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IMPROVING NUTRITIONAL STATUS IN HEAD AND NECK CANCER PATIENTS: A CLINICAL GUIDELINE

by:

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AN ABSTRACT OF THE PROJECT OF

Joyce Abi Kharma for Master of Science in Nursing
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Head and neck cancer patients are among the most susceptible groups of cancer patients to suffer from inadequate oral intake resulting in malnutrition. Two major factors play a role in the studied consequence; they are the tumor location at first and then the type of treatment received. Despite the significance of the problem, there is no standardized intervention plan for these patients due to the limited empirical evidence. The aim of the project was to develop a protocol for the nutritional assessment and treatment of head and neck cancer patients.

The literature was reviewed for the major oral complications (oral mucositis, dysphagia and trismus) that head and neck cancer patients suffer from during their diagnostic and treatment phases and their impact on nutritional status, as well as assessment tools that are used and treatment modalities. Then, the proposed nutritional guideline focuses on early screening, detection and prophylactic treatment in order to preserve the patient nutritional health. In addition, the Malnutrition Universal Screening Tool (MUST) is selected for malnutrition assessment. Then an algorithm for treatment is based on the MUST score.

This project will be submitted later on to the Radiation Oncology Department at the American University of Beirut for possible adoption. An implementation and evaluation plans are descr5ibed, with delineation of the roles of health professionals from various disciplines who will be involved in the guideline.

CONTENTS

CHAPTER I

INTRODUCTION

Among the cancer population, the head and neck cancer group has been classified as the number seven most commonly occurring type of cancer worldwide (Bossola, 2015), with more than 600,000 annual diagnoses (Nund et al., 2014). According to the Lebanese Ministry of Public Health, the incidence of head and neck cancer patients in Lebanon was 268 new cases in 2007. The majority of head and neck tumors belong to the squamous cell carcinoma category (Jensen et al., 2004; Matar &Haddad, 2011; Bragante, Nascimento & Motto, 2012; Donovan & Glackin, 2012). As categorized by the National Comprehensive Cancer Network, 30 different tumor sites are listed for head and neck cancer. These tumors are divided into five categories depending on the location of the mass. The five categories include: 1) laryngeal and hypopharyngeal cancer, 2) nasal cavity and paranasal sinus cancer, 3) nasopharyngeal cancer, 4) oral and oropharyngeal cancer including the oral mucosa: lips gums, tongue, gingiva, mouth floor; and 5) salivary gland cancer.

Several risk factors and life style habits can increase an individual's chance of being diagnosed with head and neck cancer (Donovan & Glackin, 2012). These factors include age, smoking, chewing Tobacco, alcohol abuse, vitamin A and iron deficiency, prolonged sun exposure, presence of Human Papilloma Virus, Epstein Barr Virus, and a positive family history (Bragante, Nascimento & Motto, 2012).

Head and neck cancer patients have higher five-year survival rates, up to 60%, when compared to other tumors such as gastric, liver and lung cancer (Donovan & Glackin, 2012). Nevertheless, several side effects related to the tumor location and treatment related toxicities affect the overall health and prognosis of patients (Matar & Haddad, 2011; Suzuki, 2012). Head and neck cancer patients experience difficulties while speaking, masticating, swallowing and breathing, which may lead to significant low self-esteem and social isolation (Matar & Haddad, 2011; Nund et al., 2014; Suzuki, 2012). Specifically, the tumor location, type of treatment received such as surgery, radiotherapy or radio-chemotherapy combined; the social and psychological status of the patient; and his/her quality of life during and following treatment of play a significant role in his/her daily nutritional intake (Sheth et al., 2013).

A. Problem Significance

Despite the significant medical advances in cancer management, maintaining an adequate nutritional intake in patients remains one of the challenges facing treatment at this moment. Over two million annual deaths are reported among the cancer population due to cachexia caused by malnutrition (Holmes, 2013). In the cancer population, patients with head and neck tumors are the most susceptible group to suffer from inadequate nutritional intake and subsequent complications leading to severe unintentional weight loss, muscle wasting and death (Holmes, 2013; Kartin et al., 2014; Mayre-Clinton et al., 2011, Sheth et al., 2013). Unfortunately, the location of these tumors further compromises swallowing, and thus oral intake. Due to the bulkiness of the tumor the patient initially pre-treatment starts experiencing difficulties

swallowing and masticating, followed by reduced taste sensation (Gould & Lewis, 2006; Paccagnella et al., 2008; Valentini et al., 2012). These symptoms alter the patient's eating habits leading to low oral intake and resulting in malnutrition and decreased social interactions (Donovan & Glackin, 2012). Head and neck tumors are treated either with single modal treatment by surgery or radiotherapy, or by a multimodal approach including surgery and radiotherapy, or surgery and chemo-radio, but never by chemotherapy alone (Matar & Haddad, 2011).

More than 59% of head and neck cancer patients have some degree of malnutrition upon diagnosis (Amaryl et al., 2008; Lambertz et al., 2010; Machin & Shaw, 1998). Then with every treatment option, several side effects further compromise oral intake such as the development of oral mucositis during radiotherapy, in up to 80% of patients, and thus lead to more inadequate nutrition and further complications (Vidal-Caseriego et al., 2015). The addition of chemotherapy to radiotherapy increases the chances of survival in certain types of head and neck cancer patients; however, such addition will worsen the oral side effects. Lambertz et al. (2010) discussed treatment related toxicities induced by chemotherapy when added to radiotherapy, namely nausea and vomiting, oral pain, oral mucositis, infection, odynophagia, altered taste sensation, loss of appetite with weight loss, fatigue and dehydration. More than 10% of body weight is lost while patients are receiving treatment (Bossola, 2015).

The nutritional intake in head and neck cancer patients receiving multimodal therapy becomes severely compromised and because of nutritional depletion, patients may require

hospital admission for enteral or parenteral feeding, leading to either interruption of the treatment that is stopping the cycles for a few days, or treatment dose reduction. In fact, treatment induced oral mucositis from radiotherapy may account for treatment interruption in around 8% to 27% of radiotherapy patients and up to 50% in chemoradiotherapy patients. Furthermore, with increased hospital length of stay, the financial burden is added to the patient, and the cost of nutritional status correction for severely malnourished patients may reach up to 6000$. Thus investigators highlighted the importance of early nutritional intervention and continuous close follow up in order to help avoid malnutrition, weight loss and treatment interruption (Lambertz et al., 2010).

Another treatment method for patients with head and neck tumors that has significant effects on nutritional intake are surgical interventions. Depending on the tumor's site, size, stage and patient's preference, surgery might be required whether as a primary option or secondary to chemo-radiotherapy. Specifically, the location of the tumor such the mouth, lips, tongue, gums or salivary glands has a significant impact on nutritional status. In most cases removal of the tumor might also involve removal of the salivary gland with it, and thus directly influence oral intake. Patient's swallowing habits and sensations are altered remarkably. The importance of maintaining an adequate nutritional intake during treatment does not only impact the patient during this phase of his journey, but also has significant effect on his quality of life following treatment (Languis et al., 2012; Matar & Haddad, 2011).

Anecdotal evidence from my observations in taking care of this patient population and based on communicating with the oncology radiation attending, suggests that malnutrition is a

prevalent problem at the American University of Beirut Medical Center (AUBMC). Moreover, the practice concerning nutritional status assessment of head and neck patients at AUBMC is focused on weekly weight assessment and percentage weight change that is evaluated at the Radiation Oncology Department by the registered nurse. When significant weight changes are noted, the patient is referred to a nutritionist for screening and intervention. However, after reviewing the literature, it is recommended that nutritional screening and prophylactic nutritional support should take place earlier in the pre-treatment phase (Bossolla, 2014; Brown et al., 2014; Cady, 2006). Moreover, weight assessment may not be enough as the sole measure of nutritional status, without examining factors that lead to malnutrition in this patient population.

