Improving Outcomes with Nutrition in Patients with Cancer

Each step in the cancer continuum, from diagnosis through survivorship, poses nutritional challenges for patients. In fact, up to 85% of patients experience weight loss or malnutrition during the cancer journey. But proper nutrition helps patients maintain weight, tolerate treatment, maximize outcomes, and improve quality of life. All healthcare professionals who care for patients with cancer should screen for nutritional issues, regularly assess patients’ nutritional status, and manage problems as they arise with nutrition education and intervention. This paper reviews the prevalence of nutritional issues in the oncology setting, as well as the consequences. The authors explain how nurses can identify at-risk patients and intervene with counseling and oral supplementation. The article concludes with Abbott’s Find-Feed-Follow Oncology Plan, a tool nurses can use in their practice to screen, assess, and manage nutritional issues in their patients.

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Patients with cancer face many challenges, including maintaining a good nutritional status and avoiding weight loss and malnutrition. However, research shows that the majority of patients with cancer suffer from various nutritional deficits, and up to 85% of patients with certain cancer types experience some form of weight loss and malnutrition during their cancer treatment. Poor nutritional status, weight loss, and malnutrition lead to poor outcomes for patients, including decreased quality of life, decreased functional status, increased complication rates, and treatment disruptions. Furthermore, for some patients, the nutritional deficits can proceed to cancer cachexia, a specific form of malnutrition characterized by loss of lean body mass, muscle wasting, and impaired immune, physical, and mental function. Conversely, providing early nutrition intervention for patients can improve patients’ nutritional status and help patients to maintain body weight, maintain lean body mass, better tolerate treatment, and improve quality of life. Therefore, all healthcare professionals who care for patients with cancer need to recognize the signs of malnutrition and be equipped to provide early and effective nutrition intervention to improve outcomes.

Cancer and Nutritional Status

The continuum of cancer includes diagnosis, treatment, recovery, and survivorship. Each stage in this continuum is associated with challenges to patients and their nutritional status. Both the cancer and its treatments can have profound
effects on an individual’s nutritional status, making nutrition screening, assessment, and intervention a vital component of medical care.

One of the most significant nutritional issues that can arise during cancer treatment is malnutrition. Malnutrition is defined as a state of nutrition in which a deficiency, excess, or imbalance of energy, protein, and other nutrients causes measurable adverse effects on body function and clinical outcome.\(^9\) Malnutrition, or a significant decline in nutritional status, is multifactorial and can cause weakness, fatigue, decreased quality of life, an inability to tolerate treatment, and increased mortality.\(^{10,11}\) The incidence of malnutrition in people with cancer ranges from 30–85%.\(^{12}\) Patients with cancer of the lung, esophagus, stomach, colon, rectum, liver, and pancreas are at greatest risk.\(^{13}\) Of people who die from cancer, up to half have been malnourished.\(^{14}\) In fact, up to 20% of patients die from the effects of malnutrition rather than from the cancer itself.\(^{15}\) Malnutrition can result from the disease process, from the use of cancer therapies, or from both. Side effects related to common cancer therapies, including chemotherapy, radiation, immunotherapy, and surgery, are key contributors in promoting the deterioration in nutritional status.

Changes in nutritional status may begin prior to diagnosis, when physical and psychosocial issues commonly have a negative impact on food intake. At cancer diagnosis, 50% of patients present with some form of nutritional deficit.\(^{16}\) Additionally, deterioration in nutritional status has been found to predict outcome prior to the initiation of therapy. DeWys and colleagues found that as little as 5% weight loss predicted decreased response to therapy.\(^{1}\) DeWys et al. also found that overall survival rates, performance status, productivity, and quality of life declined concurrently with weight loss.\(^{1}\) Additionally, approximately 80% of the study patients presented with weight loss before being diagnosed with cancer.\(^{1}\) Subsequently, nutritional status often declines during the natural progression of cancer and its treatment. Three major mechanisms impact nutritional status in patients with cancer.\(^{12}\)

- Reduced ability to efficiently process nutrients as a result of impaired glucose, lipid, and protein metabolism
- Increased energy requirements, secondary to tumor growth, infection/fever, inflammatory status, surgery, and cancer treatments
- Decreased food intake, resulting from side effects such as nausea, vomiting, constipation, diarrhea, and anorexia

