Significant weight loss and resultant malnutrition in patients undergoing radiotherapy for head and neck carcinomas are recognized and preventable clinical concerns. Morbidity related to weight loss during treatment may include dehydration, hospitalization, compromised treatment efficacy, and reduced quality of life and may impact survival. Malnutrition effects on wound healing may prolong recovery following treatment and increase the risk of morbidity for those undergoing subsequent salvage surgery. Multiple interventions have been implemented to help ameliorate the impact of treatment on weight loss and nutritional status, including the use of percutaneous endoscopic gastrostomy (PEG) tubes. The value of prophylactic PEG tube placement at treatment initiation increasingly is being recognized, and evidence suggests that patients experience better outcomes. Criteria for patient selection have not been defined completely, and a great deal of variation in clinical practice exists, contributing to underuse of this supportive intervention. According to a literature review, patients who require therapeutic PEG tube placement in response to significant weight loss during treatment suffer greater morbidity than patients who receive PEG tubes prophylactically. Understanding patient-, tumor-, and treatment-related risk factors to systematically identify patients most likely to benefit from prophylactic PEG tube placement is an important aspect of nursing care.

Head and neck cancers represent a complex grouping of cancers that may originate from a variety of sites (e.g., the nasopharynx, oropharynx, oral cavity, hypopharynx, larynx) (see Figures 1, 2, and 3). Although relatively rare, an estimated 35,000 new cases of head and neck cancer will be diagnosed in 2007 (Jemal et al., 2007). Outcomes of the disease and treatment according to stage are dictated largely by the unique site of origin (see Figure 4) and often result in significant cosmetic and functional sequelae, warranting particularly attentive supportive care. Nutritional complications are common among patients with head and neck cancer and often are present before treatment is initiated because of the effects of tumor presence in the oral cavity or throat (Lees, 1999). Swallowing impairment may develop from treatment-related effects; therefore, the risk of dehydration and malnutrition during therapy is a significant clinical concern.

Radiation therapy is an effective treatment for many head and neck cancers and may be used as primary definitive treatment (with or without concurrent chemotherapy) or recommended adjuvantly after primary surgical resection. For locally advanced disease, aggressive combined modality approaches to treatment are more likely to be recommended for curative intent (Seiwart & Cohen, 2005). In addition, as interest increases in organ preservation approaches to treatment, the number of patients receiving intensive multimodality therapy is likely to increase (Hoffman et al., 2004; Shafman, 2006).
Common Reactions in Patients With Head and Neck Cancer

Common acute reactions experienced during radiotherapy by patients with head and neck cancers include oropharyngeal mucositis, dysgeusia, xerostomia, and fatigue, which often contribute to dehydration and significant weight loss. Symptoms generally progress as the radiation dose accumulates over a six- to seven-week treatment period and may be compounded by the addition of chemotherapy (Munshi et al., 2003; Seiwart & Cohen, 2005; Shafman, 2006). Mucositis occurs in essentially all patients undergoing radiotherapy for head and neck cancer (Stokman et al., 2003). Although multimodality therapies generally are associated with increased toxicity, cetuximab has been the first agent in head and neck cancer treatment that does not amplify mucositis development when given in combination with radiation (Bonner et al., 2006). However, the role of cetuximab therapy in head and neck cancer has not been fully explored and does not preclude concurrent chemotherapy (e.g., cisplatin). Intensity-modulated radiotherapy techniques also are helping to limit the morbidity caused by treatment-related mucositis and xerostomia. Further investigations hopefully will continue to identify mucositis-sparing modalities in the treatment of head and neck cancers.

Malnutrition

Because of the expected toxicities, malnutrition in patients with head and neck cancer is a serious clinical concern for patients, their caregivers, and their providers. Malnutrition during treatment has been associated with more emergency room visits,
hospitalizations, and treatment interruptions; compromised treat-
ment efficacy; and diminished quality of life (Beaver, Matheny,
Roberts, & Myers, 2001; Larsson, Hedelin, & Athlin, 2003; van
Bokhorst-de van der Schuer et al., 1999; Zogbaum, Fitz, & Duffy,
2004). Significant weight loss prior to surgery for head and neck
cancer has been correlated with worse outcomes (van Bokhorst-
de van der Schuer et al., 2000). Involuntary weight loss greater
than 5% in one month, or more than 1%–2% per week, is a reliable
indicator of malnourishment (Beaver et al.). Despite awareness,
malnutrition continues to contribute to significant morbidity
during and after therapy, and evidence suggests persistent un-
dertreatment of patients (Larsson, Hedelin, Johansson, & Athlin,
2005). Although providers and patients are cognizant of the mor-
bidity that severe malnutrition may entail, the pervasive attitude
that some weight loss during treatment is inevitable may impede
aggressive intervention. Maintaining adequate nutrition during
treatment requires considerable commitment and motivation for
most patients. Swallowing difficulty, loss of appetite, dry mouth,
and taste changes may increase the time and effort required for
optimal intake, and for some, the prospect of weight loss is viewed
as a benefit of therapy. Patients without support at home to prompt
feeding at regular intervals are more likely to find maintaining
adequate intake difficult.

