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NUTRITION & PRESSURE INJURIES: PUTTING THE NEW GUIDELINES INTO PRACTICE

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Sponsor Disclosure

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Speaker

Mary D. Litchford PhD, RDN, LDN

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Objectives

Explain	Explain the science of skin and key nutrients needed for wound healing.
Discuss	Discuss the nutrition recommendations in the 2019 Prevention and Treatment of Pressure Ulcers/Injuries: Clinical Practice Guideline (CPG).
Apply and Practice	Apply and practice implementation of the 2019 CPG nutrition recommendations using a case study approach.

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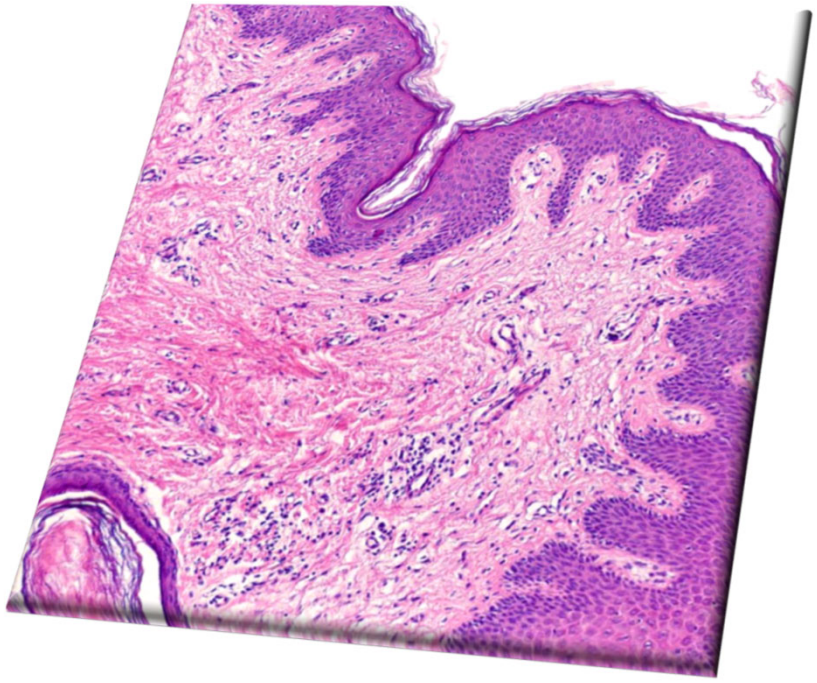
Core Content Areas

- **Science of Skin & Nutrition Status**
- Wounds & Nutrition in Healing
- Prevention & Treatment of Pressure Injuries
- Case Study



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Science of Skin

- Largest organ in the body
  - Epidermis- outer layer
    - Contains no blood vessels
    - Dependent on dermis for nutrient delivery & waste removal via diffusion at basement membrane zone (BMZ)
  - Dermis-inner layer
    - Papillary dermis
    - Reticular dermis
  - Basement Membrane Zone (BMZ)
    - Between epidermis and dermis
    - Anchors epidermis to dermis

Image from Dreamtime

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Why is the Science of Skin Important?

- Skin is designed to protect the internal workings of the body
- Epidermis and dermis layers serve a different purpose
- Nutrition plays a role in maintaining skin health by oral intake or infusions
- Lifestyle choices can protect the skin, but can not counteract your genetic makeup & the footprints of time

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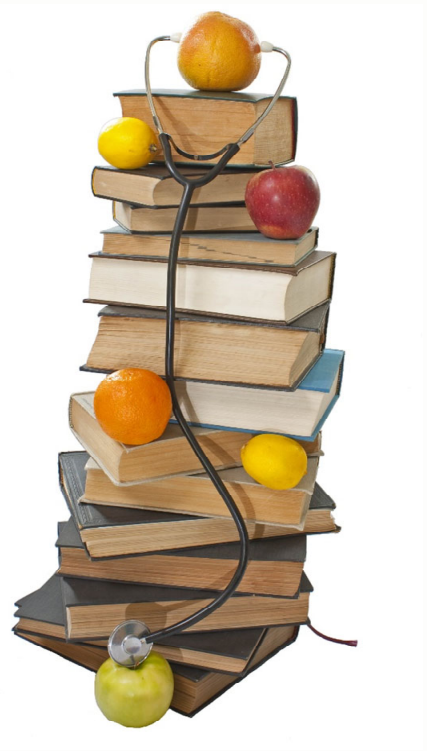
Malnutrition & Skin Health

› What is the relationship between nutrition status and skin health?
› What is the relationship between nutrition status and wound healing?



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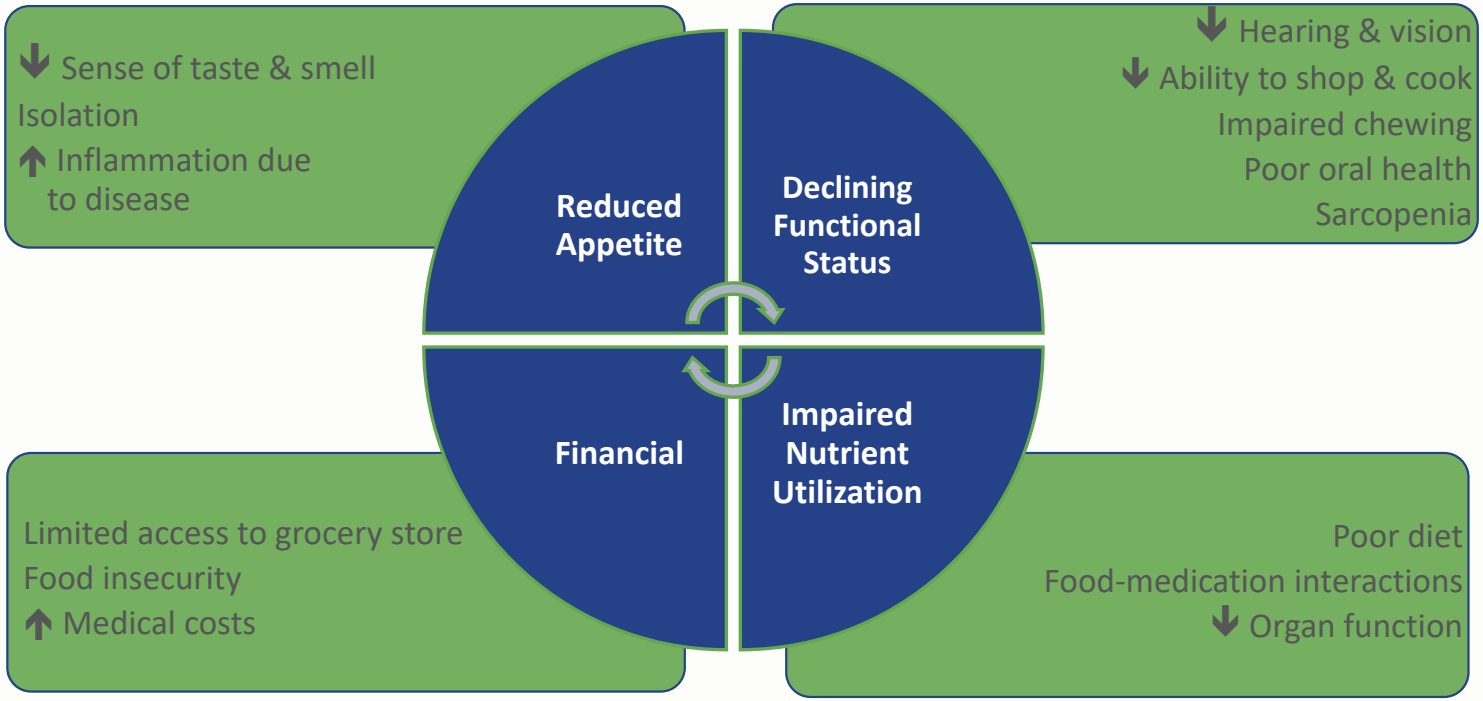
Footsteps to Undernutrition & Malnutrition



