

THE ROLE OF PROACTIVE NUTRITIONAL MANAGEMENT IN PREVENTING UNINTENDED WEIGHT LOSS IN PATIENTS WITH HEAD AND NECK CANCER UNDERGOING RADIOTHERAPY: AN EVIDENCE-BASED CASE REPORT

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Abstract

Background: Patients with head and neck cancer receiving radiotherapy are highly susceptible to nutritional deterioration because treatment-related oromotor toxicities reduce oral intake and promote unintended weight loss. Consequently, treatment tolerance and clinical outcomes may be compromised. Although proactive nutritional management has shown potential benefits, evidence from clinical trials remains inconsistent.

Objectives: This study aims to evaluate the role of proactive nutritional management in preventing unintended weight loss in patients with head and neck cancer undergoing radiotherapy.

Methods: A literature search was conducted in PubMed, Scopus, and Cochrane databases. Articles were screened for duplicates, relevance, and eligibility criteria. Selected studies were critically appraised for validity, clinical importance, and applicability using the Centre for Evidence-Based Medicine (CEBM) worksheet from the University of Oxford. The level of evidence was determined to guide the grade of recommendation.

Results: Two randomized controlled trials met the inclusion criteria. Both studies demonstrated good validity, clinical importance, and applicability, with a level of evidence of 1. Findings were consistent, indicating that proactive nutritional management initiated at the start of radiotherapy can prevent unintended weight loss. This effect persisted despite oromotor dysfunction during treatment. Overall, the evidence supports a strong recommendation (grade A) for implementation.

Conclusion: Proactive nutritional management can effectively prevent unintended weight loss in patients with head and neck cancer undergoing radiotherapy.

Keywords: Head and neck cancer, radiotherapy, proactive nutrition, weight loss

Introduction

Patients with head and neck cancer are highly susceptible to nutritional impairment due to a combination of local factors, such as mechanical difficulties in eating caused by tumor location, and systemic factors, including inflammation and metabolic alterations that promote catabolism. The risk of malnutrition is

already elevated at diagnosis and increases further during treatment, particularly radiotherapy,¹ where unintended weight loss is a common clinical problem. This is largely driven by radiation-induced side effects, including mucositis, dysphagia, xerostomia, and dysgeusia, all of which significantly reduce oral intake.^{2,3}

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Unintended weight loss in this population reflects not only an energy deficit but also complex metabolic disturbances that exacerbate nutritional decline and increase the risk of malnutrition.⁴ Moreover, weight loss during radiotherapy, whether administered alone or combined with chemotherapy, is associated with increased treatment toxicity, reduced treatment tolerance, interruptions in radiotherapy, and poorer quality of life and overall clinical outcomes.⁵ These consequences highlight the importance of early and effective nutritional strategies in this patient group.

Proactive nutritional management, defined as nutritional intervention initiated before or at the start of radiotherapy, contrasts with reactive approaches that are implemented only after treatment-related side effects impair intake.^{6,7} Emerging evidence suggests that proactive strategies may help preserve nutritional status. Recent randomized controlled trials have shown that early oral nutritional supplementation (ONS), consisting of nutrient-dense oral formulations designed to complement the habitual diet, significantly reduces weight loss compared with conventional care. Early nutritional intervention during radiotherapy has also been associated with improved nutritional outcomes.⁷⁻⁹ However, existing evidence remains heterogeneous, with some systematic reviews reporting variable effects

on clinical outcomes, and the routine implementation of proactive nutritional intervention in clinical practice remains challenging due to the substantial financial costs required.⁹

Therefore, this Evidence-Based Case Report aims to critically evaluate current evidence on the role of proactive nutritional management in preventing unintended weight loss among patients with head and neck cancer undergoing radiotherapy, in order to support evidence-based clinical decision-making in routine practice.

Case Illustration

This study was conducted in a clinical nutrition outpatient setting involving a 23-year-old male patient diagnosed with severe malnutrition and grade I mucositis in nasopharyngeal squamous cell carcinoma (T4N3M0) undergoing chemoradiotherapy. The patient was referred during the 18th fraction of a planned 33-fraction radiotherapy course due to worsening odynophagia, reduced oral intake, and significant weight loss.