The aim of this proposed project is to first highlight the oral complications that head and neck cancer patients suffer from during their battle with cancer and its treatment, and their impact on the patient's nutritional status. Then, an evidenced based nutritional guideline will be developed to be proposed to the Radiation Oncology Department at AUBMC for possible adoption during the treatment phases of head and neck cancer. The Radiation Oncology Department at AUBMC submitted a proposal to start a longitudinal study about the effects of radiotherapy on head and neck cancer patient's general health, including nutritional status and quality of life. After completing my nutritional recommendation guideline, I plan on submitting my paper to the department and participate in conducting their study.

CHAPTER II

LITERATURE REVIEW

This chapter is a review of the literature on disease and treatment related factors that affect nutritional status in head and neck cancer patients, the assessment of malnutrition and the tools used for nutritional evaluation, as well as prevention and treatment strategies.

The location of the tumor determines how soon in the disease trajectory oral intake will be compromised, for example tumor of the tongue vs. tumor of the larynx; later on the treatment method adds to the severity of the damage and thus further compromises the nutritional condition (Sheth et al, 2013). Prince and Ailles, in their study (2008) described the types of cancer cells present in head and neck tumor; they highlighted the existence of tumorigenic cell. The presence of these specific cells is responsible for cancer relapse in head and neck cancer patients. These tumorigenic cells are accountable for the overgrowth and uncontrolled differentiation of the squamous cells leading to the bulkiness of the tumors as seen in head and neck cancer patients. With increasing tumor bulkiness, patients start experiencing reduced sensation while eating, difficulties while swallowing, and severe pain at the site of the tumor. As these symptoms start to develop, oral intake will become compromised and if left untreated result in malnutrition.

A. The Effect of Treatment on Nutritional Status in Head and Neck Cancer Patients

Radiotherapy is considered the primary treatment method for head and neck cancer patients. The usual treatment protocol consists of five sessions per week, for a duration that can range between five to seven weeks where 2 Gy per day are used, equivalent to 10 Gy per week, depending on tumor location and size (Schoeff, Barrett, Gress & Jameson, 2013). In addition to the oral symptoms that the patient initially presents with, such as pain, dysphagia and low oral intake, the patient starts experiencing treatment related toxicities two weeks from starting radiotherapy. Several investigators (Machin & Shaw, 2001; Ottossan et al., 2012; Schoeff et al., 2013) described the radiotherapy induced oral toxicities, such as oral mucositis, dysphagia, altered taste, pain, trismus, xerostomia, among others and their direct effect on nutritional intake and the quality of life of head and neck cancer patients during and after treatment. Moreover, in up to 70% of head and neck cancer patients, teeth extraction is a necessity as a protective mechanism to prevent decay and possible tooth aspiration during treatment (Moradian et al., 2015). Teeth extraction further compromises the patient's nutritional intake, requiring severe dietary modification and nutritional support management besides oral supplements, such as enteral and parenteral feeding, in order to maintain nutritional health.

In 2013, Ottossan et al. (2012) in Sweden described the experience of eating and meal consumption among head and neck cancer patients receiving radiotherapy in a qualitative study. Radiotherapy related toxicities were divided into two phases, the acute and rehabilitation phase. The acute phase involved all the treatment related toxicities that occur while the patient is

recieving radiotherapy, while the rehabilitation phase included any residual side effects that occur for a longer period of time following treatment. Throughout the acute phase, several fast developing symptoms occurred daily such as: dysphagia, metallic taste, weight loss, fatigue, pain, xerostomia, loss of appetite and pleasure to eat. The patients described their food consumption as annoying, stressful, time consuming and limited to selective food choices. They elaborated on how difficult it is for them to engage in-group meals, and thus preferred to eat either alone or with a close family member only. With the limited food options, the difficulties with eating and related psychological burden, oral intake was compromised and thus the nutritional status was altered. In many cases, the treatment toxicities lasted for a long duration even after the treatment was over for around nine months. When these symptoms were not well treated or their severity induced major organ damage, further weight loss, muscle wasting and cachexia occurred (Ottossan et al, 2012). Donovan and Glackin (2012) reported similar findings in their phenomenological study of head and neck cancer patients undergoing radiotherapy who described altered eating habits even before treatment. In addition, the self-image as cancer patients further contributed to the patients' nutritional status. Another theme that emerged related to the radiotherapy experience itself and the side effects that followed. Although the radiotherapy session was painless to the patients, its bothersome oral side effects left them many times in a helpless state. Moreover, these effects remain for a prolonged duration after treatment, namely xerostomia, dysphagia, loss of taste, and fatigue; all of them leading to an altered nutritional health.

Nund et al. (2014) conducted a qualitative phenomenological study using individualized in depths interviews with 24 head and neck cancer patient undergoing non-surgical treatment. The patients described the challenges they faced with dysphagia as an ongoing significant treatment related toxicity that occurred within two or three weeks from starting radiotherapy, and when left untreated led to reduced oral intake and the risk of aspiration, malnutrition, and dehydration. The emerging study themes included the physical changes related to swallowing abilities and eating habits, the burden of living with dysphagia and its impact on meal choice, social interaction during mealtimes and changes in appreciation and taste of food. The investigators highlighted the importance of nutritional assessment and individualized nutritional support services for head and neck cancer patients during treatment (Nund et al. 2012).

Vidal-Casariego et al. (2015) evaluated radiotherapy induced oral mucositis, and the effect of mouth ulcerations on the nutritional status of 35 head and neck cancer patients. Nutritional status was evaluated using the subjective global assessment tool (SGA). The participant's weight, height, body mass index (BMI), fat free mass, and fat mass were calculated before, during, and post radiation treatment. According to the SGA score, 12 out of the 35 patients (34%) had malnutrition; 10 of them suffered from severe malnutrition while the other two had moderate malnutrition. The significant malnutrition was accompanied by weight loss, adding remarkable burden to the oncology patients and thus further deteriorating their general health. Similarly, Kartin et al., (2014) reported the occurrence of oral mucositis with grade three and four, within two weeks from radiotherapy initiation, imposing severe limitations in oral intake in their intervention study. Their sample included 30 participants in the control group and

20 in the intervention group. Participants in the intervention group received training on oral care, and a nutritional protocol applied during radiotherapy treatment. When comparing malnutrition among the two groups, 65%of participants in the intervention group and 97% of participants in the control group suffered from malnutrition at the end of the treatment ($P < 0.05$). The researchers concluded that the use of a nutritional protocol can significantly correct malnutrition in head and neck cancer patients (Kartin et al., 2014).

Radiation-induced trismus; which is reduced mandibular movement in head and cancer patients during treatment, was another radiotherapy-induced toxicity evaluated by Bragante, Nascimento and Motto (2012). The authors described how trismus affects quality of life, food intake and oral hygiene, altering facial expressions and causing speech difficulties. Physical assessment for the patients was recorded at three time points, pre-treatment, week two and three during treatment and one month after treatment completion. The results showed statistically significant reduction in the following measures: mouth opening without pain ($P = 0.006$), maximum mouth opening ($P = 0.001$), and left lateral excursion (LLE $P = 0.006$) throughout treatment (Bragante et al., 2012).

