Nutrition Solutions: Fuel to Heal

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Objectives

1. Examine the role of malnutrition in pressure injury prevention and healing
2. Discuss the evidence based nutrition recommendations and practical interventions for pressure injury healing
3. Implement nutrition quality measures addressing the IMPACT ACT's skin integrity Quality Measure Domain

Impact Act

Oct. 2017 (FY 2017)	Confidential feedback provided on previous year's report	
Oct. 2017 (FY 2019)	Standard assessment date required	Public quality data available Penalties for not reporting
Oct.2021 (FY 2022)	CMS & MedPac reports on PAC prospective payment	Study on hospital data

Improving Medicare Post-Acute Care Transformation Act of 2014 (IMPACT)

- **Goal:** reform post acute care (PAC) payments & reimbursement while ensuring continued beneficiary access to the most appropriate setting of care
- **Measure Domain**: skin integrity & changes in skin integrity
- **Outcome Measure:** Percent of residents or patients with pressure ulcers that are new or worsened(short stay).
- Replaced with Changes in Skin integrity Post-Acute Care: Pressure Ulcer/Injury
- **Post Acute Care** setting adopted
    - Inpatient rehabilitation facility
    - Long-term Care Hospital
    - Skilled Nursing Facility
    - Home Health Agency

CMS Quality Strategy framed with aims of National Quality Strategy

- **Better Care:** Improve QOC making it patient-centered, reliable, accessible, and safe.
- **Healthy People, Healthy Communities:** Improve health of US, support proven interventions addressing behavioral, social,& environmental determinants of health.
- **Affordable Care**: Reduce cost of quality healthcare for individuals, families, employers, and government.

Rationale for Pressure Injury Quality Measure

- Linked to malnutrition
- Nutrition interventions should be part of prevention & healing strategy for QMD
- Increases mortality in elderly, 70% of PI occur in adults > 70
- Longer hospital stays ⇧cost of care
- Causes discomfort & pain
- Can lead to septicemia & osteomyelitis
- PI are a high cost, adverse condition across all settings
- Burden of litigation associated with pressure injuries

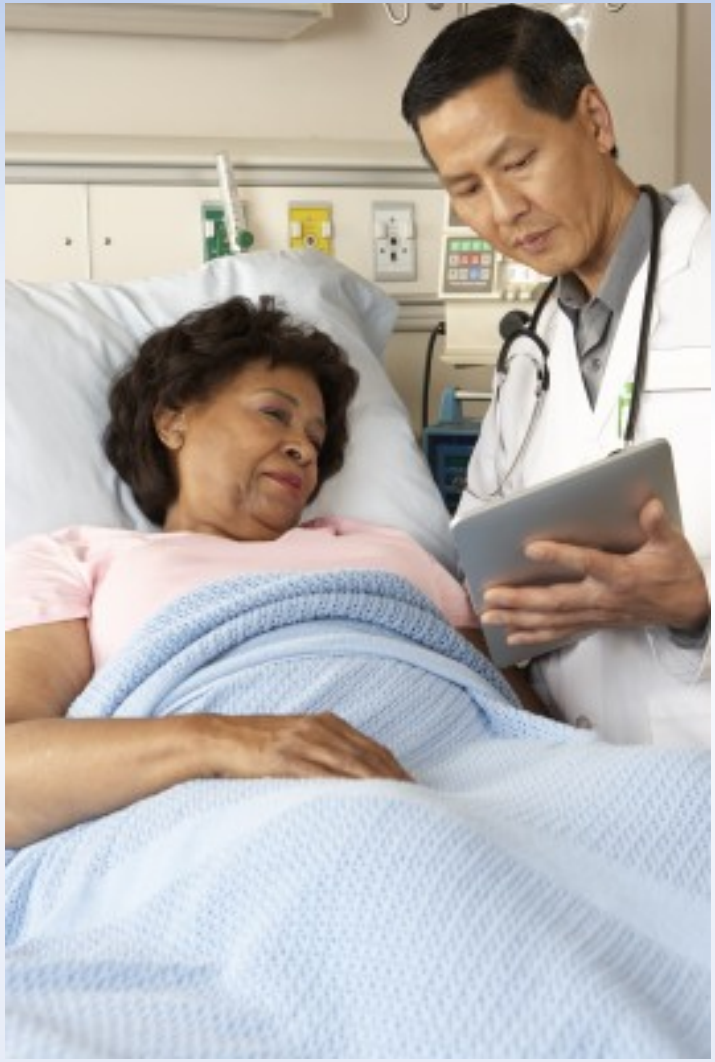
CMS Inaugural Release Oct. 24th

- Skilled Nursing Facility (SNF) Quality Reporting Program (QRP) Measure Name and Description
- National Rate of Quality Measure Performance
- Minimum Data Set (MDS)-based Measures

https://www.cms.gov/newsroom/fact-sheets/skilled-nursing-facility-snf-quality-reporting-program-qrp-data-nursing-home-compare

- *Percent of Residents or Patients in a SNF that develop new or worsened pressure ulcers (National Quality Forum #0678)*
- Percent of patients that developed new or worsening pressure ulcers during their stay in an SNF=1.7%

Malnutrition



- **Increases morbidity and mortality.**
- **Decreases function and quality of life.**
- **Increases frequency and length of hospital stay.**
- **Increases health care costs.**

White, 2012 J Acad Nutr Diet. 2012 112(5): 730-738.

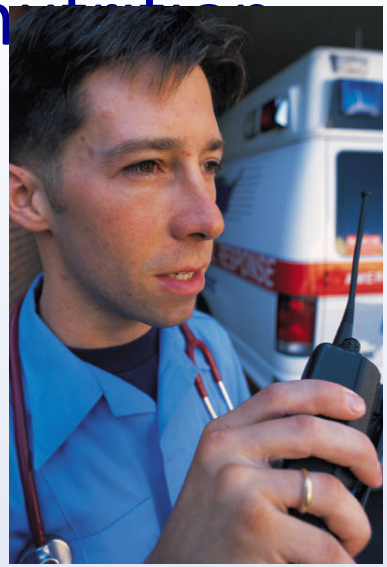
Malnutrition: problem across all settings

- Acute Care-20-50%
- LTC-20% have some form prevalence range 1.5-66.5%
- Outpatient/home care 13-30% malnourished
- Risk is higher in older adults who also have more PIs

AHRQ Report

- Protein calorie malnutrition most common (PCM)
- 2013- 1.95 million hospital stays r/t malnutrition
- 63.9% categorized as PCM
- 21.6% malnourished due to weight loss or failure to thrive

- Cost per per readmission $16,900/PCM: 34% higher cost than readmission w/o maln



Inflammation and Malnutrition

Inflammation (d/t infection, injury, surgery, etc.): an important underlying factor that increases risk for malnutrition.

May contribute to suboptimal response to nutrition intervention and increased risk of mortality