Data collection was conducted through clinical interviews, physical examination, laboratory monitoring, and follow-up during nutritional care. The patient reported feelings of anxiety and sadness related to his condition, as treatment-related symptoms interfered with daily activities and negatively affected his quality of life.

Clinical assessment revealed severe muscle wasting and decreased handgrip strength. Throughout follow-up, haemoglobin levels ranged from 9.8–11.8 g/dL, leukocyte counts from 3,000–5,000/ μ L, and renal function remained within normal limits. Nutritional management included a soft diet and high-calorie, high-protein ONS, followed by nasogastric tube placement at the 23rd fraction. The patient also received vitamin B1, vitamin B complex, vitamin C, zinc, and omega-3 supplementation, followed by education on liquid meal preparation and oral hygiene during radiotherapy. Odynophagia improved by the 28th fraction, and by the final fraction, energy intake reached total requirements with symptom resolution; however, a total weight loss of 1.6 kg over the course of radiotherapy still occurred. This case raised the clinical question of whether proactive nutritional management, initiated at or before radiotherapy, could have prevented unintended weight loss.

Problem Formulation

The clinical question of this study is: “Is there a difference in weight loss between patients receiving proactive versus reactive

nutritional management among those with head and neck cancer undergoing radiotherapy?”

Based on the clinical question, the following PICO was created:

P (Patient): patients with head and neck cancer undergoing radiotherapy.

I (Intervention): proactive (early) nutritional management, defined as nutritional support initiated before or at the start of radiotherapy

C (comparison): reactive (delayed) nutritional management provided after the onset of treatment-related side effects during radiotherapy

O (Outcome): unintended weight loss

Type of clinical question: therapy

Methods

A literature search was conducted online using three databases: PubMed, Cochrane, and Embase, between September 11th and 13th, 2025. The search strategy combined Medical Subject Headings (MeSH) and title/abstract terms derived from PICO components and their synonyms, using the Boolean operators “OR” to increase sensitivity and “AND” to improve specificity. The keywords included “head

and neck cancer,” “radiotherapy,” “radiation,” “early nutritional intervention,” “early nutritional therapy,” “early nutritional support,” “early nutritional supplementation,” and “weight loss.” Retrieved articles were screened for duplicates using Mendeley, followed by eligibility screening based on predefined inclusion and exclusion criteria.

Inclusion criteria comprised meta-analyses or systematic reviews of randomized controlled trials (RCTs), or RCTs involving adult patients with head and neck cancer undergoing radiotherapy, where all subjects received nutritional management, with the intervention group receiving proactive nutritional support before or at the initiation of radiotherapy and the control group receiving reactive nutritional care, and reporting unintended weight loss as an outcome. Exclusion criteria included non-human studies, articles without full text, and publications not in English or Indonesian. Study selection followed the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) flow diagram.

Eligible articles underwent critical appraisal by two independent reviewers using the Centre for Evidence-Based Medicine (CEBM), University of Oxford worksheet for therapeutic studies, assessing validity, clinical importance, and applicability, followed by determination of the level of evidence to guide the grade of recommendations.

Results

A total of 50 articles were retrieved from PubMed, Scopus, and Cochrane (Table 1). These articles were subsequently filtered to assess the relevance of their titles and abstracts in relation to the PICO framework. After screening, two studies met the eligibility criteria (Figure 1), all of which are RCTs. Detailed study characteristics, including research design, population, intervention, control, and outcomes assessed, are summarized in Table 2. Critical evaluations of each study are provided in Table 3.

