# Nutrition Intervention for Surgical Wound Healing in a Patient with Metastatic Cancer and Obesity

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## BACKGROUND

Gastrointestinal (GI) surgical procedures are common interventions to alleviate complications, including obstructions, hernias, and tumor formation. Recovery from these procedures may include total GI tract rest, which affects a patient's ability to meet their nutrient needs. Post-operative complications, such as a non-healing surgical site can result in the development of a wound, further complicating the nutritional needs of the patient. Unhealed, open wounds remain susceptible to surgical site infection (SSI) and impede a patient's quality of life. Risk factors associated with impaired wound healing include comorbidities, infection, aging, malnutrition, and immunosuppressive therapy. Wound healing requires the production and utilization of body proteins to repair damaged tissues, placing the body into a catabolic state. As a result, calorie and protein demands increase alongside the needs for micronutrients like vitamin A, vitamin C, selenium, zinc, and iron. High nutrient needs in conjunction with contraindications for utilizing the GI tract emphasize the need for non-oral nutrition support through intravenous nutrition, known as parenteral nutrition (PN). This case report describes the medical nutrition therapy guidelines to care for a cancer patient experiencing a non-healing surgical wound.

## NUTRITIONAL CONSIDERATIONS

**Energy, Protein, Micronutrient, and Nutrient Delivery Guidelines**

| | |
|---|---|
| **Indirect Calorimetry** | An indirect calorimeter measures metabolic gas exchange to determine energy expenditure and is the gold standard for estimating a patient's exact energy and protein needs.<br>In the absence of indirect calorimetry, predictive equations are used to estimate nutritional needs.[1] |
| **Oncology** | **Calories:** An increased energy diet with energy-dense foods and frequent meals is recommended. Energy restriction is not appropriate for patients at risk of malnutrition.[2,3]<br>**Protein:** 1-1.5 g protein/kg/day to protect and restore lean muscle mass.[2] |
| **Surgery** | **Calories:** 30-35 kcal/kg for catabolic patients or patients with wounds.[4]<br>**Protein:** 1.2-2g/kg/day and an additional 0.5-1 g/kg for surgical patients with large wounds.[4] |
| **Wound Healing** | **Protein:** 1.25-1.5 g protein/kg/day for adults with a wound who are malnourished or at risk. Protein needs may be increased by 250% during wound healing.[5,6]<br>**Micronutrients:**<br>• Vitamin A, Vitamin C, zinc, selenium, and iron.[6]<br>• Multivitamin (MVI) or mineral supplement recommended for those with a suspected or actual deficiency.[4,5] |
| **Indications for Nutrition Support** | **Enteral Nutrition (EN):** Preferred route of nutrition for patients with a functional GI tract.[1]<br>**Parenteral Nutrition (PN):** Utilized when EN is contraindicated, and the GI tract is not functional.<br>• Stable, post-operative patients who report 7-10 days of inadequate intake (at risk for malnutrition) related to gut failure are candidates for PN.[1] |

## CASE REPORT

### CASE SUMMARY

**History:** Patient is a 66-year-old female who presented over three admissions during which she underwent a right hemicolectomy with small bowel resection and experienced surgical wound healing complications. Past medical history includes stage IV adenocarcinoma of the small bowel on chemotherapy via port and obesity.

**Clinical Course:** Patient presented with abdominal pain and underwent GI surgery to treat a small bowel obstruction secondary to tumor formation. The patient readmitted 4 days later with wound dehiscence and was diagnosed with pulmonary embolism. The patient was discharged and subsequently readmitted 5 days later, complaining of excessive wound drainage.

### ASSESSMENT

**Anthropometrics:**

- Height: 5'2 | Weight: 200 lb 6.4 oz | No significant weight change | BMI: 36.65 kg/m$^2$, Class II Obesity

**Nutrition Focused Physical Exam:** No signs of muscle wasting or subcutaneous fat loss

**Food and Nutrition History:**

- Patient reported poor oral intake for ≥ 1 week prior to first admission.

### NUTRITION DIAGNOSIS

Inadequate energy and protein intake related to altered GI function and increased protein needs as evidenced by the presence of a wound at the surgical site and NPO status.

### INTERVENTION

**Goals of Care:** Prevent malnutrition, meet 100% of the patient's calorie, protein, and micronutrient needs to promote wound healing.