White J, *J Acad Nutr Diet* 2012:112:730-730

Etiology-Based Malnutrition Definitions

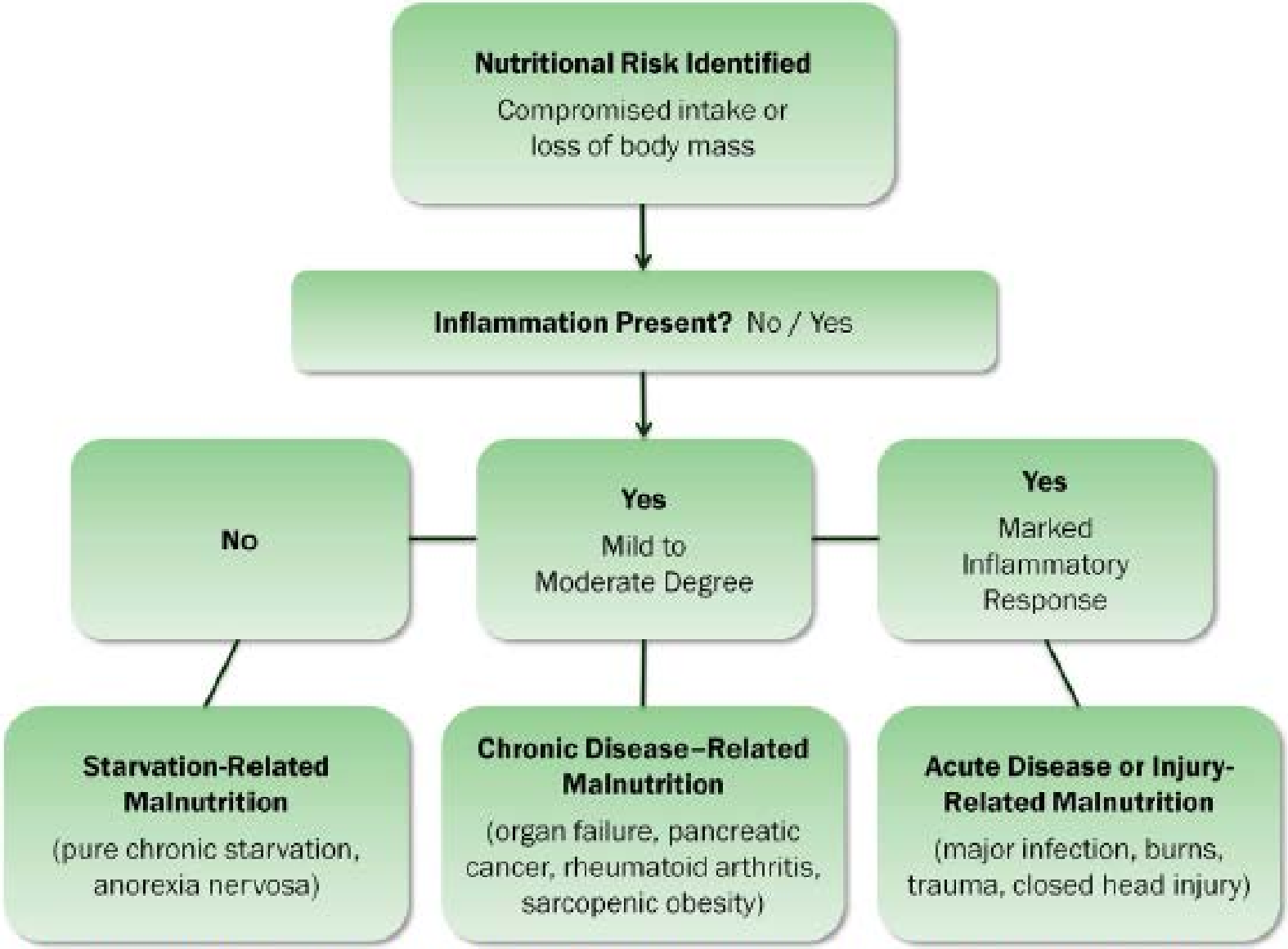


Figure. Etiology-Based Malnutrition Definitions. Adapted with permission from reference (8): Jensen GL, Bistrian B, Roubenoff R, Heimburger DC. Malnutrition syndromes: A conundrum vs. continuum. *JPEN J Parenter Enteral Nutr.* 2009;33(6):710-716.

Diagnosing Malnutrition

Identification of ≥2 of the following characteristics:

1. Insufficient energy intake
2. Weight loss
3. Loss of muscle mass
4. Loss of subcutaneous fat
5. Localized or generalized fluid accumulation that may sometimes mask weight loss
6. Diminished functional status as measured by hand grip strength (strong research; cost effective)

White J, *J Acad Nutr Diet* 2012:112:730-730

Case Study: Acute Injury-Related Malnutrition

Prior to Hospitalization

- 45 year old w/o history of malnutrition
- Weight 170#
- Admitted for major surgery

5 Days Post-Surgery

- Remains NPO > 5 days with IV for hydration
- Current weight 152# (↓ 10%)
- Develops a stage 4 pressure injury on coccyx

Case Study: Chronic Disease Related Malnutrition

Prior LTC Admission

- 88 year old/severe arthritis
- 110# admission weight
- Admitted due to functional decline, sits in W/C most of the day
- Difficulty preparing meals
- Appetite is fair

30 Days Post Admission

- Increased difficulty with ADLs (including eating)
- 6% weight decline in 30 days
- Consumes < 75 % of meals
- Developed Stage 2 pressure injury

What about Labs?

No lab test can specifically determine an individual's nutritional status.

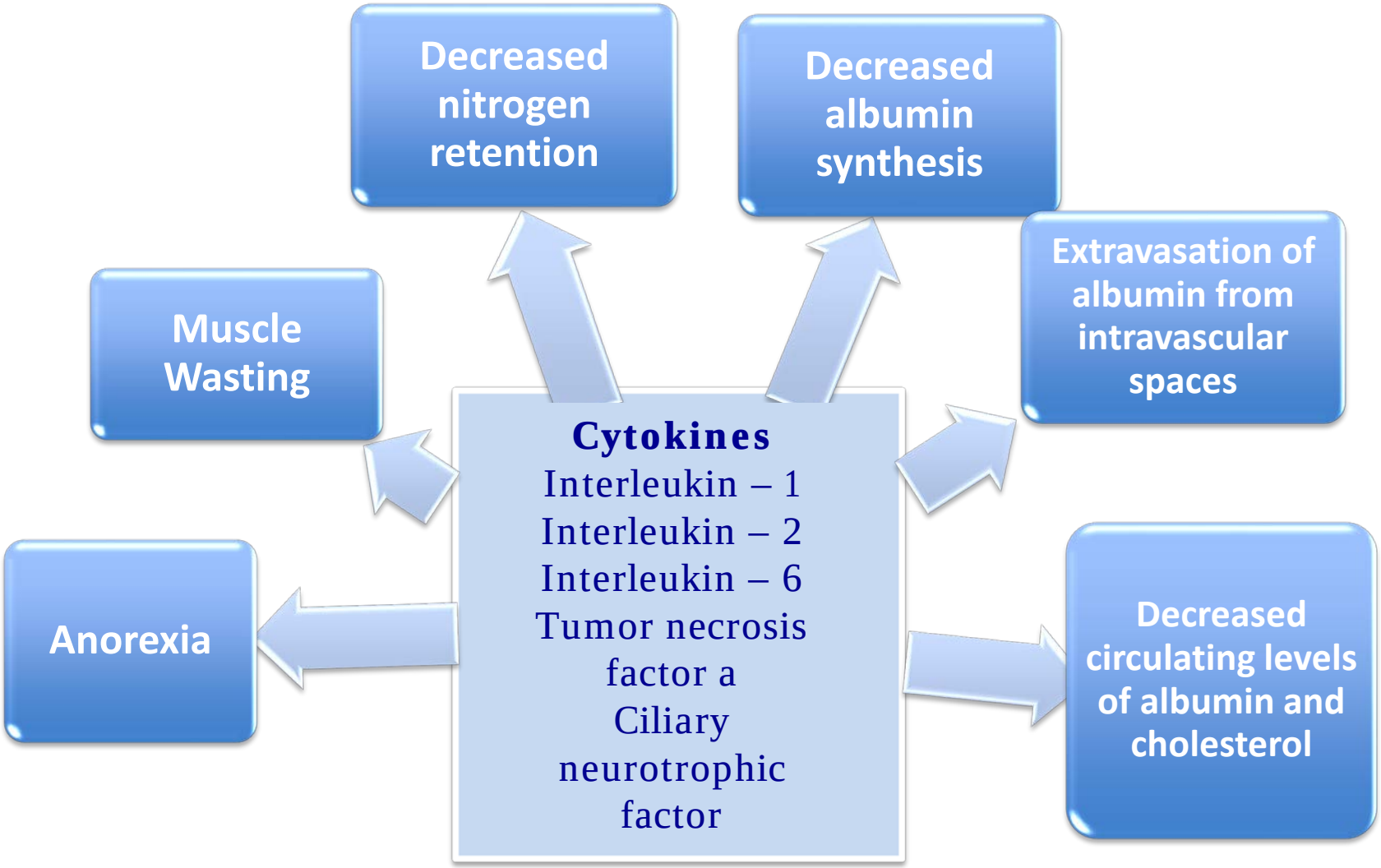
- Serum protein levels may be affected by metabolic stress, inflammation, renal function, hydration and other factors.

What about labs to diagnose malnutrition?

- Not recommending any specific Inflammatory markers for diagnosing malnutrition at this time
- Inflammatory biomarkers C-reactive protein and other acute phase reactants were excluded due to no conclusive relationship to nutritional status

Inflammation and Stress→

Release of Cytokines



Source: Council for Nutrition Clinical Strategies in LTC

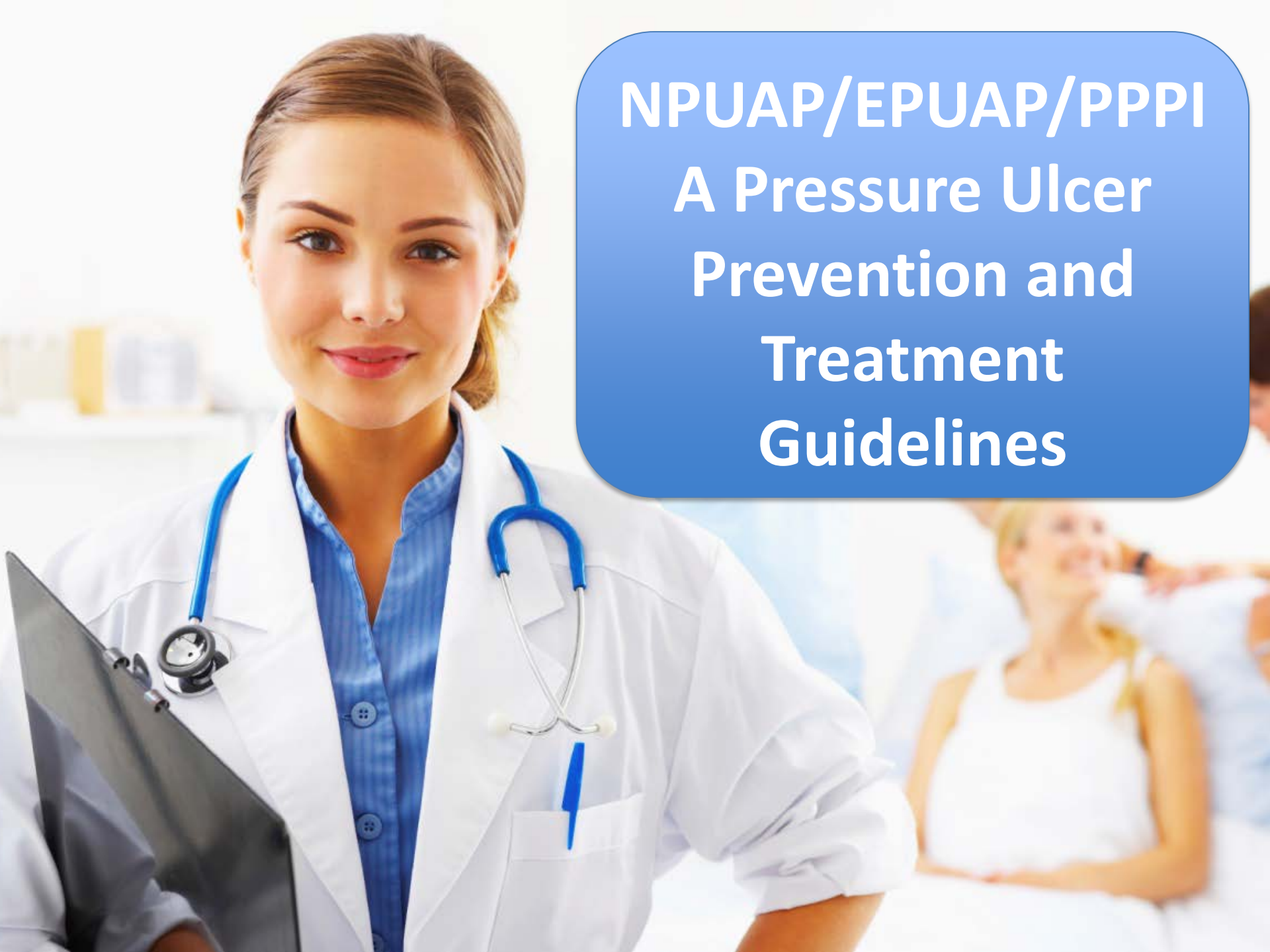
Malnutrition and Pressure Injuries

Fry
- Pre-existing malnutrition/weight loss increased the odds of developing a PU 3.8 times. (2010)

