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Nuts & Bolts of Pressure Injuries: 2019 International Nutrition Clinical Guidelines

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Disclosures

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- Executive Board of Director, National Pressure Injury Advisory Panel
- Assistant Chief, NFS, Southern Nevada Healthcare System, Las Vegas
- Lecturer, UMass, Amherst
- Co-chair of nutrition work group for international guidelines 2019
- Member of nutrition work group for international guidelines 2014
- **None pose a conflict of interest for this presentation**

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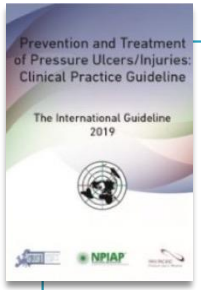
- President, MEP Healthcare Dietary Services, In.
- Past President NPIAP
- Member of nutrition work group for international guidelines 2009, 2014 and 2019
- Author: 2014 NPUAP/EPUAP/PPPIA white paper
- **No conflict of interest for this presentation**

Learning Objectives



Review the nutrition guidelines within the 2019 International EPUAP/NPIAP/PPPIA Prevention and Treatment of Pressure Ulcers/Injuries Clinical Practice Guideline

Highlight the key changes and updates from the 2014 guidelines (2nd edition), including a brief review of the evidence used to develop the 2019 international guidelines

Discuss how malnutrition impacts the risk of of developing a Pressure Injury and decreases the rate of wound healing

Demonstrate the Guidelines in action through a case report based on the nutrition care process that includes a review of nutrition assessment and relevant interventions

New Name and New Logo

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- The National Pressure Ulcer Advisory Panel (NPUAP) is now the **National Pressure Injury Advisory Panel** (NPIAP)

NPIAP℠
NATIONAL PRESSURE INJURY ADVISORY PANEL
Improving Patient Outcomes Through Education, Research and Public Policy

FOR IMMEDIATE RELEASE

- The patient is the center (green core)
  - The sunrays emanating from the core represent NPIAP's work in reaching out to improve outcomes for patients with education, research, and public policy

What's the Big Deal?

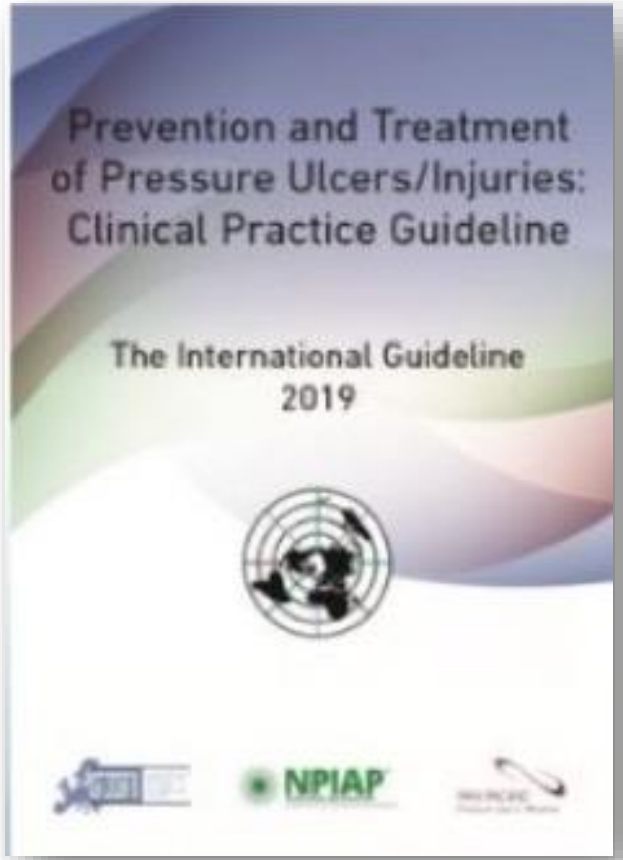
- Healthcare institutions must
  - Identify and quantify the risk for PI

Prevalence of PI

- International Prevalence Survey: Long term acute care 25.2%, acute care 9.7%, LTC-nursing home 11.8%, rehab centers 12%,
- 10 year prevalence study in the US
  - PI declined from 13.5% in 2006 to 9.3% in 2015
- 60,000 people die yearly

VanGilder C, Lachenbruch C, Algrim-Boyle C,Meyer S. The International Pressure Ulcer Prevalence Survey: 2006–2015: a 10-year pressure injury prevalence and demographic trend analysis by care setting. J Wound Ostomy Continence Nurs. 2017;44(1):20-28.
https://www.ncbi.nlm.nih.gov/pubmed/27977509

EPUAP/NPIAP/PPPIA Clinical Practice Guideline



- The Clinical Practice Guideline presents recommendations and summarizes the supporting evidence for pressure ulcer prevention and treatment

Printed copies of both the Quick Reference Guide and full 2019 International EPUAP/NPIAP/PPPIA Pressure Injury Prevention and Treatment Clinical Practice Guidelines can be obtained at https://guidelinesales.com/

Strength of the Evidence and Recommendations

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	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.

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.

Strength of the Evidence and Recommendations

	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 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.

EPUAP/NPIAP/PPPIA Clinical Practice Guideline
Nutrition Recommendations

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Nutrition Risk for Developing Pressure Injuries

What has been reaffirmed?

What is new?

Nutrition Risk for Developing Pressure Injuries
Increased Nutrient Needs

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Factors that may increase needs

- Underweight
- History of significant weight loss
- Prevention of further weight loss or regain of lost weight
- Presence of multiple wounds
- Pre-existing malnutrition
- COPD
- Cancer
- Acute spinal cord injury
- Traumatic brain injury
- Hemodialysis
- Suspected hyper-metabolism and other comorbidities

Nutrition Risk for Developing Pressure Injuries Malnutrition

	ASPEN/ Academy of Nutrition and Dietetics	GLIM
Unintended weight loss	X	X
Low BMI		X
Loss of muscle mass	X	X
Loss of subcutaneous fat	X	
Localized or generalized fluid accumulation	X	
Decreased functional status.	X	
Reduced Food Intake or Assimilation	X	X
Disease burden/Inflammation		X
	Two of the six characteristics must be present	One phenotype and one etiologic characteristics must be present

White, J.et al., *J Acad Nutr Diet* 2012, 112.5. 730-738

Nutrition Risk for Developing Pressure Injuries Malnutrition

"*Insufficient calories, protein, or other nutrients needed for tissue maintenance and repair*"

