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Nutritional interventions in patients with head and neck cancer undergoing chemoradiotherapy: Current practice at the Dutch Head and Neck Oncology centres

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Abstract

Objective: To assess variations in nutritional interventions during chemoradiotherapy (CRT) among the Dutch Head and Neck Oncology centres (HNOCs).

Methods: An online questionnaire about nutritional interventions and dietetic practices was sent to 14 oncology dietitians of the HNOCs.

Results: The response rate was 93%. The number of scheduled dietetic consultations varied from two to seven during CRT. Most centres (77%) reported using a gastrostomy for tube feeding in the majority of patients. Gastrostomies were placed prophylactically upon indication (39%) or in all patients (15%), reactive (15%), or both (31%). For calculating energy requirements, 54% of the dietitians used the Food and Agriculture Organization/World Health Organization and United Nations University (FAO/WHO/UNU) formula and 77% uses 1.2–1.5 g/kg body weight for calculating protein requirements. Almost half of the centres (46%) reported to remove the gastrostomy between 8 and 12 weeks after CR. Most centres (92%) reported to end dietary treatment within 6 months after CRT.

Conclusion: This study shows substantial variation in dietetic practice, especially in the use of a gastrostomy for tube feeding, between the HNOCs. There is a need for concise dietetic guidelines.

KEYWORDS
chemoradiotherapy, diet therapy, enteral nutrition, gastrostomy, head and neck neoplasms, nutritional intervention

1 | INTRODUCTION

In patients with locally advanced head and neck squamous cell carcinoma (LAHNSCC) the standard treatment is primary or adjuvant radiotherapy with concurrent chemotherapy for 6 to 7 weeks (Pignon et al., 2009). Side effects of this chemoradiotherapy (CRT), for example, pain, dysphagia, mucositis, taste alterations, xerostomia, sticky saliva and nausea, impair oral nutritional intake (Bressan et al., 2016; Mulasi et al., 2020). As a consequence, these patients are at high risk of malnutrition (Bressan et al., 2016), which is characterised by unintended weight loss (Cederholm et al., 2019). Weight loss in patients with head and neck cancer (HNC) is associated

with an increased rate of treatment interruption (Capuano et al., 2008; Paccagnella et al., 2010; Sealy et al., 2019), dose-limiting toxicity (Wendrich et al., 2017), more severe radiation-induced toxicity (Meyer et al., 2012), a lower quality of life (Capuano et al., 2010; Jager-Wittenaar, Dijkstra, Vissink, van der Laan, et al., 2011; van den Berg et al., 2008) and a lower overall survival (Capuano et al., 2008; Datema et al., 2011; Langius et al., 2013). Intensive nutritional intervention has been shown to be beneficial in preventing weight loss and lowering CRT related toxicity (Isenring et al., 2004; Isenring et al., 2007; Valentini et al., 2012). Dietary treatment for malnourished patients also diminishes healthcare costs for HNC patients (Scholte, 2015). Therefore, dietary treatment is usually embedded in the HNC healthcare process from diagnosis until follow-up.

In the Netherlands, HNC care is centralised in 14 head and neck oncology centres (HNOCs); 8 university hospitals; and 6 affiliated centres (van Overveld et al., 2017). Medical specialists of these centres involved in HNC care are united in the Dutch Head and Neck Cancer Society (NWHHT) (van Overveld et al., 2017). The members of the NWHHT, in consultation with members of the Allied Health Professionals for HNC (PWHHT), have developed the Dutch Head and Neck Cancer guidelines for standardisation and increasing quality of HNC care (Leemans et al., 2014). These guidelines do not provide guidance for the frequency of dietetic consultations during and after CRT. Also, the guidelines provide little information on the nutrition prescription (calculation of energy and protein needs) and nutritional interventions, such as tube feeding use, indications for gastrostomy placement and gastrostomy removal policy.

It is thereby unclear to what extent nutritional interventions vary between the HNOCs in the Netherlands. Therefore, the aim of this survey study is to evaluate current dietetic practice concerning dietary treatment, the dietetic care process, tube feeding and tube placement in patients with LAHNSCC treated with CRT at the HNOCs.

2 | METHODS

In January 2019, an email with a link to an online questionnaire was sent to 14 oncology dietitians of all fourteen HNOCs in the Netherlands.

The questionnaire consisted of 18 questions concerning nutritional intervention during CRT for LAHNSCC patients (Data S1). The following topics were addressed: dietetic consultations during CRT; tube feeding use and route; calculation of energy and protein requirements; tube placement and removal policy and end of dietary treatment.