Investigators examined the effect of radiotherapy on the quality of life in head and neck cancer patients and found a direct association between nutritional intake and quality of life. Gandhi et al. (2014) asked 100 head and neck cancer patients with locally advanced disease to rate their symptoms on a 4-point rating scale from one not at all to four very much. The symptoms included hoarseness, pain in the neck, jaw or mouth, insomnia, cough, dysphagia, loss

of appetite, fatigue, weight loss, any mouth openings or lacerations and bleeding from the tumor site. The highest four rated symptoms that impacted patients' quality of life included pain caused by a neck lump, insomnia, loss of appetite, and fatigue, respectively. The fact that more than 70% of head and neck cancer patients are initially diagnosed in advanced stages is a major drawback of treatment and adds several complications to the patient that adversely affect their nutritional status (Bossola, 2015; Gandhi et al, 2014; Jensen et al, 2004).

Malnutrition can have adverse effects on the patient's prognosis through contributing to complications such as infections. For example, Lee et al. (2011) identified the risk factors that might lead to infections at the site of the surgery for head and neck cancer patients. In a sample of 697 head and neck cancer patient, 128 patients (18.36%) had an infection within 30 days post-surgery. Several risk factors prior or during the surgery can lead to infections, increase hospital length of stay post-surgery and thus lead to higher morbidity and mortality rates. Pre-surgery risk factors included history of diabetes mellitus or history of Human Papilloma Virus, nutritional status of the patient, alcohol consumption and smoking habits, oral health and hygiene, and receipt of radiotherapy or chemotherapy before surgery. Risk factors during surgery related mostly to the location and stage of the tumor, and the amount of blood lost during the operation. Tumors of the oral cavity, oropharynx and hypophayrnx had the highest risk (up to 48%) of acquiring an infection, mainly due to the location of the tumor. Furthermore, Schoff and colleagues (2013) described how nutritional intake can become severely compromised in patients following surgery. Patients are usually instructed to maintain nothing per ooze diet (NPO) for a couple of days post-surgery, which is the time needed for the incision site to heal. In addition,

due to the pain at the surgical site, many patients remain for weeks unable to tolerate any oral intake, even fluids. If patients are at risk of fistula formation post-surgery, they will be instructed to stay NPO for a period of time ranging from days to weeks (Schoff et al., 2013).

In brief, radiotherapy and surgery lead to many symptoms and complications that have adverse effect on head and neck patients' nutritional status.

B. Assessment of Nutritional Status in Head and Neck Cancer Patients

Many investigators highlighted the importance of providing a nutritional consult for head and neck cancer patients pre, during and post treatment (Lambertz et al., 2010; Matar & Haddad, 2011; Wood, 2005). Moreover a close follow up, will help avoid further nutritional complications during the course of treatment and improve the quality of life in head and neck cancer patients. Malone and Hamilton (2013) elaborated on malnutrition screening and detection in adult patients with acute or chronic disorders. Malnutrition is diagnosed when two or more of these criteria are present: Weight loss, inadequate energy intake, muscle mass and subcutaneous fat loss, fluid accumulation and weakened handgrip strength. The authors highlighted the importance of continuous malnutrition screening in highly susceptible patients. Due to the nature of the disease and treatment, head and neck cancer patients are prone at any time to develop severe oral toxicities resulting in decreased oral intake and thus malnutrition.

Once malnutrition is identified, its severity is determined. The severity depends first on the type of the disease: for example an acute disorder such as infection versus a chronic disease such as head and neck cancer; and second on how much each malnutrition criterion is affected.

Therefore any patient with more than 5% weight loss per month, who has less than or equal to 75% energy intake over the past month, has depletion in: body fat, muscle mass, or has severe fluid accumulation in the body and reduced grip strength based on his age, will be categorized as a case of severe malnutrition. These patients require immediate nutritional intervention with parenteral or enteral feeding and an interruption of the current treatment they are receiving. On the other hand, any patient with 5% weight loss per month, less than 75% energy intake over the past month with mild depletion in body fat and muscle mass, minimal fluid accumulation and normal grip strength, is categorized as having moderate malnutrition. Patients belonging to this category may require a close follow up on weekly basis and additional nutritional oral supplements on daily basis (Malone & Hamilton, 2013).

Researchers stressed the importance of a screening tool that could detect malnutrition early in the diagnostic and treatment phase to help improve oral symptom management for head and neck cancer patients as soon as possible. Jensen et al. (2004) emphasized that the initial manifestation of oral cancers, such as the tongue lips and mouth, are usually painless ulcerations that may go unnoticed at first or even misinterpreted as temporomandibular joint disorder. With advanced stages of the disease, patients present with severe pain over the affected area that is unresponsive to any pain medications, accompanied by decreased oral intake and unintentional significant weight loss. Similarly, Anderson and Jarden (2008) in their qualitative study about coping with radiotherapy for head and neck squamous cell carcinoma found that as the severity of treatment toxicities increased, the quality of life decreased. They described how radiotherapy-induced side effects such as mouth ulceration; poor oral intake and pain led to severe distress in

the sample. The authors thus highlighted the importance of early detection and nutritional screening in this susceptible population.

The key to adequate assessment is using an appropriate nutritional assessment tool for all newly diagnosed head and neck cancer patients pre-treatment. The subjective global assessment tool (SGA) is among the most commonly used tools for assessing nutritional status in all cancer patients (Boléo et al., 2012; Malone & Hamilton, 2013). The SGA classifies patients into three categories depending on their overall nutritional screening score either as well-nourished or moderate or mal-nourished. The tool identifies: 1) patient's BMI, 2) weight changes over the past two weeks and six months, 3) duration of change in dietary intake, 4) gastrointestinal symptoms, and 5) change in functional capacity. The tool and its three categories was validated for use as a screening tool for malnutrition among all cancer patients with a sensitivity of 98% , a specificity of 82%, with significant differences between the three malnutrition categories of the tool, with $P = 0.037$ (Bauer, Capra & Ferguson, 2002).

Amaryl et al. (2008) compared nutritional screening tools to identify the most appropriate tool that is simple, sensitive and able to identify at risk cancer patients of malnutrition. Using the Nutritional Risk Screening 2002 (NRS-2002) as a reference point, two other screening tools; Malnutrition Screening Tool (MST), and Malnutrition Universal Screening Tool (MUST) were assessed in a sample of cancer patients. Three criteria used in the MUST are patient's current weight, unintentional weight loss, and disease effects causing little or no nutritional intake for more than five days. The MST, on the other hand, focuses on appetite change and unintentional

weight loss. After assessing 130 oncology patients, MUST had the highest sensitivity (97.3%) while MST had the highest specificity (94.6%). When dividing the participants based on tumor location, MUST had the highest sensitivity with head and neck tumors. Compared to the other tools, MUST was the tool able to identify the highest number of patients at risk of malnutrition (43.8%) followed by NRS-2002 (28.5%), and the last was MST (17.7%). These findings were replicated in a study by Bole ´o-Tome, Monteiro-Grillo, Camilo and Ravasco (2011) where MUS was compared to SGA or just using BMI in 450 non-selected cancer patients (18–95 years) referred for radiotherapy. MUST successfully detected patients at risk compared to SGA, yielding 0·80 sensitivity, 0·89 specificity, 0·87 positive predictive value and 1·0 negative predictive value (p for all analyses < 0,001). Based on the literature, MUST is the preferred tool to be used for the screening head and neck cancer patients who are at risk of malnutrition.

C. Treatment of Malnutrition in Head and Neck Cancer Patients

A number of studies examined interventions for malnutrition in head and neck cancer patients. Bassalo (2015) assessed the effect of nutritional counseling and oral supplements in 60 patients receiving radiotherapy or chemoradiotherapy, in a randomized trial, including 78% who had head and neck cancer. The impact of the counseling sessions was evaluated by patient's weight, appetite, nutritional health and quality of life during and post treatment. The findings showed that patients who received the counseling and oral supplements had a significant 30% fewer treatment related toxicities than patients who did not (P = 0.029). The emphasis is not only whether a patient receives nutritional counseling, but a major focus is on an individualized

counseling by the dietician. The author concluded that due to the different locations of the tumors, early individualized nutritional sessions and weekly follow up will help avoid significant weight loss and malnutrition, improve appetite, aid in resolving weekly new symptoms and as a result help improve the quality of life (Bassalo, 2015).