Cycle of Declining Nutritional Status

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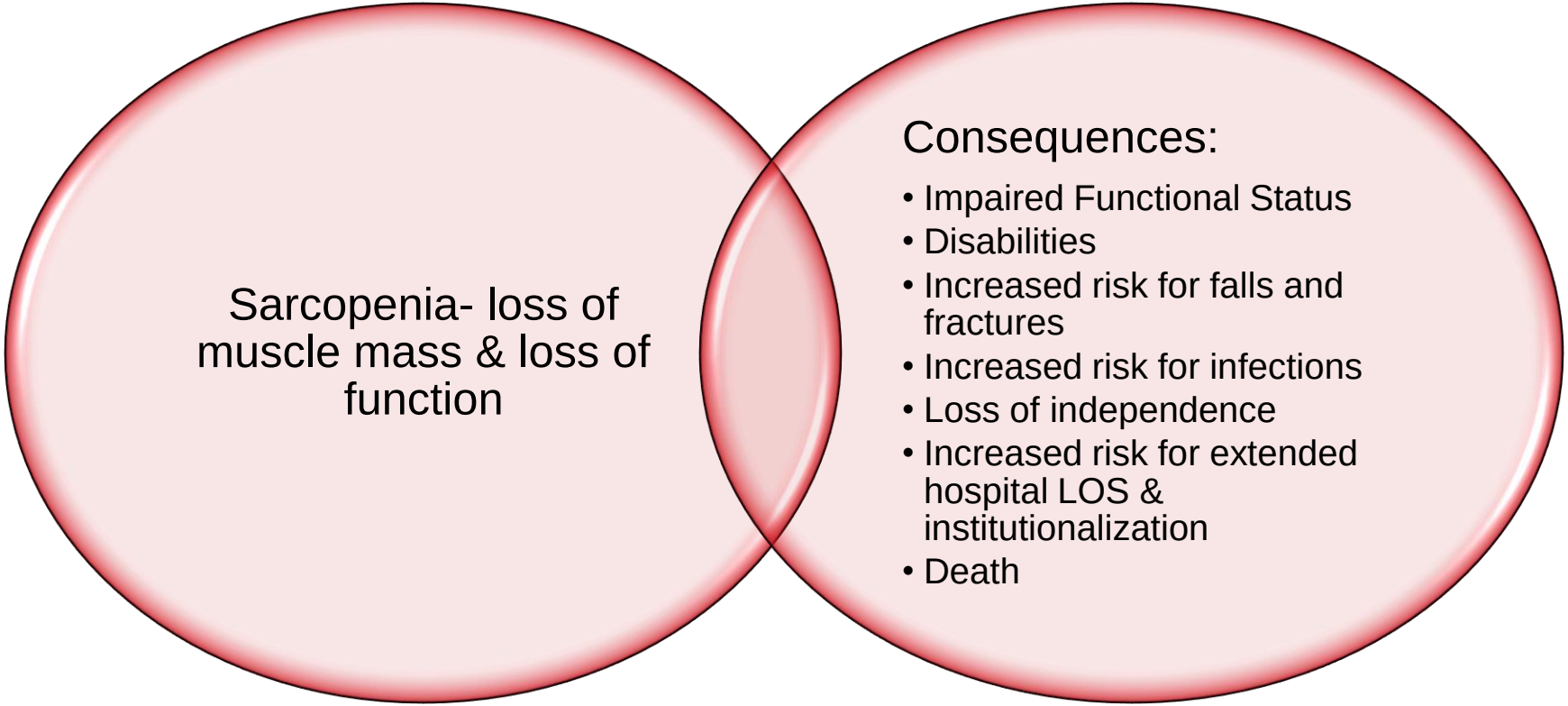
Reduced Appetite	Declining Functional Status	Impaired Nutrient Utilization	Financial
• ↓ Sense of taste & smell • Isolation • ↑ Inflammation due to disease	• ↓ Hearing & vision • ↓ Ability to shop & cook • Impaired chewing • Poor oral health • Sarcopenia	• Poor diet • Food-medication interactions • ↓ Organ function	• Limited access to grocery store • Food insecurity • ↑ Medical costs

Nutrition Risk for Developing Pressure Injuries



Cruz-Jentoft, 2010; Pichard, 2004; Reisinger, 2014; Wakabayshi, 2014.

Relationship Between Malnutrition & Sarcopenia

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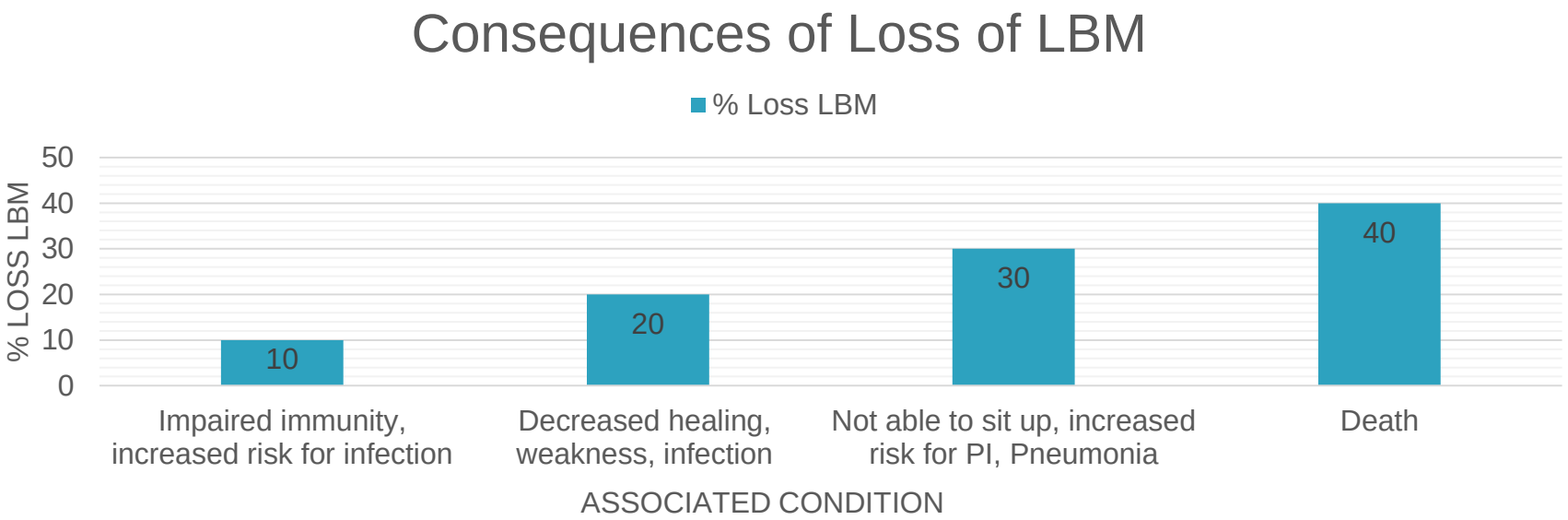
Sarcopenia: loss of muscle mass & loss of function