**Nutrition Prescription**

| Nutrient | Guideline | Rationale |
|---|---|---|
| **Calories** | 18-22 kcal/kg body weight (BW)<br>20-22 kcal/kg BW | Actual body weight with a lower kcal/kg range accounts for obesity without underfeeding the patient due to catabolic conditions.<br>The range was increased to maximize nutrition for discharge planning. |
| **Protein** | 1.2 g protein/kg BW<br>1.3 g protein/kg BW | Actual body weight accounts for higher nutrient demands for the obese patient. Protein recommendations were increased in TPN to account for prolonged wound healing. |
| **Micronutrients** | Addition of a standard MVI in PN solution. | Ensure patient was receiving micronutrients to prevent deficiency and support wound healing. |
| **Electrolytes** | Adjusted in the PN solution. | Patient was experiencing hypokalemia and hypophosphatemia during hospital stay. Electrolytes were adjusted in the PN to address these concerns. |

**Admission 1**
*PN*
• 113 g 10% amino acids (AA) (1.2 g protein/ kg)
• 150 g 70% Dextrose (D70W)
• 40 g Lipids (20%)
1362 kcals (80% of needs)
113 g protein (100% of needs)
Day 6 of 18

**Admission 2**
*PN*
• 109 g 10% AA (1.2 g protein/kg)
• 200 g D70W
• 45 g lipids (20%)
1566 kcals (96% of needs)
109 g protein (100% of needs)
Day 4 of 7

**Admission 3**
*PN*
• 125 g 10% AA (1.3 g protein/kg)
• 225 g D70W
• 45 g lipids (20%)
1630 kcal (100% of needs)
125 g protein (100% of needs)
Day 1 of 7

**Admission 3**
*PN*
• 125 g AA 10% (1.3 g protein/kg)
• 275 g D70W
• 45 g Lipids
1885 kcals (100% of needs)
125 g protein (100% of needs)
Day 7 of 7

## OUTCOMES

**Admission 1**
- Patient discharged on oral diet <25% intake.

**Admission 2**
- Patient discharged on TPN and wound VAC at home.

**Admission 3**
- Excessive wound drainage is managed inpatient.
- Patient discharged on TPN and wound VAC at home.

## DISCUSSION AND IMPLICATIONS FOR APPLICATIONS

- In the absence of indirect calorimetry, predictive equations provide insight for clinical decision making, but balancing multiple patient conditions is challenging. Predictive equations for the obese patient are sparse, and hypocaloric recommendations are only appropriate in the critically ill population. Nutrition needs were calculated from the actual body weight to maximize the amount of protein received to support wound healing.
- Total parenteral nutrition (TPN) was necessary to meet the patient's full nutritional demands since GI tract utilization was contraindicated. TPN was initiated more easily due to the patient already having central line access via the port.
- The excessive wound drainage seen during admission 3 justified increasing the amount of protein in the TPN solution to better support wound healing.

## CONCLUSIONS

This patient underwent GI surgery due to a small bowel obstruction secondary to tumor formation and experienced subsequent admissions due to wound healing complications. Increased protein intake is crucial to support wound healing, while poor nutrient intake that results in malnutrition hinders this process. Oral intake and EN were contraindicated for this patient, emphasizing the need to find alternative solutions to prevent malnutrition and improve wound healing outcomes. TPN was initiated via the patient's port and her laboratory values (potassium, phosphorus, and magnesium) were monitored to ensure she was tolerating nutrition support. Through initiating PN and adjusting her needs as necessary through monitoring labs and her clinical progression, malnutrition was prevented, and the patient was able to meet 100% of her calorie and protein needs at discharge.

## REFERENCES AND ACKNOWLEDGEMENTS

1. Mueller CM. *The ASPEN Adult Nutrition Support Core Curriculum, 3rd Edition*. Third edition. American Society for Parenteral and Enteral Nutrition; 2017. Accessed March 22, 2026. https://research-ebsco-com.ezproxy.tcu.edu/linkprocessor/plink?id=489317f0-b85c-3d79-a80d-47575beb04f1.
2. Academy of Nutrition and Dietetics. Oncology general guidance: Nutrition intervention. 2022. Nutrition Care Manual. Accessed October 21, 2025. https://www.nutritioncaremanual-org.ezproxy.tcu.edu/topic.cfm?ncm_category_id=1&lv1=2293&lv2=275155&lv3=275161&ncm_toc_id=275161&ncm_heading=Nutrition%20Care.
3. Arends J, Bachmann R, Baracos V, et al. ESPEN guidelines on nutrition in cancer patients. *Clin Nutr*. 2017;36:11-48. doi:10.1016/j.clnu.2016.07.015.
4. Siparski, N. Postoperative parenteral nutrition in noncritically ill adults. Cochran A, Collins KA, eds. UpToDate. UpToDate; 2025. Accessed October 20, 2025. www.uptodate.com.
5. Academy of Nutrition and Dietetics. Surgical and chronic wounds: Nutrition intervention. 2024. Nutrition Care Manual. Accessed March 24, 2026. https://www-nutritioncaremanual-org.ezproxy.tcu.edu/topic.cfm?ncm_category_id=1&lv1=255665&lv2=275467&lv3=275478&ncm_toc_id=275478&ncm_heading=Nutrition%20Care
6. Ghaly P, Iliopoulos J, Ahmad M. The role of nutrition in wound healing: An overview. *Br J Nurs*. 2021;30(5):S38-S42.