

## OHSU SUGGESTED GUIDELINES FOR NUTRITION CARE

**DIAGNOSIS:** PRESSURE ULCERS and HEALING DIFFICULT WOUNDS

**CALORIES:**

**Anabolic:** 30-35 kcal/kg; 35-40 kcal/kg if pt underweight/losing weight.  
Adjust based on weight loss, gain or level obesity.

1.0 -1.5 X BEE; adjust BEE for stress. If obese, use ABW.  
Do not reduce BEE for paraplegia or quadriplegia.

**PROTEIN:**

1.2-1.5 g/kg DBW for small, non-draining wound, mildly catabolic state.

1.8-2.0 g/kg for large/multiple and/or draining wounds and/or moderate-severe catabolism;

If obese, use DBW. Adequate calories are essential.

**CARBOHYDRATE:**

Approx 55% CHO from kcals. Optimize blood glucose levels.  
Aggressively treat to reach normal serum glucose range.

**FAT:**

As desired, encourage low fat. Assess for EFAD (rare).

**FLUIDS:**

VERY important: At least 1-1.5 ml/kcal, 30-35ml/kg actual weight/day; for pt with large fluid losses or at risk for dehydration: draining wounds/fistula, emesis, frequent loose stools, fever, or on air-fluidized beds.

Up to 60 ml/kg. Monitor for dehydration

**SODIUM:**

Unrestricted.

**CALCIUM:**

Supplement, if deficient, or if diet is <1500 mg/day.

**ZINC:**

MVI with Zn for all patients.

Additional Zn supplementation may only be given in stage III and IV pressure ulcers and when Zn deficiency is observed or suspected: See Other Considerations for physical findings linked with Zn deficiency.

Base doses on RDI (11 mg/day males; 8 mg/day females):

Oral: 25-50 mg for 10-14 days for large, non-healing wounds; 15-25 mg elemental Zn (65 to 110 mg ZnSO<sub>4</sub>) for non-healing pressure ulcers, reevaluate after 4-6 weeks.

Stop supplementation after healing is complete and/or serum Zn, if available, is normal.

**Caution:** Oversupplementation in pt with normal serum Zn can result in copper deficiency, depressed immune function and poor healing. Some experts recommend 2 mg Cu for every 25 mg supplemental Zn.

**LABS TO MONITOR:** Immune competence and low hepatic protein: Albumin, Prealbumin, Fe, Ferritin; Hbg, and Hct; TIBC, transferrin, % saturation, Ca<sup>+</sup>, Phos, Mg, Zn, Glucose, CRP, Chol. Alb and PAB are negative acute phase reactants (may not be sufficient indicators of nutritional status); ferritin and CRP, positive acute phase reactants. Total lymphocyte count

**MVI REQUIREMENTS:** Therapeutic, daily MVI/Mineral at RDA/DRI level when nutrient deficiency is *suspected*.

**Zinc:** MVI with DRI level of Zn: 11 mg/day males; 8 mg/day females

**Vitamin C:** 100-200 mg/day stage I and II; 1,000 mg/day III and IV or high stress x 10 days/short term or if diet low in Vitamin C or patient is elderly: divide into 2 doses (ex. 500 mg bid). Not > 250 mg/day if CKD Stages 3 to 5 (GFR  $\leq$  59).

**Vitamin A:** include in MVI; if *deficient*, supplement: 700-900 with 3000 IU upper-limit; use with caution. If patient has diabetes or is on corticosteroids, excessive vitamin E, radiation or chemotherapy, give 10,000-15,000 IUs orally for 10 days. Serum retinol will indicate vit A status, if available.

**Folic Acid:** 1 mg daily.

Do not supplement with Vitamin E or omega-3 FAs.

**OTHER FACTORS TO MONITOR:** Daily food/fluid intake, changes in weight status, diagnosis, and medications.

**OTHER CONSIDERATIONS:**

1. The Braden Scale used to evaluate severity of pressure ulcers from 6 (high risk) to 23 (low risk) with 18 as cutoff score for onset risk of pressure ulcer (<18 alert RD). See [http://ozone.ohsu.edu/healthsystem/nursing/braden\\_scale/default.htm](http://ozone.ohsu.edu/healthsystem/nursing/braden_scale/default.htm)
2. Wound healing requires a well-nourished body. Provide meals and snacks with appropriate high kcal and protein.
3. Monitor body weight (significant wt loss:  $\geq$ 5% loss 30 days;  $\geq$  10% loss 6 mo).  
-May consider appetite stimulant.
4. Diabetes and impaired glucose tolerance reduces wound healing and increases wound complications.
5. Essential fatty acid deficiency (EFAD): may cause impaired wound healing. Avoid omega-3 FA supplements at high doses, as they may increase prostaglandin synthesis and weaken inflammatory response.
7. Pts with normal levels of serum zinc do not benefit from supplementation. High volume diarrhea and/or fistula output cause impaired Zn absorption.
  - a. Physical signs of possible Zn deficiency: hair loss, diarrhea and/or other high outputs, poor appetite, altered taste and smell, dermatitis
  - b. Excessive Zn interferes with Fe and Cu absorption and may compromise wound healing or cause anemia

