



# Nutrition and Pressure Injury Healing: Updated Recommendations

By Ellen Mackay, RD MSc CDE

*Pressure injuries are caused by sustained pressure, usually over a bony prominence, that impairs circulation and prevents oxygen and nutrients from reaching the skin. This results in tissue damage and skin breakdown. Pressure injuries cause pain and discomfort and have a significant negative impact on quality of life. Recent Canadian prevalence data are scarce; however, in 2003 the prevalence of pressure injuries across all health-care settings in Canada was estimated at 26%.<sup>1</sup> The economic burden of pressure injuries on health-care systems is high; pressure injuries result in prolonged hospital stays, high re-admission rates, intensive nursing care and infections.<sup>2-4</sup> Pressure injuries are largely preventable, and prevention efforts must be considered for all individuals at risk.*

**M**alnutrition is strongly associated with increased risk of developing a pressure injury and preventing pressure injury healing.<sup>5</sup> Nutrients are required at all stages of the wound healing cascade and are vital to preserve skin integrity. Poor nutrition can contribute to wound chronicity and severity and can increase risk of infection.<sup>6-7</sup> Read [Malnutrition in Wound Healing](#) for more information on malnutrition and wound healing.

## **Nutrition Research and Pressure Injury Treatment**

Much of our understanding of the role of nutrition and wound healing comes from nutrition research involving pressure injury treatment.<sup>2</sup> In November 2019, the third edition of the International Clinical Practice Guidelines for the Prevention and Treatment of Pressure Ulcers/Injuries was released.<sup>3</sup> These guidelines are a collaboration among the European Pressure



Ulcer Advisory Panel, the National Pressure Injury Advisory Panel and the Pan Pacific Pressure Injury Alliance, and include contributions from 14 wound organizations around the world, including Wounds Canada.

These guidelines provide updated, evidence-based nutrition recommendations to help in the prevention or treatment of pressure injuries for those with malnutrition or at risk of malnutrition. Each recommendation has an associated strength of evidence and strength of recommendation, providing the health-care practitioner with the confidence to implement nutrition strategies

to improve care and positively impact wound healing and skin integrity. This article focuses on the updated nutrition recommendations. While neonates' and children's needs are reviewed in the guidelines, the focus of this article will be on adults.

### Nutrition Screening and Assessment

Early identification of those at risk for, or with, overt malnutrition is of the utmost importance. Screening for malnutrition in adults has become more streamlined with the use of several valid-

**Table 1:** Validated Nutrition Screening Tools<sup>8</sup>

Screening Tool	Population
Mini Nutritional Assessment (MNA <sup>®</sup> )	Identifies adults 65 year or older who are malnourished or at risk for malnutrition (long-term care or community dwelling)
Malnutrition Universal Screening Tool (MUST)	Identifies adults who are underweight and at risk of malnutrition (acute or long-term care, community dwelling)
Malnutrition Screening Tool (MST)	Identifies adults who are at risk of malnutrition (acute or ambulatory care)
Canadian Nutrition Screening Tool (CNST)	Identifies adult patients at risk of malnutrition (acute care)
Short Nutritional Assessment Questionnaire (SNAQ)	Identifies adults who are underweight and at risk of malnutrition (acute and residential care)
Nutri eSCREEN <sup>®</sup>	Used for self-screening for older adults in the community (online)

ated screening tools (see Table 1) and can be completed by any member of the health-care team. Regular use of screening tools has been shown to expedite nutrition intervention and subsequently reduce pressure injury rates by 50%, shorten hospital length of stay and reduce health-care expenses.<sup>4</sup> To date, only the Mini Nutritional Assessment (MNA<sup>®</sup>) screening tool has been validated for patients with or at risk for pressure injuries.<sup>2</sup>

Once a patient is identified as being at risk, screening should trigger a referral for a comprehensive nutritional assessment by a registered dietitian (RD). The RD follows standards of practice to systematically review markers of nutritional status to create a nutrition care plan with the patient.<sup>3</sup> Individualized plans need to incorporate the patient’s goals, culture, preferences and any pre-existing comorbidities. The Nutrition Assessment sidebar identifies some considerations when performing a nutritional assessment. In the recent guidelines, there is a move away from including some previous biomarkers (protein, albumin, prealbumin), as their sensitivity in establishing nutritional status can be impaired by inflammation, hydration or other disease states.