Nutrition Risk for Developing Pressure Injuries

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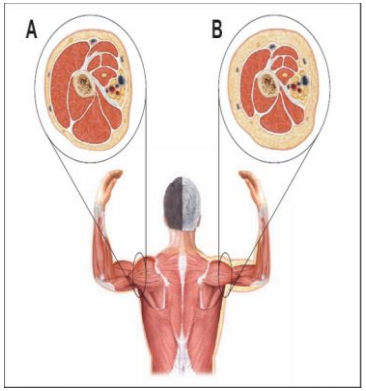
Sarcopenic Obesity

- Presence of both sarcopenia and obesity
  - Low muscle mass, decreased muscular strength, decreased physical performance
  - Combined with high fat mass
- Prevalence
  - As high as 20% in older adults



- Increased risk
  - Disability
  - Institutionalization
  - Mortality
- Greater risk for poor health related outcomes
  - Than either obesity or sarcopenia alone

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2019 EPUAP, NPIAP, PPPIA International Guideline

Nutrition Recommendation

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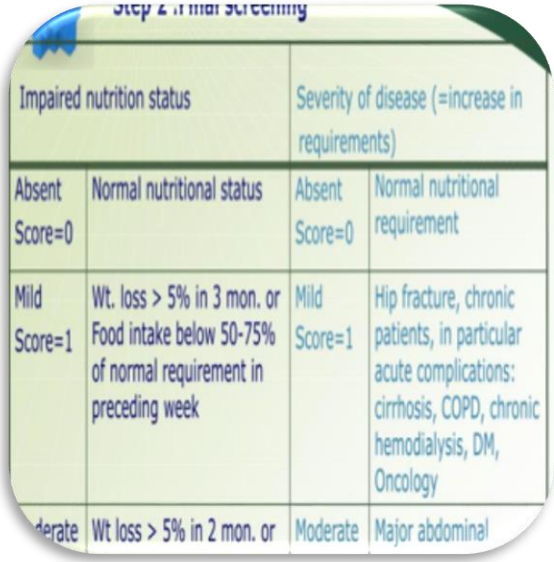
Nutrition Screening

2019

Screening

- The Academy of Nutrition and Dietetics
  - The process of identifying patients, clients, or groups who may have a nutrition diagnosis and benefit from nutrition assessment and intervention by a registered dietitian nutritionist (RDN)



Impaired nutrition status		Severity of disease (=increase in requirements)	
Absent Score=0	Normal nutritional status	Absent Score=0	Normal nutritional requirement
Mild Score=1	Wt. loss > 5% in 3 mon. or Food intake below 50-75% of normal requirement in preceding week	Mild Score=1	Hip fracture, chronic patients, in particular acute complications: cirrhosis, COPD, chronic hemodialysis, DM, Oncology
derate	Wt loss > 5% in 2 mon. or	Moderate	Major abdominal

Academy of Nutrition and Dietetics. Definition of Terms List. *Definition of Terms Workgroup, Quality Management Committee.* 2019. http://www.eatrightpro.org/~/media/eatrightpro files/practice/scope standards of practice/academydefinitionoftermslist.ashx

Audience Poll

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Time to Get Involved!

- Which screening tool is used in your facility?

Nutrition Screening: Recommendation

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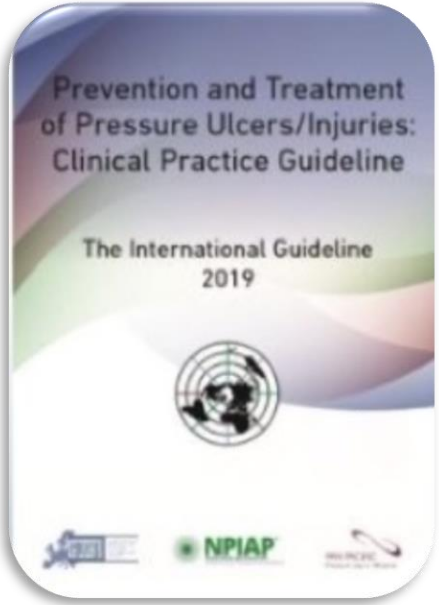
- **4.1: Conduct nutritional screening for individuals at risk for pressure ulcer/injury**
  - Strength of Evidence = B1
- Strength of Recommendation = ↑↑

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



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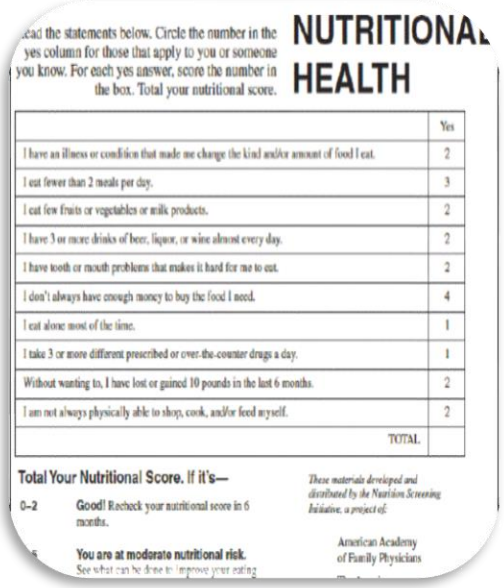
Validated Screens

- Validated for use with individuals with/at risk for PI
  - The Mini Nutritional Assessment full version (MNA®)
  - the Malnutrition Universal Screening Tool (MUST) screening
- Older Adults
  - The Nutrition Risk Screening (NRS) 2002
  - Rapid Screen
  - Short Nutrition Assessment Questionnaire (SNAQ)



ead the statements below. Circle the number in the yes column for those that apply to you or someone you know. For each yes answer, score the number in the box. Total your nutritional score.