Valentini et al. (2012) studied the role of individualized nutritional counseling and treatment induced toxicities in a sample of 21 stage II, III and IV squamous cell carcinoma of the head and neck patients receiving chemoradiotherapy. For ethical reasons the researchers did not include any control group in their study. All participants were evaluated first for any treatment induced oral toxicities, and by a nutritionist for baseline nutritional deficit. Later on, data were collected at week three, five and then after finishing treatment on treatment related toxicities such as oral mucositis and severity of the symptoms. Results showed that patients who received nutritional counseling by the dietician had less severe treatment related toxicities. In terms of the timing of the nutritional interventions, the researchers found significant effects ($P < 0.006$) when nutritional counseling was started four days prior to treatment, and follow up was done on weekly basis for the duration of six weeks. Oral supplements were provided to the patients from week one and until three months post-treatment. During weekly assessment, patients' nutritional statuses were recorded and nutritional support adjusted accordingly. Forty four percent of patients on treatment had only zero to two days interruptions in the treatment. With severe treatment related toxicities (33.3% grade three oral mucosites and 0% grade four), significant weight loss was avoided and normal BMI was maintained throughout the treatment phase (Valentini et al., 2012).

Concurrent with treatment of nutritional status is the management of its antecedents, a main one being oral mucositis. Oral mucositis progresses into four different stages accordingly. At first mild redness may occur then lesions occur in the mucous membrane; if untreated properly these may develop to become large white ulcers, damaging the mucosal integrity of the oral cavity and gastrointestinal system (Potting et al., 2006). Patients with higher grades of oral mucositis suffer a great deal of pain due to the presence of the painful ulcers; requiring parenteral opioids (Dauncey, Greedy & Morgan, 2012) (refer to table one). The clinical consequences of these mouth ulcers have significant impact on swallowing and result in the patients' inability to meet their daily nutritional requirements. In addition to the prolonged length of stay, higher grades of oral mucositis have been associated with severe localized oral infections in cancer patients. As treatment progresses, patients start having higher grades of oral mucositis (Kartin et al., 2014). Oral mucosites enhances several undesired side effects including diarrhea, vomiting, and anorexia. Severe oral mucosites impacts negatively on the overall treatment of the cancer patient, who either get frequently readmitted for nutritional feeding, or suffer from a prolonged length of stay for supportive nutritional and treatment care. In order to help improve patients' nutritional status, correcting oral mucositis is very important. Based on the grade of the mucositis, different interventions are needed. It is very important for the oncology CNS and nurses to assess and follow up on oral mucositis grades.

Although oral care does not help reduce the severity of oral mucositis, patients (in all grades) should perform it daily as prophylactic intervention to avoid the spread of oral microbes and infection. In tandem with nutrition assessment, assessment for oral mucositis can be done

using the Radiation Therapy Oncology Group scoring system shown in box 1 below. Then treatment is decided accordingly.

Box 1 Radiation Therapy Oncology Group scoring criteria

Grade	Description
0 (none)	No change over baseline
I (mild)	Irritation, may experience slight pain, not requiring analgesia
II (moderate)	Patchy mucositis that may produce inflammatory serosanguinitis discharge; may experience moderate pain requiring analgesia
III (severe)	Confluent, fibrinous mucositis, may include severe pain requiring narcotics
IV (life threatening)	Ulceration, haemorrhage or necrosis

(Trotti *et al* 2000, Sonis *et al* 2004, Radiation Therapy Oncology Group 2012)

Cryotherapy includes the consumption of ice chips for patients undergoing treatment in order to delay or help avoid severe oral mucositis. With the increase in severity, patients with mouth ulcers will start requiring mouth gargle and opioids to help minimize the pain and burning sensations (Harris et al., 2008). Several combinations including chlorhexidine, 0.9% saline, sodium bicarbonate solutions, iodine and chamomile are usually offered. Patients with grade three and four may suffer from severe pain with zero oral intake, and some will not be able to

tolerate the oral gargles. These patients will require antibiotics treatment and hospital admission for enteral or parenteral nutrition (Harris et al., 2008).

Another major oral toxicity that impacts oral intake and patient's nutritional needs, and needs to be highlighted is dysphagia. Depending on the patients swallowing difficulties, dysphagia is categorized into six levels, level one being severely limited with zero oral intake and level six having minimal limitations with normal oral intake. Patients with head and neck cancer, pre and during treatment are more likely to belong to one of the first three levels of dysphagia. Patients with a level two dysphagia have moderately severe limitation, are able to tolerate very minimal oral intake and require maximal nutritional assistance, level three dysphagia categorizes patients as having moderate dysphagia but are able to tolerate some oral supplements with a limitation over others . When patients swallowing limitations start to improve, dysphagia level starts increasing to reach up to level six. Patients belonging to level four, five and six have mild dysphagia and are able to tolerate all oral intake food. On every dysphagia level, a modified diet plan is usually prescribed to the patient, to help maintain his nutritional status as much as possible.

Several investigators compared the traditional parenteral feeding to enteral feeding in the nutritional management of head and neck cancer patients (Gould & Lewis, 2006). Multiple reasons were discussed in preference of the two most common enteral feeding tubes via a percutaneous endoscopic gastrostomy tube (PEG) or nasogastric tube (NG) vs. parenteral

feeding. One of the main reasons is the significant weight loss and dehydration in the group of patients that did not have any enteral feeding intervention compared to those who did (Cady, 2006). Interruption of cancer treatment occurs when oral related toxicities alter oral intake and thus patients present with more than five days with zero oral intake (Lambertz et al., 2010). In such cases, patients require hospital admission for nutritional status correction via parenteral routes and depending on the severity of malnutrition; some patients may stay up to two weeks in the hospital to receive feeding. The increase in the length of stay at the hospital affects patients negatively by increasing their risk of acquiring nosocomial infections, altering their psychological health and adding financial burden (Lambertz et al., 2010).

Introducing the possibility of an early intervention, as prophylactic treatment for high risk patients via enteral feeding has impacted nutrional status in head and neck cancer patients significantly (Ardilio, 2011; Brown et al., 2014; Cady, 2006; Mayre-Chilton et al, 2011; Sheth et al, 2013; Wood, 2005). Brown et al. (2014) stated that although patients are routinely assessed and given oral supplements at the beginning of treatment, many patients become unintentionally not compliant throughout the treatment phase because of the induced oral toxicities. Specifically, patients receiving chemoradiotherapy start developing severe nausea and vomiting, oral mucositis and fatigue, which hinder their compliance to the recommended nutritional plan leading to financial burden, and decreased quality of life accompanied by low self-esteem. Although the literature is still unclear concerning the best enteral feeding method that should be provided for head and neck cancer patients; nasogastric tube vs. gastrotomy tube, yet many investigators agree on the importance of starting early treatment via enteral methods (Brown et

al., 2014; Nugent et al, 2011; Nund et al, 2014). Head and neck cancer patients with an NG tube placed pretreatment had significantly lower weight loss ($P < 0.01$), lower hospital readmission rates for feeding ($P = 0.03$) and fewer days of treatment breakthrough ($P < 0.05$) as compared to patients without early prophylactic tube placement (Paccagnella et al., 2008).