Dominguez LJ, et al. *Curr Opin Clin Nutr Metab Care*. 2017;20(1):61-68. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5182201/
Huppertz VAL, et al. *J Am Med Dir Assoc*. 2017;18(11):948-954. https://pubmed.ncbi.nlm.nih.gov/28733180/
Litchford MD. *Nutr Clin Pract*. 2014;29(4):428-434. https://pubmed.ncbi.nlm.nih.gov/24913273/

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Basic Concepts of Protein Metabolism

Adequate Protein and Energy Intake

80-100 g Diet + 150-200 g LM Reserves

Synthesis DAA

Turnover Free AA
Excretion, Oxidation, or Other Pathways

Energy

Growth or repair body tissues

Images from Dreamtime

Institute of Medicine. 2005. *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids*. Washington, DC: The National Academies Press. https://doi.org/10.17226/10490..

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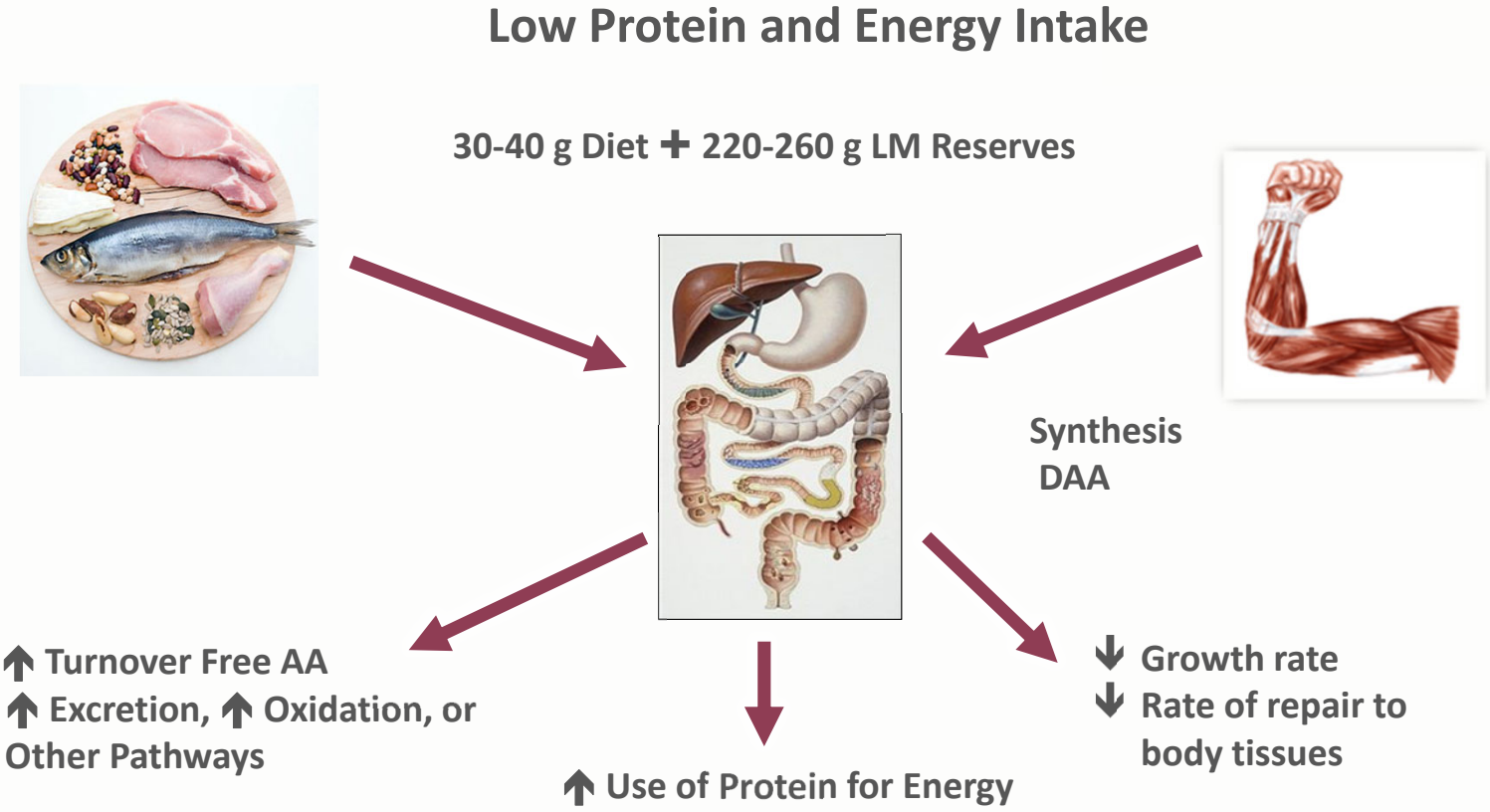
Basic Concepts of Protein Metabolism



Institute of Medicine. 2005. *Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids*. Washington, DC: The National Academies Press. https://doi.org/10.17226/10490..