Banks
- Australia, odds ration of having a pressure ulcer are higher with malnutrition in acute and LTC. (2010)

Iizaka
- Home care study in Japan: ≥ 65, rate of malnutrition 58.7% with pressure ulcers compared to 32.6% without them. (2010)

Rasero
- Acute care, LTC & home care study of older adults,88% at PI risk had inadequate nutrition. (2013)



NPUAP/EPUAP/PPPI A Pressure Ulcer Prevention and Treatment Guidelines

Nutrition Screening, Assessment, and Care Planning

Individualized Nutrition Care

- Individualized care plan should focus on:
  - improving and/or maintaining overall nutritional status
  - acceptance of nutrition interventions
  - clinical outcomes

Nutrition Screening

Screen nutritional status for each individual at risk of or with a pressure ulcer

Use a valid and reliable nutrition screening tool to determine nutritional risk.

Refer individuals screened to be at risk of malnutrition and individuals with an existing pressure ulcer to a registered dietitian or an interprofessional nutrition team for a comprehensive nutrition assessment.

Validated Screening Tools

MST

Malnutrition Valid and reliable for use in ***acute care and ambulatory care*** to identify malnutrition

(Ferguson, M et al. 1999)

MNA

Mini-Nutritional Assessment

Validated in *individuals/ Pus Langkamp-Henken et al.(2005)*

Validated and easy to use in older adults

(Paudlia 2012)

MUST

Malnutrition Universal Screening Tool

To identify risk of undernutrition (Poulia et al.2012)

Validated for use in ***older adults admitted to acute care***

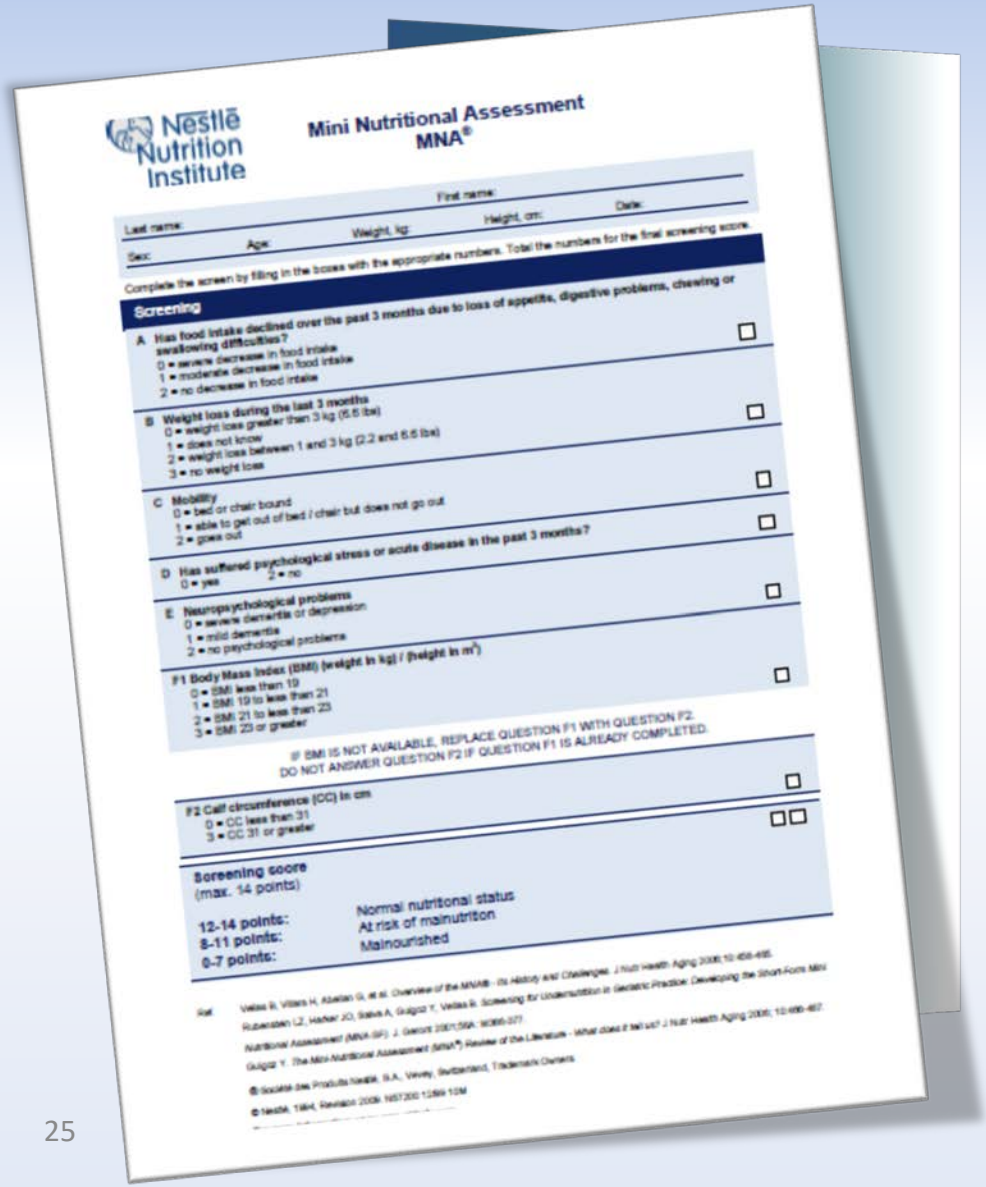
SNAQ

Short Nutrition Assessment Questionnaire

Acute care, residential care and community adults .

Neelemant et al.(2008)

Mini Nutritional Assessment®



Nestlé Nutrition Institute

Mini Nutritional Assessment
MNA®

Last name: First name:
Sex: Age: Weight, kg: Height, cm: Date:

Complete the screen by filling in the boxes with the appropriate numbers. Total the numbers for the final screening score.

Screening

A Has food intake declined over the past 3 months due to loss of appetite, digestive problems, chewing or swallowing difficulties?
0 = severe decrease in food intake
1 = moderate decrease in food intake
2 = no decrease in food intake

B Weight loss during the last 3 months
0 = weight loss greater than 3 kg (6.6 lbs)
1 = does not know
2 = weight loss between 1 and 3 kg (2.2 and 6.6 lbs)
3 = no weight loss

C Mobility
0 = bed or chair bound
1 = able to get out of bed / chair but does not go out
2 = goes out

D Has suffered psychological stress or acute disease in the past 3 months?
0 = yes 2 = no

E Neuropsychological problems
0 = severe dementia or depression
1 = mild dementia
2 = no psychological problems

F1 Body Mass Index (BMI) (weight in kg) / (height in m^2)
0 = BMI less than 19
1 = BMI 19 to less than 21
2 = BMI 21 to less than 23
3 = BMI 23 or greater

IF BMI IS NOT AVAILABLE, REPLACE QUESTION F1 WITH QUESTION F2.
DO NOT ANSWER QUESTION F2 IF QUESTION F1 IS ALREADY COMPLETED.

F2 Calf circumference (CC) in cm
0 = CC less than 31
3 = CC 31 or greater

Screening score
(max. 14 points)

12-14 points: Normal nutritional status
8-11 points: At risk of malnutrition
0-7 points: Malnourished

Ref. Vellas B, Villars H, Abellan G, et al. Overview of the MNA® - Its History and Challenges. J Nutr Health Aging 2006;10:456-465.
Rubenstein LZ, Harker JO, Salvà A, Guigoz Y, Vellas B. Screening for Undernutrition in Geriatric Practice: Developing the Short-Form Mini Nutritional Assessment (MNA-SF). J Gerontol 2001;56A: M366-377.
Guigoz Y. The Mini-Nutritional Assessment (MNA®) Review of the Literature - What does it tell us? J Nutr Health Aging 2006; 10:466-487.