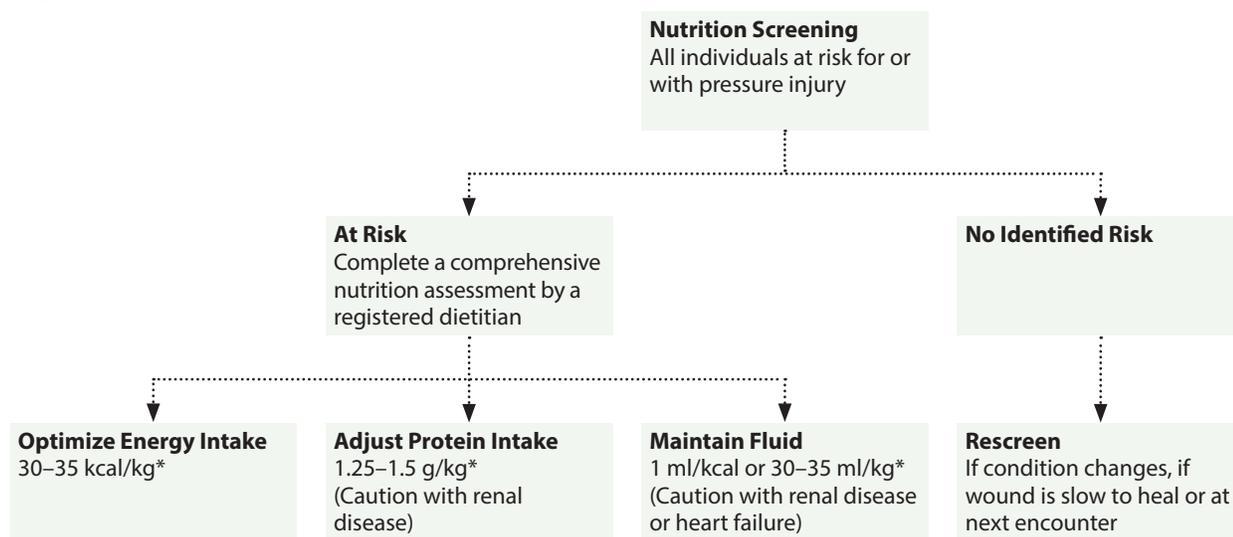
### Nutrition Assessment: Considerations for Implementation<sup>3</sup>

- Food history and adequacy of nutritional intake
- Anthropometric measures (height, weight, body mass index)
- Weight history
- Biochemical data
- Medical tests and procedures
- Nutrition-focused physical assessment (muscle wasting, edema, micronutrient deficiencies and functional status [e.g., hand grip])
- Ability to eat independently

### For the At-risk Patient: Optimize Diet

When a patient is identified as being at risk of developing a pressure injury and is malnourished or at risk of malnutrition, the nutritional focus is on optimizing energy, protein and fluid intake (see Figure 1). The nutritional approach is to ensure a balanced diet, include energy-dense foods, liberalize diet restrictions and correct suspected or confirmed nutritional deficiencies through vitamin or mineral supplementation. Where possible, nutrient needs are best met through a balanced diet before offering fortified foods or supplements. Individual

**Figure 1:** Summary of Nutrition Recommendations for Adults with, or at Risk for, Pressure Injuries<sup>3</sup>



\*Recommendation for those with a pressure injury who are malnourished or at risk of malnutrition.

energy needs are based on degree of weight loss or level of obesity. Protein and fluid needs will be impacted by renal function and other comorbidities.

### For the Pressure-injury Patient: Nutrition Recommendations

In the presence of a pressure injury, specific nutrition recommendations can enhance healing. A summary of nutrition requirements for adults is presented in Figure 1. As wound healing is an anabolic event, energy (calories) from carbohydrates and fat are needed to “spare” the protein, to allow the protein to be used for wound healing and preserving skin integrity. Liberalizing the diet and offering nutrient-dense foods, fortified foods and supplements can help boost nutrition intake.