Table 1. Search Strategy and Results

Database	Research Strategy	Search Period	Hits
Pubmed	(((head and neck cancer[MeSH Terms]) OR (head[Title] AND neck cancer[Title])) AND (((radiotherapy[MeSH Terms]) OR (radiotherapy[Title/Abstract])) OR (radiation[MeSH Terms]) OR (radiation[Title/Abstract]))) AND (((((((early nutritional intervention[MeSH Terms]) OR (early nutritional intervention[Title/Abstract])) OR (early nutritional therapy[MeSH Terms]) OR (early nutritional therapy[Title/Abstract])) OR (early nutritional support[MeSH Terms]) OR (early nutritional support[Title/Abstract])) OR (early oral nutritional supplementation[MeSH Terms])) OR	September 11 th , 2025	21

	(early oral nutritional supplementation[Title/Abstract])) AND ((weight loss[MeSH Terms]) OR (weight loss[Title]))		
Scopus	TITLE-ABS-KEY(("head and neck cancer" OR ("head" W/2 "neck cancer"))) AND TITLE-ABS-KEY(("radiotherapy" OR "radiation")) AND TITLE-ABS-KEY(("early nutritional intervention" OR "early nutritional therapy" OR "early nutritional support" OR "early oral nutritional supplementation")) AND TITLE-ABS-KEY("weight loss")	September 12 th , 2025	9
Cochrane	#1 MeSH descriptor: [Head and Neck Neoplasms] explode all trees #2 "head and neck cancer":ti,ab,kw OR (head NEAR/2 neck):ti,ab,kw #3 #1 OR #2 #4 MeSH descriptor: [Radiotherapy] explode all trees #5 "radiotherapy":ti,ab,kw OR "radiation":ti,ab,kw #6 #4 OR #5 #7 MeSH descriptor: [Nutrition Therapy] explode all trees #8 "early nutritional intervention":ti,ab,kw OR "early nutritional therapy":ti,ab,kw OR "early nutritional support":ti,ab,kw OR "early oral nutritional supplementation":ti,ab,kw #9 #7 OR #8 #10 MeSH descriptor: [Weight Loss] explode all trees #11 "weight loss":ti,ab,kw #12 #10 OR #11 #13 #3 AND #6 AND #9 AND #12	September 13 th , 2025	20