NUTRITIONAL HEALTH

	Yes
I have an illness or condition that made me change the kind and/or amount of food I eat.	2
I eat fewer than 2 meals per day.	3
I eat few fruits or vegetables or milk products.	2
I have 3 or more drinks of beer, liquor, or wine almost every day.	2
I have tooth or mouth problems that makes it hard for me to eat.	2
I don't always have enough money to buy the food I need.	4
I eat alone most of the time.	1
I take 3 or more different prescribed or over-the-counter drugs a day.	1
Without wanting to, I have lost or gained 10 pounds in the last 6 months.	2
I am not always physically able to shop, cook, and/or feed myself.	2
TOTAL	

Total Your Nutritional Score. If it's—

0–2 **Good!** Recheck your nutritional score in 6 months.

You are at moderate nutritional risk.

These materials developed and distributed by the Nutrition Screening Initiative, a project of:

American Academy of Family Physicians

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Nutrition Assessment

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Nutrition Assessment

- The Academy of Nutrition and Dietetics
  - identifying and evaluating data needed to make decisions about a nutrition- related problem/diagnosis

Includes

- food/nutrition-related history
- biochemical data
- medical tests and procedures
- anthropometric measurements
- nutrition-focused physical findings
- client history

Academy of Nutrition and Dietetics. Definition of Terms List. *Definition of Terms Workgroup, Quality Management Committee.* 2019. http://www.eatrightpro.org/~/media/eatrightpro files/practice/scope standards of practice/academydefinitionoftermslist.ashx

Nutrition Assessment: Recommendation

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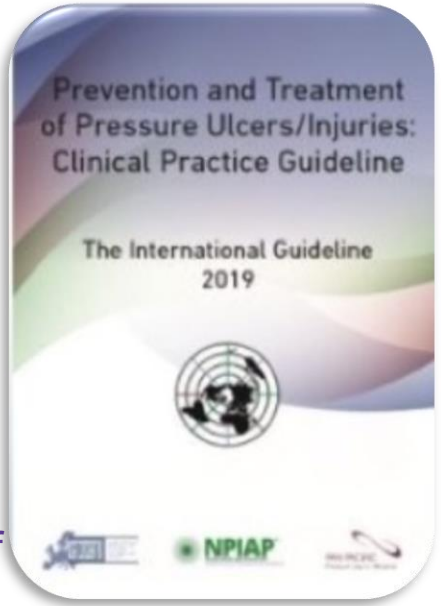
- 4.2: Conduct a comprehensive nutrition assessment for adults at risk of a pressure ulcer/injury who are screened to be at risk of malnutrition and for all adults with a pressure ulcer/injury.
  - Strength of Evidence = B2
  - Strength of Recommendation = ↑↑

- Not as prescriptive
  - Assess the weight status of each individual to determine weight history. Then identify significant weight loss (= 5% in 30 days or 10% in 180 days). (Strength of Evidence = C; Strength of Recommendation = 👍)
  - Assess the individual's ability to eat independently. (Strength of Evidence = C; Strength of Recommendation= 👍 👍)
  - Assess the adequacy of total nutrient intake (i.e., food, fluid, oral supplements, and enteral/parenteral feeds). (Strength of Evidence = C; Strength of Recommendation= 👍 👍)



Nutrition Assessment

- Assessment conducted by RDN
- Weight Hx
- Ability to feed self
- Laboratory results in context of diagnosis and prognosis

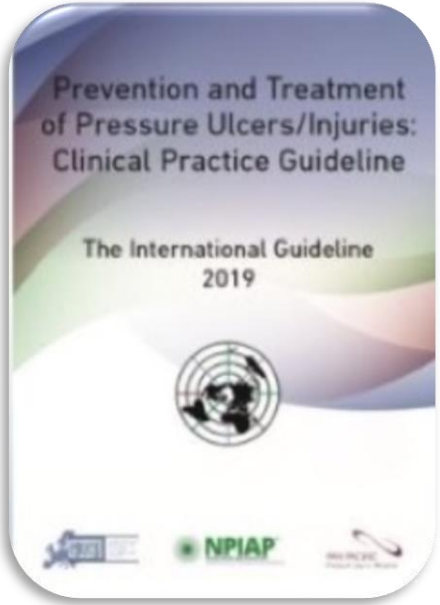
Nutrition Care Planning

2019

Nutrition Care Planning

- Care plan developed to meet the patient's desired outcomes
- Care plan should:
  - Individualized
  - Interdisciplinary
  - Revolve around the patient's goals and preferences
  - Include due date
  - Reviewed and updated frequently

Nutrition Care Planning: Recommendation



- 4.3: Develop and implement an individualized nutrition care plan for individuals with, or at risk of, a pressure ulcer/injury who are malnourished or who are at risk of malnutrition.
  - Strength of Evidence = B2
  - Strength of Recommendation = ↑↑

Not as prescriptive

- Develop an individualized nutrition care plan for individuals with or at risk of a pressure ulcer. (Strength of Evidence = C; Strength of Recommendation = ↑)
- Follow relevant and evidence-based guidelines on nutrition and hydration for individuals who exhibit nutritional risk and who are at risk of pressure ulcers or have an existing pressure ulcer. (Strength of Evidence = C; Strength of Recommendation = ↑)

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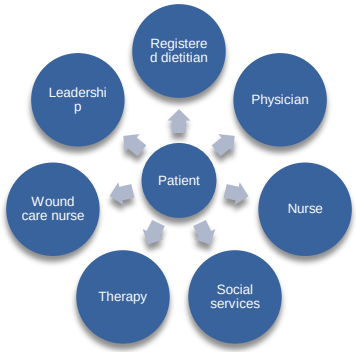
Nutrition Care Planning Evidence

- RDN with interprofessional team
  - Individualized interventions
  - based on the individual's nutritional needs
  - Feeding route
  - Clinical goals of care

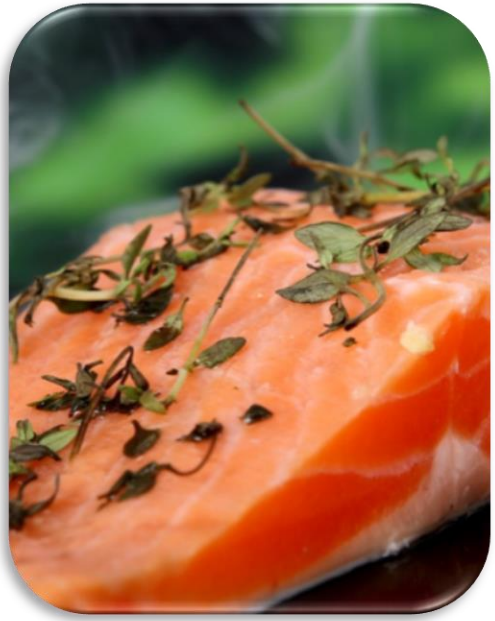
- Research 2013
  - Care plan for older adults with stage 2 PI associated with improved wound healing