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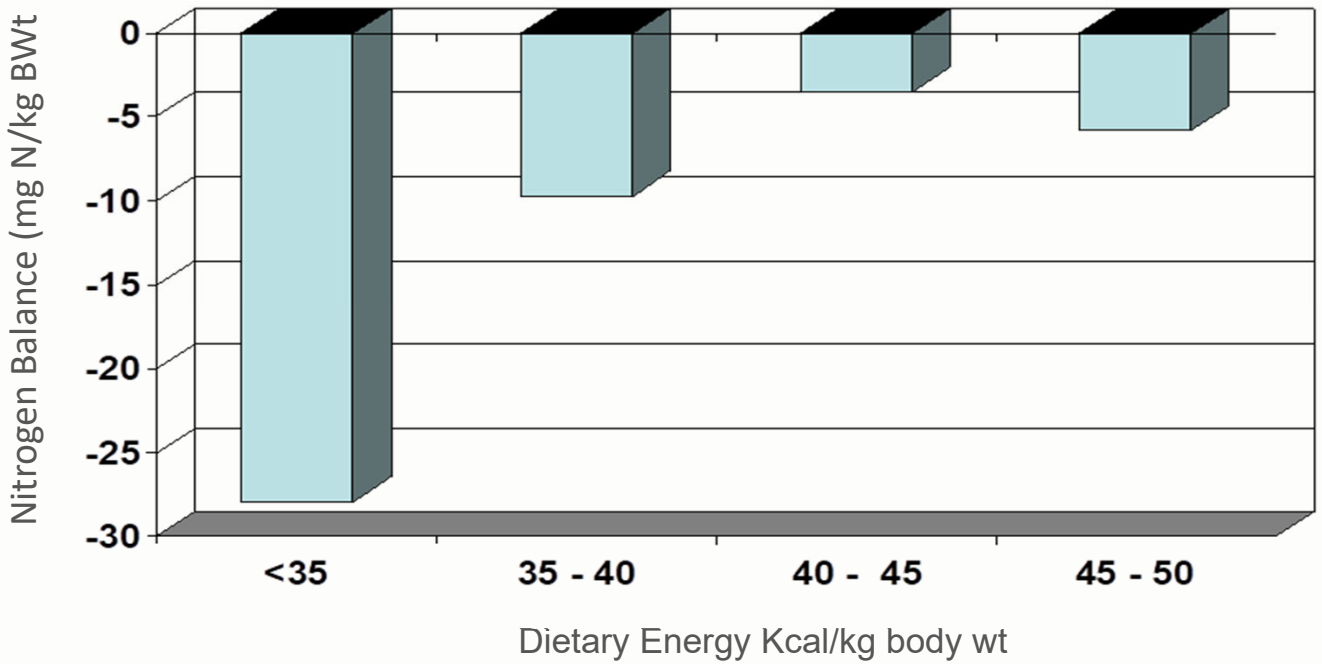
Primary Drivers of Wound Healing

› Relationship Energy Intake & Nitrogen Balance



Pellett PL. *Protein-Energy Interactions.* Scrimshaw eds. IDECG, Lausanne, Switzerland. 81-121, 1992. http://www.nzdl.org/cgi-bin/library.cgi?e=d-00000-00---off-0ccgi--00-0----0-10-0---0---0direct-10---4-------0-1l--11-en-50---20-about---00-0-1-00-0-0-11-1-0utfZz-8-00&a=d&c=ccgi&cl=CL3.1&d=HASH45ca5b9c6ad120e289fbc3.8.4.1

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How is the Nutrition Status Related to Skin Health?

- Sufficient Protein & Energy intake is needed to maintain the skin
- Malnourished individuals will deplete nutrient reserves to maintain vital organ systems including muscle mass and skin
- Protein will be burned for fuel if food energy intake is insufficient

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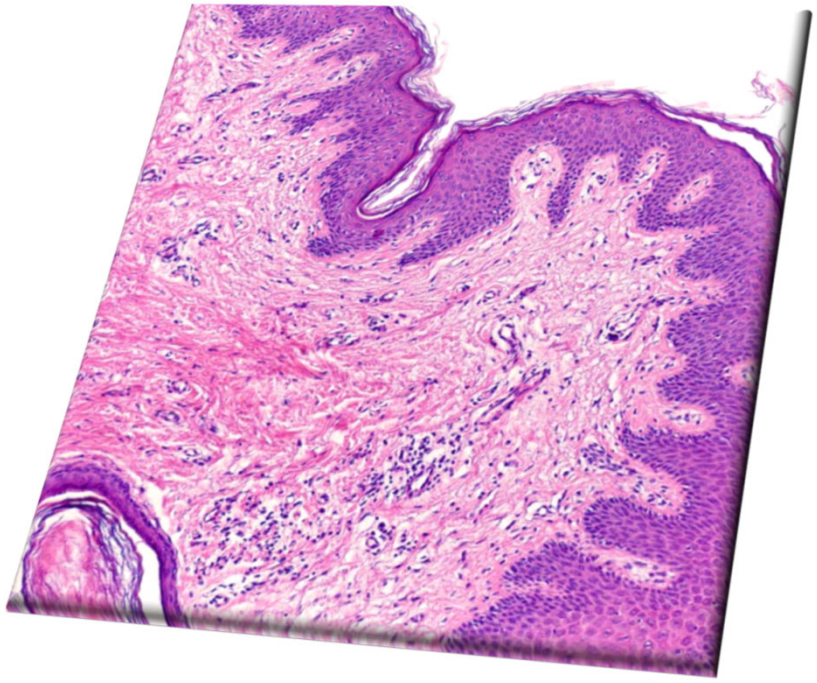
Core Content Areas

- Science of Skin & Nutrition Status
- **Wounds & Nutrition in Healing**
- Prevention & Treatment of Pressure Injuries
- Case Study



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The First Step To Healing Is Recognizing That There's A Wound

Anonymous

https://www.askideas.com/60-top-healing-quotes-and-sayings/

What are Wounds?

- An injury to living tissue caused by a cut, blow or other impact; skin may be broken, i.e. open wound or intact, i.e. closed wound
- May be associated with a disruption of structure or function
- May be intentional
  - occur during therapy, i.e. radiation therapy
  - surgical wounds
- May be unintentional wounds
  - trauma or injury
  - pressure injuries
- Some wounds are slow to heal and become chronic wounds

Nussbaum SR, et al. *Value Health.* 2018;21(1):27–32.

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Wounds…The Silent Epidemic?

- 2018 analysis of Medicare beneficiaries[1]
  - ~ 8.2 million people had wounds with and without infections
  - ~ 3% of population 65 yr or older have open wounds
- > 20% of older adults in long-term care facilities in the U.S. and Canada have pressure injuries[2,3]
- 2.5 million adults in US develop pressure injuries annually[4]
- ~ $11 billion/yr to treat pressure injuries

1. Nussbaum SR, et al. Value Health 2018;21:27–32.
2. Horn SD, et al. *J Am Geriatr Soc*. 2004;52:359-67.
3. Woodbury MG, et al. *Ostomy Wound Manage*. 2004;50:22-8
4. Berlowitz D, et al. AHRQ, U.S. Department of Health and Human Services.

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What is a Pressure Injury (PI)?

National Pressure Injury Advisory Panel definition:

- A pressure injury is localized damage to the skin and/or underlying soft tissue usually over a bony prominence or related to a medical or other device
- The injury can present as intact skin or an open ulcer and may be painful
- The injury occurs as a result of intense and/or prolonged pressure or pressure in combination with shear
- The tolerance of soft tissue for pressure and shear may also be affected by microclimate, **nutrition**, perfusion, co-morbidities and condition of the soft tissue

NPUAP Pressure Injury definition and stages. Updated 2016. http://www.npuap.org/resources/educational-and-clinical-resources/npuap-pressure-injury-stages/. Accessed June 25, 2020.