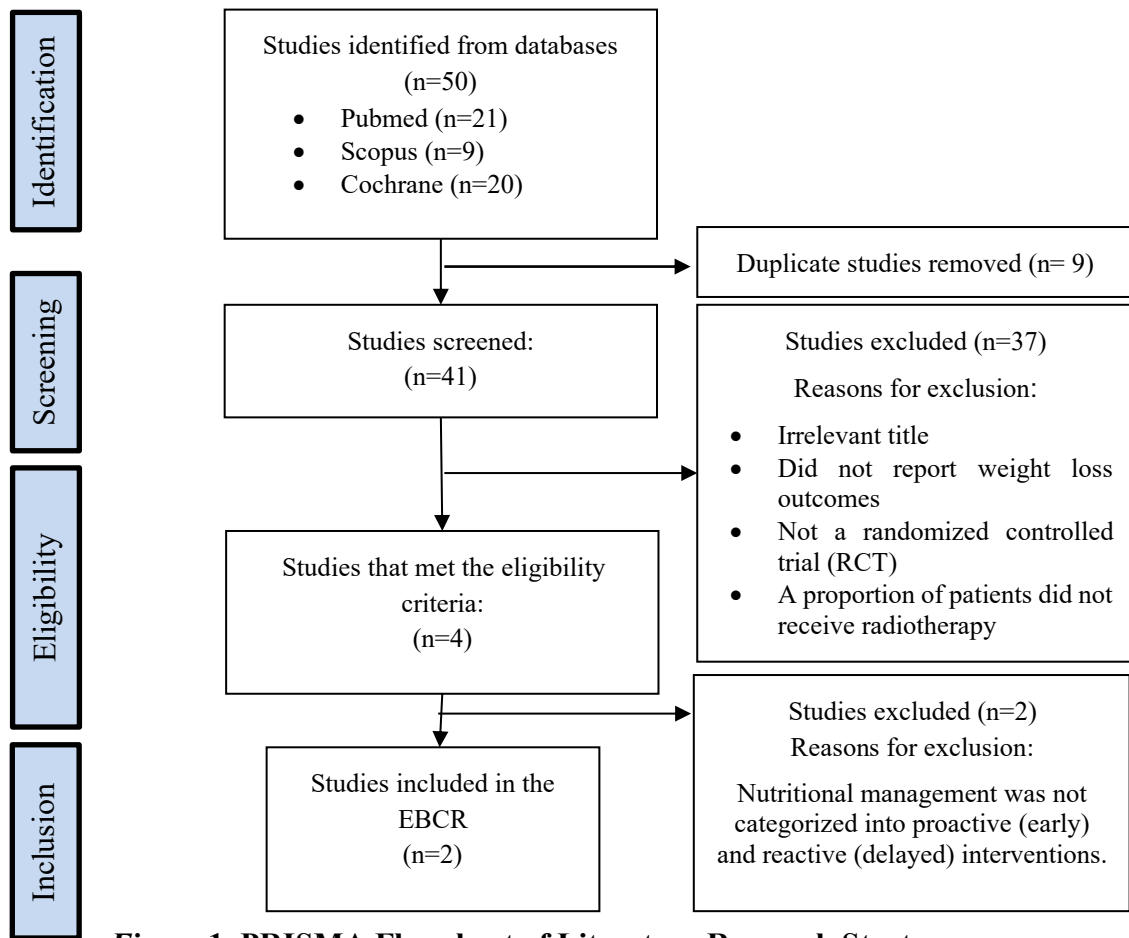


Figure 1. PRISMA Flowchart of Literature Research Strategy

Table 2. Characteristics of Relevant Studies

Researcher (year)	Design	Population	Intervention	Control	Outcome
Jiang et al., 2025 ⁸	RCT	Patients with oral or oropharyngeal cancer (n=63), with a history of curative surgery, who are currently undergoing radiotherapy or chemoradiotherapy.	Proactive nutritional intervention consisted of administering ONS from 2 weeks prior to the initiation of radiotherapy until 2 weeks after radiotherapy.	Reactive nutritional intervention consisted of administering ONS once more than 5% weight loss or a significant reduction in oral intake had occurred during radiotherapy.	Weight loss between 2 weeks prior to radiotherapy and 2 weeks post-radiotherapy was 0.11 kg in the intervention group and 4.15 kg in the control group, respectively (p < 0.001; 95% CI: 2.47–5.62).

Wei et al., 2024 ⁷	RCT	Patients with stage II–IV head and neck cancer (n=100) undergoing radiotherapy	Proactive nutritional intervention consisted of administering ONS, followed by enteral nutrition if oral intake was inadequate, and parenteral nutrition if enteral intake remained insufficient to meet the patient's requirements, initiated from the start of radiotherapy.	Reactive nutritional intervention consisted of administering ONS followed by enteral nutrition if oral intake was inadequate, and parenteral nutrition if enteral intake remained insufficient to meet the patient's requirements, initiated only after the development of oral mucositis or severe gastrointestinal toxicity during radiotherapy.	Weight loss in the intervention group at week 4 of radiotherapy was 1.39 ± 0.67 , whereas in the control group was 1.76 ± 2.16 (95% CI: -0.06 to 1.50 ; $p = 0.072$). At week 7 of radiotherapy, the mean weight loss in the intervention group was 2.10 ± 2.75 , compared with 3.18 ± 2.29 in the control group (95% CI: 0.08 – 2.09 ; $p = 0.035$).
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Table 3. Summary of Critical Appraisal of Validity, Importance, and Level of Evidence of the Studies by Jiang et al., 2025⁸ and Wei et al., 2024⁷

	Question	Jiang, et al., 2025 ⁸	Wei, et al., 2024 ⁷
Validity	Was the allocation of patients to the treatment groups performed randomly (randomization)?	Yes Eligible patients were randomly allocated in a 1:1 ratio to the intervention and control groups using a computer-generated randomization list prepared by an independent statistician.	Yes Patients who met the inclusion criteria were randomly allocated into two groups using concealed allocation, with the randomization sequence generated by a third-party investigator using a random permuted block method. Patients were subsequently assigned to either the intervention group or the control group.
	Were the baseline characteristics between groups comparable at the start of the clinical trial?	Yes All participants were adults with head and neck malignancies who had previously undergone curative surgery, were able to consume ONS, and had a Karnofsky Performance Scale score ≥ 70 .	Yes All participants were adults with stage II–IV head and neck malignancies confirmed by histopathology, with a Karnofsky Performance Scale score >70 .
	Aside from the allocated intervention, did both groups receive	Yes Both groups received the same ONS (Ensure®, Abbott) at a dose of three servings per day in	Yes The control group received the same standard nutritional management as the intervention

