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OUCH!

WOUNDS AND NUTRITION PLANNING

OBJECTIVES

Did poor nutrition cause the wound or did the wound result in poor nutritional status?

- Gain / maintain knowledge for how different wounds could impact management of nutrient needs.
- Understand and apply current evidence for nutrition care by wound type.
- Integrate nutrition interventions for wound healing based on an individual's need.

IMPACTS ON HEALING

- **Age**
- Medical history – overall health
- Nutritional status
- Available care and support
 - Living situation
 - Caregivers
 - Financial means



AGING CHANGES BODY COMPOSITION

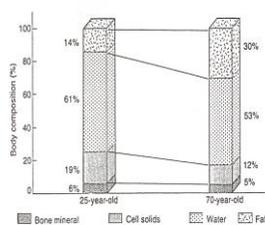


Fig. 3 Diagrammatic comparison of the effect of age on changes in body composition. Note the increased percentage of fat and reduction of body water in the 70-year-old person. This decrease reflects the age-associated decline in lean body mass. (Adapted from Schook et al. (1994))

IMPACTS ON HEALING

- **Age**
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IMPACTS ON HEALING

- Age
- Medical history – overall health
- **Nutritional status**
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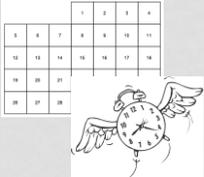
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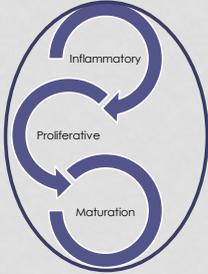


TIME TO HEAL

- Acute Wound
 - Follows "normal" phases of healing
 - <4 weeks
- Chronic Wound
 - Persist >4 weeks
 - Often complex
 - Frequently defy treatment



PHASES OF WOUND HEALING




WHICH WOUND IS IT?

- Cut, abrasion, burn, surgical wound
- Diabetic ulcer
- Venous Stasis Ulcer
- Arterial Ulcer
- Pressure Ulcer
 - Stage I – IV
 - Not stageable



WHICH WOUND IS IT?

Diabetic ulcer
(neurogenic ulcer)

- Callus -> ischemia-> wound formation
- Contributing issues:
 - Neuropathy
 - Poor circulation
 - Uncontrolled BG
 - CVD
 - Smoking
 - Too tight shoes
- BG control is key factor in prevention and healing

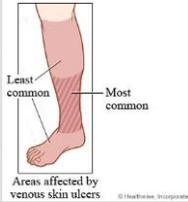



©2010 Logical Images. Accessed on-line April 2015 at Skin-Sight.com

WHICH WOUND IS IT?

Venous Ulcer (also stasis leg ulcer)

- Discolored skin -> Dry, itchy, flaky at site -> Swells, aches -> Infection
- Contributing issues:
 - Venous insufficiency
 - DVT
 - Obesity
 - Smoking
 - Lack of activity
- Maintaining normal weight and activity is key



Legendre, Parker, Swazey, Wipke-Tevis

VENOUS ULCERS & NUTRIENTS

- Often elderly person
- High probability of nutrient deficiency
 - ↓ intake
 - ↑ prevalence of protein deficiency
 - Low serum levels A, E, carotene and zinc
- Key indicators: serum albumin, transthyretin and CRP
 - Anthropometrics not specific
- Suggested focus:
 - Protein
 - Correcting deficiencies
 - Adequate energy
- Impact of nutrition on healing is unknown



Legendre, Wipke-Tevis,

WHICH WOUND IS IT?

Arterial Ulcer (ischemic)

- Pale, shiny skin -> "punched out" look -> painful
- Contributing issues:
 - Atherosclerosis (vascular diseases)
 - Diabetes
 - Hypertension
 - Smoking
 - Obesity
- Nutrition to address any deficiencies and other underlying concerns
 - Zinc - no evidence that oral zinc increases healing
 - Findings include venous ulcers



CHARACTERISTICS

Venous Ulcer

- Ruddy base color
- Brown staining on skin
- Shallow wound
- Irregular wound margins
- Moderate to heavy exudate
- Pitting/non-pitting edema
- Warm skin
- Granulation tissue present
- Minimal to severe pain
- Potential for infection
- Pedal pulses present
- Capillary refill normal

Arterial Ulcer

- Pale base color when elevated
- Shiny, taut skin
- Deep wound
- Punched out appearance
- Minimal exudate
- Variable edema
- Cold skin
- Rare presence of granulation tissue
- Infection frequent
- Pain present at rest and exercise
- Pedal pulses diminished or absent
- Capillary refill delayed

Explanation accessed from Coloplast®

NEW FROM NPUAP

- Adopted in 2016
- Pressure Ulcer now Pressure Injury
- Stages I, II, III, IV now Stages 1,2,3,4
- New categories:
 - Medical device related pressure injury
 - Mucosal membrane pressure injury
- Updated staging definitions

WHICH WOUND IS IT?