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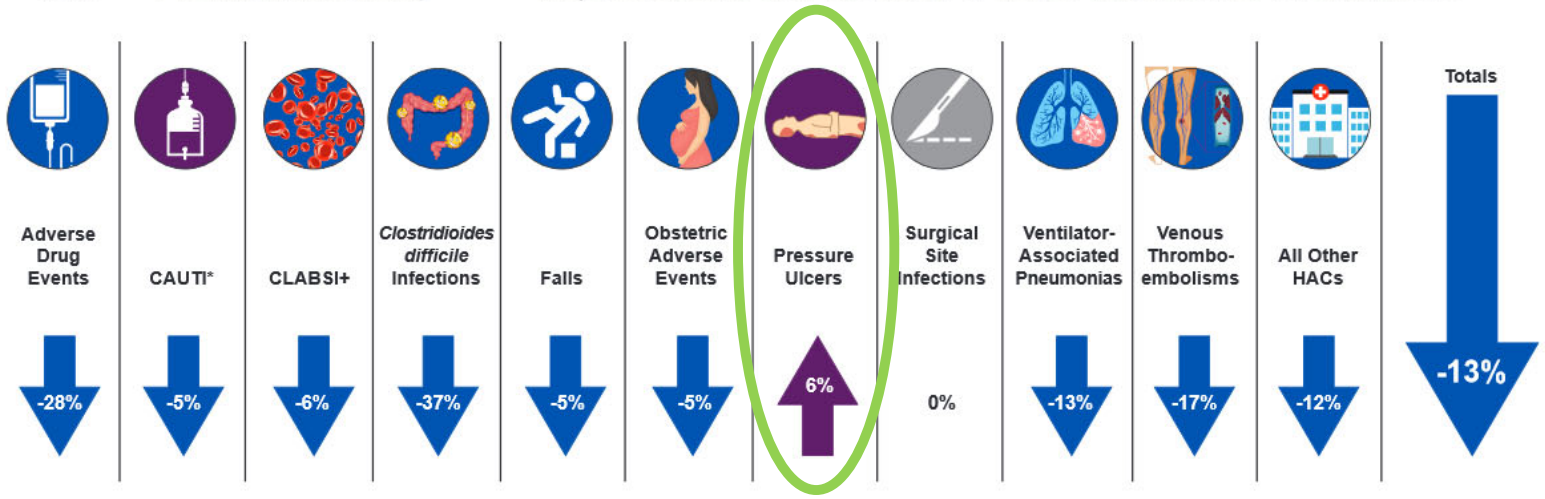
Declines in Hospital-Acquired Conditions

Agency for Healthcare Research and Quality

National efforts to reduce hospital-acquired conditions such as adverse drug events and injuries from falls helped prevent 20,500 deaths and saved $7.7 billion between 2014 and 2017.



*CAUTI - Catheter-Associated Urinary Tract Infections

+CLABSI - Central Line-Associated Bloodstream Infections

**The percent change numbers are compared to the 2014 measured baseline for HACs.

Source: AHRQ National Scorecard on Hospital-Acquired Conditions Updated Baseline Rates and Preliminary Results 2014-2017

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Stage/Categories of Pressure Injuries

Deep Tissue Injury

Pressure Injuries

Medical Device Related Pressure Injuries

Images from AAWC & NPIAP

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Nutrition-Related Factors that Increase Risk for PIs

- Increased nutrient needs
- Undernutrition
- Malnutrition
- Dehydration
- Low BMI
- Inadequate food and fluid intake
- Inability to feed self
- Individuals with multiple risk factors
- Individual with acute injuries or major surgeries often have stress-related hyperglycemia resulting in poor glycemic control

BMI – Body Mass Index

European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel, and Pan Pacific Pressure Injury Alliance. Prevention and Treatment of Pressure Ulcers/Injuries: Clinical Practice Guideline. The International Guideline. 3rd ed. Haesler E, ed. 2019. http://internationalguideline.com. Accessed 6/25/20.

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Nutrients & Wound Healing

› Hemostasis
- Protein
- Energy
- Vitamin K
- Ascorbic acid

› Inflammation
- Protein
- Energy
- Ascorbic Acid
- B-Complex Vitamins

Demling RH. *Eplasty* 2009;9:e9–e9.

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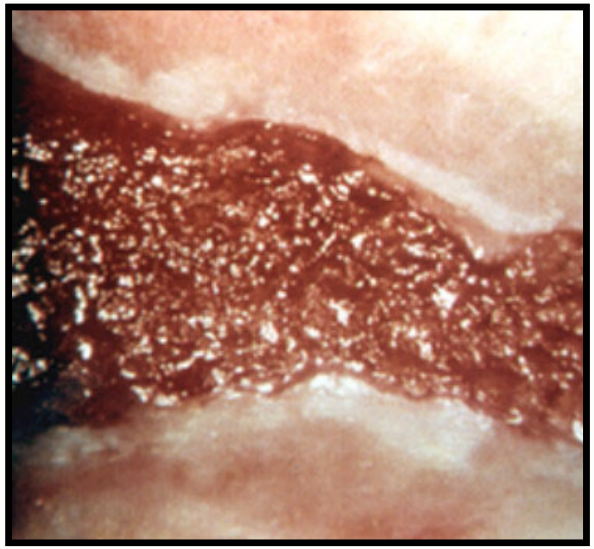
Nutrients & Wound Healing

› Proliferation
- Protein, Arginine*, Energy
- Vitamins A, C*, E*
- B-Complex Vitamins
- Folate
- Iron, Zinc*, Copper*, Selenium*, Manganese*



› Maturation
- Protein
- Energy
- Ascorbic Acid
- Vitamin A

Demling RH. *Eplasty* 2009;9:e9–e9.
*Cereda,E et al. *Ann Intern Med*, 2015; 162(3):167-174

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How is the Nutrition Status Related to Wound Healing?

› Sufficient Protein & Energy intake is needed for healing
› Sufficient intake of vitamins and minerals is needed for healing
› Poly-morbidities may hinder healing

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Core Content Areas

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- **Prevention & Treatment of Pressure Injuries**
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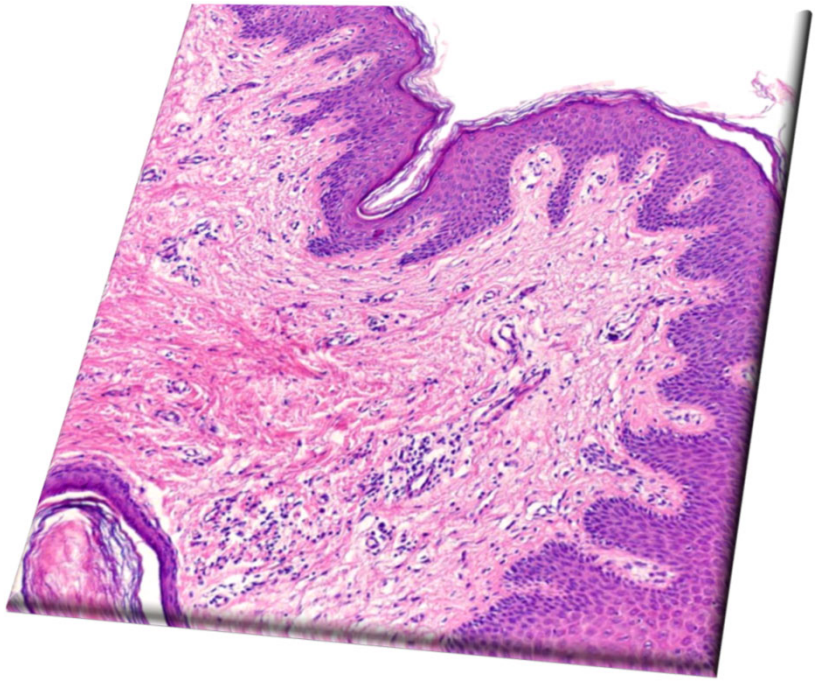