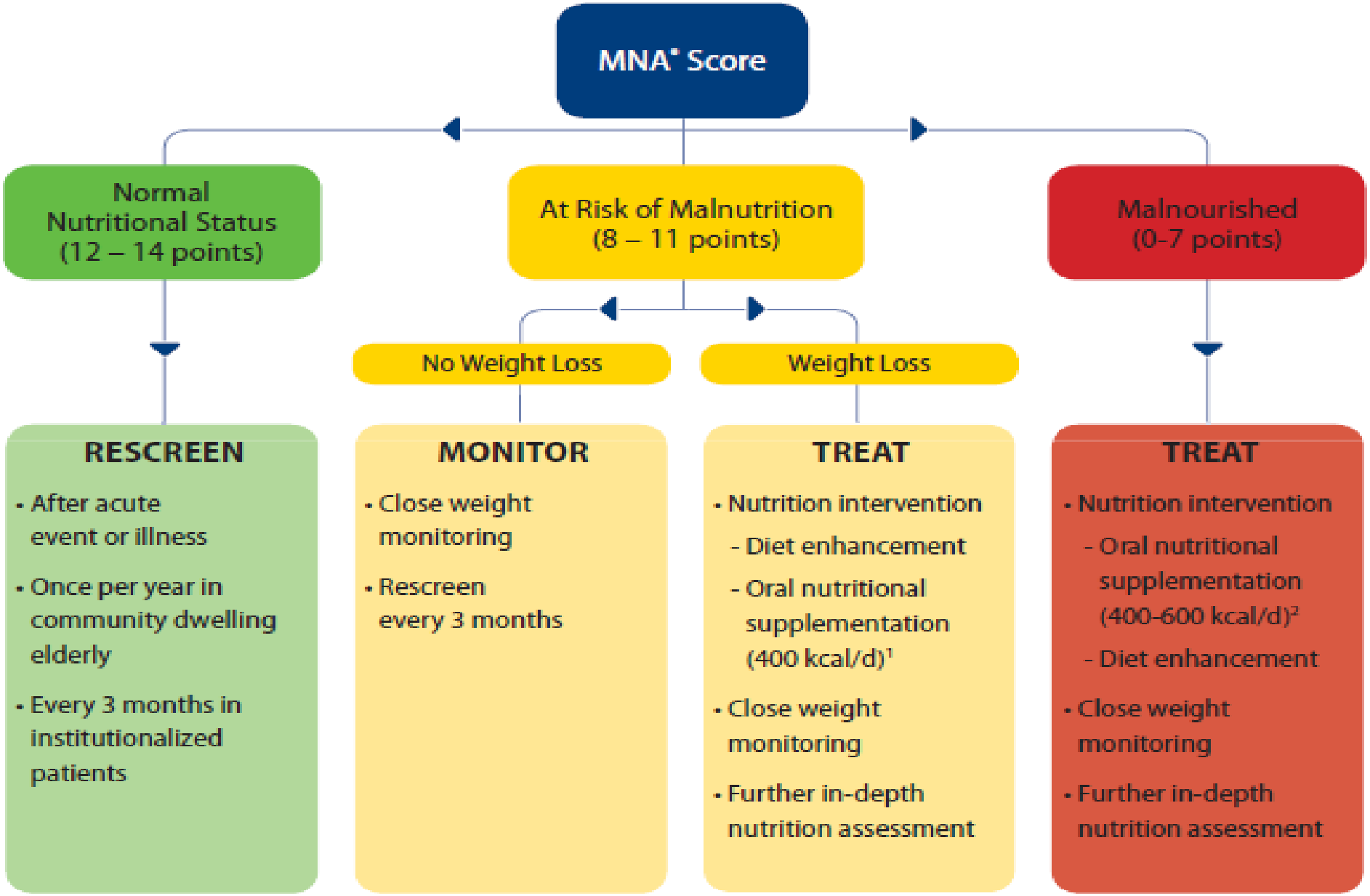
MNA®

Validated and easy
to use in geriatric patients

Acute care, hospital based
ambulatory care, LTC

http://www.mna-elderly.com

Recommendations for Intervention



1. Milne AC, *et al. Cochrane Database Syst Rev.* 2009:2:CD003288 2. Gariballa S, *et al. Am J Med.*2006;119:693-699

Braden Scale: Nutrition Subscores

Sensory Perception	1 Completely limited	2 Very limited	3 Slightly limited	4 No impairment
Moisture	1 Constantly moist	2 Very moist	3 Occasionally moist	4 No impairment
Activity	1 Bedfast	2 Chairfas		
Mobility	1 Completely immobile	2 Very limited	ightly limited	No limitation
Nutrition	**1 ery poor**	**2 Probably inadequat**	**3 Adequate**	**4 Excellent**
Friction & Shear	1 Problem	2 Potential	3 No apparent	

Refer to RDN

Braden Subscale Rating as Indicator of Dietary intake & Weight in Nursing Home Residents at Risk for PI

- Screened at admission and weekly
- Changes in wt. occurred in poor intake
- 690 residents: protein 25 very poor,214 probably adequate
- Meal intake 49.6= very poor, 65.11 probably adequate
- Braden subscale can be used as preliminary screening tool
- Offers clues for intake-protein, calories etc.

Nutrition Assessment

Medical Hx, Physical Exam	Diet History, Food Intake	Body Composition
Diagnosis/ recent changes in condition (depression) Medications Risk or S/S of malnutrition, dehydration	Adequacy of food/fluid intake compared to needs Chewing, swallowing, self feeding, GI issues	Height, weight, wt. history, UWL (≥5% in 30 days or ≥10% in 180 days), BMI ≤19 Insidious weight loss

Nutrition Assessment

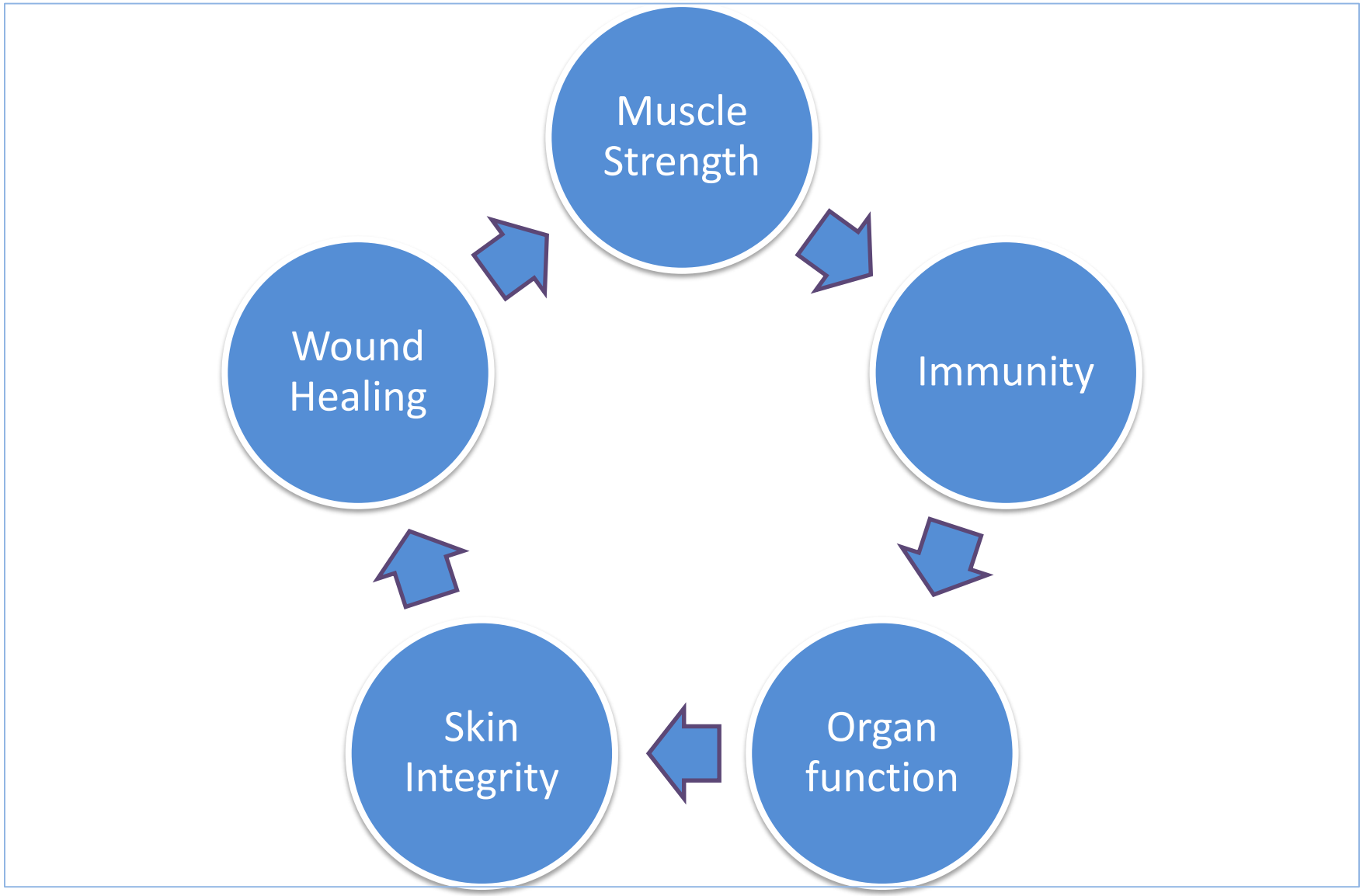
Current Interventions	Interviews	Nutrition Focused Physical Examination
Food or dining related interventions Oral nutrition supplements Nutrition support	with resident, family and/or staff Acceptance to interventions Compare goals to outcomes	Overall appearance/ indicators of PEM Oral examination Skin examination

Legs thin & frail vs. edematous

Orbital Area

Healthy Hands vs. Frail

Lean Body Mass is Essential for:



Loss of Lean Body Mass Counts

Loss of LBM	Complications	Associated Mortality
10%	↓immunity, ↑ infections	10%
20%	↓ healing, weakness, infection	30%
30%	too weak to sit, pressure ulcers, pneumonia, no healing	50%
40%	**DEATH,** usually from pneumonia	100%

R. Demling

Nutrition Assessment

1. Assess weight status for each individual to determine weight history and significant weight loss from usual body weight (≥5% change in 30 days or ≥10% in 180 days).