Lambertz et al. (2010) explained that the rationale for early tube insertion in patients is that as treatment begins, head and neck cancer patients become more immunocompromised and suffer from several oral treatment related toxicities that affect their general health, therefore the decision of placing a tube at that point may worsen their overall health. Brown and colleagues (2014) recommended starting enteral feeding in head and neck cancer patients in the following situations:1) requirement of nutritional support for six months or more; 2) decreased oral intake with weight loss of more than 10% over six months; 3) 5% weight loss within one month; or 4) inability to meet estimated energy requirements (less than 60%) for more than 10 days.

Several investigators compared the advantages and disadvantages of a PEG and NG tube as an early prophylactic treatment for malnutrition in head and neck cancer patients (Brown et al., 2014; Cady, 2006; Mayre-Chilton et al., 2011; Nugent et al, 2011; Nund et al, 2014;). Since there are no cutoff criteria of which enteral tube to use and when, several investigators compared the two techniques and concluded that both approaches deliver the successful amount of nutrients needed and are able to maintain stable body weight (Sheth, Sharp & Walter, 2013). Therefore the difference will be based on each patient's overall health and benefit vs. risk of therapy. PEG tube insertion is considered an invasive procedure and thus carries a risk of:

infection at the incision site, tube blockage, peritonitis, bleeding, bowel perforation; yet it is the preferred method for patients requiring a prolonged period of nutritional supplementation, namely more than four weeks and up to six months (Cady, 2006; Sheth et al., 2013). With an NG tube insertion, patients become more prone for aspiration, tube displacement and self-intentional tube removal. On the other hand, Sheth et al. (2013) audited the enteral feeding practices in one hospital in England. They reviewed the records of all patients diagnosed from 2006-2008 who required enteral feeding via an NG or a PEG. The investigators stated that both practices were able to adequately meet the nutritional needs of the patients, thus the use of an NG can avoid the risks of the invasive procedure (PEG) complications. Moreover, while comparing the audit results with regional institutions, the investigators found that patients who received nutritional support via an NG tube suffered from lower tube related complications, and their body weight improved significantly, with 89.6% maintaining adequate oral intake six months after finishing treatment.

When comparing PEG tube to the surgically-inserted gastrostomy (SIG) and the radiology inserted-gastrostomy (RIG), the rates for serious procedure complications were 0%, 10% and 11% respectively, supporting the relative safety of PEG insertion among the cancer population (Schoff et al., 2013). Although treatment related toxicities often resolve within one month after the completion of therapy, some oral toxicities remain for a prolonged period ranging between six to nine months post treatment and impact negatively the individuals' nutritional status, further supporting the use of the PEG in these cases. Moreover, patients receiving chemoradiotherapy suffer from significant nausea and vomiting for a prolonged

duration. In this case the preference is again towards a PEG tube in order to avoid NG tube unintentional removal during nausea and vomiting. In brief, the literature is unclear of which method to choose, and thus several investigators reported that the final decision to be made will be based physician and patient preference (Brown et al., 2014; Cady, 2006; Mayre-Chilton et al., 2011; Nugent et al, 2011; Nund et al, 2014).

As noted above, adequate screening and early initiation of nutrition therapy are recommended for head and neck cancer patients. An individualized approach guided by a dietitian starting prior to cancer treatment with regular follow up during and after completion of treatment would save the patient complications of malnutrition. Moreover, oral mucositis and other symptoms that impact oral intake must be addressed as well.

CHAPTER III

THE PROPOSED GUIDELINE

When treating head and neck cancer patients, it is very important to monitor and identify at risk patients of malnutrition. MUST is chosen as the primary screening tool in this project as it has the most rigorous psychometric properties and is the only tool able to identify malnutrition, patients at risk of malnutrition, and so guide further management of patients. MUST is a five step screening tool that classifies the patients into three categories; 0 = low risk, 1 = medium risk and 2 or more = high risk. Step one includes calculating each patient's BMI and accordingly assigning a risk score. Step two calculates the percentage weight loss for each individual over the past three to six months and assigns a score depending on the severity of the percentage lost. Step three evaluates the impact of the disease on the individual, that is how many days has the patient been off nutritional intake; if more than five days the patient gets a score of two. Step four includes adding the scores and coming up with a final number and accordingly step five proposes a nutritional intervention that may be applied. For the purpose of this project, we will only use the first four steps of the tool, since we are interested in the screening part of the tool only, and the fact that stage five in our project will include the referral to the nutritionist. Patients with a risk score of two or more will further be assessed according to the malnutrition screening criteria: weight loss per month, energy intake, body fat, muscle mass, fluid accumulation and hand grip strength, in order to distinguish if the patient is still at risk or has progressed into

malnutrition (moderate or severe). Patients with active malnutrition will require immediate nutritional interventions.

In addition to the screening tool and with the assistance of a nutritionist several other screening measures will be obtained such as patient's diet history, physical and functional assessment and clinical data. With the assistance of the radiation oncology clinical nurse specialist (CNS) and radiation registered nurses, patients should be assessed for physical symptoms such as pallor, hair changes, tongue and oral status, loss of appetite and edema. The functional assessment will include muscle strength, range of motion and ability to ambulate. As for the laboratory profile, the following values should be obtained at baseline: hemoglobin and hematocrit, white blood cell count, electrolytes level, albumin and pre-albumin before starting any nutritional intervention (Malone & Hamilton, 2013). Because of low oral intake and malnutrition, head and neck cancer patients are at risk of developing anemia secondary to iron deficiency, necessitating measurement of hemoglobin and hematocrit levels at baseline and during the follow up. Obtaining electrolyte, albumin and pre-albumin level will help guide the nutritionist on what to recommend in the diet plan.

Based on the literature, each head and neck cancer patient will be evaluated by a nutritionist at a three-point time interval during his treatment journey. If the patient is planned to receive radiotherapy or chemoradiotherapy, nutritional status evaluation will take place: at diagnosis, two to three weeks after treatment is initiated, and after completing treatment. As some delayed oral toxicities remain for a prolonged period of time post treatment, the after

treatment phase will include assessment directly at the end of treatment, and one month afterwards. Patients who are still performing badly with the oral intake will continue close nutritional follow up on monthly basis. However, in order to maintain a close follow up on patients' nutritional health, the oncology radiation CNS and registered nurses shall assess them on weekly basis during treatment for compliance measured by percentage weight loss, BMI and treatment related oral toxicities. In addition nurses will assess patients regularly for oral mucositis and dysphagia. At any point, if a patient presents with significant deterioration, he/she will be referred to the nutritionist for re-evaluation and intervention. If the patient is planned for surgery only, nutritional status evaluation will take place one week pre-surgery, directly post-surgery and wound healing, and one month after complete healing.

Any patient scheduled to receive radiotherapy/ chemoradiotherapy or surgery then radiotherapy, will be referred to the nutritionist at least one week pre-treatment for baseline nutritional screening and evaluation. Depending on the risk scores or the severity of malnutrition the patient will be informed about the proposed nutritional interventions: oral intake recommendations, or enteral feeding approaches that need to be implemented to further prevent or correct malnutrition.

Maintaining an individualized nutritional plan for each patient is significantly important. Head and neck cancer tumors include more than 15 sub types of cancer, each subtype has its own impact on oral health and nutritional status; tumor bulkiness, location, size and treatment method applied. Ardilio (2011) elaborated on the difference in nutritional needs between healthy

individuals and oncology patients. For a healthy individual daily protein intake is calculated as 0.8 – 1 gram/ weight in kilograms, and caloric needs are 25 k-cal/ weight is kilograms. Among the cancer population the Mifflin- St. Jeor equation for resting energy expenditure (REE), that is the energy needed to keep vital body organs (brain, heart, kidney, lung and liver) functioning, is used. The daily protein requirements increase in cancer patients to 1.2-1.5 gram/kilogram/day or up to 1.5-2.5 gram/ weight in kilograms per day for hyper-metabolic patients, the daily energy expenditure is 1 kcal/ weight in kilograms, while daily caloric intake is around 35- 40 kcal/weight in kilograms. Failure to meet the daily nutritional requirements results in malnutrition in head and neck cancer patients (Ardilio, 2011).