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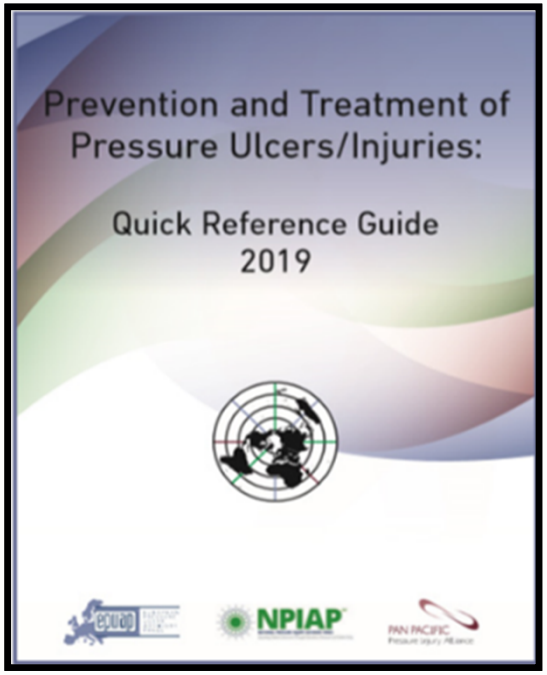
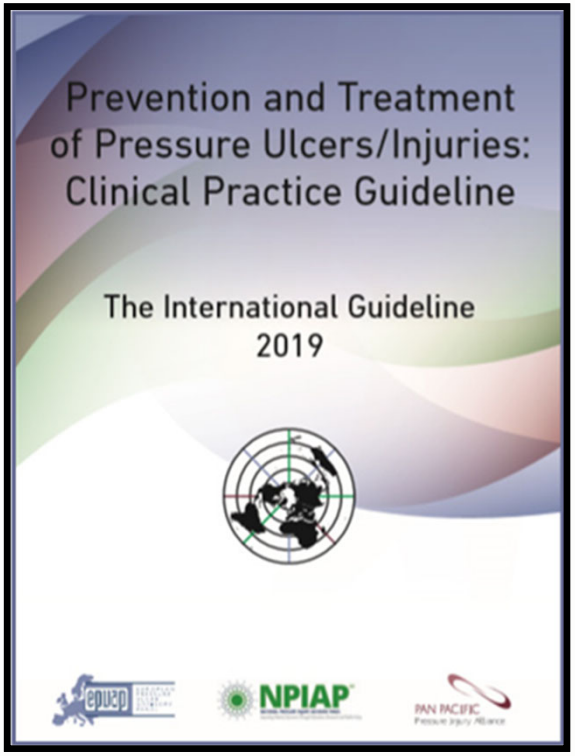
2019 International Guideline

› http://www.internationalguideline.com

› https://guidelinesales.com/





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2019 Clinical Practice Guideline(CPG)

	Strength of Evidence
A	• More than one high quality Level I study providing direct evidence • Consistent body of evidence
B1	• Level 1 studies of moderate or low quality providing direct evidence • Level 2 studies of high or moderate quality providing direct evidence • Most studies have consistent outcomes and inconsistencies can be explained
B2	• Level 2 studies of low quality providing direct evidence • Level 3 or 4 studies (regardless of quality) providing direct evidence • Most studies have consistent outcomes and inconsistencies can be explained
C	• Level 5 studies (**indirect evidence**) e.g., studies in normal human subjects, humans with other types of chronic wounds, animal models • A body of evidence with inconsistencies that cannot be explained, reflecting genuine uncertainty surrounding the topic
GPS	**Good Practice Statement** • **Statements that are not supported by a body of evidence as listed above but considered by the GGG to be significant for clinical practice. Based on Expert Opinion**

Reference: EXTRACT FROM INTERNATIONAL GUIDELINE 2019 EDITION
European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel and Pan Pacific Pressure Injury Alliance. Prevention and Treatment of Pressure Ulcers: Clinical Practice Guideline. The International Guideline. Emily Haesler (Ed.). EPUAP/NPIAP/PPPIA; 2019.

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2019 Clinical Practice Guideline (CPG)

	Strength of Recommendations
↑↑	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

Reference: EXTRACT FROM INTERNATIONAL GUIDELINE 2019 EDITION
European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel and Pan Pacific Pressure Injury Alliance. Prevention and Treatment of Pressure Ulcers: Clinical Practice Guideline. The International Guideline. Emily Haesler (Ed.). EPUAP/NPIAP/PPPIA; 2019.

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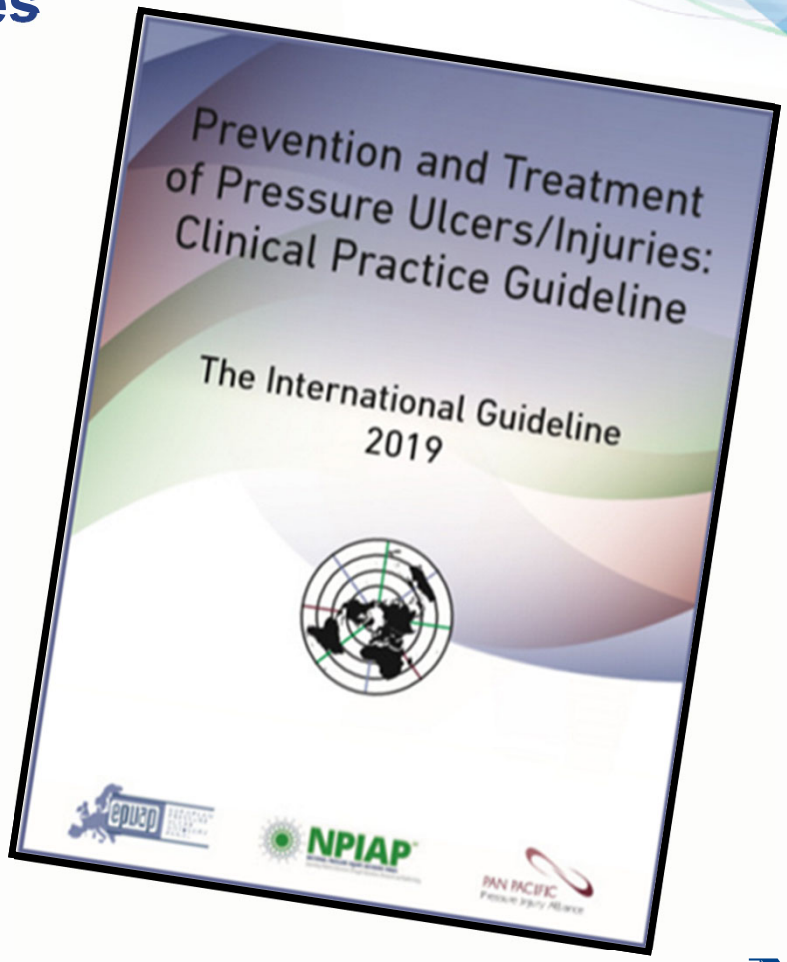
Key Nutrition-related CPG updates

