

Vitamin Supplementation

Consider if there is reason to suspect deficiency

Recommendations for zinc supplementation

220 mg Zinc Sulfate x 10-14 days (50 mg zinc)[3, 4]

Additional supplementation may be required due to GI losses [1]

Chronic intake of zinc can lead to copper deficiencies [1,3]

Recommendations for Vitamin C supplementation

100-200 mg/day for Stage 1-2 [4]

1000-2000 mg/day for Stage 3-4 [4]

Recommendations for Vitamin A

10000-50000 IU/day for injured or severely malnourished patients [4]

Factors that Compromise Wound Healing

- Malnutrition[1,2,3,4,5]
- Infection[1]
- Vascular Complications[1]
- Suboptimal debridement[1]
- Uncontrolled glucose[1]
- Dehydration [3,4,5]
  - Water serves as solute for nutrients and transports waste products
- Social factors
  - Inability to make meals
  - Loneliness
  - Poor Appetite/PO intake

Effects of Uncontrolled Glucose on Wound Healing

Impaired Blood Flow

- *Decreased oxygen and Nutrients to Wound[1,8]*

Immune System Deficiency

- *Ineffective White Blood Cell Function[1,8]*
- *Increased Risk of Infection[1,8]*

Diabetic Neuropathy

- *Decreased Sensation – inability to sense development or worsening of wound[1,8]*

SAMPLE MENU 4

Meal	Sample Menu (Non-Diabetic)
Breakfast	1 cup of scrambled eggs made with 1 cup shredded cheese 2 slices of whole wheat toast 2 tablespoons of peanut butter 1 cup 2% milk ¼ cup orange juice 1 cup coffee
Lunch	4 ounces roast beef 2 tablespoons gravy ½ cup rice ½ cup peas 1 biscuit 2 tablespoons butter 1 cup tossed salad 2 tablespoons salad dressing ½ cup ice cream 1 cup tea
Supper	3 ounces baked chicken with skin 2 tablespoons gravy ½ cup mashed potatoes ½ cup spinach 1 slice whole wheat bread 2 tablespoons butter 1 orange 1 cup 2% milk 1 cup water
Evening Snack	2 Graham Crackers 1 cup 2% milk

QUESTIONS?

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