*“Regular monitoring of nutrition status ... is strongly encouraged to evaluate interventions ...”*

When possible, calculate energy requirements using indirect calorimetry to estimate energy needs. Without this, which is often the case outside the acute or research setting, the recommendation is to target 30 to 35 kcal per kg of body weight daily, individualized for degree of underweight or obesity. Protein needs are estimated at 1.25 to 1.5 g/kg body weight to ensure adequate amino acids to support wound healing. Caution is advised with elevated protein intakes when renal or liver disease is present. Protein intake should be tapered to normal levels (1.0 to 1.2 g/kg/d) once the pressure injury has fully healed.

Dehydration can impact blood volume and circulation, resulting in reduced delivery of nutrients to the wound bed and elimination of wastes. This may contribute to impaired wound healing and risk of further skin breakdown. Evidence-based guidelines recommend that water requirements be calculated as 1 ml per calorie (kcal) per

# Cutimed® Sorbact®

Advanced Wound Care Management  
for Individualized Care



### The perfect combination of safety and efficiency. Cutimed® Sorbact®

has innovative properties to help absorb quicker and better manage infection.

- Helps bind\* pathogenic bacteria and fungus to the dressing for removal with every change
  - For the successful treatment of difficult, complex wounds
- \*through hydrophobic interaction



1.877.978.5526 [www.essity.com](http://www.essity.com)



day or 30 ml per kilogram body weight per day. Additional fluid may be required in the presence of highly exuding wounds, fever, dehydration, diarrhea, vomiting or any other condition that results in fluid loss. High protein intakes may also increase requirements for fluid. Meeting fluid needs must be consistent with patient's goals and comorbidities. Fluid volume may need to be reduced for patients with renal or cardiac disease.

*“While nutrition intervention, including the cost of supplements, may initially be seen as an additional expense, these costs are more than offset by reduced direct medical costs.”*

For individuals who cannot meet nutrition recommendations, oral intake can be enhanced by offering nutrient-dense foods, fortified foods and/or high-energy oral nutrition supplements. Meeting the nutrition recommendations is not always feasible in the frail elderly, or patients at the end of life. When oral intake remains sub-optimal despite best efforts, the health-care team should discuss the risks and benefits of enteral or parenteral nutrition support, which may be initiated to help meet the individual's high energy and protein demands. Enteral and parenteral support is not without risks, however, and must be consistent with the patient's or care partner's goals and preferences.

Regular monitoring of nutrition status, including measuring body weight weekly, is strongly encouraged to evaluate interventions and modify as needed to improve or sustain nutritional intake.

### **Nutrition Supplementation**

Offering oral nutrition supplements (ONS) between meals can optimize energy and protein intake. ONS vary widely in the amount of protein, carbohydrate, fat, vitamins, minerals and amino acids they supply. It is unclear if high-energy ONS can reduce the development of pressure injuries in susceptible individuals; however, overall nutrition status may improve, shortening length of hospital stays.<sup>9</sup> Recent evidence supports use of supplement formulas that include arginine, zinc and antioxidants in adults when pressure injury is present (Category/Stage II or greater), as healing has been shown to be enhanced.<sup>10-11</sup> For greatest efficacy, supplementation should continue for a minimum of four weeks.<sup>3</sup>

Many studies have looked at individual vitamin or mineral supplementation and the effect on wound healing. While correcting known deficiencies is essential, single vitamin supplementation has not shown benefit beyond the consumption of a balanced diet.<sup>2,12</sup>

Arginine is a dispensable amino acid that becomes indispensable in times of stress, such as when a patient is wounded or septic. Arginine plays an important role in wound repair, stimulating insulin secretion, promoting the transport of amino acids into tissue cells and supporting the synthesis of protein and collagen in the cells. Supplemental arginine (in doses ranging from 4.5 g to 9 g/d) has been explored, with the sug-

gestion of accelerated pressure injury healing.<sup>13-15</sup>

An RD can help navigate the types of ONS available locally. Currently there are few wound-specific ONS available in Canada, and there has been limited use of supplemental arginine.