As a result of these mechanisms, patients with cancer often have multiple and inter-related nutritional issues. In 2010, a group of nutrition researchers in Australia reported a study of 191 medical oncology patients with varying types of cancer. They found that half (49%) of the patients were malnourished (as assessed by the Patient-Generated Subjective Global Assessment [PG-SGA]).\(^{17}\) The study also showed that about half (46%) of the patients required improved symptom management and/or nutrition intervention compared to what they were currently receiving and that almost all of the patients (89%) had five or more nutrition-related symptoms.\(^{17}\) Other research shows that patients with weight loss and/or malnutrition have worse outcomes than patients without weight loss, including decreased quality of life, increased complication rates, decreased treatment tolerance, and increased mortality (see Figure 1). Andreyev and colleagues conducted a study in 1,555 gastrointestinal cancer patients in which outcomes were measured over a six-year period. The study found that although patients with weight loss received lower chemotherapy doses initially, they developed more frequent and more severe dose-limiting toxicity, especially plantar-palmar syndrome (p < 0.0001) and stomatitis (p < 0.0001) than patients without weight loss.\(^{3}\) Consequently, on average, patients with weight loss received one month (18%) less treatment (p < 0.0001).\(^{3}\) Weight loss correlated with shorter failure-free (p < 0.0001, hazard ratio = 1.25) and overall survival (P <0.0001, hazard ratio = 1.63) and decreased response (p = 0.006), quality of life (p < 0.0001), and performance status (p < 0.0001).\(^{3}\)
In addition to weight loss, cancer patients often experience loss of lean body mass, or muscle mass. Loss of muscle mass can result in decreased immunity, increased infections, increased skin breakdown, decreased healing, and increased mortality.\textsuperscript{18} A 2010 study of 174 chemotherapy patients (breast, gynecologic, head and neck, gastrointestinal, lung, etc.) found that 23\% had malnutrition (as measured by PG-SGA) upon chemotherapy initiation.\textsuperscript{16} The study also showed a significant loss of fat-free mass (FFM) (-7.61\%, p < 0.001) in the patients with severe malnutrition.\textsuperscript{16} This is an important finding because not only is FFM a marker of malnutrition, but malnutrition in the beginning of chemotherapy could be a determinant factor to FFM loss during the treatment.\textsuperscript{16} Another study examined 17 head and neck cancer patients who were starting nine weeks of treatment with concurrent chemotherapy and radiation. The researchers found that weight loss began one week after the start of chemoradiation.\textsuperscript{19} On average, the subjects lost almost 15 pounds over the course of treatment, and lean body mass accounted for 71\% of the weight loss.\textsuperscript{19}

In some patients, malnutrition can progress to cancer cachexia. A 2011 paper from Fearon et al. provided a definition and classification of cancer cachexia developed by a panel of experts: “a multifactorial syndrome defined by an ongoing loss of skeletal muscle mass (with or without loss of fat mass) that cannot be fully reversed by conventional nutritional support and leads to progressive functional impairment.”\textsuperscript{2} Its pathophysiology is characterized by a negative protein and energy balance driven by a variable combination of reduced food intake and abnormal metabolism.\textsuperscript{2} The agreed diagnostic criterion for cachexia was weight loss greater than 5\%, or weight loss greater than 2\% in individuals already showing depletion according to current body weight and height (body mass index [BMI] < 20 kg/m\textsuperscript{2}) or skeletal muscle mass (sarcopenia).\textsuperscript{2} With this consensus statement on the definition of cancer cachexia, an agreement was made that the cachexia syndrome can develop progressively through various stages—from precachexia to cachexia to refractory cachexia, as is depicted in Figure 2.\textsuperscript{2}

Finally, nutrition remains important after treatment for cancer survivors. During survivorship, individuals are often highly interested in diet and lifestyle modifications to prevent cancer recurrence and to optimize their health. Cancer survivors might also experience long-term or chronic side effects from treatment, such as fatigue and saliva changes, that can continue to impact their food intake and nutritional status. Research regarding the effects of diet, exercise, and body weight on survivorship are in the early stages, and recommendations regarding the prevention of future cancer have not been established.\textsuperscript{20} However, cancer survivors are encouraged to follow the same guidelines recommended for cancer prevention including maintaining a healthy body weight, being physically active, consuming a healthy diet rich in plant foods and low in fat intake, and limiting alcohol intake.\textsuperscript{20,21}

Although all patients with cancer are at nutritional risk, not all patients with cancer become malnourished or develop cancer cachexia. Therefore, nutrition screening, assessment, and intervention are crucial to preventing and minimizing the development of malnutrition at all stages of cancer treatment.

