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ORIGINAL RESEARCH

Evaluating the effectiveness of a nutrition assistant role in a head and neck cancer clinic

Running head: Nutrition assistants in a head and neck clinic

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Abstract

Aim: Acute toxicities secondary to (chemo)radiation for head and neck cancer can substantially impact nutritional intake. Nutrition is usually managed by dietitians, although time constraints may limit capacity to sufficiently deal with complex nutritional issues. The aim of this study was to determine the effectiveness of a nutrition assistant performing screening and intervention of patients in a multidisciplinary head and neck clinic.

Methods: A model of care was developed to guide nutrition assistant practice within the clinic, with training provided to nutrition assistants prior to the clinic's implementation. Outcomes, including amount of dietitian time managing high risk patients, weight change over the duration of treatment, timing of initiation of enteral feeding and patient satisfaction were compared pre-and post-implementation of the nutrition assistant role.

Results: Ninety-one patients were included, 43 pre-implementation and 48 post-implementation. Overall, (n= 21, 44%) of patients met criteria for nutrition assistant screening or intervention. Mean weight change between groups was comparable both during (-5.6% vs. -4.7%, p=0.3) and post-radiotherapy (-6.6% vs. -6.49%, p=0.9). Following implementation of the role significant improvement was found for overall patient satisfaction (4.0 $\pm$ 1.1 vs 4.6 $\pm$ 0.61,

p=.03), and the dimensions: patient perceived benefit (3.8 ± 0.69 vs 4.4 ± 0.62, p<.01) and dietitian/nutrition assistant interpersonal skills (3.91 ± 1.1 vs 4.6 ± 0.55, p=.02).

Conclusions: The nutrition assistant role resulted in improved patient satisfaction and maintenance of nutritional outcomes demonstrating the effectiveness of this role in supporting the management of head and neck cancer patients within a multidisciplinary treatment clinic.

Key words: nutrition, head and neck cancer, cancer, radiotherapy, nutrition assistant

Introduction

Head and neck cancers include tumours of the oral cavity, salivary glands, paranasal sinuses, larynx and pharynx. In Australia the number of new cases of head and neck cancer for 2017 was projected to be 4,955.[1] This is an increase of more than 1935 new cases since 2007.[2] Head and neck cancers are treated by surgery, radiotherapy or chemotherapy, or any combination of these modalities. Radiotherapy or chemoradiotherapy, given either definitively (primary treatment) or post-operatively, is delivered over a period of five to seven weeks and is associated with significant acute toxicities including mucositis (mouth ulceration), dysphagia (difficulty swallowing), dysgeusia (altered taste), and xerostomia (dry mouth) which have a substantial impact on nutritional status.[3] The prevalence of malnutrition in patients with head and neck

cancer can be as high as 50% prior to treatment, with further exacerbation of malnutrition occurring secondary to acute and late treatment toxicities.[3,4] The adverse effect of malnutrition on outcomes, including mortality and quality of life, has been well reported.[5-7] Evidence based guidelines for the nutritional management of patients with head and neck cancer recommend weekly contact with a dietitian to improve outcomes in patients receiving radiotherapy based on results from multiple randomised trials.[8] This recommendation leads to a substantial requirement for dietetic services in this patient group.

Head and neck cancer patients receiving curative intent radiotherapy or chemoradiotherapy at Peter MacCallum Cancer Centre are managed in a twice-weekly multidisciplinary on-treatment clinic which includes radiation oncologists, dietitians, speech pathologists and nurses. Approximately 40 to 50 head and neck cancer patients are on treatment at any one time, with between 20 to 30 patients attending each multidisciplinary clinic. Currently all patients attending this clinic are seen weekly by a dietitian during radiotherapy and then fortnightly for up to six weeks post radiotherapy in a model of care previously described.[9]

Nutrition assistants (NA) are allied health assistants (AHA) who specifically work with dietitians. NAs are trained to work within a certain scope of practice undertaking tasks designated and specified by dietitians. NAs currently work in the inpatient and ambulatory chemotherapy settings at Peter MacCallum Cancer Centre, performing malnutrition screening to identify patients at risk of malnutrition, as well as provision of basic nutrition intervention. While patients

were seen by the dietitian weekly in the multidisciplinary head and neck clinic, due to the volume of patients there was often insufficient time to spend with those who had complex nutritional issues. Therefore, there was scope to implement an NA role in the head and neck multidisciplinary clinic to screen certain patients for nutrition problems, and provide basic nutrition interventions, thereby releasing dietitian time for the management of patients with more complex needs including those who are nutritionally unstable. The aim of this study was to determine the effectiveness of an NA role performing screening and intervention in lower risk patients within the head and neck clinic on nutritional outcomes, dietitian time and patient satisfaction through comparison of two models of care.