Following the pre-treatment nutritional screening and evaluation, each patient will be categorized in a nutritional group with the specific recommended interventions. Patients of all levels will be educated on how to fill a daily diet diary that will be presented on weekly basis to the CNS or registered nurses and to the nutritionist during the re-evaluation period. Dietary diaries are common approaches for close monitoring of oral intake for cancer patients at home (Ardilio, 2011). With the assistance of a nutritionist, patients will first attend a thirty minutes session and will be educated on how to record their oral intake at home. The nutritionist will provide patients with picture of food models in order for them to know how to record their food consumption. Measuring volume in milliliters (cups and bottles), and documenting how many spoons were consumed during meals will aid the nutritionist in calculating accurate intake of patients at home. Documenting oral intake will assist patients in recalling what they consumed all week, rather than trying to remember (Ardilio, 2011). Moreover, patients will be provided

handbooks with pictures of measuring food items. Nurses will monitor patients' compliance with recommendations weekly. Appendix A shows a sample food diary

As oral symptoms begin to appear during week two and three of radiotherapy or chemoradiotherapy, patients start experiencing more difficulty in swallowing solid food (dysphagia) and hence start eliminating food options from their daily intake and substituting them with more fluids. In order to avoid food elimination, a dysphagia diet will be implemented to help patients maintain oral intake as much as possible, prevent choking and aspiration of food. Patients will be advised to avoid foods that may induce aspiration and choking such as corn, crackers, cereals, dry bread, carbonated beverages etc. Following the AUBMC dysphagia diet protocol, each patient will be assessed by the speech therapist and nutritionist and grouped according to his swallowing limitations into the six dysphagia levels. Each level has specific recommended meals and food options that match the individual's swallowing abilities. Following the AUBMC dysphagia diet protocol, patients will be prescribed their diet plan accordingly. (See appendix B)

Patients with high risk of malnutrition or those who have moderate or severe malnutrition will be referred for enteral feeding and evaluated about tube options based on their primary disease, treatment options and preferences. Patients who require enteral feeding for a prolonged period of time (more than 28 days), have nasal, paranasal or tongue tumors will require chemoradiotherapy sessions and candidates for tumor dissection, will be candidates for PEG tube insertion if they have no contraindications for PEG. Patients who require enteral feeding for less

than 28 days, have no obstructions, and are not candidates for invasive procedures, will have an NG tube placed. After the decision of tube placement has been made, the nutritionist, oncology CNS and the radiation oncology nurses will start educational sessions to the patients concerning tube handling and food administration at home. The nutrition rescue team at the Radiation Oncology Department will provide patients with oral and enteral nutrional supplements. The nutritionist will choose the supplement from the different nutritional supplements, the amount needed (bolus, intermittent or continuous) and the duration. The CNS and the registered nurses will demonstrate handling the tube, cleaning the dressing, administering the food and recording the intake. The chronologic process of nutrition assessment and intervention is described below.

1. **Pretreatment Screening and Interventions:**

Any individual admitted for his first cycle of treatment whether: 1) chemoradiotherapy or 2) radiotherapy or 3) surgery or 4) surgery then radiotherapy will be first assessed for oral health status by the oncology CNS, and then directly referred to the nutritionist for pretreatment screening and evaluation.

MUST score zero:

Patients, who belong to this category, have no malnutrition risk yet. They will be observed, re-screened (weight, BMI) by the oncology nurse on weekly basis, and provided the educational sessions on how to record the dietary diaries.

MUST score one:

Patients who belong to this category have a medium risk of developing malnutrition as treatment begins. These patients are unable to fully meet the required nutritional needs, but with less than 10% (5% - 10%) unintentional weight loss over the past three to six months. They will be provided the educational session of recording the dietary intake at home, will be informed about the dysphagia food diet to be applied at home, and will be given the oral nutritional supplements as a prophylactic and corrective measure. In addition to the patient's daily intake, oral nutritional supplements given twice per day should contain an average of 373 kcal per 100 gram serving; with 89 grams protein, 2 grams lipids and 1.5 grams carbohydrates, adjusted according to each patient's body mass index (Valentini et al., 2012).

MUST score two or more:

If at diagnosis the patient has a high risk score of two or more, that is more than 10% weight loss over the past three to six months; he/she will be candidate for early prophylactic enteral feeding. On an individual basis the primary attending with the nutritionist will inform the patients about the PEG and NG options, weighing risk vs. benefit ratio. According to the tumor location, mode of treatment, possible side effects and physician/patient preference, the type of the enteral feeding will be decided and patient referred to attend the enteral feeding sessions. If the patient refuses enteral tubes, he/shewill be informed about the impact of treatment-related toxicities on nutritional status, overall health and the need of immediate parenteral or the necessity of enteral nutrition later during the course of treatment.

2. **<u>Follow up During Treatment:</u>**

Two to three weeks after starting treatment, patients will be re-screened using the MUST by the nutritionist. Any patient with a risk score of two or more will be also screened for malnutiron severity. With the assistance of the oncology CNS, treatment related toxicities (loss of appetite, dysphagia, oral mucosites, altered taste sensation and pain) that start to appear during this period will be assessed and severity levels will be recorded. The physician will be informed about the assessment results and the patients will be prescribed the related treatment. For the majority of the patients (more than 80%), oral intake may become inadequate and thus nutritional status will be altered. Patients will start having a higher MUST score requiring more nutritional support and diet modification. For the following reasons, nutritional re-screening and evaluating by a nutritionist is indicated.

MUST Score Zero:

Patient that still did not develop any treatment related toxicities, have no malnutrition risk, and their dietary diaries meet all the required nutritional needs; they will be followed up on weekly basis by the radiation oncology nurse. However, the patients will be reminded of the possibility of delayed treatment related toxicities and will be instructed to inform the nurse if they start experiencing any of the symptoms.

MUST Score one:

Patients pre-treatment who belonged to the zero risk category, and now belong to the moderate category require the start of treatment related toxicities, and their diet plan will be adjusted. The nutritionist will revise their diet diaries. They will be informed about the dysphagia

food diet, their symptoms will be assessed and accordingly the CNS and nurses will give them oral nutritional supplements, with weekly follow up.

Patients who belonged to this category during the pretreatment phase and are still in the same category during treatment will be informed about the induced oral toxicities and the necessity of reporting them. Their food diaries will be revised and they will be re-instructed about dysphagia diet, and the provided oral supplements will be increased in order to avoid higher risks.

MUST Score two:

Any patient who had a score lower than two in the pre-treatment phase and now has a score of two or more is at high risk of malnutrition, induced by the oral toxicities and will be a candidate for enteral feeding. Based on the tumor location, treatment regimen and severity of the oral toxicities, the decision for the best enteral feeding tube will be agreed on. Patients will be given the enteral feeding sessions.

Three reasons could justify patients remaining in the same high risk category since pre-treatment: severe oral toxicities, lack of enteral feeding tube in the pre-treatment phase, and non-compliance with nutritional recommendations. Patients with severe oral toxicities may suffer from other non-oral symptoms such as fatigue that will affect their compliance to the nutritional treatment at home. For this reason, the CNS will assess the symptoms and the enteral feeding educational sessions will be given again, re-enforcing the importance of treatment. For this group the diet plan will be adjusted with increased nutritional intake per day. Patients who refused enteral feeding in the pre-treatment phase will be addressed again by the physician and

nutritionist about the necessity of inserting the tube to avoid further deterioration and will be referred to the enteral feeding sessions. Patients who were not compliant will be evaluated for the reasons and referred to the enteral feeding sessions.

