A clinical audit of the nutritional status and need for nutrition support amongst head and neck cancer patients treated with radiotherapy

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RESEARCH

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Abstract

Background

Radiotherapy is an effective treatment for head and neck cancers but patients often experience side effects which lead to weight loss. Nutrition intervention in the form of counselling or oral nutrition support (ONS) is frequently needed for these patients. For some patients, tube feeding is required to minimise weight loss during treatment.

Method

Data was collected on 48 patients who received radiotherapy to the head and neck region over a nine-month period (June 2009–March 2010). Retrospective data collection was commenced in July 2010. Each patient's Diet Therapy Department record was reviewed. Main outcome measures were: 1) type of nutrition support; 2) percentage weight change during treatment; and 3) Patient-Generated Subjective Global Assessment Global (PG-SGA) rating.

Results

On initial assessment 28 (77.8%) patients were classified as well nourished using the PG-SGA. Mean weight loss during radiotherapy was 5.74%. Risk factors for the need for ONS and enteral nutrition support (ENS) were older age, presence of nutrition impact symptoms, high-risk tumour sites, advanced disease and chemotherapy. No significant difference was shown in weight loss between ONS and ENS groups.

Conclusion

This study identified the need for early dietetic intervention for high nutritional risk groups of head and neck cancer patients to prevent significant weight loss. Pre-treatment nutritional status did not influence weight loss during treatment. ONS alone cannot prevent significant weight loss in patients with multiple nutrition impact symptoms. Early enteral feeding should be considered in this group of patients.

Key Words

Enteral nutrition; head and neck neoplasms; nutrition status; nutritional support.

Background

Malnutrition is commonly seen amongst head and neck cancer patients. The incidence of malnutrition at diagnosis is estimated to be 30–50% of all patients.[1] The cause of malnutrition at diagnosis amongst head and neck cancer patients is considered multi-factorial and includes both lifestyle factors such as smoking and heavy alcohol use and tumour factors.[2] The tumour itself can cause dysphagia and odynophagia due to obstruction contributing to reduced oral intake, while the catabolic effects of cancer cachexia lead to unintentional weight and muscle loss.

Radiotherapy is an effective treatment for head and neck cancer.[3] During radiation treatment patients may experience dysphagia, odynophagia, mucositis, xerostomia, dysgeusia, loss of appetite and fatigue. Long after the radiation treatment is completed patients may develop trismus (reduced jaw opening). Concurrent chemoradiotherapy is associated with increased frequency of these acute side effects.[3]

Given that the effectiveness of radiotherapy treatment is maximised by maintaining the radiation treatment as

scheduled, unplanned treatment breaks that result from severe mucositis, malnutrition or dehydration may lead to decreased efficacy of treatment and thus poorer patient outcomes.[4] Weight loss is common in patients undergoing radiotherapy for head and neck cancer. It is also a critical factor for these patients as significant weight loss contributes to poorer quality of life scores.[5-7] Significant weight loss also correlates with treatment interruptions, infections, mortality and hospital readmission rates.[8]

Nutrition intervention is reported to positively influence patient outcomes and quality of life.[9] The literature also supports tube feeding via nasogastric tube or percutaneous endoscopic gastrostomy (PEG) as a means of minimising loss of weight in patients with locally advanced head and neck cancers receiving accelerated fractionation and concurrent chemoradiotherapy.[5,10,11]

To date there have been no studies conducted at this tertiary hospital site to determine the extent of nutritional compromise and the supportive measures used in head and neck cancer patients to facilitate adequate nutrition throughout their treatment journey.

The aims of this study were to determine: 1) the prevalence of malnutrition amongst a sample population of head and neck cancer patients at the commencement of radiation therapy; and 2) the proportion of patients who required ONS or ENS during their treatment. The use of ONS and ENS was directly compared to determine the factors that precipitated their use and if they were equally as effective in promoting weight stabilisation among patients experiencing weight loss.

Method

A retrospective chart audit was conducted on patients presented at the Head and Neck Cancer Multidisciplinary Team Meetings at Sir Charles Gairdner Hospital (SCGH) between 29 June 2009 and 29 March 2010. Retrospective data collection was commenced in July 2010. SCGH is a tertiary care hospital with specialist cancer care facilities. All patients receiving radiotherapy to the head and neck region at this facility are assessed by a dietitian, and a nutrition and diet therapy record is kept for each patient. The principal investigator, a dietitian from SCGH, together with other dietitians at the hospital recorded weight, height, PG-SGA score and global rating and form of nutrition support as part of standard practice in their clinic notes.

The database contained 125 patients over the data collection period. Forty-eight patients randomly selected from the database by a nutrition and diet therapy staff member comprised the sample. Patients were selected from the database if they met inclusion and exclusion criteria and had an even medical record number. Consecutive patients with even medical record numbers on the database were selected. The required sample size was 60 but only 48 patients met the study criteria and had even medical record numbers.