Fewer Recommendations

- 29 recommendations in 2014
- 10 recommendations in 2019

New Features:

- Expert Opinion = Good Practice Statements
- 5 Good Practice Statements
- Implementation considerations



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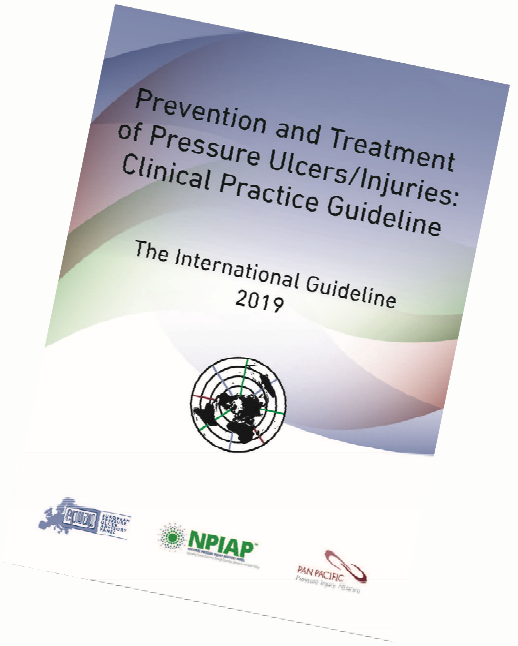
Nutrition Screening: Recommendation

› **4.1: Conduct nutritional screening for individuals at risk for pressure injury**

- Strength of Evidence = B1
- Strength of Recommendation = ↑↑



› When to screen:

- At admission to a health care setting
- With each significant change of clinical condition; and/or
- When progress toward pressure injury closure is not observed

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Nutrition Screening: Validated Tools

Malnutrition Screening Tools	Criteria Used
Malnutrition Screen Tool (MST) http://static.abbottnutrition.com/cms-prod/abbottnutrition.com/img/Malnutrition%20Screening%20Tool_FINAL.pdf	Unplanned weight loss Appetite
Nutrition Risk Screen-2002 https://www.mdcalc.com/nutrition-risk-screening-2002-nrs-2002	Unplanned weight loss BMI, Age Disease severity Impaired physical condition
Malnutrition Universal Screen Tool(MUST) http://www.bapen.org.uk/pdfs/must/must_full.pdf	Unplanned weight loss BMI, Disease severity Food intake
Mini Nutrition Assessment (MNA) http://mna-elderly.com/default.html	Appetite, GI issues Unplanned weight loss Mobility, BMI Stress

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Nutrition Screening: Validated Tools

Malnutrition Screening Tools	Criteria Used
Short Nutrition Assessment Questionnaire (SNAQ) http://www.fightmalnutrition.eu/toolkits/summary-screening-tools	Unplanned weight loss Appetite Intake of supplemental drinks or tubefeeding
Seniors in the Community: Risk Evaluation for Eating and Nutrition (SCREEN II) https://www.researchgate.net/publication/257790956_Validation_of_the_nutrition_screening_tool_%27Seniors_in_the_Community_Risk_Evaluation_for_Eating_and_Nutrition_version_II%27_among_octogenarians	Unplanned weight loss Appetite, Intake, Impaired physical condition (difficulty chewing, swallowing, shopping, cooking)
Canadian Nutritional Screening https://journals.lww.com/aswcjournal/Fulltext/2017/02000/The_Canadian_Nutrition_Screening_Tool.4.aspx	Unplanned weight loss without regain Food intake

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Nutrition Assessment: Recommendation

› **4.2: Conduct a comprehensive nutrition assessment for adults at risk of a pressure injury who are screened to be at risk of malnutrition and for all adults with a pressure injury.**

- Strength of Evidence = B2
- Strength of Recommendation = ↑↑

› **Not as prescriptive as 2014**

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Nutrition Care Planning: Recommendation

› **4.3: Develop and implement an individualized nutrition care plan for individuals with, or at risk of, a pressure injury who are malnourished or who are at risk of malnutrition.**

- Strength of Evidence = B2
- Strength of Recommendation = ↑↑

› **Not as prescriptive as 2014**

› Care plan should:

- Individualized
- Interdisciplinary
- Revolve around the patient's goals and preferences
- Include due date
- Reviewed and updated frequently

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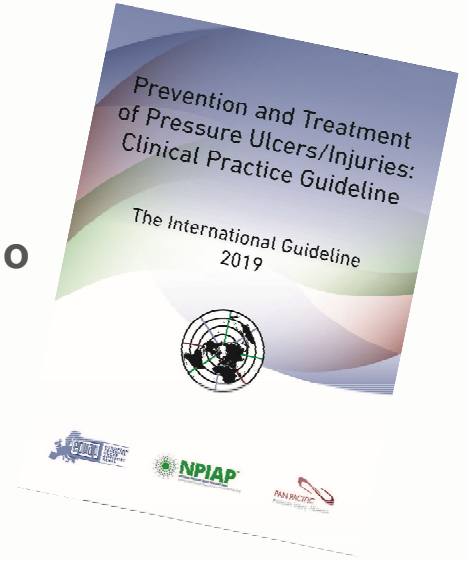
Energy and Protein-At Risk for PI: Recommendations & GPS

› **4.4: Optimize energy intake for individuals at risk of pressure injuries who are malnourished or at risk of malnutrition.**

- Strength of Evidence = B2; Strength of Recommendation =↑

› **4.5: Adjust protein intake for individuals at risk of pressure injuries who are malnourished or at risk of malnutrition.**

- Good Practice Statement



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Changes from 2014 Energy & Protein-At Risk for Pressure Injuries

› Indirect evidence
  - Risk of pressure injuries and with malnutrition
  - Nutritional supplementation
  - Improved energy intake

› Research examining the benefits of providing increased energy & protein for individuals at risk for PI or at risk for malnutrition has produced mixed results
  - No high quality research evidence to indicate if a higher protein and higher energy intakes reduces the incidence of pressure injuries in people at risk

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Energy and Protein PI Present: Recommendations

- **4.6: Provide 30 to 35 kcalories/kg body weight/day body weight for adults with a pressure injury who are malnourished or at risk of malnutrition**
  - Strength of Evidence = B2
  - Strength of Recommendation = ↑
- **4.7: Provide 1.25 to 1.5 g/kg body weight/day for adults with a pressure injury who are malnourished or at risk of malnutrition**
  - Strength of Evidence = B1
- Strength of Recommendation = ↑↑
- **Note : these recommendations apply to all stages of PIs including deep tissue injury and mucosal tissue PI**