3. Post Treatment Follow Up

Post-treatment follow up will be divided into two phases: 1) directly at the end of treatment and 2) one month after completing treatment. The reason behind the choice of the timing is to monitor for delayed oral toxicities that may still be present at the end of treatment.

Patients that are in category zero (no risk) directly at the end of treatment, with no evident oral-treatment toxicities assessed by the CNS, will not need any nutritional intervention, just follow up at six months during their routine disease re-evaluation. If an enteral feeding tube was placed, the nutritionist and speech therapist will assess these patients' oral intake, and the tube will be removed.

At the end of treatment, patients with moderate malnutrition risk (score one) and resolving oral-toxicities will continue the same nutritional management they are on and will be followed up at one month. If an enteral feeding tube was placed, the nutritionist and speech therapist will assess swallowing habits, and the tube will be removed.

Patients who have a high-risk score of two or more will be managed as follows:

1) If the patient had an enteral feeding tube, and evident oral treatment related toxicities: the tube will be kept and nutritional supplements will be increased and patients will be followed up twice per month for the first month, then on monthly basis for six months.

2) Patients with enteral feeding tube and resolving oral treatment toxicities as assessed by the CNS will be kept on the same management expecting improvement, and patients will be followed up at one month and six months.

3) For patients without enteral feeding tube but with evident oral toxicities, the decision will ve to admit to the hospital for NG tube (less than 28 days) insertion or parenteral feeding. These patients belong to the group with delayed oral-toxicities group and will require immediate intervention to resolve symptoms before causing organ damage, and monthly follow up.

4) For patients without enteral feeding who have resolving oral-toxicities, and improving oral intake, give oral supplements and follow up at one month.

Appendix B displays the nutrition management guideline for head and neck cancer patients.

CHAPTER IV

IMPLEMENTATION AND EVALUATION

As noted in the description of the proposed guideline, the success of its implementation requires a concerted effort from the nurses, the clinical nurse specialist, dietitians and oncology physicians. As with any therapeutic program, a number of steps ought of be taken to ensure successful implementation and achievement of positive patient outcomes.

A. Multidisciplinary Task Force

In order to proceed with the approval of the proposed project, the guidance of a multidisciplinary team is necessary. Thus a multidisciplinary task force that includes the oncology CNS, radiation oncology nurse and oncology dietitian is formed; the developed guideline will be sent for revision. Once feedback is secured and modifications made, the chief of the Hematology and Oncology Department and the chief of the Radiation Oncology Department are presented the protocol for approval and feedback. Once the medical team approves, a proposal about the guideline, rationale and significance, a detailed description of the guideline including additional documentation, the resources needed and any change in policy with financial analysis, will be presented to the AUBMC administration and patient advocate personnel for further approval of application.

After the required approvals are secured, an assigned clinical nutritionist, oncology CNS, speech therapist and the social service should be on board to plan their roles in implementation,

education and assessment of head and neck cancer patients. Once the full team members are on board, the first step will be staff education about the proposed protocol importance, proper implementation and documentation. Staff at the adult inpatient infusion unit (8 North), the adult outpatient unit and Radiation Oncology Department will attend sessions provided by the oncology clinical nurse specialist.

The role of the radiation oncology CNS taking care of head and neck is very important. These patients require continuous physical and psychological support to survive their diagnosis and treatment phase. The CNS role is not only limited to assessing treatment related toxicities and patient's education; a major role is gaining entrée into the patient's daily life. With the proposed guideline focused on the nutritional health of head and neck cancer patients, the oncology CNS plays a major role in its implementation. Early assessment of patients' oral health status by the CNS will help guide the treatment regimen. In addition to her role in assessment and follow up the CNS will be aware of the appropriate time to refer patients to other healthcare providers such as nutritionist, speech therapist, psychologist or social worker. Another important role is supporting the nurses in following up in the nutritional management of these patients in collaboration with the nutritionists.

B. Pilot Testing

After agreeing with the multidisciplinary team on the proposed protocol and receiving the hospital administration approval and completion of the educational sessions to the staff, we will proceed with the implementation phase; the proposed protocol will be first tried on a small

sample of patients. Upon admission, the CNS will be approach the patients and inform the patients about the protocol, and the importance of their compliance to the proposed nutritional intervention and assessment dates. Within a one year time frame, the first ten patients who agree to participate will be enrolled in the pilot phase testing. Feedback will be secured from the staff about feasibility of implementation and any difficulties experienced and from patients as well. Modifications will be made based on the feedback received

C. Evaluation:

Before adopting the protocol as standardized nutritional intervention for head and neck cancer patients at AUBMC, the effectiveness of the protocol will be evaluated. Patient's nutritional assessment scores pre and post the nutritional intervention will be compared. Through the AUBMC database, we will track any non-oncology treatment related admissions such as dehydration, infection and feeding. After obtaining these results, we will perform a retrospective medical chart review for head and neck cancer patients who were not involved in the proposed protocol over the past year. Any nutritional related information or assessment including: weight, BMI, feeding approaches, readmission rates for head and neck cancer patients will be obtained. A comparison between the patients on the protocol and those that were not enrolled and received the traditional AUBMC nutritional consult and intervention will be conducted. We expect that patients who received the proposed protocol will have better nutritional scores (electrolytes level, BMI and percentage weight loss, muscle strength, hand grip), than patients who did not.

D. Limitations

Few challenges are expected to hinder the successful implementation of this guideline. With the current practice at AUBMC, any consult or service outside the department is charged as extra money on the patients. That is any patient that will be referred to the nutritionist will be charged extra, which adds more financial burden on the patients. Knowing that most insurance companies do not approve of outside the service fees, many patients may not be able to afford the extra charges and thus refuse the consult. This necessitate collection of empirical data that show that implementation of this guideline will result in less readmissions and complications of patients; such data might convince insurers to pay for dietary consults.

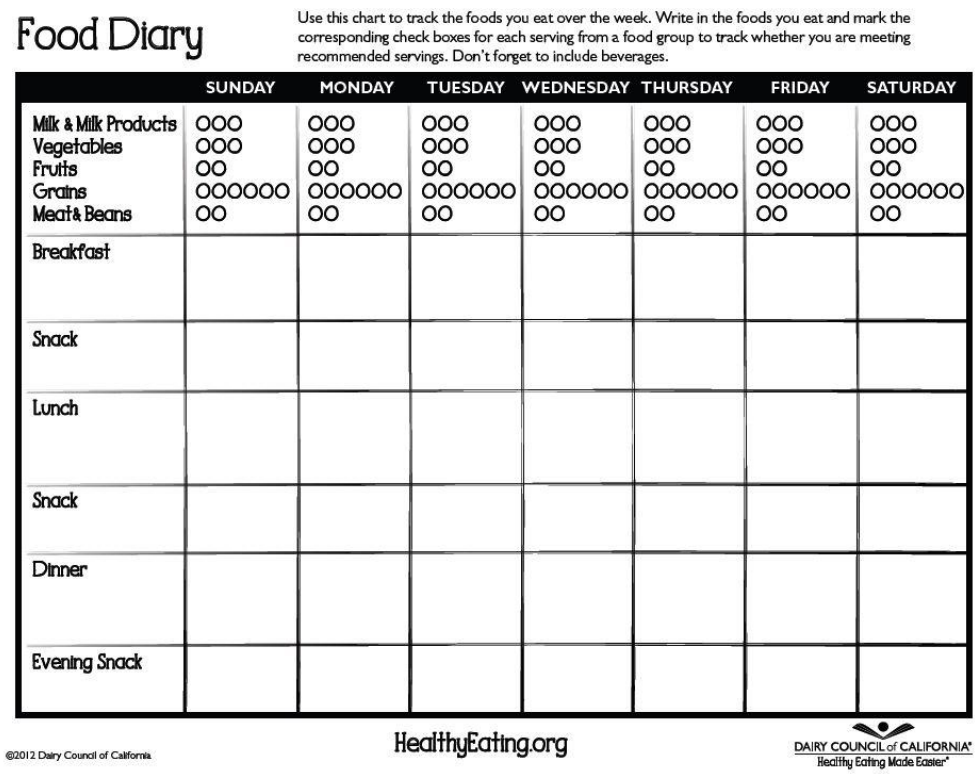
The proposed project specifies the role of a CNS in the assessment, follow up and education of patients; however in the absence of an oncology CNS at the department of radiation oncology, the radiation oncology nurse will be responsible for the extra tasks (presence in educational sessions, weekly close follow up and monitoring of the diaries), which will add more workload on the nurse.