**Percutaneous Endoscopic Gastrostomy Tubes**

Feeding tubes are beneficial in facilitating adequate nutrition
and hydration during head and neck cancer treatment because
they do not result in mucosal irritation and taste changes (Riera
et al., 2002). Percutaneous endoscopic gastrostomy (PEG) tubes
are preferred in patients with head and neck cancer over naso-
gastric tubes (Lee et al., 1998; Piquet et al., 2002) (see Figure 5).
Although PEG tube placement is considered relatively safe and
has a low rate of significant associated complications, it is not an
entirely benign invasive procedure. Common complications asso-
ciated with PEG tube placement include local site infections, tube
blockage, and migration or dislodgement. Serious complications,
such as peritonitis, abscess, or fistula development, are relatively
uncommon (Riera et al.). Rare case reports of metastasis of the
primary tumor to the gastrostomy site have been documented
(Sinclair, Scolapio, Stark, & Hinder, 2001). Therapeutic PEG tubes
(TPT) commonly are placed during treatment in patients who

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**Figure 3. Anatomy of the Hypopharynx**

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**Figure 4. Head and Neck cancer Sites in the Nasopharynx**
develop severe swallowing difficulty (e.g., when swallowing fluids) (Munshi et al., 2003). The benefit of prophylactic PEG tube (PPT) placement at treatment initiation, prior to development of mucositis and weight loss, is being increasingly recognized (Scolapio, Spangler, Romano, McLaughlin, & Salassa, 2001).

Currently, criteria for patient selection regarding PPT placement are not standardized. Clinical judgment, in addition to patient and family preferences, most commonly guides the decision on an individual basis and may vary greatly based on the practice setting (Zogbaum et al., 2004). Chart reviews of patients with head and neck cancer undergoing irradiation consistently demonstrate that a significant number ultimately require TPT during treatment and have worse outcomes (i.e., significantly greater weight loss and increased hospital admissions for dehydration) than high-risk patients selected for PPT placement, thus illustrating the underuse of the intervention (Beaver et al., 2001; Larsson et al., 2005; Lee et al., 1998).

Some patients have reported feelings of indignity and shame when contemplating feeding tube placement (Larsson et al., 2003), which may contribute to resistance to PPT placement before significant mucositis is experienced. Nurses working with patients with head and neck cancer are in a position to significantly impact care by identifying those at risk for nutritional-related complications, providing support and education about nutrition during treatment, and influencing patient and provider decisions about invasive supportive care (e.g., PPT, TPT) when appropriate. Because it is not feasible or appropriate to place PPTs in all patients undergoing irradiation for head and neck cancer, careful selection of patients at significant risk for treatment morbidity because of malnutrition is essential. Until greater systematic selection of patients appropriate for PPT is implemented, understanding the risk factors associated with morbidity from treatment-related weight loss aids nurses in identifying at-risk patients and providing appropriate counseling and intervention.

### Literature Review

Munshi et al. (2003) attempted to describe the pattern of weight loss and associated causative factors for patients during radiotherapy for head and neck cancer. They retrospectively reviewed the course of 140 patients with head and neck cancer undergoing irradiation (i.e., definitive radiotherapy, combined chemoradiotherapy, or adjuvant radiotherapy). Weight loss occurred as early as the second week of therapy; the greatest decline in weight occurred during weeks 3 and 4 of treatment, with approximately 37% of patients, including those who were selected for feeding tube placement before or during treatment, losing 5 kg or more overall during the treatment course. Risk factors that were significantly associated with serious weight loss (greater than 5 kg) were initial Karnofsky performance status less than 80, combination chemoradiotherapy, and receiving a total dose 60 Gy or more. The study may have underestimated the incidence of serious weight loss during treatment because patients who required more than a five-day break in treatment were excluded from evaluation. Patients who require a prolonged treatment delay have poor treatment tolerance and may be at even greater risk of nutritional deficiencies.