- 8. Vitamin E may interfere with collagen synthesis, scavenge oxygen at the wound site, prolong inflammatory phase of healing, and interfere with beneficiary Vitamin A.
- 9. Vitamin A is the nutritive precursor of retinoic acid necessary for growth and differentiation. May counteract delayed healing due to corticosteroids. ESRD patients cannot convert retinol to retinoic acid—avoid vitamin A supplementation in that group.
- 13. Enteral nutrition: Improves healing. Geriatrics with dysphagia, long-term care facilities.
- 14. Consult TPN recommendations for Zn dosage. 30 kcal/kg to improve healing in stage III and IV pressure ulcers.
- 15. Arginine: non-essential amino acid and nitric oxide precursor; necessary for healing; enhances collagen production and protein deposition in wound site; enhances immune function with occurrence of stress. Recommend:3-9g (max 14 g)
- 16. Glutamine: reduces incidence of infection. Physiological stress reduces concentrations of glutamine, thus impairing healing. Recommend: 14 g (or 0.57 g/kg/day). Based on preliminary research, recommend mixture of: 14g arginine, 2 g HMB (beta-hydroxy-beta methybutyrate), and 14 g glutamine

<b>Nutrition related risk factors associated with <i>developing</i> pressure ulcers, especially in the elderly</b>	<b>Other factors associated with pressure ulcers</b>
1. Protein-Energy Malnutrition	1. Dehydration deficits
2. Reduced food intake.	2. Incontinence (fecal or urinary).
3. Decreased protein intake (PEM)	3. Fractures (immobility).
4. Impaired ability to eat independently	4. Hypo-albuminemia.
5. Recent weight loss.	5. Dementia.
6. Unintentional weight loss >10%/ 6 mo	6. Smoking.
7. Low BMI (< 22 kg/m <sup>2</sup> )	7. Deficiencies in vitamins A, B <sub>6</sub> , B <sub>12</sub> , C, D, and Zinc.
	8. Immobility/Hip fractures
<b>Due to:</b> - Cognitive deficits - Food-Medication interactions - Dysphagia -GI disorders - Depression -“Anorexia of aging” (appetite decline, weight loss, decreased metabolic rate)	

<b>Conditions affect pressure ulcer <i>healing</i></b>	
1. Undernutrition	<ul style="list-style-type: none"> <li>• Undesirable weight trends</li> </ul>
2. Protein-Energy Malnutrition (PEM)	<ul style="list-style-type: none"> <li>• Wasting and excessive loss lean body mass</li> <li>• Edema: can mask muscle &amp; fat loss</li> </ul>
3. Cachexia	<ul style="list-style-type: none"> <li>• Loss of muscle, occasionally loss of fat mass; indicated by weight loss (correct for fluid retention)</li> </ul>
4. Other conditions associated with wasting disease	<ul style="list-style-type: none"> <li>• Anorexia</li> <li>• Inflammation</li> <li>• Insulin resistance</li> <li>• Increased muscle protein breakdown</li> </ul>

**COMMON DRUGS AND POTENTIAL SIDE EFFECTS:**

- **Corticosteroids:** Anti-inflammatory effects may impair wound healing. May need Vitamin A to help reverse this effect, but *cautiously* as it may reverse the therapeutic reason for the steroid.
- **Zinc Sulfate:** If taken for long periods of time, may cause copper or iron deficiency, or decrease immune response.
- **Vitamin C:** Use cautiously in patients with renal insufficiency as can precipitate oxalate stones and soft tissue deposits of oxalate crystals.
- **Antibiotics:** Can cause diarrhea and decreased nutritional intake and/or losses.

**POTENTIAL DIAGNOSTIC STATEMENT:** Inadequate (protein, zinc, food, fluid) intake related to poor appetite and increased nutrient requirements for wound healing, evidenced by low alb, calorie count results, non-healing stage IV pressure ulcer and 5 lb. weight loss in 2 wks (and other physical symptoms as observed, such as seborrheic dermatitis).

**NUTRITION ASSESSMENT/ INTERVENTION:** Assess current nutritional intake, routes and extent of nutrient and fluid losses; existing barriers inhibiting optimal nutrition; consider coexisting clinical conditions/disease states; anthropometrics, biochemical data, clinical indicators of nutritional status; and goals/wishes of patient/caregiver. Provide a regular diet with fortified foods at each meal and a 6 oz nutritional supplement after lunch and HS.