Energy and Protein Intake for Individuals at Risk of Pressure Injuries

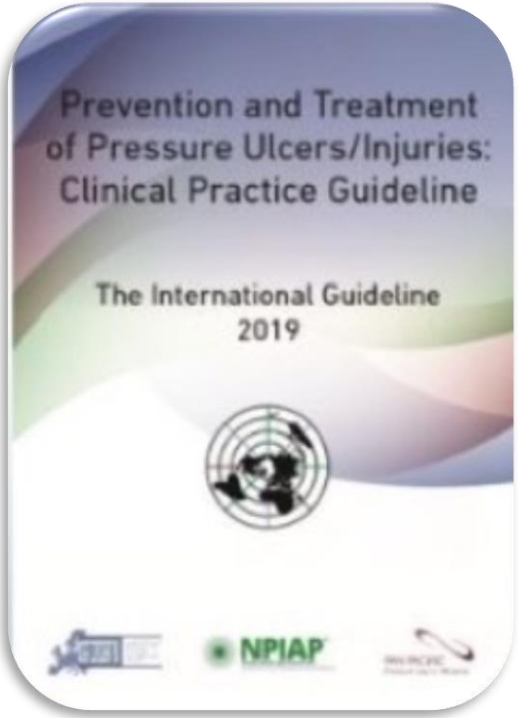
2019

Energy and Protein- At Risk for PI



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

Energy and Protein-At Risk for PI: Recommendations



- 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)

New Recommendation: 2019

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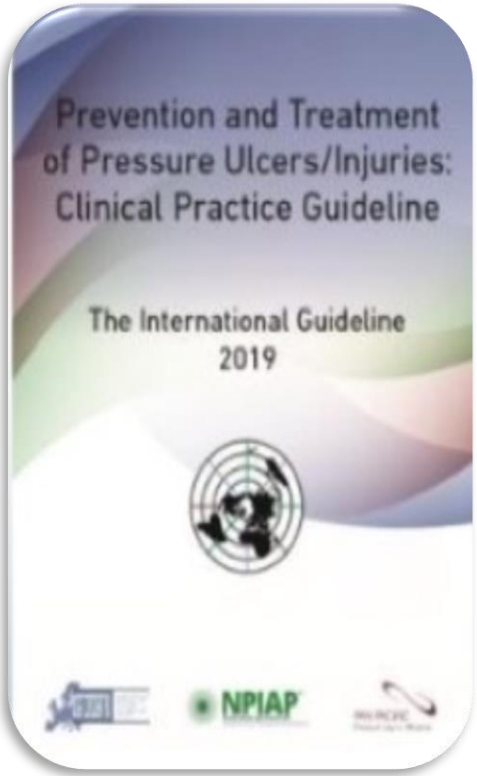
Energy and Protein-At Risk for PI Discussion

- Research examining the benefits of providing increased energy and 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

Energy and Protein for Individuals with Pressure Injuries 2019

Energy and Protein Intake: 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 ulcer/injury who are malnourished or at risk of malnutrition
  - Strength of Evidence = B1
  - Strength of Recommendation = ↑↑

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Energy and Protein Intake: PI Present Evidence Discussion

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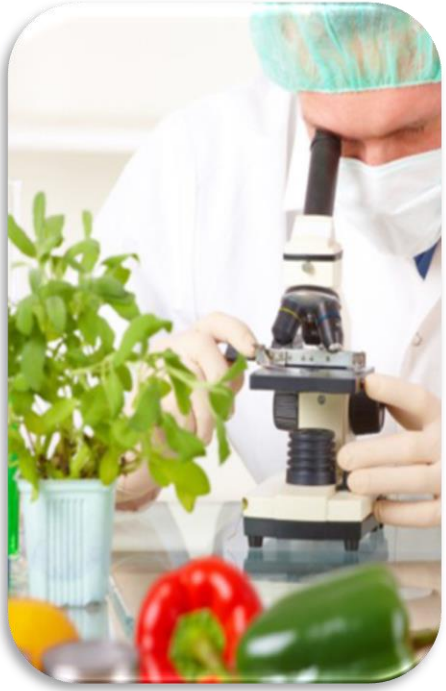

- Research in the past three decades
  - Demonstrate the interrelationship between meeting energy and protein requirements
    - Breslow-1993-individuals receiving higher protein, higher energy diets achieved statistically significantly greater reductions in pressure injury surface area compared to baseline than did individuals receiving a standard diet ($p < 0.02$)
    - Lizaka-2014-Energy and protein intake was associated with wound healing for deep pressure injuries
    - Lee- 2006- Providing 1.5 g/kg body weight/day (total protein 45 g) compared to placebo resulted in a 60% reduction in PUSH scores after eight weeks of treatment compared to a 48% reduction in the control group ($p < 0.05$)

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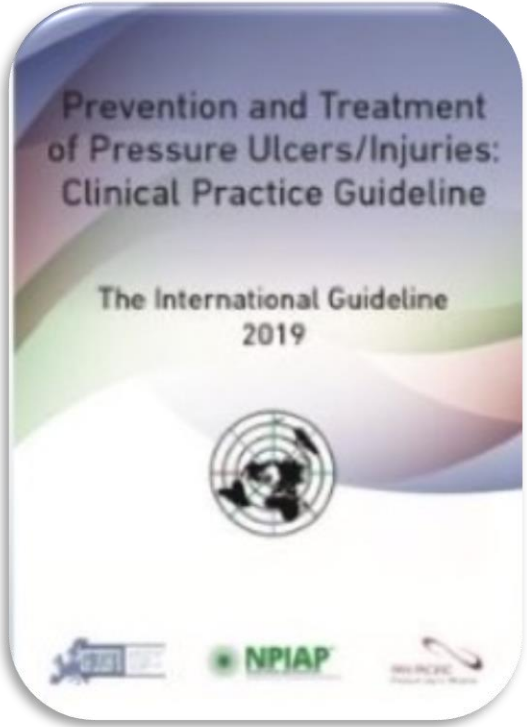
Nutritional Supplementation

2019

Oral Nutritional Supplements

- Oral nutritional supplements (ONS) and fortified food can be used to reverse unintended weight loss and malnutrition
  - Unable to consume estimated requirements by PO food intake
- ONS
  - Products that supply nutrients including protein, carbohydrates, fat, vitamins, minerals, and/or amino acids
  - Read labels!