Pressure Injury

- **Stage I - IV**
 - Unstageable
 - Deep Tissue
- Preventable?
- Typically develop over bony prominences
- Contributing issues:
 - ↓ mobility
 - Confounding medical dx
 - Diabetes, CVD
 - Prior PU's
 - Nutritional status
 - Poor protein status
 - Low BMI / weight



<http://reference.medscape.com/features/slideshow/pressure-ulcers>

PRESSURE INJURIES & NUTRIENTS

- Nutrition matters ... but it may not heal
- NPUAP Guidelines
 - Screen for & Assess status in at-risk and those with PIs
 - Correct deficiencies
 - Individualize energy recommendation
 - Base need + activity
 - Provide adequate protein
 - Positive nitrogen balance
 - Encourage fluid intake
 - Needs + manage against fluid loss (draining wounds, fever, etc.)
 - Supplement vitamin / mineral deficiencies

NPUAP.org

DO SUPPLEMENTS HELP?

- Formula enriched with arginine, zinc, and antioxidants (C&E) resulted in greater reduction in PU area versus standard ONS
- 200 institutionalized elderly
 - Stage II, III, and IV PUs
 - Malnourished
 - 2 supplements/day + std diet



☐ We don't know

- Results of same study formula with well nourished

Cereda E et al. Ann Intern Med. 2015;162:167-174.

NUTRITION & WOUNDS

- Wound healing is dependent on adequate energy and protein.
- Diet for medical condition OR diet for wound healing?



ENERGY

- For -> anabolism, nitrogen synthesis and collagen formation...sparing protein
- Little data on energy needs specific to wound healing
 - ↑ energy need with healing BUT not great
- Standard 25 – 40 kcal/kg
 - NPUAP 30-35 kcal/kg
 - 25-30 kcal/kg elderly; moderately stressed
 - Underweight 35-40 kcal/kg
 - Obese - ??
 - Critically ill – caution to not overfeed
 - Pediatric – clinician discretion
- Bottom line: clinician discretion

Doley, NPUAP, Smith et al., Stechmiller, Thomas, Thompson & Fuhrman



PROTEIN

- Protein is essential to healing
 - Worse the wound the greater the need
 - E.g. Stage 4, dehisced, infected, exudate
- Higher protein is associated with decreasing surface area NOT complete healing.
 - With no correlation to +N balance
- RDA 0.8 g/kg (older adults 1 g/kg)
 - NPUAP 1.25 – 1.5 g/kg
 - Critically ill 1.0 – 1.5 g/kg
 - AHRQ up to 2 g/kg
 - >1.5 g/kg ?
 - Overfeeding, renal insufficiency
- Bottom line: clinician discretion; greater than 'normal healthy'



Doley, NPUAP, Smith et al., Stechmiller, Thomas, Thompson & Fuhrman

PRACTICE POINT

- Meeting energy and protein needs likely requires:
 - Nutrient dense foods
 - High protein meals and snacks
 - ONS
- Find person's preference



AMINO ACIDS

- Arginine
 - Conditionally essential; precursor to substrates and processes for healing
 - Supplementing benefits the deficient diet
 - Best results: pre-surgery, healing surgical incisions
 - Optimal dose unknown
 - Range 4.5 g – 25 g / day
 - Higher end to enhance immune function
 - Caution in severe sepsis
 - Bottom line: clinician discretion

Arginine

Glutamine

Leucine

HMB

BCAA

Doley, NPUAP, Stechmiller, Thomas, Thompson & Fuhrman

AMINO ACIDS

- Glutamine –
 - Conditionally essential in extreme stress
 - Removes excess ammonia from the body, helps immune system, brain function and digestion
 - Supplementing benefits the deficient diet
 - Evidence limited to burns, surgical infection and cancer mucositis
 - Suggested dose: 0.57g/kg/d
 - No duration (safety) data
 - Bottom line: clinician discretion

Arginine

Glutamine

Leucine

HMB

BCAA

Doley, Stechmiller, Thomas, Thompson & Fuhrman

AMINO ACIDS

- Leucine –
 - Work shows leucine supports protein synthesis for building muscle
 - No data to specific to wound healing
- BCAA –
 - May improve N+ balance
 - No data to support wound healing