2. Assess the individual's ability to eat independently.

3. Assess the adequacy of total nutrient intake (food, fluid, oral supplements, enteral/parenteral feedings).

Dietary Intake

- Depression affects appetite of 30% of adult outpatients.
- Loss of appetite related to high risk of malnutrition.
- Increases risk of poor wound healing.
- Decreased ability to eat independently.
- ↑ Risk for undernutrition and delayed healing.

Horn 2004; Gilmore 1995

General Recommendations: Nutrition Interventions for Pressure Injuries


CALORIE

What Does the Evidence Suggest?

Energy Intake

Responsive increase in metabolic rate which increases caloric needs (triggered by PrU, infection, severe illness, trauma, etc.)

Calories support: angionenesis, collagen synthesis, prevents protein used as energy source

Carbohydrate provides glucose to support normal cellular activity, protein synthesis,

secretion of hormones and growth factors

Fats

- Dense source of calories
- Essential component of cell membranes
- Essential fatty acids deficit: Interferes with body's ability to have normal immune response, may reduce inflammation

Linoleic: omega 6

sources: nuts, seeds, veg. oils corn, soybean, safflower

Linolenic: omega 3

sources: canola, soybean, flaxseed, fatty fish, nuts, seeds

Energy Intake

- Provide individualized energy intake based on underlying medical condition and level of activity.
- Provide 30 to 35 kcalories/kg body weight for adults with a pressure ulcer and malnourished
- Adjust energy intake based on weight change or level of obesity.

Obesity and Pressure Injuries

Obese Individuals

- There are no evidence based guidelines available related to the nutritional needs of the obese person with pressure injuries
- Adequate calories, protein, fluids and nutrients are needed for healing
  - General consensus is that diets should be liberalized to promote healing
  - Once the PI is completely healed, diet restrictions may be gradually implemented as needed
- Monitor skin integrity and coordinate with RDN (ongoing)

Weigh Risk vs. Benefits of Weight Reduction for Adults with Pressure Injuries

Energy Intake

- Revise and modify/liberalize dietary restrictions when limitations result in decreased food and fluid intake.

- Offer fortified foods and/or high calorie, high protein oral nutritional supplements between meals if nutritional requirements cannot be achieved by dietary intake.

What Does the Evidence Suggest for Optimal Protein

Increased protein linked to improved healing rates

Inadequate Protein:

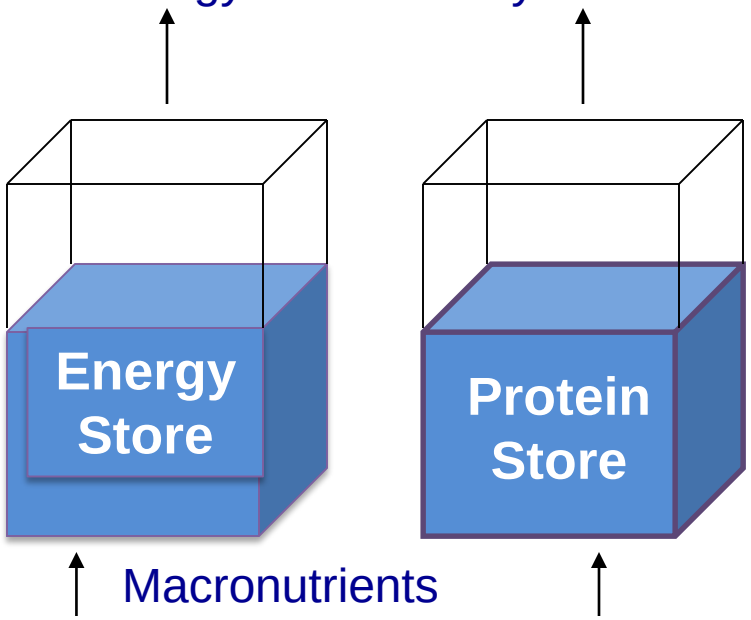
- prolongs inflammatory state
- inhibits antibody responses
- ↓collagen synthesis & deposition
- ↓cell multiplication
- ↓wound contraction

The Non-healing Chronic Wound
Failure to Heal by 12 Weeks

The Non-healing Wound

↑ Catabolism ↓ Anabolism

Energy Protein Synthesis

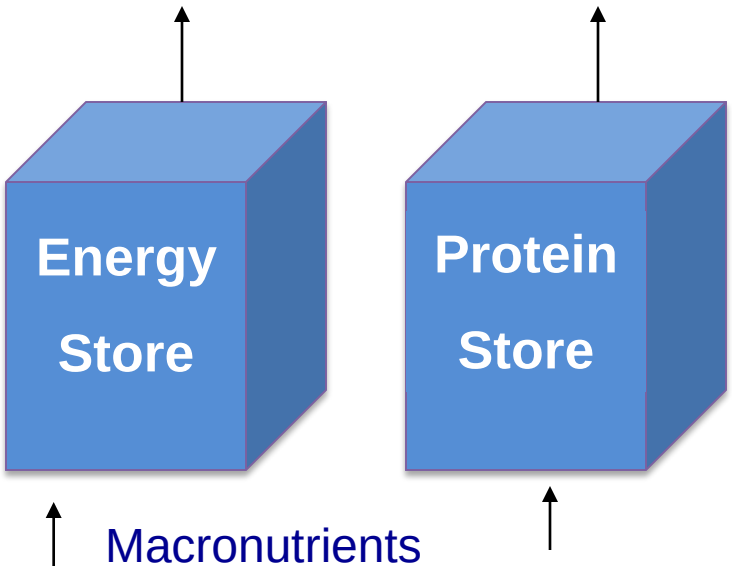


The Healing Wound

Wound contraction

↑ Anabolism ↓ Catabolism

Energy Protein synthesis



Protein Intake

- Adequate protein for positive nitrogen balance

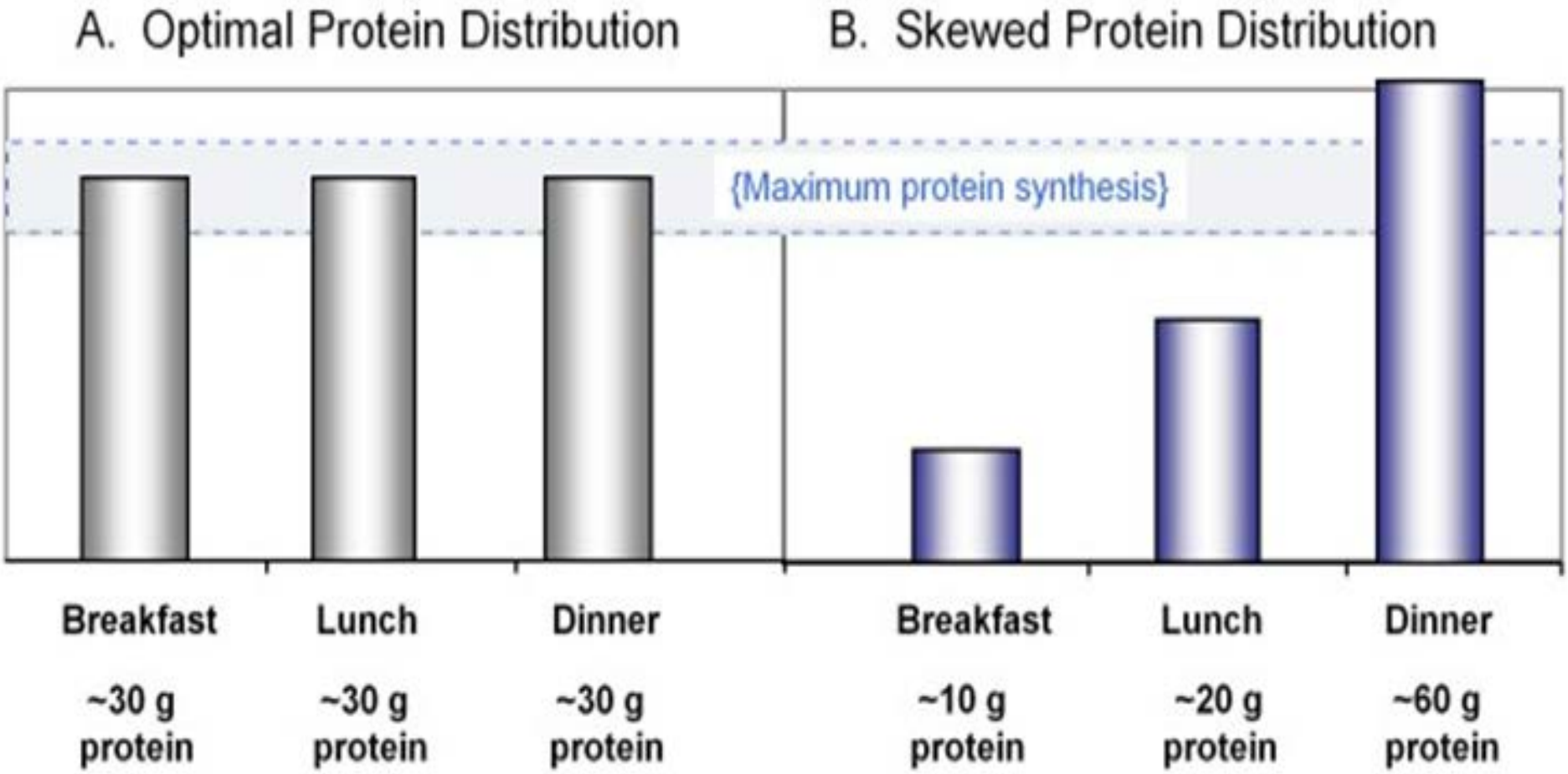
- Offer 1.25 to 1.5 grams protein/kg body weight daily for adults with an existing pressure ulcer when compatible with goals of care, and reassess as condition changes.