The Benefits of Nutrition Intervention

Many studies have demonstrated that maintaining a good nutritional status through nutrition intervention can help
individuals with cancer improve outcomes including:
- Increase energy and protein intake
- Maintain and gain body weight
- Improve quality of life
- Improve strength and energy levels
- Manage treatment-related side effects
- Avoid dose reduction and treatment delays
- Reduce unplanned hospital admissions

Eating well during cancer treatment means including a variety of foods every day to provide the nutrients (protein, carbohydrate, fat, fluid, vitamins, and minerals) needed to maintain health. However, eating well is frequently a challenge because cancer and the side effects of treatment can impact dietary intake and, ultimately, nutritional status.

Individuals with cancer undergoing treatment often need extra calories and nutrients, especially protein. Resting energy expenditure (REE) is often increased and can make it difficult to gain or maintain weight. Encouraging adequate calorie and protein intake is vital for maintaining and improving nutritional status.

Nitrogen balance is an index of whether physiological protein requirements are being met. Many patients with cancer are in negative nitrogen balance, a catabolic state in the body involving muscle degradation resulting in excess nitrogen excretion, in contrast to nitrogen consumption. Provision of additional dietary protein is essential to supply nitrogen for maintenance of nitrogen balance and to prevent muscle breakdown.

Nutrition intervention in cancer patients can involve many strategies, including dietary counseling and oral nutritional supplementation. The goals of nutritional support in patients with cancer are numerous and include maintaining an acceptable weight and preventing or treating protein-calorie and micronutrient deficiencies, leading to better tolerance of treatment and its side effects, more rapid healing and recovery, reduced risk of infection during treatment, and enhanced overall survival.

Oral nutritional supplementation is preferable to enteral or parenteral nutrition in most cancer patients. Research on Nutritional Intervention

Research has demonstrated that nutritional intervention in cancer patients can result in positive outcomes. Nutrition intervention, including oral nutritional supplementation, started as early as possible, can result in a reduction or improvement

FIGURE 2. Stages of Cancer Cachexia
Adapted with permission from Fearon K, Strasser F, Anker SD et al. Definition and classification of cancer cachexia: An international consensus. Lancet Oncol. 2011;12:489-495.
in nutritional status,7 quality of life,7,26-28 performance score,7 strength,29,30 and physical activity,31-33 as well as increased tolerance to treatment6 and better treatment outcomes.5

A 2012 systematic review and meta-analysis of oral nutritional interventions in malnourished cancer patients by Baldwin et al. evaluated 13 studies and included 1,414 subjects.23 This review showed that nutritional intervention, including nutritional counseling and oral nutritional supplementation, was associated with statistically significant improvements in weight and energy intake compared with routine care (mean difference in weight = 1.86 kg, 95% CI = 0.25 to 3.47, p = 0.02; and mean difference in energy intake = 432 kcal/d, 95% CI = 172 to 693, p = 0.001).23 Additionally, nutritional intervention had a beneficial effect on some aspects of quality of life (emotional functioning, dyspnea, loss of appetite, and global quality of life) but had no effect on mortality (relative risk = 1.06, 95% CI = 0.92-1.22, p = 0.43).23

Nayel et al. assessed the effect of oral nutritional supplementation for 10–15 days in patients with head and neck tumors prior to treatment with irradiation.5 Twelve patients were randomly assigned to radiotherapy only and 11 to supplementation plus radiotherapy. All 11 patients who received nutritional supplementation gained weight, whereas seven of the 12 patients treated with radiotherapy alone lost weight, a significant difference (p = 0.001).5 Radiotherapy had to be discontinued in five of the 12 patients who received no nutritional support due to severe mucositis or poor performance status, while all 11 who received supplementation received a course of irradiation without interruption.5

A study of 60 patients with head and neck cancer or lower gastrointestinal cancer undergoing radiation therapy by Bauer et al. compared usual care to a program of nutritional intervention including dietary counseling and provision of oral nutritional supplements. Patients in the nutritional intervention group compared to the usual care group had better weight maintenance (p = 0.001), less deterioration in nutritional status (p = 0.02), and a smaller decrease and faster recovery in global quality of life and physical function (p = 0.009) measured by a European Organization for the Research and Treatment of Cancer (EORTC) instrument.7

In a study of 271 patients being treated for a variety of head and neck or gastrointestinal cancers, Ravasco et al. showed that patients rated weight loss and dietary intake as the greatest determinant of their quality of life.26 These concerns were greater than stage, duration, or treatment of their cancer, suggesting that interventions to improve quality of life are of high interest to patients.