Respondents were asked to fill out the questionnaire within 3 weeks. After 3 weeks a reminder was sent to those who had not filled out the questionnaire. When information was unclear a request for further explanation was sent.

2.1 | Ethical considerations

No ethical approval was needed for this survey on routine clinical practice and no patients were involved.

3 | RESULTS

3.1 | Dietetic consultations during treatment

Thirteen of the fourteen (93%) oncology dietitians completed the questionnaire. In all participating 13 centres, every LAHNSCC patient undergoing CRT was routinely referred to an oncology dietitian. In most centres (69%), dietetic consultations were scheduled weekly for all patients. Two centres (15%) reported scheduling between two and four dietetic consultations during the 7-week treatment period and the remaining two centres (15%) determined the frequency of dietetic consultations depending on patients' needs and preferences. In all centres, all scheduled dietetic consultations were face-to-face contacts.

3.2 | Tube feeding and feeding route

When asked what percentage of CRT patients required tube feeding, dietitians provided estimates ranging from 25% to 50% ($n = 1$), 50% to 75% ($n = 7$), and 75% to 100% ($n = 5$). In summary, all but one respondent (92%) estimated that more than half of all CRT patients required tube feeding at some point during CRT treatment. In most centres (77%), a gastrostomy was most frequently used (in 75% to 99% of patients) for the administration of tube feeding during CRT. In the remaining three centres (23%), a nasogastric tube was the preferred route (in 70% to 95% of their CRT patients). Four dietitians reported using a nasoduodenal or nasojejunal tube in a minority of patients (1% to 10%). Five centres (39%) reported placing a gastrostomy only prophylactically upon indication, thus in selected patients. Four centres (31%) reported placing gastrostomies both prophylactically upon indication or reactive. Two centres (15%) reported placing only reactive gastrostomies and two other centres (15%) placed prophylactic gastrostomies in all patients. Six out of the thirteen centres (46%) developed a centre-specific protocol with indications for gastrostomy placement. Five other centres (38%) used selection criteria for gastrostomy placement as well, but these were not embedded in a protocol. Reported selection criteria for (prophylactic) gastrostomy placement include, among others: tumour location; tumour size; bilateral neck irradiation; malnutrition risk and pre-treatment dysphagia. Detailed information on gastrostomy placement and selection criteria used can be found in Table 1.

3.3 | Energy and protein requirements

For calculating resting energy expenditure (REE), seven dietitians (54%) reported using the equation of the Food and Agriculture Organization/World Health Organization and United Nations University (FAO/WHO/UNU, 1985), four dietitians (31%) reported using the Harris and Benedict equation (Roza & Shizgal, 1984), one respondent (8%) uses a fixed factor (30–35 kcal/kg) (Weir, 1949) and one

TABLE 1 Detailed information on gastrostomy placement and the presence of a gastrostomy placement protocol at the thirteen participating Dutch Head and Neck Oncology centres

Respondent number	Gastrostomy placement	Selection criteria for gastrostomy placement	Protocol with indications
1	Reactive	Based on weight loss ≥10% and intake <50%	Yes
2	Prophylactic upon indication and reactive	Prophylactic based on criteria: very low BMI, large tumour, dysphagia. Reactive in case of severe complications during treatment and if nasogastric tube is not possible. Reactive often after CRT treatment	No
3	Prophylactic upon indication	If tumour is localised in oropharynx, oral cavity or nasopharynx. If tumour is localised elsewhere, it is based on insufficient intake and weight loss	Yes
4	Reactive	If nasogastric tube is not possible or not tolerated	No
5	Prophylactic upon indication and reactive	Prophylactic on indication in case of treatment with cisplatin, reactive if enteral nutrition is necessary (but then nasogastric tube is used instead of PEG/PRG)	No
6	Prophylactic upon indication and reactive	—	No
7	Prophylactic upon indication and reactive	No clear indicators, but at least 10% weight loss before treatment and dysphagia at baseline	No
8	Prophylactic (in all patients)	All patients receive a PEG/PRG tube prophylactic, unless it is not possible due to comorbidity. In that case, a nasogastric tube will be placed reactive	Yes
9	Prophylactic upon indication	If nutritional status is insufficient before start of CRT treatment	No
10	Prophylactic upon indication	In case of a primary tumour in oral cavity or oropharynx and/or bilateral neck irradiation	No
11	Prophylactic upon indication	If the physician expects that swallowing problems will be minimal (5% of the cases), a PEG or PRG tube is not placed prophylactic. In other cases, PEG or PRG tubes are placed before the treatment starts	Yes
12	Prophylactic (in all patients)	Prophylactic placement in almost every patient, except if there are contraindications or if the patients does not want a PEG or PRG tube. If the PEG tube is not placed prophylactic and tube feeding is needed in the last weeks of CRT, it will be provided via nasogastric tubes	Yes
13	Prophylactic upon indication	When at least one of the following applies: (1) T3/T4 tumour in oral cavity, oropharynx or hypopharynx; (2) nasopharyngeal tumour; (3) bilateral neck irradiation; (4) weight loss >5% in one month or >10% in three months; (5) low BMI (<18.5 or <20 when age >65 years); (6) dysphagia with insufficient intake	Yes