Methods

This was a prospective pre-test post-test study of two consecutive, independent cohorts of patients attending the twice-weekly multidisciplinary head and neck clinic between November 2015 and March 2016 to compare outcomes under the previous model of care with the new model of care. Prior to implementation of the NA role (pre-implementation cohort) data were collected between November and December 2015. Following implementation of the NA role (post-implementation cohort) data were collected between February and March 2016. The pre-and post-implementation cohorts were separated by a one month settling in period to embed the new model of care prior to evaluation. Patients

were eligible for the study if they had a primary diagnosis of head and neck cancer, were over 18 years of age and had the ability to understand and complete surveys. Patients were excluded from the study if they were receiving treatment with a palliative intent. The study was approved by the Peter MacCallum Cancer Centre Human Research Ethics Committee (15/116L). The study followed the Standards for Quality Improvement Reporting Excellence (SQUIRE 2.0).[10]

In the previous model of care, all patients attending the multidisciplinary head and neck clinic were automatically seen by the dietitian weekly during radiotherapy and then fortnightly for up to six weeks following radiotherapy. Patients were seen by the other disciplines present in the clinic in the same location, but under a separate appointment. Nutrition assistants were not present in the clinic. The new model of care was established to introduce the NA role and guide the NAs practice within the clinic (Figure 1). Patients were always seen by the dietitian in the first and final week of radiotherapy as these were deemed important time points for dietetic intervention. At the time of the weekly dietitian review, dietitians identified patients who met the criteria for NA screen and intervention the following week. Excluding these time points, the weekly dietitian review could be replaced by NA review at any time during or post treatment. Patients who were receiving enteral nutrition were always seen by the dietitian. An 8-week training module was developed to upskill two NAs knowledge of the operation of the head and neck cancer clinic, use of the

screening tool and triggers for referral back to the dietitian (Supplementary material 1).

Data on participant demographics including age, gender, tumour type and stage, and treatment were obtained from the hospital electronic medical record. Patients' weight at the commencement and end of radiotherapy, and at four weeks post-treatment, was collected from the dietitians assessment in the electronic medical record. Percentage change in weight at the end of and at four weeks post-treatment relative to weight at commencement of treatment was calculated. The mean percentage weight loss over these time periods was compared between the pre-and post-implementation groups.

The number of patients with a percutaneous endoscopic gastrostomy (PEG) tube inserted either prophylactically prior to the commencement of radiotherapy or within the first few weeks of treatment, and those in whom a nasogastric feeding tube was placed during treatment were recorded. The time to commencement of enteral feeding, through either type of feeding tube, measured from the start of radiotherapy was compared between groups to determine if the replacement of dietitian reviews with NA reviews delayed commencement of enteral feeding.

The total amount of time (minutes) spent with the dietitian per patient from the commencement of radiotherapy up to six weeks post-treatment was determined from reports within the electronic Activity BarCoding system used by dietitians to record clinical and non-clinical activity. NA time was unable to be

recorded using this system. At commencement of treatment patients were classified into nutrition risk criteria in order to determine the proportion of dietitian time spent with each patient risk category (Figure 2).

Patient satisfaction was measured using the modified Patient Satisfaction with Clinical Nutrition Services (PSCNS) questionnaire.[12] The PSCNS questionnaire, validated in the oncology population, consists of nine items which measure overall satisfaction with nutritional care, as well as two dimensions of nutrition services: (i) dietitian/ NA interpersonal skills and (ii) patient perceived benefits of the nutrition care received.[12,13] Satisfaction with each item is measured on a five point Likert scale that ranges from strongly disagree (1) to strongly agree (5).[12,13] All participants were mailed the PSCNS questionnaire upon discharge from the clinic at six weeks post-treatment and were informed that survey responses would be analysed by a researcher independent of the clinicians who provided their care in the clinic in order to maintain confidentiality of their responses.

Sample size was pragmatic and based on similar time-frames for the two models of care. Demographic and clinical characteristics of the participants were summarised using descriptive statistics. Data were analysed using Stata version 13 (StataCorp LP, Texas, USA). Independent sample t-tests compared mean weight and mean score of the pre-implementation and post-implementation groups for overall patient satisfaction and the two dimensions: patient-perceived benefit and dietitian/ NA interpersonal skills. Clinically

important differences were considered as: percentage weight change ± 0.5%; patient satisfaction 0.3 to 0.5.[12,13] Alpha was set at 0.05 (two-tailed) for all analyses.