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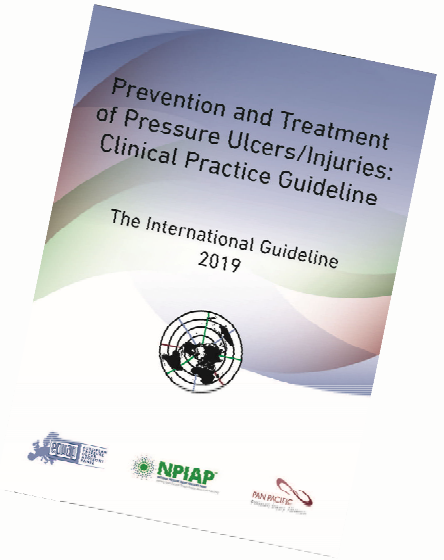
Nutritional Supplementation: Recommendations

› **4.8: Offer high calorie, high protein fortified foods and/or nutritional supplements in addition to the usual diet for adults who are at risk of developing a pressure injury and who are also malnourished or at risk of malnutrition, if nutritional requirements cannot be achieved by normal dietary intake**

- Strength of Evidence = C
- Strength of Recommendation = ↑



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Nutritional Supplementation: Recommendations

› **4.9: Offer high calorie, high protein nutritional supplements in addition to the usual diet for adults with a pressure injury who are malnourished or at risk for malnutrition, if nutritional requirements cannot be achieved by normal dietary intake**

- Strength of Evidence = B1
- Strength of Recommendation = ↑↑

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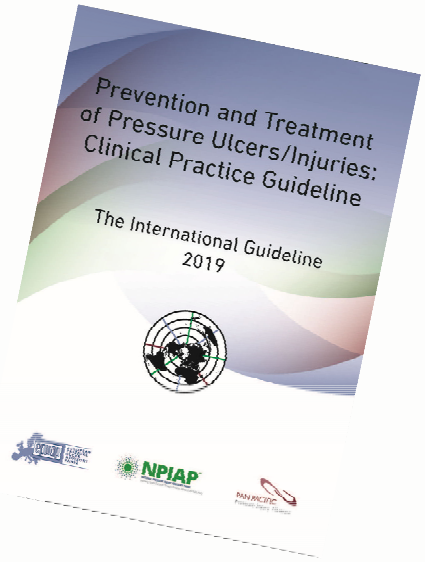
Nutritional Supplementation: Recommendations

› **4.10: Provide high-calorie, high-protein, arginine, zinc and antioxidant oral nutritional supplements or enteral formula for adults with a Category/Stage 2 or greater pressure injury who are malnourished or at risk for malnutrition**

- Strength of Evidence = B1
- Strength of Recommendation = ↑



› **Change from 2014**

› **Note that there are no specific nutritional supplementation recommendations for:**

- **Stage 1**
- **Deep Tissue Injury**
- **Mucosal Tissue Pressure Injury**

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Evidence on Nutritional Supplementation

ONS for adults at risk for developing PI

- Linking ONS to PI risk reduction is challenging due to multifactorial nature of PI risk reduction
- Research in this area- has mixed findings

› ONS for adults with PI

- Research conducted in hospitals, long term care and community care settings have consistently demonstrated significant improvement in healing of PI in individuals receiving high energy, high protein ONS in additional to a usual diet compared to control groups
- The research supporting the use of arginine and micronutrients (zinc and antioxidants Vitamins C, E) to high calorie, high protein nutritional supplementation via either ONS or tube-feeding is growing

Amano, et al *Am J Hosp Palliat Care*, 2013; 30(7); 730-733. Bauer, et al *JAMDA,*2013; 14(8):542-339.
Cereda, et al . *Ann Intern Med.* 2015; 162(3): 167-174. Cereda, et al *Clin Nutr.* 2017; 36(1): 246-252.
Hartgrink,H et al. *Clin Nutr*.1998; 17(6):287-292. Houwing,R. et al *Clin Nutr*, 2003; 22(4);401-405.
vanAndolt, et al. *Nutr* 2010;26(9):867-872.

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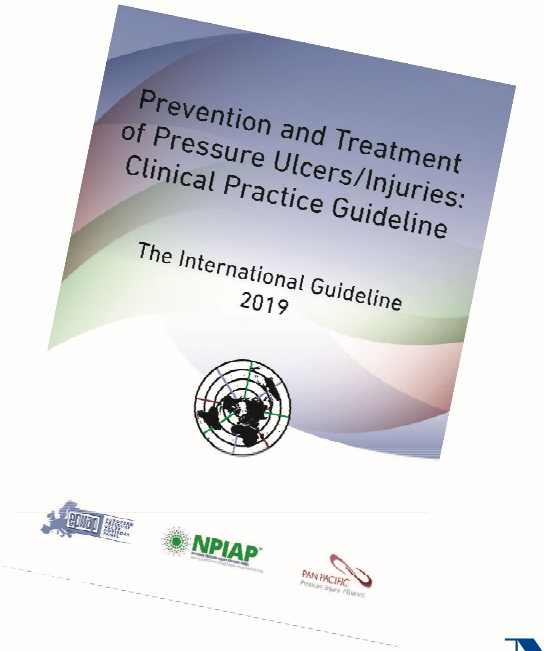
Artificial Nutrition: GPS

› **4.11: Discuss the benefits and harms of enteral or parenteral feeding to support overall health in light of preferences and goals of care with individuals at risk of pressure injury who cannot meet their nutritional requirements through oral intake despite nutritional intervention**

- Good Practice Statement



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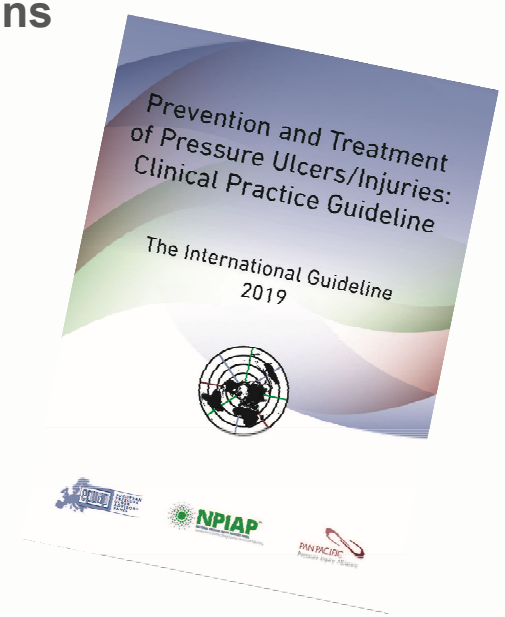
Artificial Nutrition: Recommendations

› **4.12: Discuss the benefits and harms of enteral or parenteral feeding to support pressure injury treatment in light of preferences and goals of care for individuals with pressure injury who cannot meet their nutritional requirements through oral intake despite nutritional interventions**

- Strength of Evidence = B1
- Strength of Recommendation = ↑



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2019 CPG & Nutrition Chapter

CPG

- Higher quality research
- Fewer recommendations than 2014 CPG
- Good practice statements include expert opinion and limited or inconclusive evidence
- Implementation considerations provide guidance to translate recommendations into practice

Nutrition Chapter

- Fewer nutrition recommendations than 2014 CPG
- Specific energy and protein requirements for prevention of pressure injuries (4.5, 4.6)
- Disease specific ONS for stages 2 and higher PI (4.10)