**NUTRITION MONITORING/EVALUATION:** Calorie count, body weight, laboratory measurements of nutritional status.

**REFERENCES:**

1. Ayelo EA, Thomas DR, Litchford MA. Nutritional aspects of wound healing. *Home Healthcare Nurs.* 1999;17(11):719-729.
2. Detroit Medical Center. Using the Braden Scale in clinical practice. 2004. [http://ozone.ohsu.edu/healthsystem/nursing/braden\\_scale/default.htm](http://ozone.ohsu.edu/healthsystem/nursing/braden_scale/default.htm) Accessed 5-12-10.
3. Dietary Reference Intakes for Vitamin A, Vitamin K, Arsenic, Boron, Chromium, Copper, Iodine, Iron, Manganese, Molybdenum, Nickel, Silicon, Vanadium and Zinc (2001). [http://fnic.nal.usda.gov/nal\\_display/index.php?info\\_center=4&tax\\_level=4&tax\\_subject=256&topic\\_id=1342&level3\\_id=5141&level4\\_id=10590](http://fnic.nal.usda.gov/nal_display/index.php?info_center=4&tax_level=4&tax_subject=256&topic_id=1342&level3_id=5141&level4_id=10590) Accessed 5-12-10.
4. Dorner B, Posthauer ME, Thomas D. The role of nutrition in pressure ulcer prevention and treatment: National pressure ulcer advisory panel white paper. NPUAP. *Adv in Skin & Wound.* 2009;22:212-221.
5. Ellinger S, Stehle P. Efficacy of vitamin supplementation in situations with wound healing disorders: results from clinical intervention studies. *Curr Opin Clin Nutr Metab Care.* 2009;12:588-595.
6. Flanigan , KH. Nutritional aspects of wound healing. *Adv Wound Care.* 1997;10(2):48-52.
7. Gray M. Does oral zinc supplementation promote healing of chronic wounds? *J Wound Ostomy Continence Nurs.* 2003. 30: 295-299.
8. Heyman H, Van De Looverbosch DE, Meijer EP, Schols JMGA. Benefits of an oral nutritional supplement on pressure ulcer healing and long-term care residents. *J Wound Care.* 2008;17:476-481.

9. Houwing RH, Rozendall M, Wouters-Wesseling W. A randomized double-blind assessment of the effect of nutritional supplementation on the prevention of pressure ulcers in hip-fracture patients. *Clin Nutr*. 2003;22:401-405.
10. Keast DH, Parslow N, Houghton PE, Norton L, Fraser C. Best practice recommendations for prevention and treatment of pressure ulcers: Update 2006. *Adv Skin Wound Care*. 2008;20:447-60.
11. Langemo D, Anderson J, Hanson D, Hunter S, Thompson P, Posthauer ME. Nutritional considerations in wound care. *Wound Care J*. 2006;19:297-303.
12. Langer G, Schloemer G, Knerr A, Kuss O, Behrens J. Nutritional interventions for preventing and treating pressure ulcers. [Systematic Review] Cochrane Wounds Group Cochrane Database of Systematic Reviews. 2, 2008.
13. McClave SA, Martindale RG, Vanek VW, McCarthy M, Roberts P, Taylor B, Ochoa JB, Napolitano L, Cresci G, A.S.P.E.N. Board of Directors. American College of Critical Care. Guidelines for the provision and assessment of nutrition support therapy in the adult critically ill patient: Society of critical care medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (A.S.P.E.N). *J PEN*. 2009;33:277-316.
14. Milne, AC. Potter, J. Avenell, A. Protein and energy supplementation in elderly people at risk from malnutrition. [Systematic Review] Cochrane Metabolic and Endocrine Disorders Group Cochrane Database of Systematic Reviews. 2, 2008.
15. National Pressure Ulcer Advisory Panel Web site. [www.npuap.org](http://www.npuap.org) (full access members only). Updated pressure ulcer staging at <http://www.npuap.org/pr2.htm> Both accessed 5-12-10.
16. Posthauer ME. The role of nutrition in wound care. *Adv Skin Wound Care*. 2006;19:43-52.
17. Ross, V. Micronutrient recommendations for wound healing. *Support Line*, August 2002; 24(4): 3-9.
8. Thompson C, Fuhrman MP. Nutrients and wound healing: still searching for the magic bullet. *Nutr In Clin Practice*. 2005. 20: 331-347.
9. Volkert D, Berner YN, Berry E, Cederholm T, Coti Bertrand P, Milne A, Palmblad J, St. Schneider, Sobotka L, Stanga Z, Lenzen-Grossimlinghaus R, Krys U, Pirlich M, Herbst B, Schutz T, Schroer W, Weinrebe W, Ockenga J, Lochs. ESPEN guidelines on enteral nutrition: Geriatrics. *Clin Nutr*. 2006;25:330-360.
10. Wound, Ostomy, and Continence Nurses Society (WOCN). Guideline for prevention and management of pressure ulcers. Glenview (IL): Wound, Ostomy, and Continence Nurses Society (WOCN); 2003. 52 p. (WOCN clinical practice guideline; no. 2). [http://www.guidelines.gov/summary/summary.aspx?doc\\_id=3860&nbr=003071&string=Pressure+AN+D+Ulcers](http://www.guidelines.gov/summary/summary.aspx?doc_id=3860&nbr=003071&string=Pressure+AN+D+Ulcers) Accessed 5-12-10.