- Assess renal function to ensure that high levels of protein are appropriate for the individual.

What Does the Evidence Suggest for Optimal Protein Intake for Older Adults

- Protein spread equally between breakfast lunch and dinner
  (Paddon-Jones 2009)
- If needed, additional protein supplementation should given between meals
  (Wilson MM 2002)

Protein Distribution



Alternate Food Sources of Protein

8 oz. Greek yogurt
140 cal
14 gms pro

Half sandwich
8 oz. 2% milk
320 cal
18 gm pro

High protein bar
210 cal
12 gm pro

Protein Needs: 150#

Protein Values	Healthy: 0.8 gms/Kg (1.0 older adult)	Pressure Injury: 1.25-1.5 gms/Kg
	54.5 - 68 grams	**85 – 102 grams (+30-47 g)**
Food needed to achieve protein values	Breakfast: 1 egg, 8 oz milk (15) Lunch: 2oz meat, 4oz milk (18) Dinner: 3oz meat, 4oz milk (25) **Total** (+ starches, veg. 21= 79)	Breakfast: **2** eggs, 8 oz milk (+7) Lunch: 2oz meat, **8oz milk** (+4) Dinner: 3 oz meat, **8 oz milk** (+4) **Snack:** **8 oz shake** (+8) **102 Total**

Can your patients eat all this food?

Protein Intake

Adults malnourished and/or with pressure injury

- Offer high calorie, high protein nutritional supplements in addition to the usual diet to adults if nutritional requirements cannot be achieved by dietary intake.
- Supplement with high protein, arginine and micronutrients for individuals with a pressure ulcer Category/Stage III or IV or multiple pressure ulcers when nutritional requirements cannot be met with traditional high calorie and protein supplements.

CUBE Trial

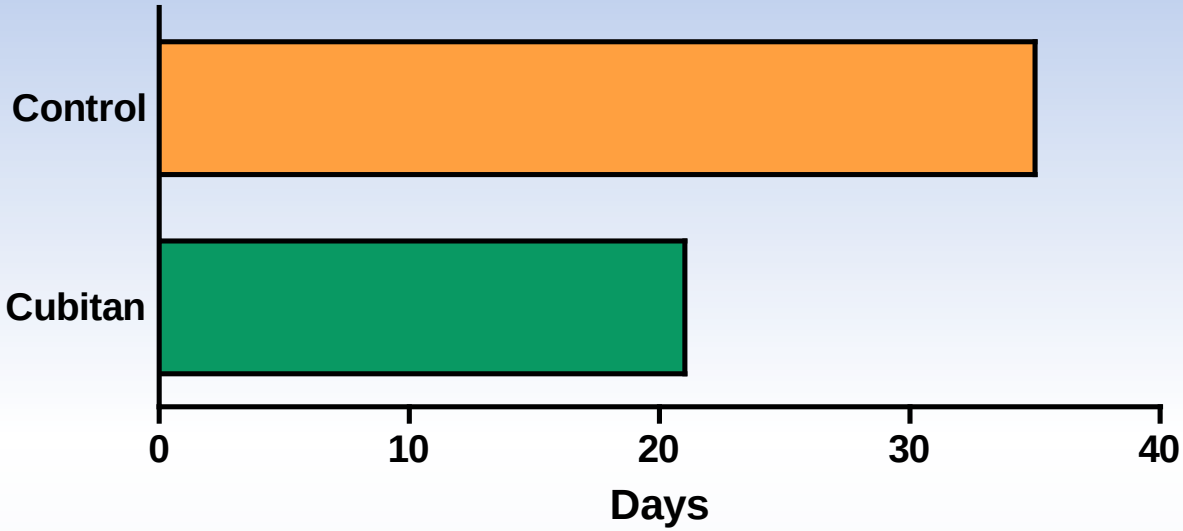
A multi-country, randomized, placebo-controlled trial to demonstrate the efficacy of a specific 'arg+ONS-spec.') on pressure ulcer healing in **non-malnourished patients with stage III-IV ulcers**

Ready-to-drink, high-protein, arginine enriched nutritional supplement

Containing per 200-ml serving:

- 20 g protein
- 3 g L-arginine
- 250 kcal
- Vitamins and micronutrients including:
  - 250 mg vitamin C
  - 38 mg vitamin E (α-TE)
  - 9 mg zinc
  - 1.5 mg carotenoids

Earlier Reduction in Ulcer Size from Baseline



With specific oral nutritional support a significant reduction in ulcer size was reached 2 weeks earlier compared to the control group.

- First time-point with a significant reduction compared to baseline
- Arg+ONS-spec.= day 21, P=0.011
- Control group = day 35, P= 0.019
- Means ± SEM; data adjusted for center

Oligo Element Trial Study Group

- Multicenter, RCT to evaluate supplementation with arginine, zinc & antioxidants in high-calorie, high-protein formula to improve PrU healing
- 200 malnourished patients with stage II,III,and IV PrUs
- 8 week trial – LTC and home care in Italy
- Majority of PrUs on sacrum

Cereda E, Klersy C, Serioli M, Crespi A, D'Andrea F; for the OligoElement 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):167-17

Malnourished criteria

- UWL – 5%(30 days) and 10% 3months
- BMI< 20 age <65 and < 21 > 65
- Food intake (<60% of estimated total daily energy requirements in the week before the study)
- Both groups received a 400 mL high-calorie, high-protein formula (100 Ml ,4x /day)
- Standard wound care for all

Nutritional Supplement in 100mL

Intervention

- Protein 10 grams
- Arginine-L 1.5
- Zinc 4.5 mg
- Copper 675 mcg
- Vitamin C 125 mg
- Vitamin E 19.0 mg

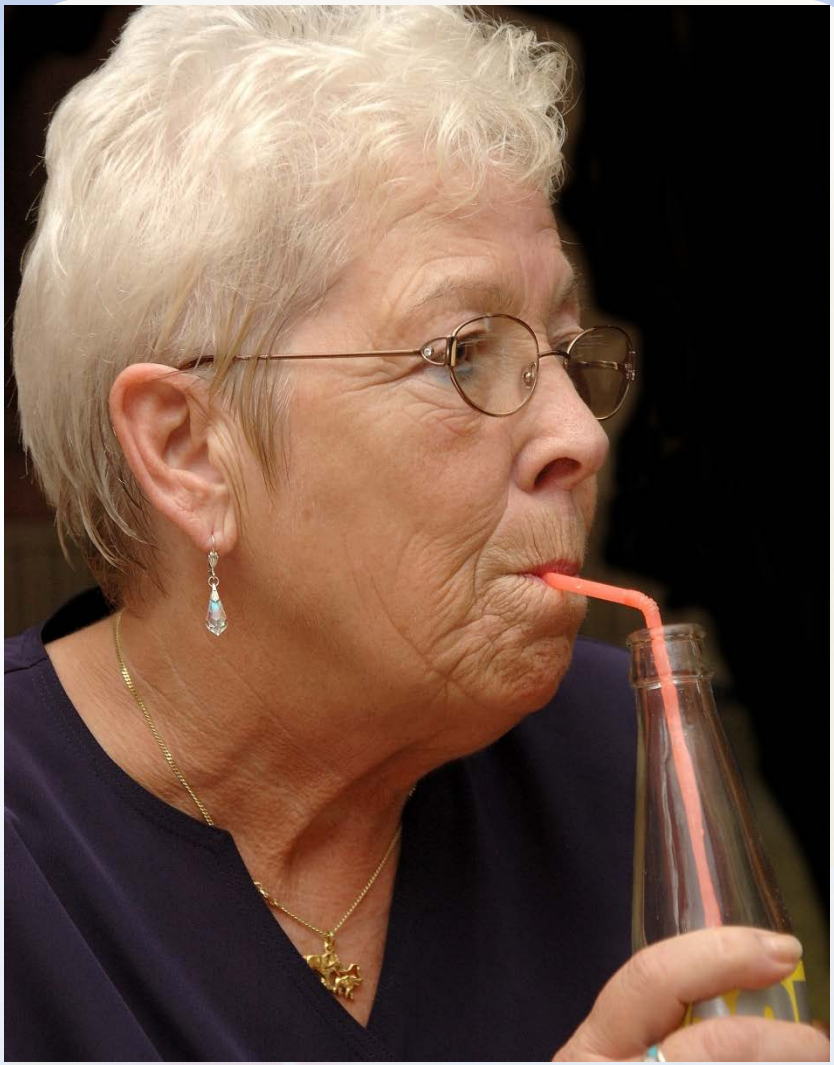
Standard: Control

- Protein 10 grams
- Arginine-0
- Zinc 2.3 mg.
- Copper 338 mcg
- Vitamin C 19mg
- Vitamin E 2.3 mg

Conclusion

- 69.9% in intervention formula group had 40% or greater reduction in PU size compared to 54.1% in control
- The efficacy of these nutrients in wound healing is likely synergistic because there is no evidence supporting an independent effect when given alone
- This nutritional intervention may be beneficial when added to optimized local wound care for the treatment of pressure ulcers in malnourished patients.

Fluids: What Does the Evidence Suggest?