### Nutrition Saves Money

Nutrition intervention directly enhances the wound healing process. Nutrition support can also prevent the development of pressure injuries for those at risk and is less costly than pressure injury treatment.<sup>16</sup> In addition to helping individuals heal, timely and adequate nutrition support can reduce health-care costs.<sup>17</sup> While nutrition intervention, including the cost of supplements, may initially be seen as an additional expense, these costs are more than offset by the reduced direct medical costs, such as nursing time, medical tests, dressing material, medications and hospital length of stay.<sup>9,13,17</sup> Individuals with pressure injuries also indicate that it is a priority for them to have access to nutrition guidance.<sup>3</sup>

### Conclusion

Wound healing and nutrition are closely linked. While not all wounds are equal, nutrition is often a common denominator in the treatment of individuals with or at risk for pressure injuries. Early identification and diagnosis of malnutrition, and swift nutritional intervention by a Registered Dietitian and nutrition care team has the potential to reduce pressure injury prevalence rates in Canada, improve the quality of life of those in our care and reduce health-care costs. 🇩🇪

### References

1. Woodbury MG, Houghton PE. Prevalence of pressure ulcers in Canadian healthcare settings. *Ostomy Wound Manage.* 2004;50(10):22-38.
2. 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. *Adv Skin Wound Care.* 2015;28(4):175-188.
3. European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel and Pan Pacific Pressure Injury Alliance. *Prevention and Treatment of Pressure Ulcers/*



### PICO<sup>◇</sup> 14

Single Use Negative Pressure Wound Therapy System

Helping you get **CLOSER TO ZERO**<sup>®</sup> delay in wound healing  
[smith-nephew.com/pico](http://smith-nephew.com/pico)



## + NEW PICO<sup>◇</sup> 14 sNPWT

designed to challenge  
hard-to-heal wounds

Our new **PICO 14 Single Use Negative Pressure Wound Therapy System (sNPWT)** with **AIRLOCK<sup>®</sup> Technology** has a pump duration of up to 14 days,<sup>1</sup> and is aimed for use on deep wounds greater than 2cm deep.<sup>2</sup> With an enhanced pump to aid use in large wounds with less user intervention.<sup>3†</sup>

Turn around wound healing trajectory more effectively than standard dressings<sup>4</sup> and tNPWT<sup>5</sup> with PICO sNPWT.

## Smith+Nephew

For detailed product information, including indications for use, contraindications, precautions and warnings, please consult the product's applicable Instructions for Use (IFU) prior to use.

† Compared to previous versions. **References:** 1. Smith+Nephew December 2018. PICO 14 Service Life Testing: 14 Day Device Lifespan. Internal Report. RDY18/132. 2. Smith+Nephew 2018. The review of evidence supporting the use of PICO in wounds > 2cm in depth. Internal report EGOAWM PCS230001v2. 3. Smith+Nephew 2018. Research and Development Report: PICO 14 and PICO 14 Initial Pump Downward Maintenance Pump Down Time Out (R019/0844). Downloaded at Hampton J Hyems D Smyth T. Use of PICO to provide clinical and economic outcomes hard-to-heal wounds. *Wounds International* 2017; 8(6):3-8. 4. Kregel R, Owen C, Reynolds A, Vogel D, James H. A prospective, randomised, controlled clinical trial on the efficacy of a single-use negative pressure wound therapy system, compared to traditional negative pressure wound therapy in the treatment of chronic ulcers of the lower extremities. *Wound Repair Regen.* 2019 May 14. [Epub ahead of print].

\*Trademark of Smith+Nephew (August 2019 Smith+Nephew: 21013) (C)MCEB.

Injuries: Clinical Practice Guidelines. The International Guidelines. Emily Haesler (Ed.) EPUAP/NPIAP/PPPIA: 2019.