This project presented a proposed guideline for the assessment and treatment of malnutrition in head and neck cancer patients. As eating is a basic human need and at the core of nursing, implementation of this guideline is very important to promote patient outcomes and reduce complications in the vulnerable population of head and neck cancer patients.

CHAPTER V

Appendix A

Food Diet Diary Sample



Food Diary

Use this chart to track the foods you eat over the week. Write in the foods you eat and mark the corresponding check boxes for each serving from a food group to track whether you are meeting recommended servings. Don't forget to include beverages.

	SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
Milk & Milk Products	OOO	OOO	OOO	OOO	OOO	OOO	OOO
Vegetables	OOO	OOO	OOO	OOO	OOO	OOO	OOO
Fruits	OO	OO	OO	OO	OO	OO	OO
Grains	OOOOOO	OOOOOO	OOOOOO	OOOOOO	OOOOOO	OOOOOO	OOOOOO
Meat & Beans	OO	OO	OO	OO	OO	OO	OO
Breakfast							
Snack							
Lunch							
Snack							
Dinner							
Evening Snack							

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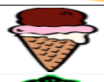
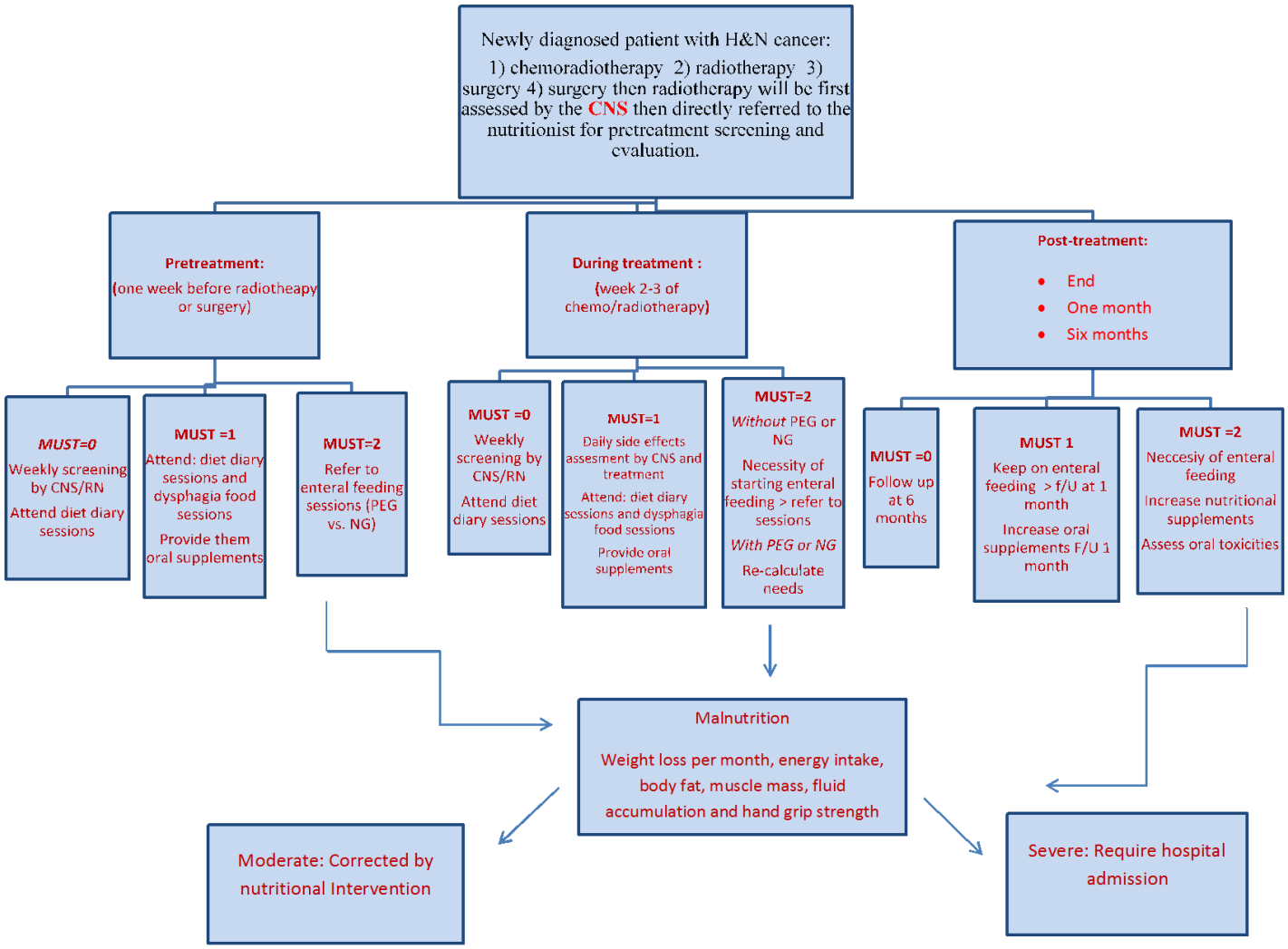
Food Quantity Estimations

1	3 ounces of meat is about the size and thickness of a deck of playing cards or an audiotape cassette.		=	
2	A medium apple or peach is about the size of a tennis ball.		=	
3	1 ounce of cheese is about the size of 4 stacked dice.		=	
4	½ cup of ice cream is about the size of a racquetball or tennis ball.		=	
5	1 cup of mashed potatoes or broccoli is about the size of your fist.		=	
6	1 teaspoon of butter or peanut butter is about the size of the tip of your thumb.		=	
7	1 ounce of nuts or small candies equals one handful.		=	

Appendix B: A Sample of AUBMC Dysphagia level 1 Diet

Breakfast	1/2 cup orange juice, at prescribed consistency 1/2 cup farina 1/4 cup low-fat milk, for farina 1/2 teaspoon brown sugar, lump-free for farina 1 pureed, scrambled egg 1/2 muffin, blended or pureed 1 teaspoon butter, for muffin 1 cup smooth beverage (like milk or coffee)
Lunch	1/2 cup pureed tomato soup, made with milk 3 pureed saltine crackers 1/2 cup pureed meatloaf, with ketchup on top 1/2 cup mashed potatoes 1/4 cup gravy 1/2 cup pureed carrots and peas 1/2 cup vanilla pudding 1/2 cup pureed peaches 1 cup smooth beverage (like tea, coffee, or milk)
Evening Meal	1/2 cup pureed potato soup made with milk 3 pureed saltine crackers 1 cup pureed chicken noodle casserole 1/2 cup pureed green beans 1/2 cup pureed applesauce 6 oz smooth, whipped fruit-flavored yogurt 1 cup smooth beverage (like tea, coffee, or milk)

Appendix C: Proposed Project Algorithm



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