Inclusion criteria:

- diagnosis of a head and neck cancer;
- aged over 18 years;
- completion of radiotherapy as all or part of curative intent treatment.

Exclusion criteria:

- received palliative radiotherapy;
- recurrence of disease;
- missing demographic data (site, staging, treatment plan).

Patient consent was not required for this retrospective chart audit. The study was approved by the SCGH Quality & Safety Department and Curtin University Human Research Ethics Committee.

Nutrition and Diet Therapy Department records from initial assessment and subsequent review consultations were then reviewed using an audit tool (Appendix). The tool was designed after considering data collection methods used in another retrospective chart audit.[12] Data was extracted from the diet therapy record by the principal investigator (EJ) who is experienced at extracting information from the Nutrition and Diet Therapy Department patient notes. A single investigator completed the audit to maintain intra-rater reliability and a protocol for data collection was followed.

The scored PG-SGA includes questions relating to dietary intake, the presence of nutrition impact symptoms and recent weight loss.[13] The medical history and physical examination components of the assessment are completed by a trained health professional. A score is awarded based on the impact that symptom has on nutritional status. The score is intended to guide the level of nutritional support that the patient needs. A global rating of well nourished, moderately malnourished and severely malnourished can also be assigned based on the patients' responses.

Nutrition support was categorised into: 1) counselling alone; 2) ONS; and 3) ENS. Patients were classified as counselling alone if they had dietary education for a high protein, high energy diet and the management of nutrition impact

symptoms but did not consume specialised nutrition supplements throughout their radiation treatment. Patients who consumed nutrition supplements orally and did not receive tube feeding (nasogastric or PEG) were identified as the ONS group. Patients who consumed nutrition supplements via a feeding tube, contributing to all or part of their nutrient intake were identified as the ENS group.

Tumours had been grouped in stages using a standard classification system[14] and this information was extracted from the medical notes. Stage IV disease is classified as the most advanced tumour stage. Body Mass Index (BMI) was calculated and classified according to the World Health Organisation (WHO) criteria.[15,16] Percentage weight loss was calculated as weight (end radiotherapy)/weight (baseline) x 100. Weight maintenance was classified as <5% weight loss from baseline. For data analysis the tumour site for each patient was classified as either high risk or low risk. This classification was made based on literature review.[13,16] The high risk sites included the oral cavity, oropharynx, nasopharynx, hypopharynx and larynx. Salivary glands and cutaneous primary cancers made up the low risk group.

Data was analysed using SPSS version 17. Descriptive statistics were performed to determine the mean and standard deviation for demographic data. The level of statistical significance was set at a p-value of 0.05. Group means were compared by independent t-tests and the Chi-squared test of association.

Results

Forty-eight subjects were selected for audit. Table 1 summarises the baseline characteristics for subjects receiving radiotherapy. The mean age of the sample was 63 years (34-86 years). The majority of the subjects selected for this sample were males (n = 40). The mean BMI was 26.8 kg/m^2 (SD ± 5.2) (n=34). A height measurement is required for the calculation of BMI. The BMI of 14 patients (29%) could not be calculated because their height was not recorded. Two patients (5.9%) were considered underweight (BMI < 18.5) at initial presentation. Thirty-six (75%) subjects were assessed using the PG-SGA. Twelve (25%) subjects were not assessed with the PG-SGA due to time constraints. Twenty-eight (78%) of the patients assessed with the PG-SGA were considered well nourished. No patient received a PG-SGA global rating of severely malnourished. There is the potential for measurement error of the recorded data relating to the fact that different scales were used at different clinic locations and it was not documented if patients were/were not wearing shoes. Dietitians have completed training in the PG-SGA to achieve consistency amongst practitioners in the physical assessment component.

Characteristic	**Mean (n = 48)**	**SD**
Age (years)	63	± 13.3
Weight (kg)	81.8	± 20.4
BMI (kg/m^2)	26.8	± 5.2
	n = 34	**%**
<18.5	2	5.9
18.5 - 24.9	11	32.4
25 - 29.9	13	38.2
>30	8	23.5
PG-SGA† global rating:	**n = 36**	**%**
A: well nourished	28	77.8
B: moderate malnutrition	8	22.2
C: severe malnutrition	0	0
Tumour Stage	**n = 48**	**%**
I & II	6	12.5
III & IV	22	45.8
Unknown	20	41.7
Tumour Site	**n = 48**	**%**
High Risk	30	62.5
Low Risk	13	27.1
Unknown	5	10.4
Treatment Modality	**n = 48**	**%**
Radiation	15	31.2
Surgery + Radiation	12	25
Surgery + chemoradiation	2	4.2
Chemoradiation	12	25
Induction chemo + chemoradiation	7	14.6
† Patient Generated Subjective Global Assessment		