- Meehan A, Loose C, Bell J, Partridge J, Goates S. Health system quality improvements: Impact of prompt nutrition care on patient outcomes and health care costs. *J Nurs Care Qual.* 2016;31(3):217–223.
- Posthauer ME, Collins N, Dorner B, Sloan C. Nutritional strategies for frail older adults. *Adv Skin Wound Care.* 2013;26(3):128–40.
- Cereda E, Klersy C, Derioli M, Crespi A, D’Andrea F. A nutritional formula enriched with arginine, zinc and antioxidants for the healing of pressure ulcers: A randomized trial. *Ann Intern Med.* 2015;162(3):167–174.
- Neyens JCL, Cereda E, Meijer EP, Lindholm C, Schols JMGA. Arginine-enriched oral nutritional supplementation in the treatment of pressure ulcers: A literature review. *Wound Medicine.* 2017;16:46–51.
- Liu P, Shen WQ, Chen HL. Efficacy of arginine-enriched enteral formulas for the healing of pressure ulcers: A systematic review. *J of Wound Care.* 2017; 26(6):319–323.
- Wong A, Goh G, Banks MD, Bauer JD. Economic evaluation of nutrition support in the prevention and treatment of pressure ulcers in acute and chronic care settings: A systematic review. *JPEN.* 2019;43(3):376–400.
- Banks MD, Graves N, Bauer JD. Cost effectiveness of nutrition support in the prevention of pressure ulcer in hospitals. *European J of Clin Nutr.* 2013;67(1):42–46.
- Hisashige A, Ohura, T. Cost effectiveness of nutritional intervention on healing of pressure ulcers. *Clin Nutr.* 2012; 31(6):868–874.
- van Anholt RD, Sobotka L, Meijer EP, Heyman H, Groen HW, Topinkova E, et al. Specific nutritional support accelerates pressure ulcer healing and reduces wound care intensity in non-malnourished patients. *Nutrition.* 2010; 26(9):867–879.
- Marra, MV, Bailey RL. Position of the Academy of Nutrition and Dietetics: Micronutrient supplementation. *J Acad Nutr Diet.* 2018;118(11):2162–2173.
- Cereda E, Gini A, Pedrolli C, Vanotti A. Disease-specific, versus standard, nutrition support for the treatment of pressure ulcers in institutionalized older adults: A randomized controlled trial. *J Am Geriatr Soc.* 2009;57(8):1395–1402.
- Bauer K, Rock K, Nazzal M, Jones O, Qu W. Pressure ulcers in the United States’ inpatient population from 2008 to 2012: Results of a retrospective nationwide study. *Ostomy Wound Manage.* 2016;62(11):30–38.
- Katona P, Katona-Apte J. The interaction between nutrition and infection. *Clin Infectious Dis.* 2008;46(10):1582–1588.
- Stechmiller JK. Understanding the role of nutrition and wound healing. *Nutr Clin Pract.* 2010;25(1):61–68.



## The Power of 360° - Advanced Wound Care, Within Reach The Right Product at the Right Time for the Right Clinical Need

### Transforming Wound Care Today

360° Advanced Wound Care is focused on research and innovation for the management of burns, and acute and chronic wounds. Our commitment is to provide a comprehensive suite of evidence-based product solutions coupled with industry leading science and service initiatives to support both the patients’ natural restorative healing process and the providers’ goals of healing complex wounds efficiently and effectively at every stage of the wound healing process.



For more information, please contact:

**Integra Canada ULC**  
2590 Bristol Circle, Unit 1  
Oakville, Ontario L6H 6Z7

1-800-263-6693 (Toll Free)  
905-632-7888 (Local)

[IntegraCanadaCustSvc@integralife.com](mailto:IntegraCanadaCustSvc@integralife.com)

Bioguard®, MEDIHONEY®, TCC-EZ®, Xtrasorb®, Integra®, and the Integra® logo are registered trademarks of Integra LifeSciences Corporation or its subsidiaries in the United States and/or other countries. © 2020 Integra LifeSciences Corporation. All rights reserved.



# NSWOCC 39<sup>TH</sup> NATIONAL CONFERENCE 39<sup>E</sup> CONGRÈS NATIONAL DES ISPSCC

MAY 21-24, 2020 | 21-24 MAI, 2020

# GOING VIRTUAL!



NURSES SPECIALIZED IN  
WOUND, OSTOMY AND CONTINENCE  
CANADA  
INFIRMIÈRES SPÉCIALISÉES EN  
PLAIES, STOMIES ET CONTINENCE  
CANADA

EDUCATION IN SPECIALIZED WOUND, OSTOMY & CONTINENCE CARE

The  
**POWER** of  
L'expertise à la  
**PUISSANCE**

# 3

FORMATIONS SPÉCIALISÉES EN PLAIES, STOMIES ET CONTINENCE

Register for the Virtual Conference today  
at [www.nswoc.ca/conference](http://www.nswoc.ca/conference) to access  
everything from online sessions by national &  
international **expert speakers** to our innovative  
**Virtual Exhibit Hall & Poster Library!**



[WWW.NSWOC.CA](http://WWW.NSWOC.CA) | [@NSWOCC](https://twitter.com/NSWOCC) | [OFFICE@NSWOC.CA](mailto:OFFICE@NSWOC.CA) | 1-888-739-5072