Dehydration is a risk factor for pressure ulcer development

Hydration needs must be met to assure proper prevention and healing

SIGNS OF DEHYDRATION

- Dry oral mucosa
- Weight change
- Skin tenting
- Decreased urine output
- Hypernatremia
- Calculated serum osmolality >295 mOsm/Kg
- BUN: creatinine above 25:1

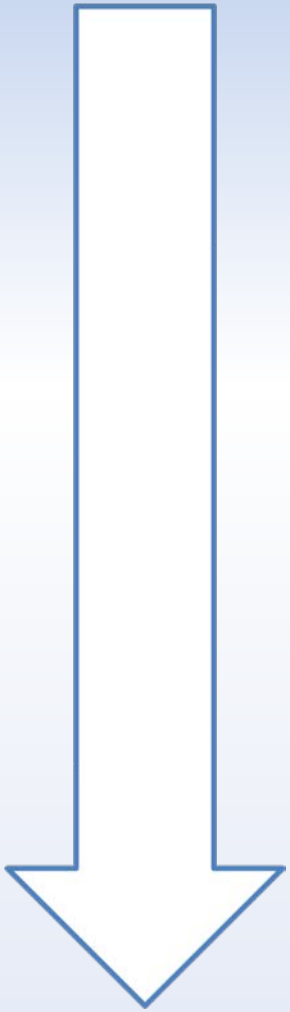
Hydration

Provide additional fluid for individuals with dehydration, elevated temp, vomiting, profuse sweating, diarrhea or heavily draining wounds.

2014 Prevention and Treatment of Pressure Ulcers: Clinical Practice Guideline

Fluids

Needs increase according to insensible water loss



Needs may decrease for CHF, renal failure

Consider Taps

- Turn
- Align
- Position
- Sips

Hydration Interventions

- Offer variety of beverages
- Glass of water with meals
- Hydration pass & juice machines with resident access
- Hydration in rehab department

What Does the Evidence Suggest?

Micronutrients

Micronutrients

- Individuals with pressure injuries may not be consuming an adequate diet to meet established nutritional reference standards
- Is the diet served consumed?
- Do mega doses result in adverse outcomes?
- Are deficiencies suspected or confirmed?

Vitamins and Minerals

- Provide/encourage an individual with a pressure injury/ulcers to consume a balanced diet with good sources of vitamins & minerals
- Consider vitamin and mineral supplements if dietary intake is poor or deficiencies are confirmed or suspected

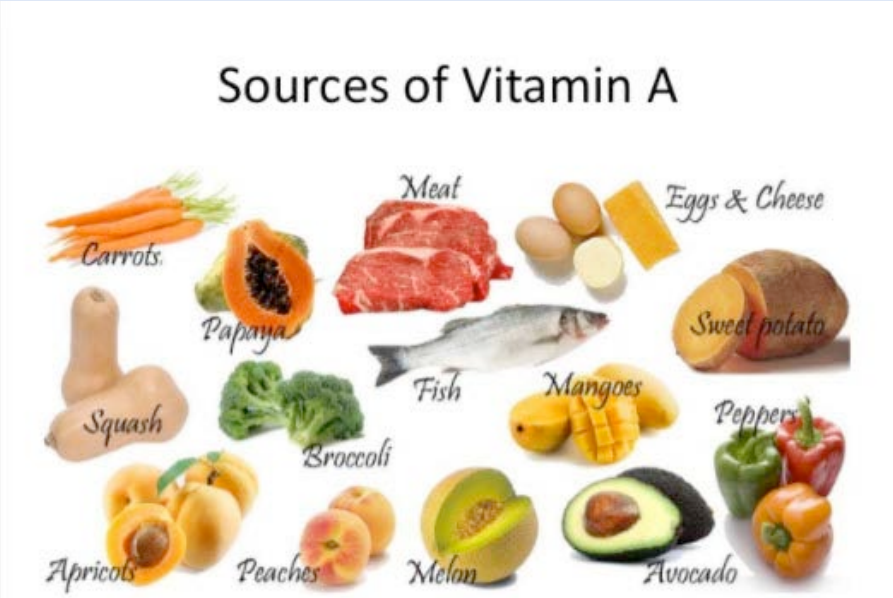
Vitamin C

- Provides tensile strength to new collagen
- Macrophages during inflammatory phase
- Promotes iron absorption
- Deficiency = capillary fragility & decreased wound strength
- No evidence to support mega doses

Source: Google Image

Vitamin A

- Cell mediated immune function, collagen synthesis,& cross linking
- Steroids can delay healing
- Fat soluble vitamin
- Deficiency Increases risk of infection



Source: Google Image

Zinc

- Stimulates activity of multiple enzymes
- Provides membrane stability
- Provides maturation of collagen in proliferative and remodeling phases

Zinc

- Zinc requirements can be met by 2 servings/ day of animal protein
- A multivitamin/mineral supplement daily (15 mg zinc) may be adequate. (DRI 2004)

Zinc

- No research to show zinc supplementation improves healing
- Doses >40 mg/day can affect copper status and possibly result in anemia

Labs values not reliable

- Negative acute phase reactant
- Zinc is widespread in body
- Decreased values with inflammation

Iron

- Improves tissue perfusion
- Carries oxygen to tissues
- Important for collagen synthesis

Deficiency:

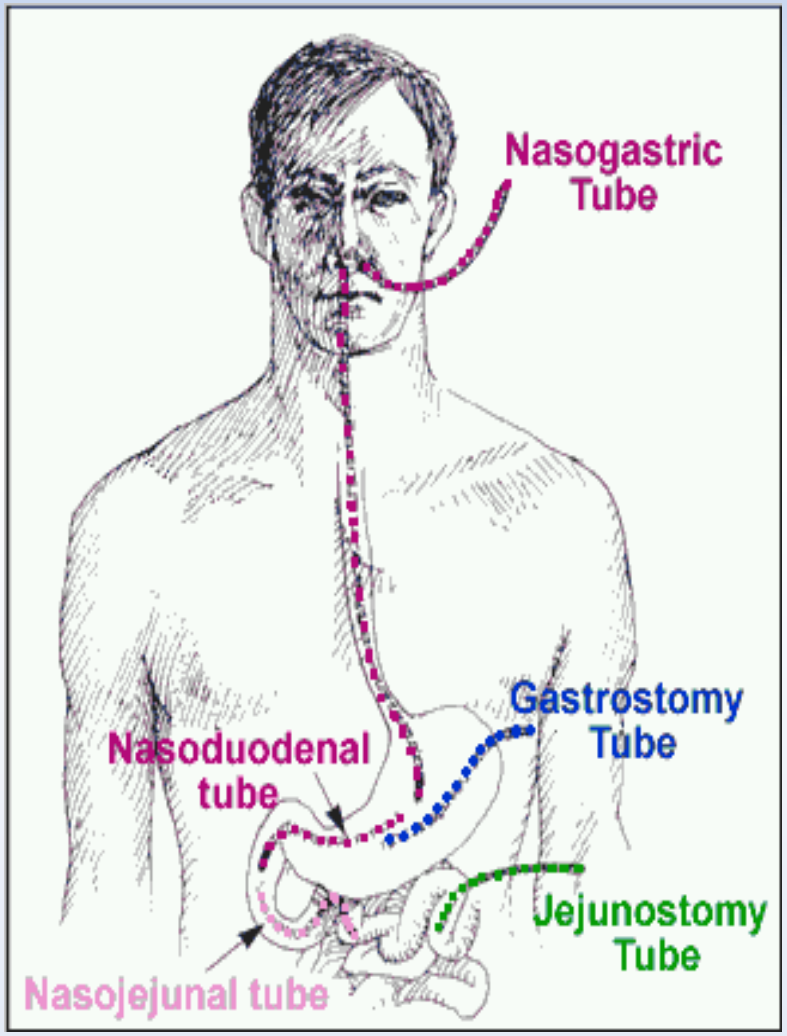
- Increases tissue ischemia
- Decreased wound strength
- Impaired collagen cross linking

Source: Google Image

Nutrition Support

- Consider nutritional support (enteral or parenteral nutrition) when oral intake is inadequate
- NPO >3-5 days
- Hydration with IVs does not supply nutrients
- Places individual at risk of undernutrition and pressure injury development

Enteral Feedings



Determine if patient ***actually*** receives TF as prescribed:

- Is TF given as ordered (product, mLs/hr)?
- Are flushes given as ordered (flushes, flushes with meds)?
- Is the strength correct?
- Is the individual tolerating the feeding?
- Round the clock or intermittent (turned off)?