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 ulcer/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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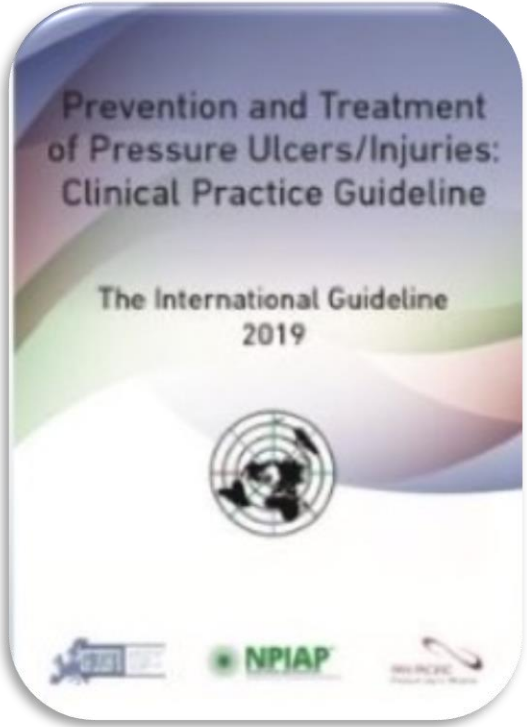
Nutritional Supplementation Recommendations



- 4.9: Offer high calorie, high protein nutritional supplements in addition to the usual diet for adults with a pressure ulcer/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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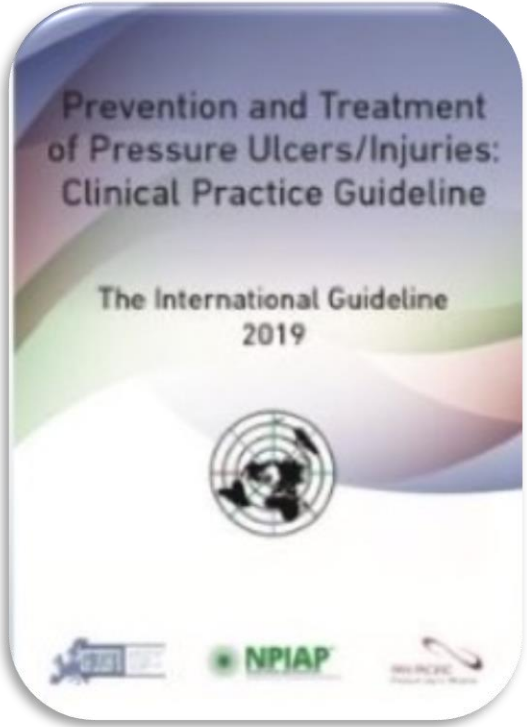
Nutritional Supplementation Recommendations



- 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 ulcer/injury who are malnourished or at risk for malnutrition
  - Strength of Evidence = B1
  - Strength of Recommendation = ↑

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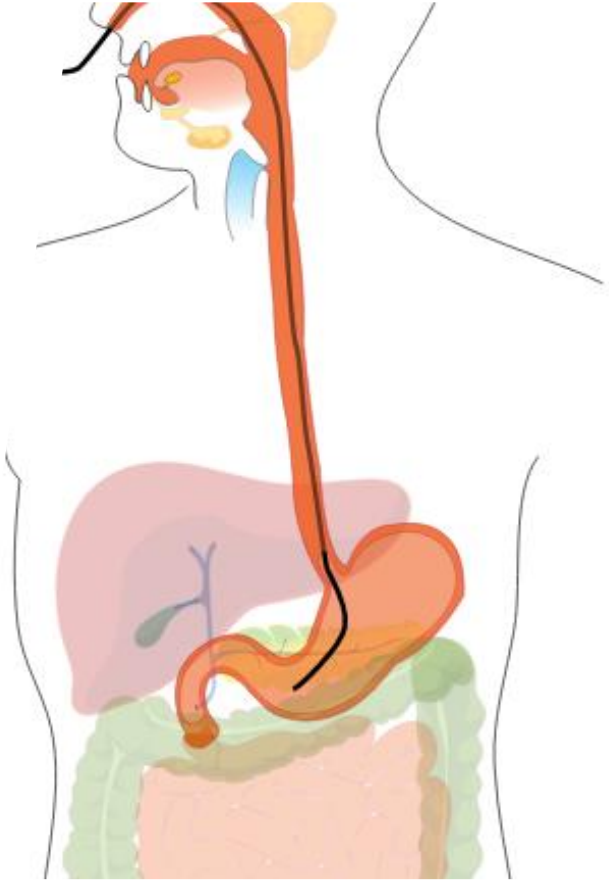
Nutritional Supplementation Evidence

- ONS for adults at risk for developing PI
  - PI risk reduction is multifactorial in nature
    - Linking ONS to PI risk reduction is challenging
  - Research in this area- has mixed findings
    - There is uncertainty about the efficacy of supplementation in the prevention of PI

Nutritional Supplementation Evidence

ONS for adults with PI

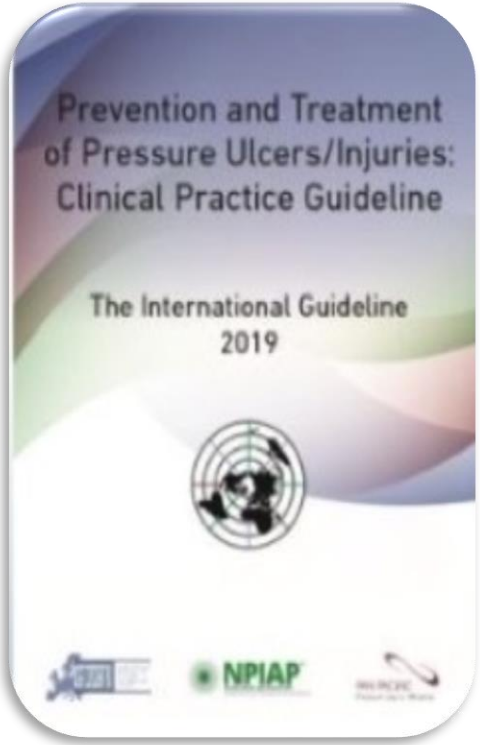
- Evidence on the efficacy of extra protein and energy provision in the healing of pressure injuries is substantial.
- Research conducted in hospitals, long term care and community care settings have consistently demonstrated significant improvement in healing of pressure injuries in individuals receiving 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) to high calorie, high protein nutritional supplementation via either ONS or tube-feeding is growing