Arginine

Glutamine

Leucine

HMB

BCAA

Thomas, Thompson & Fuhrman

AMINO ACIDS

- HMB (β -hydroxy β -methylbutyrate) –
 - Studies suggest support for collagen deposition and minimizing muscle & protein loss
 - Studied in combo with arginine and glutamine
 - Evidence is confounding
 - Dose: 3g HMB/d
 - Bottom line: clinician discretion

Arginine

Glutamine

Leucine

HMB

BCAA

Thompson & Fuhrman

VITAMINS & MINERALS

- Treat deficiencies and encourage balanced diet
- Vitamin C
 - Deficiency can result in poor quality healing and wound dehiscence
- Vitamin A
 - Deficiency associated with delayed healing and susceptibility to infection
- Evidence is lacking to supplement unless deficient



Doley, NPUAP, Smith et al., Stechmiller, Thomas, Thompson & Fuhrman

VITAMINS & MINERALS

- Vitamin E
 - No clear role in wound healing
- Zinc
 - Deficiency impairs wound strength, collagen synthesis, epithelialization, depresses immunity and increases risk for infection
- Copper
 - Deficiency impairs healing
- Other vitamins/minerals
 - Important but no data
- Evidence is lacking to supplement unless deficient



Doley, Smith et al., Stechmiller, Thomas, Thompson & Fuhrman

VITAMINS AND MINERALS

	RDA	Upper Limit	Wound Care*
Vitamin A	3,000 IU	10,000 IU	Up to 10x upper limit IM then step down dosing with oral
Vitamin C	90 mg (male) 70 mg (female) + 35 mg smokers	2,000 mg	500-1,000 mg/d up to 1-2g/d for burns
Vitamin E	15 mg	1,000 mg	varies
Copper (gluconate)	900mcg	10 mg	1.5-2.5 mg/d (male) 1.5-3 mg/d (female)
Zinc	11 mg (male) 8 mg (female)	40 mg	220 mg/d

* Oral. To replete a deficiency

Doley, Stechmiller, Thomas, Thompson & Fuhrman

HYDRATION

- Many reasons for people to be dehydrated
- Dehydration
 - Contributes to skin breakdown
 - Decreases blood volume for delivery of nutrients to heal
- ↑ risk with wounds:
 - Infection, draining
 - Air-fluidized beds are dehydrating
 - Add 10-15 mL/kg at high temp [88°F to 93°F]
- 30-35 mL/kg/d or 1-1.5 mL/kcal
 - Increase with high protein
 - Increase with fluid loss
 - Decrease with CHF, renal disease



Doley, NPUAP, Stechmiller, Thomas, Thompson & Fuhrman

"SIMPLY" PUT

- One size does not fit all
- Nutrition for wound healing is nutrition that addresses whole body needs.
 - Baseline needs
 - Deficiencies
 - Road blocks to healing



LET THE HEALING BEGIN

- Assess current nutrition status
 - Determine baseline needs
 - Current intake adequacy
 - Diagnosis, labs, medications
- Address nutrient needs to support healing
 - Protein
 - Fluids
- ? Maybe vitamins, minerals or other novel nutrients
 - Trial



KEY TAKE-AWAY



- Don't keep going down a path that may not be 'working'



- Remember everyone is unique and they will respond differently to 'same' treatments



- Be aggressive, don't stop support too soon...it can take years to fully heal



Your Special Diet Partner

THANK YOU FOR PARTICIPATING
IN TODAY'S SESSION!

This presentation is intended to provide general information about nutrition and wound healing but is not intended to provide medical advice.

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POST-TEST

Select the best answer based on current evidence.

1. True or False. All wounds heal basically by the same process.
2. Essential nutrients for the substrates for wound healing are:
 - a. Energy, Protein and Fluid
 - b. Protein, Fluid and Vitamin/Minerals
 - c. Protein, Fluid
3. Which novel nutrients have the "best" support for use in wound healing
 - a. Arginine, HMB, Leucine
 - b. Arginine, HMB
 - c. Arginine, Glutamine, BCAA's
 - d. HMB, Glutamine, Leucine

POST-TEST ANSWERS

Select the best answer based on current evidence.

1. **True** or False. All wounds heal by basically the same process. **The time and ability to heal may vary but the body goes through the 'same' steps to repair any wound.**
2. Essential nutrients for the substrates for wound healing are:
 - a. Energy, Protein and Fluid
 - b. Protein, Fluid and Vitamin/Minerals
 - c. **Protein, Fluid** **All nutrients matter but protein and fluid are key to recovery and successfully building new tissue.**
3. Which novel nutrients have the "best" support for use in wound healing
 - a. Arginine, HMB, Leucine
 - b. **Arginine, HMB** **Although inconclusive, these two nutrients have the best evidence to date to suggest a role in healing.**
 - c. Arginine, Glutamine, BCAA's
 - d. HMG, Glutamine, Leucine