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	the same management?	addition to their regular diet, with the only difference being the timing of the intervention.	group, with the only difference being the timing of the intervention.
	Were all patients enrolled in the clinical trial accounted for and analyzed according to their randomized groups?	No There were two participants (6%) lost to follow-up in the intervention group, whereas no loss to follow-up occurred in the control group.	Yes There were no participants lost to follow-up, and all participants were analyzed according to their randomized groups.
	Were the outcome measurements objective, or were patients and clinicians blinded to the treatment allocation?	Yes Body weight was measured using standardized instruments in both groups.	Yes Body weight was measured using standardized instruments in both groups.
Importance	What was the magnitude of the treatment effect?	The mean weight loss at the end of radiotherapy in the intervention group was 4.04 kg less than in the control group.	Weight loss at week 7 of radiotherapy in the intervention group was 1.08 kg less than in the control group.
	How precise was the estimate of the treatment effect?	The mean weight loss in the intervention and control groups was 0.11 kg and 4.15 kg, respectively ($p < 0.001$; 95% CI: 2.47–5.62).	The mean weight loss at week 7 of radiotherapy was significantly lower in the intervention group compared with the control group, at 2.10 ± 2.75 and 3.18 ± 2.29 , respectively (95% CI: 0.08–2.09; $p = 0.035$).
Applicability	Can the results of this study help inform decision-making in the management of my patient?	Yes The results of this study can be applied to all patients with head and neck malignancies who are scheduled to undergo radiotherapy.	Yes The results of this study can be applied to all patients with head and neck malignancies who are scheduled to undergo radiotherapy.
Level of Evidence		1	1

Discussion

Radiotherapy is a key component in the multidisciplinary management of head and neck cancer; however, its adverse effects increase the risk of malnutrition and reduce quality of life.¹⁰ Head and neck irradiation commonly causes xerostomia, dysgeusia, mucositis, pain during mastication and swallowing, and dysphagia, all of which impair oral intake. Damage to taste buds and olfactory receptors further contributes to food aversion, while radiation-induced

inflammation and fibrosis of the masticatory muscles may limit mouth opening.¹⁰ These complications progressively reduce energy, protein, and fluid intake, increasing the risk of weight loss, malnutrition, and dehydration.¹¹ As these treatment-related toxicities are largely unavoidable, optimizing nutritional status before radiotherapy becomes the most modifiable factor. Therefore, proactive nutritional management aims to ensure patients begin treatment with adequate nutritional reserves, thereby

improving treatment tolerance and clinical outcomes.¹²

Currently, ONS is recommended for malnourished cancer patients undergoing radiotherapy, with formulations tailored to individual patient needs. A systematic review by Elia et al.¹³ demonstrated that liquid ONS significantly increased total energy intake and contributed to weight maintenance during treatment.¹⁴ In addition, dietary counseling has been shown to improve nutritional intake, maintain nutritional status, enhance quality of life, and reduce treatment-related toxicity. These benefits are not solely attributable to ONS, highlighting that nutrition education-based interventions are an integral component of the management of cancer patients undergoing radiotherapy.¹⁵ Accordingly, combining dietary counseling with ONS appears to be an effective nutritional strategy to improve intake and minimize treatment-related weight loss.¹⁶

Jiang et al.⁸ investigated patients with oral or oropharyngeal cancer who had undergone curative surgery before radiotherapy or chemoradiotherapy. Sandmael et al.¹⁷ reported that surgery may compromise nutritional status prior to

radiotherapy through postoperative pain, swallowing difficulties, inflammation, and negative energy balance, contributing to greater weight loss and muscle wasting. In Jiang et al.'s study,⁸ proactive nutritional management was initiated two weeks before intensity-modulated radiotherapy (IMRT) and continued until two weeks after treatment completion. Compared with conventional care, this approach reduced mean weight loss by 4.04 kg ($p < 0.001$, 95% CI). Furthermore, consistent with studies by Kono et al.¹⁸ and Wei et al.,⁷ proactive nutritional intervention also reduced the incidence of oral mucositis, thereby improving oral intake.