Results

In total N= 91 patients were eligible for inclusion in the study, n= 43 in the pre-implementation period and n= 48 during the post-implementation period. Patient characteristics at the commencement of radiotherapy were similar in both groups (Table 1). The numbers of high, intermediate and low risk patients were evenly distributed across both groups. In the pre-implementation period there were n= 35 (81.4%) high risk, n= 7 (16.3%) intermediate risk and n= 1 (2.3%) low risk patients. In the post-implementation period there were n= 39 (81.3%) high risk, n= 7 (14.6%) intermediate risk and n= 2 (4.2%) low risk patients.

Following implementation of the NA role n= 21 (43.8%) patients met the criteria for NA screening and intervention. Only n= 4 (19%) of these patients required a same day referral back to the dietitian. Two low risk, two intermediate risk and one high risk patient were identified for a NA screen at more than one time point. The average time patients were identified to see the NA was in week 3 of radiotherapy, with this being slightly earlier in high risk patients and slightly later in lower risk patients (Table 2).

The proportion of dietitian time spent with high risk patients did not differ between the groups. Pre-implementation, 88% of dietitian time was spent with

high risk patients, 11% with intermediate risk and 1% with low risk patients. Post-implementation 86% of dietitian time was spent with high risk patients, 12% with intermediate risk and 2% with low risk patients.

The mean percentage weight loss did not differ between the pre-and post-implementation cohorts either between the start and end of radiotherapy (-5.6%, SD 4.4 versus -4.7%, SD 3.8, p= 0.23) or between the start of radiotherapy and four weeks post completion of treatment (-6.6%, SD 5.3 versus -6.5%, SD 4.9, p= 0.91).

In total, n= 18 (42%) patients received enteral feeding through a nasogastric tube in the pre-implementation cohort and n= 14 (29%) in the post-implementation cohort. The time to the commencement of feeding through the nasogastric tube did not differ between the pre- and post-implementation cohorts (33 days, SD 10 versus 31 days, SD 10, respectively, p= 0.24). In total, n= 9 (19%) patients received enteral feeding through a PEG tube in the pre-implementation cohort and n= 23 (46%) in the post-implementation cohort. Time to commencement of feeding through the PEG tube was longer in the post-implementation cohort compared to the pre-implementation cohort but did not reach statistical significance (13.7 days, SD 13 versus 7.1 days, SD 7.8, respectively, p=0.95).

Thirty-eight patients returned the PSCNS questionnaire, with a 49% response rate pre-implementation and 35% post-implementation. A clinically and statistically significant improvement in all dimensions of patient satisfaction

was observed following the implementation of the NA role into the head and neck clinic (Table 3).

Discussion

This study describes the effect of implementing a nutrition assistant role in a multidisciplinary head and neck cancer clinic through comparison of two models of care. To our knowledge it is the first time such a role has been implemented in this setting and in this patient population. Patients with head and neck cancer undergoing radiotherapy have a high requirement for dietetic services due to the high prevalence of malnutrition both prior to and during treatment and the development of significant treatment related toxicities which impact on nutritional intake.[3,4] Current recommendations for nutritional management are for weekly dietitian contact during radiotherapy which has demonstrated improved patient outcomes.[8] A recent evaluation of a weekly speech pathology and dietetic service model for head and neck cancer patients during (chemo)radiotherapy has questioned whether this level of intensity is required for all patients and if this is the most efficient use of clinician time.[14] In the setting of growing numbers of people diagnosed with cancer and increasing complexity of patients, it is important to evaluate innovative models of care to meet demand for regular and proactive nutritional management, whilst maintaining quality of care and nutritional outcomes. In the current study, this was intended to increase time for dietitians to manage complex patients.

A substantial proportion of patients were identified as meeting the criteria for NA screening and intervention. This is reflective of the findings of the abovementioned evaluation of the weekly speech pathology and dietetic service model where it was reported that 24% of scheduled speech pathology and dietetic sessions were perceived as not necessary by either the patient, clinician or both.[14] Whilst it was anticipated that the NA role would be utilised most with low risk patients, and thereby increase dietitians time to spend with high risk patients, high risk patients made up the majority of the patient group with only very small numbers of low risk patients across both cohorts. Therefore, in reality the NA role was utilised across patients from all risk categories, while the low proportion of same day referrals back to the dietitian indicated this was both a feasible and appropriate use of the NA role. This indicates the implementation of the NA role achieved the goal of releasing dietitian time for patients with more complex needs such as intolerance to enteral feeds or multiple symptoms affecting nutritional intake, albeit in a way that was not anticipated prior to the study. The timing of the NA screening and intervention occurred on average within the first three weeks of radiotherapy indicating the NA screening and intervention appeared to fit best prior to the onset of radiation induced toxicities which are more likely to occur after the third week of treatment. However, it is possible that a higher number of patients may have been suitable for NA screening and intervention, including at later points in radiotherapy. The adjustment to the change in practice may have meant that the dietitians did not

identify all of the patients suitable for a NA screen despite allowing a one month settling in period to embed the new model of care. Further efficiency may be gained by a nurse or NA themselves identifying suitable patients.