In a retrospective, descriptive chart review of 50 patients undergoing head and neck cancer treatment, a decline in weight was documented by the second week of treatment, with all patients losing 2%–11% of their weight despite implementation of interventions (Larsson et al., 2005). By the third week of treatment, 26% of patients received a TPT, which increased to 42% by treatment completion. Most patients had nasopharyngeal, oropharyngeal, or hypopharyngeal tumors or significant pretreatment swallowing impairment. Although no characteristics were identified with significant differences in weight loss among groups, the small sample size and incomplete records may have made that more difficult to detect. Pre- and post-treatment weights were not documented consistently, making evaluation of the efficacy of placing TFTs so late in treatment difficult to determine.

Another retrospective chart review of 249 patients with head and neck cancer aiming to identify characteristics associated with significant weight loss during treatment reported that, of the 32% of patients in whom feeding tubes were placed, most were placed during treatment in response to a malnutrition-related event (Beaver et al., 2001). Significantly greater weight loss, hospitalizations, and emergency room visits for dehydration and the need for TPT occurred in patients with nasopharyngeal tumors and those receiving concurrent chemoradiotherapy. In addition, patients receiving postoperative radiation or with oropharyngeal tumors were more likely to be considered high risk based on clinical criteria. Those patients were more likely to have a PPT placed and had significantly less incidence of severe weight loss. The need for TPT placement during or immediately after treatment was associated with greater overall weight loss and morbidity, implying that aggressive intervention for the remainder of therapy does not adequately compensate for significant depletion once evidence of malnutrition has occurred.

Lee et al. (1998) reviewed records for 88 patients with locally advanced head and neck cancer undergoing accelerated twice-
daily radiotherapy or chemoradiotherapy. They found that pa-
tients with lower baseline performance status and oropharyngeal
tumors were more likely to be selected for PPT placement (41%) 
and demonstrated significantly less severe weight loss (greater 
than 5% decline in weight). The 59% who did not receive a PPT 
experienced greater hospitalizations for dehydration, at which 
point TPTs usually were placed (31%). Although overall hospital-
izations, treatment interruptions, and survival at three years were 
not statistically significant, patients perceived to be at higher risk 
were more likely to have earlier intervention (PPT), which may be 
a confounding factor. Earlier intervention in the TPT group may 
have averted hospitalizations for dehydration, which is consistent 
with findings in other studies (Beaver et al., 2001).

Although few prospective studies have been conducted to eval-
uate PPT efficacy, Piquet et al. (2002) compared patients selected 
for PPT (i.e., age greater than 70 years, body mass index less than 
20, or recent weight loss greater than 10%) against comparable 
historical controls. Based on the criteria, 74% of patients quali-
fied for PPT and an additional 13% ultimately received PPT for 
significant dehydration and weight loss. In the control group, 11% 
had early PEG tubes placed based on clinical judgment and an 
additional 27% underwent subsequent TPT placement. As expected, 
patients prospectively evaluated for prophylactic intervention 
experienced significantly less weight loss and no hospitalizations 
for dehydration compared with the standard care group.

Implications for Nursing Care

Malnutrition is a recognized complication of head and neck 
cancer and its treatment. The clinical significance of its occur-
rence is manifested by the incidence of dehydration-related 
emergency room visits and hospitalizations, reduced treatment 
efficacy because of treatment delays and dose reductions, impact 
on quality of life, and overall survival. Treatment toxicity, includ-
ing mucositis and radiation dermatitis, may be exacerbated by 
poor nutritional state during therapy and may impact recovery 
time because of the effects of malnutrition on wound healing. 
Altered immune function also may increase the risk of infections, 
particularly when combined with integumentary compromise.

Multiple strategies have been suggested to prevent morbidity 
related to nutritional deficit and weight loss. Assessment of base-
line weight and evidence of pretreatment weight loss or eating 
impairment may herald poor treatment tolerance and the need 
for increased nutritional support. Patient assessments should be 
performed weekly or more frequently as warranted, with special 
attention to swallowing ability, weight change, hydration status, 
electrolytes, and albumin to ensure early detection and interven-
tion. Weight loss of more than 1%–2% per week, or 5% in less than 
a month, should prompt further patient assessment, nutritional 
counseling, and more aggressive interventions (e.g., promotion 
of high-calorie, high-protein nutritional supplements) (Larsson et 
al., 2005; Nitenberg & Raynard, 2000). Regular dietary counseling 
during treatment also has been recommended because it has been 
associated with less weight loss during treatment (Dawson, Mor-
ley, Robertson, & Soutar, 2001). Use of megestrol acetate during 
treatment to stimulate appetite has been investigated and may be 
of some benefit in certain circumstances (McQuellon et al., 2002). 
However, the benefits of stimulating appetite when a physical 
impediment exists to swallowing may not be fully realized.