respondent (8%) uses the mean of three different equations. None of the respondents measured REE using indirect calorimetry in routine care. In order to calculate total energy expenditure (TEE), all dietitians who use an REE prediction equation instead of a fixed factor, added a percentage between 30% and 50% for physical activity level, illness and thermic effect of food. Most dietitians (77%) reported using 1.2 to 1.5 g protein/kg body weight to calculate protein requirements during CRT treatment. Only one respondent (8%) uses more than 1.5 g protein/kg body weight and one respondent (8%) uses 1.0 to 1.2 g protein/kg body weight to calculate protein requirements. All but one dietitian (92%), reported using fat free mass or corrected body weight (e.g., body weight corresponding to a body mass index [BMI] of 27) instead of actual body weight for calculating protein requirements in overweight patients. For calculating energy requirements in overweight patients, the actual body weight is used in most institutions (69%).

3.4 | Gastrostomy removal

Almost half of the centres (46%) reported that a gastrostomy is, on average, removed between 8 to 12 weeks after CRT (Figure 1). At all but two centres (85%), the dietitian and treating physician jointly decided when to remove the gastrostomy. Four dietitians (31%) mentioned that the patient is also involved in this decision making. Three centres (23%) developed a protocol for gastrostomy removal. These centres report that the gastrostomy will be removed when the patient has an adequate oral nutritional intake, a stable weight (or within acceptable range) and their gastrostomy has not been used for 2–6 weeks. One centre also added 'safe swallowing function/no aspiration' as a prerequisite for gastrostomy removal.

3.5 | End of dietary treatment

Most dietitians (76%) reported ending dietary treatment on average within 6 months after treatment. Two dietitians (15%) ended dietary treatment between 6 and 9 months and one dietitian (8%) ended dietary treatment, on average, more than 9 months after CRT treatment. However, several respondents denoted that there are considerable differences in the length of dietary treatment between patients, depending on patients' recovery after treatment, needs and nutritional intake. Reasons for ending dietary treatment varied per centre and included an adequate nutritional intake, weight stabilisation, reaching dietary treatment goals and removal of the gastrostomy. Two dietitians reported referring to a primary care dietitian if the patient is prolonged tube feeding dependent or if prolonged dietary treatment is indicated.

4 | DISCUSSION

Results of this nationwide survey indicate that there is substantial variation in the number of scheduled dietetic consultations and tube placement (and removal) policy during CRT among the thirteen HNOCs participating in this study. Also, slight variations were reported in the calculation of energy and protein requirements and length of dietary treatment.

In all centres, all CRT patients are routinely referred to an oncology dietitian for face-to-face consultations, but the number of these consultations during CRT treatment varied between two and seven. Although the current Dutch Head and Neck cancer guidelines provide no information about the optimal frequency of dietetic consultations during CRT, in most centres (69%) they are scheduled weekly. This is in line with the Dutch Handbook 'Nutrition in Cancer' (Huitema & Jager-Wittenaar, 2016) and guidelines from British Association of Head and Neck Oncologists (BAHNO) and Clinical Oncology Society of Australia (COSA) (Findlay et al., 2016; Talwar et al., 2016). Previous studies have shown that intensive, weekly nutritional intervention results in fewer treatment interruptions, less weight loss and milder symptoms of toxicity in HNC patients (Isenring et al., 2004; Paccagnella et al., 2010). These studies do not describe whether patients were compliant with the nutritional intervention. A more recent study showed that compliance with a dietary regimen with weekly nutritional counselling was low: as many as half of the patients missed more than 25% of scheduled appointments (Kabarriti et al., 2018). Future research should therefore gain insight into (non-) compliance with weekly consultations and patients' needs and preferences considering the number and type of consultations.