Artificial Nutrition: Enteral and Parenteral Feeding

2019

Nutritional Enteral/Parenteral Recommendations



- 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 ulcer/injury who cannot meet their nutritional requirements through oral intake despite nutritional intervention
  - Good Practice Statement

- 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 ulcer/injury who cannot meet their nutritional requirements through oral intake despite nutritional interventions
  - Strength of Evidence = B1
  - Strength of Recommendation = ↑

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Artificial Nutrition Discussion

- If oral intake is inadequate, enteral or parenteral nutrition may be recommended if consistent with the individual's wishes
- Enteral (tube) feeding is the preferred route if the gastrointestinal tract is functioning
- The risks and benefits of nutrition support should be discussed with the individual and informal caregivers early on and should reflect the individual's preferences and goals for care

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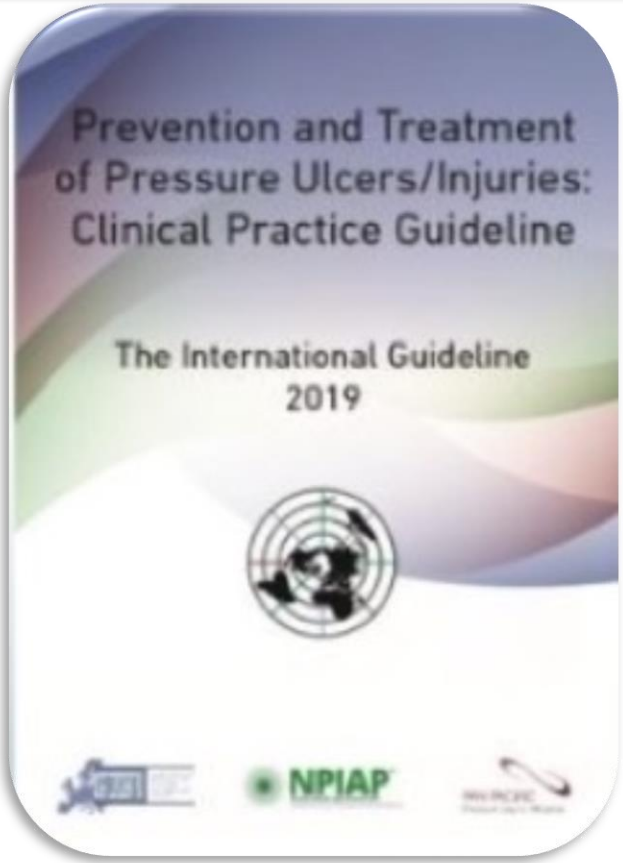
Hydration

2019

Hydration

- Water serves as the solvent for vitamins, minerals, glucose and other nutrients
  - Water is also needed to transport nutrients through the body, and to eliminate waste products
  - In healthy individuals who are adequately hydrated, water released from food and metabolism accounts for 20% or more of total water intake
  - Total water needs include the water content of food
  - ONS and enteral feedings normally contain 75% water from its total volume
    - Review labels

Hydration Recommendations



- 4.13: Provide and encourage adequate water intake for hydration for an individual with or at risk of a pressure ulcer/injury, when compatible with goals of care and clinical condition
  - Good Practice Statement

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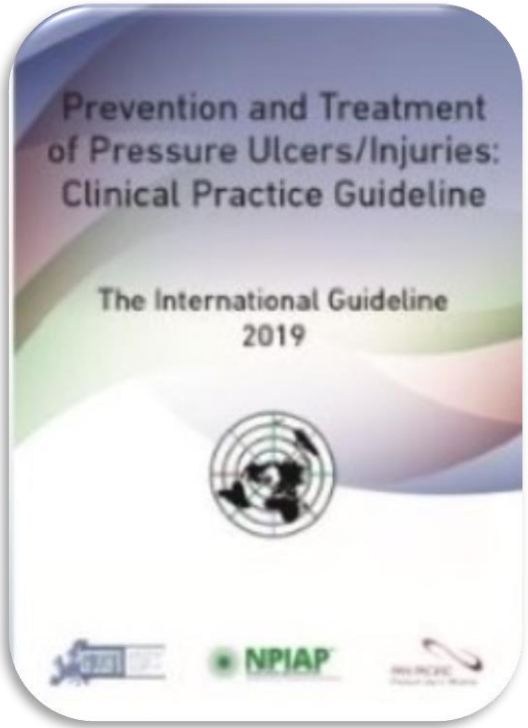
Nutrition Management in Neonates and Children

2019

Nutrition Management in Neonates and Children Recommendations



- 4.14: Conduct age appropriate nutritional screening and assessment for neonates and children at risk of pressure injuries
  - Good Practice Statement

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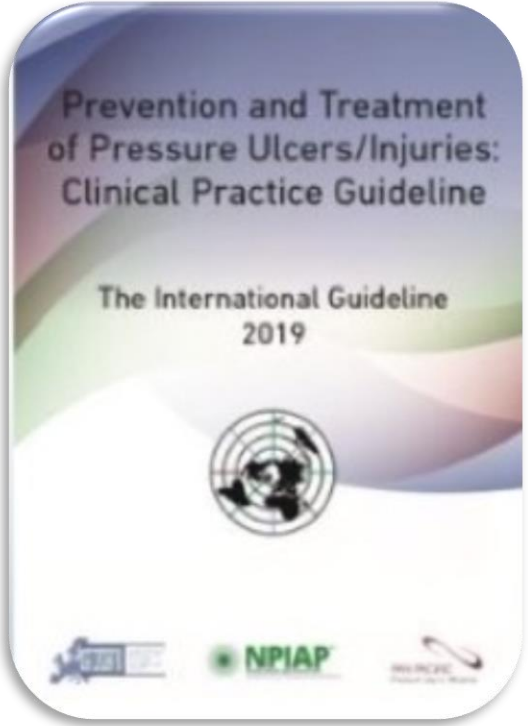
Nutrition Management in Neonates and Children Recommendations



- 4.15: For neonates and children with or at risk of pressure injuries who have inadequate oral intake, consider fortified foods, age appropriate nutritional supplements, or enteral or parenteral nutritional support.