Davidson et al. studied patients with pancreatic cancer who experienced an average 17% weight loss prior to entering the study.27 Those patients who reached weight stabilization had improved quality-of-life scores (EORTC) (p = 0.037) and longer survival (p = 0.019).27 In a small study of colorectal cancer patients receiving oral nutritional supplements prior to and during treatment with combination chemotherapy of leucovorin, 5-fluorouracil, and irinotecan (FOLFIRI) showed not only improved quality of life (p = 0.05) but also increases in weight (p = 0.03) and preservation of lean body mass.28 In another study in patients receiving chemotherapy for non-small cell lung or pancreatic cancer, intense dietary counseling and oral nutritional supplementation showed improvement in nutritional status (p = 0.019), quality of life (p = 0.01), and performance status (p = 0.019).7

Odelli et al. showed that patients undergoing chemoradiotherapy for esophageal cancer in a nutrition intervention program experienced better outcomes than those who had received usual care. The patients receiving nutrition intervention had greater treatment completion rates (92% vs. 50%; p = 0.001) and fewer unplanned hospital admissions (46 vs. 75; p = 0.04), and those who were admitted to hospital had shorter length of stay (3.2 days vs. 13.5 days; p = 0.002) compared to the patients receiving usual care.8

Expert nutrition groups including the American Society for Parenteral and Enteral Nutrition (ASPEN) and the European Society for Clinical Nutrition and Metabolism (ESPEN) have both issued clinical guidelines for nutritional treatment of cancer patients. The ASPEN guidelines state that patients with cancer are nutritionally at risk and should undergo nutrition screening to identify those who require formal nutrition as-

Hypothetical Case Study: Part 2

Two Weeks Later:
Jane has begun to complain about:
• Mouth sores
• Nausea
• Pain upon swallowing

She has lost 6 pounds since her initial visit – current weight: 134 lbs. She is not concerned about her weight loss; she considers it the “silver lining” of treatment.

What should be the oncology nurse’s concerns? Other healthcare providers? How should Jane be counseled now? What interventions are appropriate?

(Please refer to the Find-Feed-Follow Oncology Plan on page 8.)

FEED/FOLLOW:
• Provide patient education on nausea, mouth sores, and swallowing difficulty.
• Counsel Jane on a high-calorie, high-protein diet.
• Prescribe 2 servings of an oral nutritional supplement per day.
• Provide oral nutritional supplement coupons and other suggestions such as a Web site for easy product access: www.abbottstore.com/nutrition4

Case study continued on page 6
in cancer patients both recommend that nutritional screening and assessment of cancer patients should be performed frequently and nutritional intervention should be initiated early when deficits are identified.24,25 Nutrition screening tools that are commonly used in cancer patients include the Patient-Generated Subjective Global Assessment (PG-SGA) and the Malnutrition Screening Tool (MST).34,36,37 Both screening tools are easy to use and have been validated in the cancer setting. The entire healthcare team needs to work together to identify cancer patients at risk of malnutrition early in order to plan the best possible intervention and follow-up during cancer treatment and progression.39 One method of implementing this nutrition care into clinical practice is by use of the Find-Feed-Follow Oncology Plan to help find patients at risk, feed patients the appropriate oral nutritional supplements and provide targeted nutrition education, and follow patients’ progress. See the Find-Feed-Follow Oncology Plan on page 8.

Summary

Poor nutritional status, weight loss, and malnutrition are common in patients with cancer. These nutritional challenges significantly increase morbidity and mortality in these patients, and severe cases can lead to cancer cachexia. Early nutrition screening and intervention are vital in these patients to help prevent this nutritional decline and to help patients better tolerate their treatment regimens. Research has demonstrated that early nutrition intervention, including oral nutritional supplementation, improves outcomes in cancer patients, including nutritional status, weight, treatment tolerance, and quality of life. A multidisciplinary approach among all healthcare professionals involved in cancer care is necessary to identify at-risk patients early in the process and provide the appropriate and effective nutritional interventions.