Most dietitians were convinced that tube feeding is required for most patients during CRT treatment. Previous observational studies showed most LAHNSCC patients (68% to 81%) use tube feeding

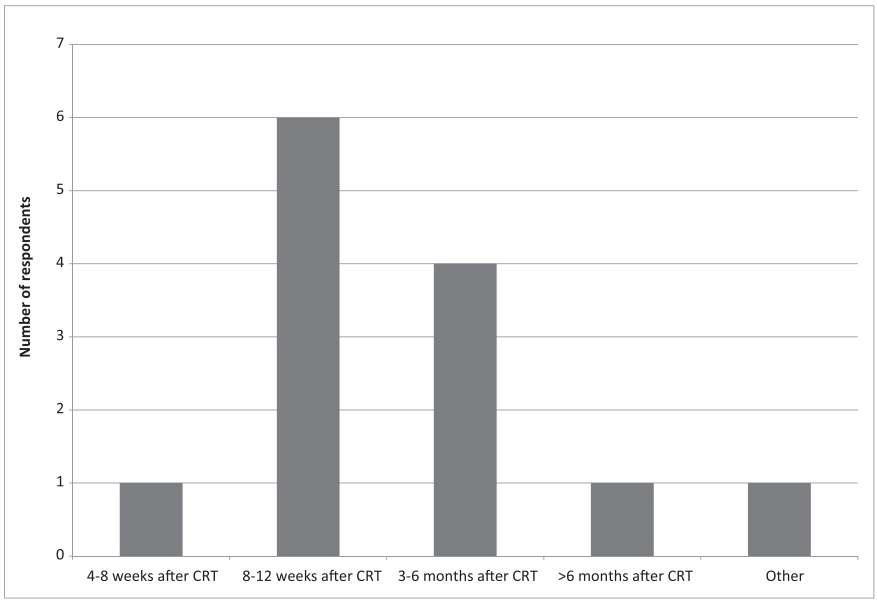

FIGURE 1 Estimated average time of gastrostomy removal after end of CRT treatment as reported by the 13 dietitians of the participating centres

during CRT treatment (Karsten et al., 2019; van der Linden et al., 2017). In this survey, we did not verify the indications used for starting tube feeding. According to the Dutch malnutrition guideline, tube feeding in addition to oral intake is advised when 50% to 75% of calculated nutritional requirements are met, and full tube feeding is advised when less than 50% of requirements are met using only oral intake (Kruizenga et al., 2019). Tube feeding is commenced even earlier in this specific patient population in anticipation of side effects of treatment, usually occurring from the second week of treatment onward (Brown et al., 2017a).

In most of the responding centres (77%), a gastrostomy is the preferred route for the administration of tube feeding, although the optimal route for tube feeding administration has not yet been established. A nasogastric tube has the advantage of its relatively low costs and easy placement procedure in an outpatient setting (Corry et al., 2009). However, in contrast to gastrostomies, nasogastric tubes dislodge more often and patients find them more inconvenient (Corry et al., 2009). A gastrostomy is preferred when tube feeding is expected to be necessary for at least four weeks (Arends et al., 2016; Willemsen et al., 2019).

Insertion of a prophylactic gastrostomy in all patients has been subject of debate (Chen et al., 2010). In the Netherlands, there is currently a shift from prophylactic gastrostomy in all CRT patients towards prophylactic gastrostomy in selected patients or reactive gastrostomy placement, which is illustrated by the results of this survey: most centres that placed a gastrostomy did so upon indication only. In two centres, however, *all* patients treated with CRT received a prophylactic gastrostomy. This is in contrast with the Dutch Head and Neck Cancer guideline, that states that a gastrostomy should be placed only upon indication and therefore not in all CRT patients (Langius et al., 2013). Although evidence is low, we support the recommendation to place a prophylactic gastrostomy only in selected patients because 9% to 47% of prophylactic gastrostomies are never used during CRT (Madhoun et al., 2011; van der Linden et al., 2017), and complication rates are high (Grant et al., 2009; Strijbos et al., 2018). Moreover, prophylactic gastrostomy insertion in all CRT patients might increase long-term dysphagia and tube feeding dependency due to atrophy of the swallowing muscles in the prolonged absence of oral intake (Oozeer et al., 2011; Williams et al., 2012).