- Good Practice Statement

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Let's Put It All Together

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Case Study

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- Jane admitted to LTC following hip fx
- Fell at home,& on floor for hrs
- Additional dx, arthritis, DM
- Admission wt. 150 lbs., ht. 5 ft.2
- 8 lbs. decline in 3 wk due to poor intake
- Regular diet
- Meds: hypoglycemic, NSAID
- Poor endurance in therapy, poor hand grip strength
- Wheel chair most of day
- Stage 3 hip measuring 2.5 cm X 3.0 cm
- Braden sub-score= 2
- MNA Score= 5
- RDN interviews Jane & learns she ate microwave meals and snakes at home
- Labs: Hgb A1C 8%, FBS 195 mg/dl
- Meal intake records indicate 50% average eaten
- Current weight is 5% decline since admission
- No edema or meds to cause wt. decline
- Slow PI healing noted on medical record

MT's Typical Daily Menu

Case Study

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Breakfast

- 1 eggs/bacon slices
- 1 toast slices/jelly
- 8 oz. milk
- Coffee
- Total Protein: 18 grams

Noon

- Meat -3 oz.
- 1/2 cup Potatoes
- 12/veg
- Roll/margarine
- 2 cookies
- Coffee
- Total Protein: 27 grams

Supper

- Meat Sandwich (2 oz)
- 1 cup of veg. soup
- Milk 8oz.
- Total Protein: 28 grams

Snack

- 1/2c pudding
- Juice
- Total Protein: 6 grams

- Based on guidelines protein needs are 81-97 grams/day
- Is Jane consuming adequate protein?
- How would you define Jane's nutritional status?

Eats 50% of meals= 39 gr.

MNT Guide to Manage Pressure Injuries

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Implement PI Protocol/POC

- Calories: 30-35 kcalories/kg/body weight (adjust per clinical condition)
- Protein: 1.2-1.5 gms/kg/body weight (adjust per clinical condition)
- Fluid: Provide & encourage good hydration & monitor status
- Provide high calorie ,high protein ONS or high calorie, high protein ONS fortified with arginine ,zinc & anti-oxidants between meals
- Liberalize restrictive diets
- Offer vitamin/mineral supplement with 100% of RDI's if intake is poor

Monitor per Facility Policy

- Skin condition and/or wound status per facility policy
- Acceptance and tolerance of ONS
- Caloric, protein, fluid adequacy compared to estimated requirement
- Weight status
- Laboratory values, if applicable
- Ability to meet estimated needs orally
- Oral intake and if inadequate, consider enteral feeding consistent with individual's wishes

Desired Outcome

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Intact skin or progress toward healing

Improved and/or stable nutritional status

Intake meets estimated caloric, protein and fluid requirements

Effectiveness of intervention in collaboration with interdisciplinary team and adjust, if condition changes, improves or declines

Document and re-assess per policy

Practice Pearls

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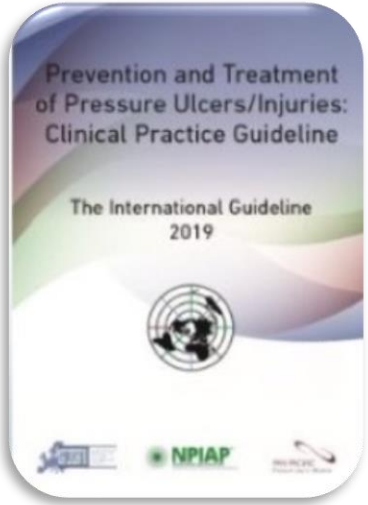
Use	Use a validated nutrition screening tool to identify nutritional status of individuals at risk of PI or with PIs
Refer	Refer individuals at risk of PI or with PIs to the RDN for a nutrition assessment
Collaborate	Collaborate with the RDN and interdisciplinary team to determine a patient-centered nutrition plan
Encourage	Encourage consumption of a balanced diet based on the individuals' assessed caloric, protein and hydration requirements

Practice Pearls

Provide	Provide enriched foods and/or high calorie, high protein ONS between meals if needed to achieve assessed requirements
Consider	Consider ONS enriched with arginine, zinc, and antioxidant for individuals with PIs who are at risk for or malnourished as needed to meet their assessed nutritional requirements.
Offer	Offer nutrition support (EN or PN) for individuals who are unable to consume adequate intake. Note, this must be compatible with individual's goals
Provide	Provide palliative/hospice care based on individual's wishes

Resources

- NPIAP https://npuap.org/
- 2019 International EPUAP/NPIAP/PPPIA Pressure Injury Prevention and Treatment Clinical Practice Guidelines
  - http://internationalguideline.com/
- Printed copies of the full 2019 International EPUAP/NPIAP/PPPIA Pressure Injury Prevention and Treatment Clinical Practice Guidelines
  - https://guidelinesales.com/
- Guidelines Quick Reference Guide
  - https://guidelinesales.com/



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Resources

- NPIAP https://npuap.org/
- NPUAP Pressure Injury Stages
  - Updated 2016
  - https://npuap.org/page/resources
- Pressure Injury Staging Illustrations
  - https://npuap.org/page/resources
- Posthauer ME, Banks M, Dorner B, Schols JMGA. The Role of Nutrition for Pressure Ulcer Management National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel, and Pan Pacific Pressure Injury Alliance White Paper. https://journals.lww.com/aswcjournal/Fulltext/2015/04000/The_Role_of_Nutrition_for_Pressure_Ulcer.7.aspx

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3. Evidence-based recommendations for optimal dietary protein intake in older people: a position paper from the PORT-AGE study group. J Am Med Dir Assoc 2013;14(8):542-59. http://www.sciencedirect.com/science/article/pii/S152586101300326 5. Accessed June 10, 2016.
4. 2014 National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury Alliance. Prevention and treatment of pressure ulcers: clinical practice guideline. Haesler E, ed. Cambridge Media: Osborne Park, Western Australia.

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3. van Anholt RD, Sobotka L, Meijer EP, et al. Specific nutritional support accelerates pressure ulcer healing and reduces wound care intensity in non-malnourished patients. Nutrition 2010;26(9):867-72. http://www.sciencedirect.com/science/article/pii/S089990071000167X.
4. Cereda E, Klersy C, Serioli M, et al.; Oligo Element Sore Trial Study Group. A nutritional formula enriched with arginine, zinc, and antioxidants for the healing of pressure ulcers: a randomized, controlled trial. Ann Intern Med 2015;162(3):167-74.

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