Case Study

- MT admitted with hip fx and Stage 2 pressure injury on coccyx injury
- Dx Hypertension, CHF depression,
- On 2gram sodium diet
- Admission wt 159 lbs
- Braden sub-score= 2 (rarely eats a complete meal)
- RDN interviews MT & learns he rarely eats fruits or veggies
- Meal intake records indicate 50% average eaten
- Current weight is 5% decline in 1 week
- No edema or meds to cause wt decline

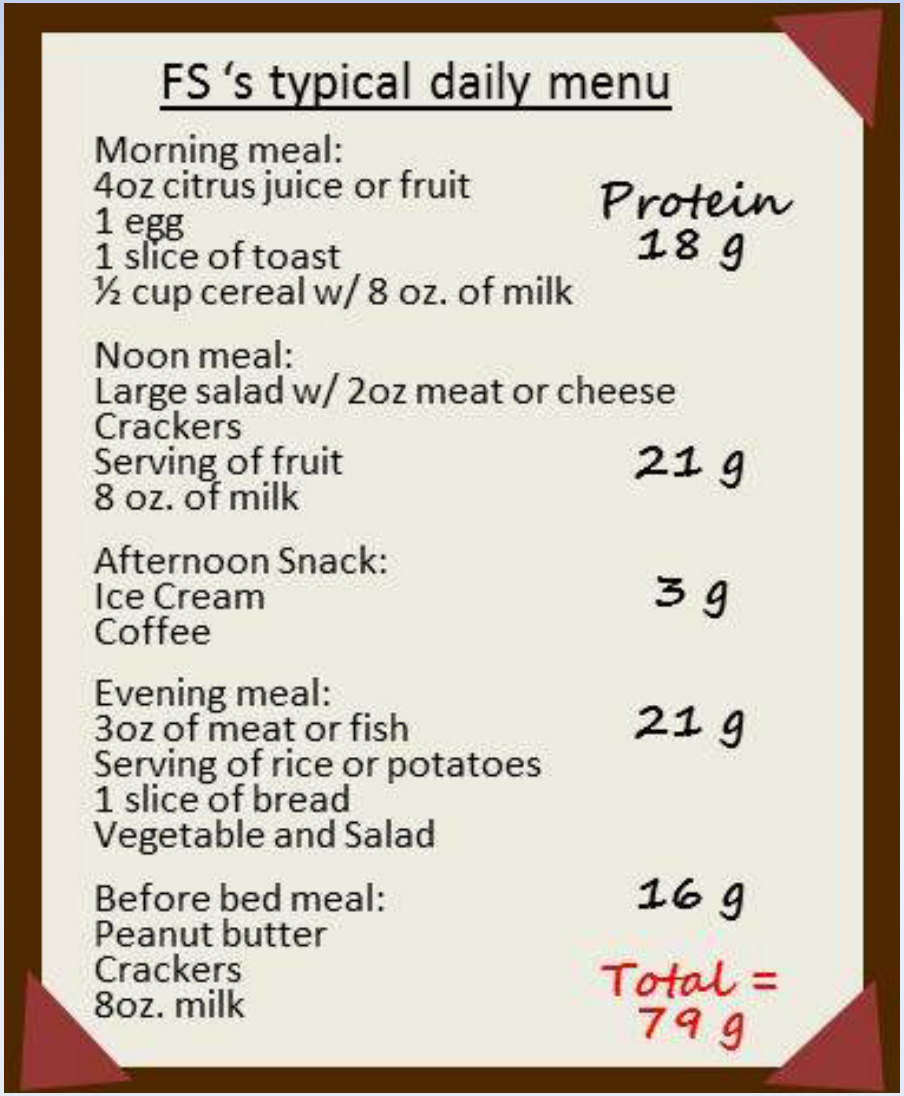
- Based on guidelines protein is 86-120 grams/day
- Is MT consuming adequate protein?
- Is MT malnourished?
- What would be your POC ?

Case Study 2

- FS has a chronic stage 4 pressure injury on her coccyx and a stage 3 on her heel.
- Wt is stable at 180 #
- Nursing notifies MD, RDN, individual, and family
- RDN interviews FS & confirms that she eats a balanced diet.
- RDN notes that MD has ordered vitamin C 250 mg bid and zinc sulfate 220 mg daily = (50 mg. of elemental zinc)

Case Study 2

- Based on the guidelines FS's protein requirement is 102-123 gms/day
- Is FS consuming adequate protein?
- Is FS malnourished?
- What is your POC ?



Nutrient	Function	Recommendation
Calories	Energy source to preserve lean body mass	30-35 kca/kg BW & adjust per client, level of obesity
Protein	Tissue maintenance Collagen synthesis, build LBM	1.25- 1.5 g/kg BW adjust per condition, monitor renal status
Fluid	Normal cell function & tissue integrity	1 mL/kcal consumed, monitor hydration status
Vitamin C	Collagen synthesis ,supports formation of new blood vessels	Mega doses not recommended
Zinc	Protein synthesis; cellular growth; deficiency impairs healing	RDA 11mg/day males,8mg/day females, mega doses not recommended, UTL 40 mg/day
Arginine	Biological precursor to nitric oxid,increases blood flow which can support collagen in wounds	Supplemental arginine in ⇧cal. ⇧ protein supplement with micronutrients maybe beneficial

Steps to Successful Nutrition Care

1

- Screen and Assess Nutrition Status
- Individualize interventions and develop POC

2

- Provide diet based on estimated needs, consider fortified foods
- Offer supplements between meals if intake is inadequate

3

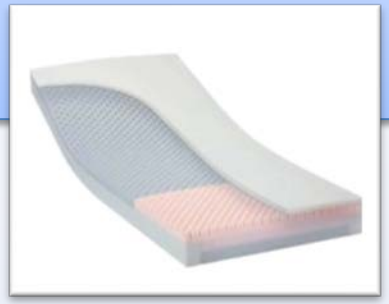
- Consider ONS fortified with arginine, vitamin or minerals if needs not met with high calorie/protein supplement
- Consider EN/PN based on resident's wishes, when needs cannot be met orally

Pressure Injury Care

Effective pressure injury treatment: multidisciplinary & holistic

Nursing Care
Turning regimes, hygiene, etc.

Support Surfaces
Mattresses, cushions, protection, etc.



Wound Care
Dressings, cleaning, drainage, etc.

Nutrition
Delivery of nutrients to stimulate healing

Questions

References

- SKF: CMS Initiatives Final rule in 2016: Medicare Payment Rulehttp://www.leadingage.org SNF_Medicare_Payment_Rule_2016.aspx
- National Alliance for Infusion Therapy and the American Society for Parenteral & Enteral Nutrition/Public Policy Committee & Board of Directors. Disease related malnutrition & enteral nutrition therapy: A significant problem & a cost effective solution; *Nutri Clin Prac*.2010;25(5):548-554.
- White J, et.al. Consensus Statement of the Academy of Nutrition and Dietetics/American Society of Parenteral and Enteral Nutrition: characteristics recommended for the identification and documentation of Adult Malnutrition(Undernutrion) *J Acad Nutr Diet* 2012:112:730-738http://malnutrition.andjrnl.org/Content/articles/1-Consensus_Statement.pdf
- Jensen GL , et al. . Malnutrition syndromes: A conundrum vs continuum **.** *JPEN J Parenter Enteral Nutr* . 2009;33(6):710–716
- Fry, D, Pine, M Patient Characteristics and the Occurrence of Never Events Arch Surg 2010: 145(2): 148-151
- Banks, M., J. Bauer, N. Graves, et al. (2010). "Malnutrition and pressure ulcer risk in adults in Australian health care facilities." Nutrition in Clinical Practice 26(9):896-901
- Lizaka et al. The impact of malnutrition and nutrition-related factors on the development and severity of pressure ulcers in older patients receiving home care, 2010;29(1):47-53.
- 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. Emily Haesler (Ed.). Cambridge Media: Osborne Park, Western Australia.
- Horn et al. The National pressure Ulcer Long Term Care Study: pressure ulcer development in long-term care residents. *J Am Geriatr Soc.* 2004;52:359-67.
- Gilmore, S, et al (1995). Clinical indicators associated with unintentional weight loss and pressure ulcers in elderly residents of nursing facilities. *J Am Diet Assoc* 95:984, 1995.
- Gabay C, Kushner I. Acute-phase proteins and other systemic responses to inflammation. N Engl J Med 1999;340(6):448 –454
- Johnson , AM, Merlini,G. Clinical indications for plasma protein assays: transthyretin (prealbumin) in inflammation and malnutrition. *Clin Chem Lab Med* 2007;45(3):419-426

References

- Stratton et al. Enteral nutrition support in prevention and treatment of pressure ulcers: a systematic review and meta-analysis. *Ageing Research Reviews*. 2005;4(3):422-450.
- Wilson M-MG et al. Effect of liquid dietary supplements on energy intake in the elderly. *J Clin Nutr*. 2002;75(5):944-947.
- Lee SK et al .Pressure ulcer healing with a concentrated, fortified, collagen, protein hydrolysate supplement: A randomized Controlled Trial. *Adv. Skin Wound Care* 2006;19(2):92-96.
- Ohura T., T., et al. Evaluation of effects of nutrition 738 intervention on healing of pressure ulcers and nutritional states (randomized 739 controlled trial).Wound Repair And Regeneration: Official Publication Of The 740 Wound Healing Society [And] The European Tissue Repair Society. 2011;**19**(3):330-6.
- Cereda E. A et al. Disease-specific, versus standard, 640 nutritional support for the treatment of pressure ulcers in institutionalized older 641 adults: a randomized controlled trial. *J Amer Geria Soc* 2009; 57(8):1395-1402.
- Morley J et. al. Nutritional recommendations for the management of sarcopenia J Am Med Dir 2010;11:391-396.
- Evidence -Based Recommendations for optimal dietary protein intake in older people: A Position Paper from the PORT-AGE study group *JAMDA 2013; 14(8):542-559*
- Paddon-Jones D, et al: Amino acid ingestion improves muscle protein synthesis in the young and elderly. *Am J Physiol Endocrinl Metab* 2004; 286:E321-E328.
- Demling RH Nutrition, anabolism, and the wound healing process: an overview. ePlasty. 2009; 9:65-94.
- van Anholt, RL,, et al. Specific nutritional support 788 accelerates pressure ulcer healing and reduces wound care intensity in non-789 malnourished patients. *Nutrition* 2010; 26(9):8678-72.
- Cereda E, er al.; for the 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):167-17
- ter Riet G, Kessels AG, Knipschild PG. Randomized clinical trial of ascorbic acid in the treatment of pressure ulcers. J Clin Epidemiol 1995;48:1453-60.
- Maillet,OSJ, Schwartz DB,Posthauer ME. Position of the Academy of Nutrition and Dietetics: ethical and legal issue of feeding and hydration. J Acad Nutr Diet. 2013;113:828-833