Identifying At-Risk Patients and Providing Appropriate Nutrition Intervention

Patients with cancer face many nutritional challenges, including treatment-related side effects and weight loss. For many of these patients, these challenges are present prior to cancer diagnosis and can worsen during the course of treatment. Therefore, it is imperative that the healthcare team identify patients early so appropriate nutrition interventions can be implemented to help improve the patients’ outcomes and quality of life. The research and expert recommendations support a preventive, rather than therapeutic, approach that encompasses nutrition screening as early as possible and treatment of nutritional problems through nutrition intervention.2,15,24,25,34,35 The ASPEN and ESPEN guidelines for nutrition screening with the development of a nutrition care plan.24 The ESPEN guidelines provide further guidelines: 25

- During radio- or radio-chemotherapy, use intensive dietary advice and oral nutritional supplements to increase dietary intake and to prevent therapy-associated weight loss and interruption of radiation therapy (grade A).
- Nutrition assessment should be performed frequently and nutrition intervention initiated early when deficits are detected (grade C).
- Start nutrition therapy if undernutrition already exists or it is anticipated that the patient will be unable to eat for > 7 days (grade C).

Hypothetical Case Study: Part 4

Two Weeks Later:

- Jane is admitted to the hospital’s oncology unit.
- She is diagnosed with pneumonia.
- She has lost 5 more pounds – current weight: 120 lbs.

What is the likely outcome for Jane at this point?
What interventions can be employed?

(Please refer to the Find-Feed-Follow Oncology Plan on page 8.)

FEED/FOLLOW:

Recommend a dietitian consultation while Jane is in the hospital to assess her nutritional status and need for additional nutrition interventions.
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References

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(31) Moses AW, Slater C, Preston T, Barber MD, Fearon KCH. Reduced total energy expenditure and physical activity in cachectic cancer patients with pancreatic cancer can be modulated by an energy and protein dense oral nutritional supplement enriched with omega-3 fatty acids. Br J Cancer. 2004;90:996-1002.
## Find-Feed-Follow Oncology Plan

### Diagnosis:
- Breast cancer/Prostate cancer

### Symptoms: Yes, to 1-2 of the following:
- Change in eating habits
  - eating less
  - eating less solids
  - unable to eat
- Nausea and vomiting
- Diarrhea
- Loss of appetite
- Difficulty chewing and swallowing
- Less involvement with activities of daily living

### Weight Loss:
- Up to 5% since start of treatment

### Nutrition Targets—per kg body weight

<table>
<thead>
<tr>
<th>Calorie Target</th>
<th>Protein Target</th>
<th>Supply Patient Support Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LOW RISK</strong></td>
<td>25-30 Kcal/kg</td>
<td>Patient educational brochure, oral nutritional supplement sample, and coupons</td>
</tr>
<tr>
<td><strong>PROTEIN</strong></td>
<td>1-1.2 g/kg</td>
<td>Symptom management handouts</td>
</tr>
</tbody>
</table>

**Recommended Nutrition Plan:**
- Recommend oral nutritional supplement as needed (1-2/day)
- Ensure Clinical Strength® 8 oz.
- 350 Kcal 13 g protein 1.5 g Revigor
- For patients with diabetes – Glucerna® Shake 8 oz.
- 200 Kcal 10 g protein

**Recommended Nutrition Plan Follow-Up:**
- Conduct weekly weights, monitor change
- Reassess nutritional risk at every visit
- Verify patient adherence to nutrition plan

### MODERATE RISK

### Diagnosis:
- Pancreatic cancer/Lung cancer/GI cancer/Colorectal cancer

### Symptoms: Yes, to 3-4 of the following:
- Change in eating habits
  - eating less
  - eating less solids
  - unable to eat
- Nausea and vomiting
- Diarrhea
- Loss of appetite
- Difficulty chewing and swallowing
- Less involvement with activities of daily living
- At risk for a wound

### Weight Loss:
- Weight loss prior to treatment of >5%
- Weight loss since start of treatment of 6%-10%

### Therapy
- Concurrent therapies

### HIGH RISK

### Diagnosis:
- Head and neck cancer

### Symptoms: Yes, to 5 or more of the following:
- Change in eating habits
  - eating less
  - eating less solids
  - unable to eat
- Nausea and vomiting
- Diarrhea
- Loss of appetite
- Difficulty chewing and swallowing
- Less involvement with activities of daily living
- Wound

### Weight Loss:
- Weight loss >10% since treatment

### Therapy
- Breaks in treatment

## The American College of Surgeons Commission on Cancer 2012 Program Standards indicate an optimal cancer program encompasses nutrition services, including screening and education, across the cancer continuum.18

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with Abbott Nutrition

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* Ensure Clinical Strength twice daily has 3g Revigor (CaHMB).
Juven twice daily has 3g of Revigor. Do not exceed a total of 4 servings per day of Ensure Clinical Strength and Juven.

Use under medical supervision.

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