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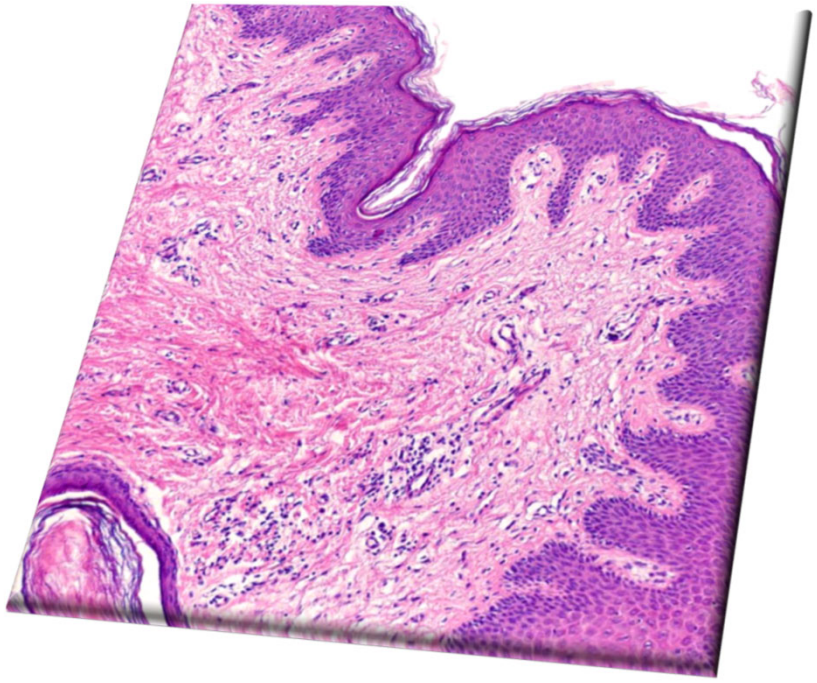
Core Content Areas

- Science of Skin & Nutrition Status
- Wounds & Nutrition in Healing
- Prevention & Treatment of Pressure Injuries
- **Case Study**



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Case Study : Lee

The neighbors notice that Lee has not walked her dog for several days.

- She usually walks her dog early in the mornings
- Lee is a retired teacher and has been fiercely independent
- She has no family living in the area; she never married and has no children

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Case Study : Lee

- The pharmacy delivery driver sees that she had several boxes on her porch
- The driver suspects something is wrong; Lee doesn't answer the doorbell but the driver hears a faint cry for help

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Case Study : Lee

- Emergency responders find Lee unable to get out of her vintage-style bathtub
- She doesn't know how long she has been in the tub
- Lee is transported to the hospital for evaluation; she is confused, anxious, and moaning in pain

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Case Study : Lee

Admitting Data

- 76 yr old, 62 inches, usual weight 170 lbs (BMI 31); admission weight 163 lbs (BMI 30)
- Health History: type 2 diabetes, dyslipidemia, gastroesophageal reflux disease, hypertension
- Medications: simvastatin, metformin, cimetidine, apixaban
- Skin assessment: open area on sacrum, deep marron area on left lateral ankle & heel

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Case Study : Lee

- Nutrition Hx: Lee eats mainly fruits, vegetables, legumes, and grain products.
- She eats eggs, chicken, and fish 3-4 x/wk.
- No problems chewing or swallowing
- No therapeutic diet

Estimated Intake	MSJ Energy	Protein Need (wt 78 kg)	2019 CPG Recommendation Energy	2019 CPG Recommendation Protein
Energy: 1000-1200 k Pro: 40-50 g/d	1500-1800 K	0.8 ~ 63 g pro 1.0 ~ 78 g pro	2340-2730 K	1.25 ~ 98 g pro 1.5 ~ 117 g pro

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Case Study : Lee

Measure	Values
Height inches/Weight pounds	62/163
Blood Pressure /Heart Rate	99/68;110
Sodium mEq/L	150
Chloride mEq/L	103
Glucose mg/dL (non-fasting)	199
Blood Urea Nitrogen mg/dL Creatinine mg/dL	45 1.3
Alkaline Phosphatase U Aspartate Aminotransferase U Alanine Aminotransferase U	129 32 39
Hemoglobin g/dL Hematocrit % Mean Corpuscular Volume fL	10 30% 110
Albumin g/dL	4.4
Hemoglobin A1c	8.5%

Do you see any signs of undernutrition or malnutrition?

Potential micronutrient deficiencies?

Is she at risk for poor wound healing?

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Case Study : Lee

Measure	Values
Height inches/Weight pounds	62/163
Blood Pressure /Heart Rate	99/68 ↓;110 ↑
Sodium mEq/L	150 ↑
Chloride mEq/L	103 ↑
Glucose mg/dL (non-fasting)	199 ↑
Blood Urea Nitrogen mg/dL Creatinine mg/dL	45 ↑ 1.3 ↑
Alkaline Phosphatase U Aspartate Aminotransferase U Alanine Aminotransferase U	129 32 39
Hemoglobin g/dL Hematocrit % Mean Corpuscular Volume fL	10 ↓ 30% ↓ 110 ↑
Albumin g/dL	4.4
Hemoglobin A1c	8.5% ↑

Do you see any signs of undernutrition or malnutrition? Low muscle function and weight may suggest sarcopenic obesity

Potential micronutrient deficiencies?
Nutritional anemias

Is she at risk for poor wound healing?
Yes; dehydrated, diabetes

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Case Study : Lee NFPE

I. Overall Appearance & Body Language	II. Vital Signs
Overweight Female, appears fatigued with halting speech	Oxygen saturation 95-97%
III. Skin, Nails, & Hair	**IV. Head: Eyes, Nose, & Mouth**
Dry skin & lips. Multiple bruises & skin tears on arms; erythema on lower Left leg with brown patches under skin related to falls & being stuck in tub. Pressure Injury (PrI) assessment: Stage 3 PrI sacrum 3.2 centimeter (cm) X 2.8 cm Unstageable PrI: medial Left ankle 1.5 cm X .75 cm Unstageable PrI: medial Left heel .75 cm X 2.5 cm	Weak masseter muscle with mild fat wasting in face. She is able to eat chopped foods and ground meats. Tongue is dark marron & sore to touch; appears slick.
V. Neck & Chest	**VI. Abdomen**
Mild-moderate loss of muscle or fat in upper torso	History GERD. No bloating or distension
VII. Musculoskeletal	**VIII. Criteria for Malnutrition**
Grip strength Right & Left hand markedly ↓; reports 3 falls at home in the last 2 months. She was not injured in falls, but needed assistance getting up.	

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Case Study : Lee

Goals for Care to Promote Pressure Injury (PI) Healing

- Team approach
- Address hydration status
- Chronic disease management
- Prevention strategies to reduce risk of additional PIs
- Treatment strategies to address current PIs
- Increase energy & protein intake in diet, offer high energy, high protein ONS with arginine, zinc and antioxidants

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Questions?

ACCESS CRITICAL CARE RESOURCES at
https://www.nestlemedicalhub.com/therapeutic-areas/critical-care/screening-tools

Visit MyCE at
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Offering CE to dietitians and nurses

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