Table 1: Baseline characteristics for subjects receiving radiotherapy to the head and neck region

Nutrition Support	n	Mean (%)	SD
Counselling *	12	0.06	3.19
Oral	26	7.61	5.74
Enteral	8	8.94	6.67

* = $p < 0.05$

Table 2: Mean percentage weight loss for subjects as categorised by type of dietetic intervention

On average, subjects lost 5.87% (± 6.34%) of their body weight during radiation treatment. Figure 1 summarises the degree of weight loss in patients receiving radiotherapy. Eighteen subjects (37.5%) maintained their weight during radiation treatment. One-quarter of the sample had weight loss of >10% body weight during the course of their radiation treatment. As shown in Table 2, subjects within the ONS and ENS groups lost significantly more weight than those who received counselling alone ($p < 0.001$).

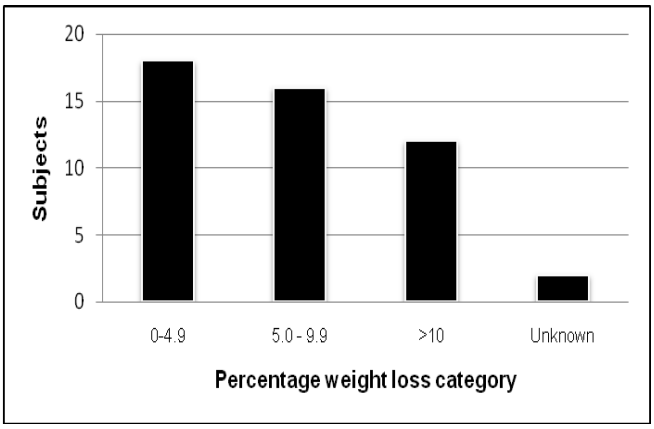

Figure 1: Degree of weight loss from commencement of radiotherapy for 48 subjects receiving radiotherapy to the head and neck region

The mean age for patients requiring ENS was 70.75 years. Age was a statistically significant factor ($p < 0.05$) in those patients requiring enteral feeding in comparison to patients who required counselling alone. Figure 2 illustrates the influence of the number of nutrition impact symptoms on the type of nutrition intervention provided. A statistically significant difference was shown between number of nutrition impact symptoms and type of nutrition support ($p < 0.05$). All eight patients who required enteral feeding had high risk (HR) tumour sites. Patients who required ONS throughout their treatment were more likely to have a high risk tumour site in comparison to a low risk (LR) (HR = 65.4%, LR = 17%). Seven of the eight patients (87.5%) who required enteral feeding had either Stage III or Stage IV disease. Patients requiring ONS were more than four times more likely to have Stage III or IV cancers (n=14). Three-quarters of those requiring enteral feeding underwent chemotherapy as part of their treatment regime.

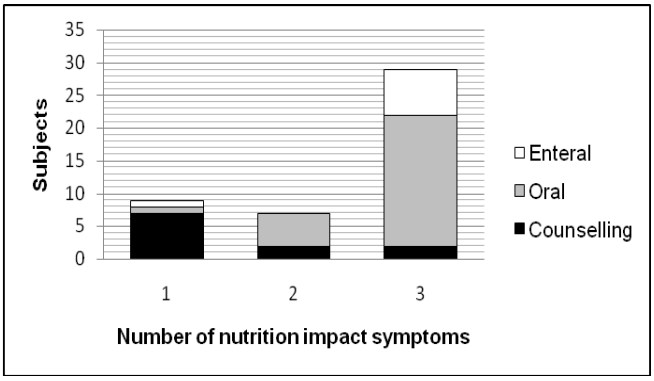

Figure 2: The influence of number of nutrition impact symptoms on type of nutrition intervention

Discussion

This audit has demonstrated a lower prevalence of malnutrition at presentation compared with previous studies.[1,8,17] This could reflect the exclusion of patients for palliative treatment in this audit. Palliative patients tend to have more advanced disease and therefore are more likely to have poorer nutritional status due to the size and location of the tumour or from cancer cachexia. One study reported that 56% of malnourished patients in the sample had Stage III and IV disease,[18] however tumour stage was unreported in 50% of the current study sample. Where tumour stage was known, 22 (78.5%) patients had Stage III and IV disease. At the time of diagnosis, critical weight loss has been more frequently observed in patients with cancer of the hypopharynx, oropharynx oral cavity, or supraglottic larynx.[17] The lower prevalence of malnutrition at initial presentation in this sample of head and neck cancer patients may also reflect current trends in the general population towards being overweight and obese with 61.7% of patients classified as overweight or obese. This also has an impact on how much weight has to be lost before 5% loss is achieved.