Similarly, Wei et al.⁷ reported that proactive nutritional management initiated at the start of radiotherapy and continued throughout treatment resulted in significantly less weight loss (1.08 kg; $p = 0.035$, 95% CI) and smaller reductions in body mass index than reactive nutritional intervention. Unlike Jiang et al.,⁸ the study included patients with stage II–IV head and neck cancer regardless of previous treatment. Taken together, both Jiang et al.⁸ and Wei et al.⁷ demonstrate the effectiveness of proactive nutritional intervention, initiated at or before the start of

radiotherapy and maintained throughout treatment, in patients with head and neck cancer across different disease stages and treatment histories. (Level of Evidence 1).

However, both studies have several limitations. In Jiang et al.'s study,⁸ nutritional counseling was provided to both groups from before the initiation of radiotherapy until its completion, which may reduce the ability to isolate the specific effect of ONS alone. Additionally, the study assessed only weight loss without evaluating body composition, which would provide a more accurate assessment of muscle mass changes. In the study by Wei et al.,⁷ although similar nutritional management was described for both groups, the specific procedures for implementing nutritional interventions across the study population were not clearly detailed. Furthermore, both studies were conducted at a single center with relatively small sample sizes, which may limit statistical power and the generalizability of the findings to broader clinical practice.

Despite these limitations, the critical appraisal of both studies included in this evidence-based case report demonstrates good validity, clinical importance, and applicability in routine clinical practice. Both studies consistently show that proactive nutritional management in patients with head and neck cancer undergoing radiotherapy plays a significant role in maintaining

nutritional status. Initiating nutritional intervention either before or at the start of radiotherapy can effectively prevent unintended weight loss in this population (Grade of Recommendation A).

Although current evidence supports the effectiveness of proactive nutritional management, its implementation in routine clinical practice remains challenging. It requires early nutritional screening, timely access to clinical nutrition specialists, availability of ONS and enteral nutrition when indicated, and regular nutritional monitoring throughout radiotherapy. These resources may not be readily available in all healthcare settings, particularly in resource-limited settings where workforce shortages and financial constraints may hinder implementation.^{19,20} However, integrating routine nutritional screening with individualized dietary counseling at the start of radiotherapy may represent a feasible initial approach to identify patients at high nutritional risk and prioritize them for more intensive nutritional support. Future studies should evaluate implementation strategies and cost-effectiveness across different healthcare settings to facilitate the integration of proactive nutritional management into routine oncology practice.

This evidence-based case report also has several limitations, including a limited literature search conducted within a short

timeframe and restricted to a limited number of databases, which may have resulted in the exclusion of relevant studies. In addition, there is currently no standardized definition of proactive nutritional management across studies, making comparisons between studies and implementation in clinical practice more challenging. Therefore, further research is needed to establish a standardized definition and determine the most effective, feasible, and cost-effective timing for initiating nutritional intervention in patients with head and neck cancer undergoing radiotherapy, particularly in Indonesia.

Conclusions and Recommendations

Proactive nutritional management in patients with head and neck malignancies undergoing radiotherapy plays an important role in maintaining nutritional status. Initiating nutritional intervention at the latest from the start of radiotherapy provides an adequate nutritional reserve prior to treatment, thereby helping to prevent unintended weight loss, despite the unavoidable oromotor dysfunction experienced during the course of radiotherapy. Nevertheless, further studies are still needed to evaluate the cost-

effectiveness of implementing proactive nutritional intervention in routine clinical practice, particularly considering the financial burden associated with long-term nutritional support.

Conflict of Interest

The authors declare that there are no conflicts of interest related to the studies in this manuscript.

Authors' Contribution

Author 1 – Generated the clinical question, conducted the search and critical review, analyzed the data and synthesized the evidence, and drafted the manuscript.

Author 2 – Provided academic supervision, directed the process of data analysis and interpretation, and reviewed and edited the manuscript.

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