A concern with replacing patient nutritional reviews undertaken by a dietitian with screening by a NA is the potential to negatively affect nutritional outcomes, particularly since the literature demonstrates improved patient outcomes with weekly dietitian contact.[8,15] Our study has demonstrated that nutritional outcomes were maintained with this innovative model of care. Mean weight loss and the time to commencement of enteral feeding, in patients with a nasogastric tube, did not differ between the cohorts and is similar to results reported in previous studies.[9,16] While the time to commencement of enteral feeding was longer post-implementation in patients with a PEG, this is most likely due to the small numbers of patients in the pre-implementation cohort who had a PEG rather than an indication of poorer nutritional outcomes. Further, although not statistically significant, patients in the post-implementation group had a mean weight loss of less than 5% between the start and end of radiotherapy which is an important goal in the nutritional management of cancer patients since more than 5% weight loss is an indicator of malnutrition.[17,18]

One study reporting the introduction of an AHA role in the ICU setting reports improved patient outcomes including reduced skin breakdown and number of ventilator days. However, this was in a setting of limited baseline access to a physical therapist where the introduction of the AHA role increased

patient access to physical therapy services and therefore improved patient outcomes can be expected.[19] The goal of introducing the NA role into the head and neck cancer clinic was to ensure nutritional outcomes were maintained whilst more effectively and efficiently using clinician time. The maintenance of nutritional outcomes following the implementation of the NA role supports the feasibility of using this model of care to continue adherence to current evidence based recommendations of weekly nutritional review albeit utilising a combination of dietitian and NA reviews to reduce the demand on highly specialised dietetic services.

Patient satisfaction is a key indicator of health care quality and is an important measure to consider in the evaluation of a new model of care.[20] Using patient satisfaction as an outcome measure provides important patient-centred insight into the acceptability of a new model of care and may have implications for patient adherence to interventions which is essential for achieving improved outcomes.[21] We demonstrated a clinically and statistically significant improvement in overall patient satisfaction, as well as the dimensions of patient perceived benefit and dietitian interpersonal skills, following the implementation of the NA role in the clinic. This is most likely due to patients receiving the most appropriate care at the appropriate time. Patients who were identified as suitable for NA screening and intervention were required to meet strict criteria, including a stable weight and having a stable food intake. Under these circumstances a short intervention by the NA, where less time is spent in the

clinic, is likely to be more preferable to the patient than a comprehensive appointment with the dietitian. Likewise, patients referred back to the dietitian on the same day are likely to have been reassured their care was being appropriately monitored and actioned, also contributing to overall satisfaction, while patients who had more complex nutritional issues or were nutritionally unstable remained under the management of a dietitian. A systematic review of studies investigating AHA roles has also found increased patient satisfaction with the introduction of AHA roles, although these studies were in physical therapy or rehabilitation settings.[22]

There is increasing recognition that AHA roles are an important workforce with potential to support health care delivery thereby releasing highly qualified clinician time to spend on the management of patients with more complex needs.[22,23] The majority of the literature published on the use and effectiveness of AHA roles is in the area of general rehabilitation, physiotherapy or occupational therapy assistance.[22] There is a need for further investigation of AHA roles in a variety of health care settings and patient populations. AHA roles are an important step in meeting the increasing demands for health care services. However, it is important to have sufficient clarity around the role as well as clear expectations and boundaries to ensure both the AHA and the clinician have confidence in the care delivered and there is no associated clinical risk to patients. In our study this was achieved through an extensive training program in addition to a well-defined model of care.

This study has some limitations. The model of care relied on dietitians to identify patients who were suitable for NA screening and intervention and it is possible that some patients who were suitable for NA screening and intervention were retained by the dietitian. In addition, the study did not include an economic evaluation and therefore the cost effectiveness of this model of care has not been established.

This study demonstrated that NAs are an effective workforce to support the delivery evidence-based nutritional management in a head and neck cancer clinic while enabling more efficient use of highly specialised dietitian time. Results reveal that the introduction of the NA role did not compromise nutritional outcomes and increased patient satisfaction. Further studies should investigate the cost-effectiveness of introducing NA or AHA roles into new models of care.

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Conflict of interest

The authors have no conflicts of interest to declare.

Authorship

NK designed the study, participated in data analysis and interpretation of results, drafted the manuscript. SG, LA, JB and JF participated in the design of the study, interpretation of results and writing the manuscript. PQ completed the data analysis, participated in interpretation of results and writing the manuscript. All authors are in agreement with the manuscript and declare that the content has not been published elsewhere.

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