Based on a review of available literature, all patients undergo-
ing radiotherapy for head and neck cancer should be assessed 
prior to therapy and at regular intervals during treatment for 
the potential need for enteral feeding tube placement. When 
TPT placement occurs later in treatment (after the third or 
fourth week), weight loss is less likely to improve, increasing the 
incidence of treatment interruptions and hospitalization. Early 
identification of patients in need of PEG tube support prior to 
treatment or in the first few weeks of therapy should be a priority 
in nursing evaluation and counseling (Beaver et al., 2001; van 
Bokhorst-de van der Schuer et al., 1999; Zogbaum et al., 2004).

Characteristics Associated With Risk 
for Nutrition-Related Morbidity

Patterns of malnutrition-related morbidity have been reported 
and highlight risk characteristics in three major domains: 
patient-related factors, tumor-related factors, and treatment-
related factors.

Patient-related factors may reflect the patient’s overall 
health status regarding presence of comorbidities, prior treat-
ment, or the impact of tumor presence. They include the pres-
ence of eating difficulty prior to treatment (related to disease 
presence or prior surgery) (Larsson et al., 2005), losing more 
than 10% of weight in the six months prior to beginning treat-
ment (Beaver et al., 2001; Piquet et al., 2002; van Bokhorst-de 
van der Schuer et al., 1999), and poor initial performance 
status (Karnofsky performance status less than 80% at the start 
of treatment) (Munshi et al., 2003). Although being older than 
age 70 was considered a risk factor by Piquet et al., other studies 
have not supported greater risk associated with age alone. The 
impact of social status (living alone) has not been specifically 
correlated with risk but should be investigated further. A recent 
investigation recognized poorer overall outcomes in unpart-
nered male patients with head and neck cancer in comparison 
to those living with a wife or significant other (Konski et al., 
2006). Clearly, maintaining adequate nutritional intake and hy-
dration through treatment is a greater challenge for those who 
live independently and have less assistance and support.

Tumor-related factors that contribute to the risk of 
malnutrition-related morbidity are advanced tumor stage (III 
or IV) and pharyngeal primary tumor site (nasopharynx, hy-
popharynx, or oropharynx, particularly base of tongue) (Beaver 
et al., 2001; Larsson et al., 2005). Advanced-stage disease may 
contribute to more tumor-related symptoms and may prompt 
more aggressive treatment, including combined modality ap-
proaches. As pharyngeal structures are involved more directly 
in the swallowing mechanism than other head and neck sites 
(e.g., the oral cavity, larynx), greater impact on swallowing dif-
culty in patients is not unexpected.

Treatment-related factors that contribute to the risk of 
malnutrition and its complications include radiation in combi-
nation with chemotherapy, radiation dose of 60 Gy and great-
er, and hyperfractionated radiation schedules (e.g., smaller dose 
given twice per day at least six hours apart) (Beaver et al., 2001; 
Larsson et al., 2005; Munshi et al., 2003; Piquet et al., 2002; 
v Bokhorst-de van der Schuer et al., 1999; Zogbaum et al., 2004). 
Interestingly, field size has not been recognized as a risk factor 
during treatment, which may be related to the greater importance
of the sensitivity of the specific structures in the field (e.g., the base of tongue) rather than absolute field size itself.

Conclusions

PPT placement has demonstrated efficacy in reducing weight loss and dehydration-related events during radiotherapy for head and neck cancer in select patients. Although evidence-based standards are not in place to guide selection, nurses can influence patients based on risk factors that have been identified. Further investigation, including more prospective studies evaluating specific selection criteria for use, is needed to ensure proper use of this supportive measure. More information also is needed to address the needs of special groups of head and neck cancer populations, including women and unpartnered men. The disturbing number of patients who receive TPT late in treatment illustrates the need for more proactive intervention. Selection criteria based on evidence, rather than clinical judgment alone, may assist in earlier identification of patients. Attention to systematic evaluation of all patients being considered for head and neck cancer irradiation also raises the level of awareness and encourages proactive practices. With greater understanding of appropriate interventions, significant weight loss during treatment need not be perceived as inevitable after all.

Author Contact: Jormain Cady, ARNP, MS, AOCN®, can be reached at jormain@u.washington.edu, with copy to editor at CJONEditor@ons.org.

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