A high percentage of subjects (25%) from this sample experienced severe weight loss (>10% body weight) during their radiation treatment. Beaver et al reported that 32.7% of their sample experienced severe weight loss.[5] In the same study, severe weight loss in patients who had prophylactic feeding tubes was 14% (n=4). Of note from the current audit is that mean weight loss between ONS and ENS groups did not differ significantly. This is likely a reflection of the reactive approach to enteral feeding in the audited hospital, but may also represent a difference between the patients in this audit and those previously reported in the literature. One study involving subjects of a comparable age and gender ratio researched weight loss with Stage I and II head and neck cancer patients and found that 25% of the sample experienced greater than 5% weight

loss, in comparison to the 62.5% with greater than 5% weight loss in this sample.[19]

Whilst this study did not look directly at the factors contributing to significant weight loss in this population, many previous studies have investigated these factors. One study reported that pre-treatment determinations of nutritional status or dietary habits and anthropometric measurements were not predictive of weight loss during radiotherapy.[20] Studies have found that sex, tumour site and stage influenced critical weight loss during treatment.[19] Early disease (Stage I or II) is generally compared with advanced stages (III or IV), and the comparisons show that advanced stage head and neck cancer patients are more likely to experience weight loss and consequently receive enteral nutrition.

Mean weight loss in the present audit was 5.87%. Patients in the ONS and ENS groups of this audit had a mean weight loss of more than 8%. Capuano et al reported on the results of their nutritional programme designed for patients to achieve and maintain their calculated energy and protein requirements.[8] They observed that all non-compliant patients continued to lose weight, whilst compliant patients did not lose significant amounts of weight. In practice, patients may find it difficult to be compliant if they have multiple nutrition impact symptoms.[21] More than three nutrition impact symptoms were experienced by 29 patients (60.4%). Twenty-eight patients (62.5%) lost greater than 5% body weight during their treatment. This audit revealed a significant difference in weight loss between the counselling group and other nutrition support groups. However, the group which received counselling alone had fewer nutrition impact symptoms and were therefore at a decreased risk of weight loss. Higher numbers of nutrition impact symptoms contribute to risk of weight loss and indicate the need for oral or enteral nutrition support.

In this audit due to the small numbers and large number of categories for tumour site, for statistical analyses the groups were divided into high-risk and low-risk categories to determine if this influenced the need for oral nutrition support. Whilst the results indicate a statistically significant difference between high-risk and low-risk tumour sites and the type of nutrition support required by patients ($p < 0.05$), it is not possible to make inferences about more specific tumour sites. This may be a topic for future studies to consider.

Treatment type was investigated for its relationship with type of nutrition support. Radiation combined with chemotherapy was associated with a higher need for ONS and ENS ($p < 0.05$). This is consistent with the literature on combined modality treatment. This could reflect that chemotherapy is often given in conjunction with high-risk tumour sites and not normally for low-risk salivary primary or cutaneous primary sites. The use of chemotherapy is a common treatment modality in patients who have more advanced tumour stages. Those with early stage tumours are more likely to have single modality treatment.

Conclusion

This study has identified that increasing age, high risk tumour site, advanced stage disease and the addition of chemotherapy are risk factors for weight loss during radiation treatment. These patients are more likely to need enteral feeding during treatment. Pre-treatment nutritional status did not influence weight loss during treatment in this study. Therefore, this study highlights the need for early identification and intensive dietetic intervention for high-risk patients to prevent weight loss. It is also evident that ONS alone cannot prevent significant weight loss in the presence of multiple nutrition impact symptoms. It is strongly recommended that early enteral feeding should be considered in this group of patients. The results from this study cannot be generalised for all head and neck cancer patients due to the small sample size. Therefore, we recommend that further studies with a larger sample size be undertaken.

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CONFLICTS OF INTEREST

The authors declare that they have no competing interests.

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Nil.

Appendix: Audit Tool

Patient code	
Sex	☐ Male ☐ Female
Tumour Site	☐ Oral Cavity ☐ Oropharynx ☐ Nasopharynx ☐ Hypopharynx ☐ Larynx ☐ Paranasal sinuses/nasal cavity ☐ Salivary glands ☐ Cutaneous primary ☐ Unknown Primary
TNM Stage	T: N: M:
Treatment	☐ Radiation ☐ Surgery + Radiation ☐ Chemoradiation ☐ Surgery + chemoradiation ☐ Induction chemotherapy + chemoradiation
Weight (kg)	Baseline: End Radiotherapy:
SGA Rating	☐ A ☐ B ☐ C
Body Mass Index (kg/m^2)	
Nutrition Impact Symptoms	☐ 1 ☐ 2 ☐ ≥ 3
Nutrition Support	☐ Counselling ☐ Oral supplements ☐ Enteral nutrition