To better predict which patients would benefit from a prophylactic gastrostomy, we recently developed and internally validated a prediction model for tube feeding dependency for at least four weeks during CRT which can be used as a tool to support personalised decision making on prophylactic gastrostomy insertion (Willemsen et al., 2019).

There is no consensus on when to remove a gastrostomy. Most centres reported removing the gastrostomy, on average, between 8 and 12 weeks after CRT. It is essential to stimulate oral intake during and after CRT, to closely monitor tube use and to remove the gastrostomy as soon as possible after CRT treatment to prevent long-term dysphagia (Berthiller et al., 2016; Brown et al., 2017b). Three centres have already formulated indications on when to remove the gastrostomy. Future studies should focus on the optimal timing of gastrostomy removal and criteria for gastrostomy removal, as information in literature is lacking. It should also be noted that in 70% of the centres the patient was not mentioned as being involved in this gastrostomy removal decision making, suggesting that there is ample opportunity to increase the use of shared-decision making.

Several methods were used to calculate energy requirements of patients. This is no surprise, because for calculating a patients' individual energy requirement, various prediction equations for REE can be used, for example Harris and Benedict, the FAO/WHO/UNU and Schofield formula (FAO/WHO/UNU, 1985; Roza & Shizgal, 1984; Schofield, 1985; Weijs et al., 2008). The Dutch Head and Neck cancer guidelines provide no information on which formula is best to use in HNC patients. The FAO/WHO/UNU formula seems to perform best in patients with a BMI < 30 and the Harris and Benedict in patients with a BMI > 30 (Huitema & Jager-Wittenaar, 2016; Kruizenga et al., 2016). An earlier study showed that the Harris and Benedict underestimates REE in a CRT population with a BMI < 25 (Garcia-Peris et al., 2005). Therefore, the FAO/WHO/UNU (for BMI < 30) or the Harris and Benedict equation (for BMI > 30) seem to be the best prediction equations for calculating REE, until a population specific formula for calculating REE in HNC patients has been developed. All respondents reported calculating TEE by multiplying REE with 1.3–1.5 (physical activity level and illness rate), which is in line with general guidelines for cancer patients (Beijer et al., 2016; Kruizenga et al., 2019).

Some variations in calculating protein requirements were observed. Although most dietitians (77%) use 1.2 to 1.5 g protein/kg bodyweight, which is also used for malnourished patients (Deutz et al., 2014), the optimal protein requirement for cancer patients has not yet been determined (Arends et al., 2016). Recommendations vary between 1.0 and 2.0 g protein/kg bodyweight per day depending on disease stage, type of treatment and complications (Arends et al., 2016; DDO Group, 2012). There is some evidence that protein requirements can be even higher as 1.7 g/kg bodyweight in patients receiving combination therapy (Jager-Wittenaar, Dijkstra, Vissink, Langendijk, et al., 2011).

Although most dietitians (76%) participating in this survey reported ending dietary treatment shortly (0 to 6 months) after CRT, it is known that late toxicity rates of CRT are considerable. For instance, van den Berg reported that as few as 15.6% of HNC patients were able to eat without restrictions 44 months after treatment and the majority of patients reported to still experiencing a dry mouth and sticky saliva at their late morbidity clinic (van den Berg et al., 2014). Patients with these late toxicities may benefit from long term dietary treatment.

Results of this survey provide a nice overview of dietetic care for HNC in the Netherlands, although it has some limitations. For answering some survey questions, we relied on the judgement of the respondent and we could not verify answers with objective data. Since all are experienced HNC dietitians, we think this would not highly affect our results. However, the number of years of experience in the field of HNC might differ between respondents, but this was not asked in our survey. In the Netherlands, there is no national specialisation or

training to be a HNC dietitian, which might explain some variation in care between dietitians and centres.

Overall substantial variation was found in nutritional interventions during CRT in the Dutch centres. Previously, van Overveld et al. assessed variation in quality of HNC care in the Netherlands (van Overveld et al., 2018). They demonstrated variation was associated with patient characteristics (tumour stage, tumour subsite and performance status) and hospital characteristics (volume of HNC care). Variation in nutritional interventions during CRT is not likely to be influenced by patient characteristics as all CRT patients have advanced disease and a sufficient performance status is usually a prerequisite for CRT treatment. Although we did not assess differences in hospital volume of HNC, this is likely to vary between university hospitals and affiliated centres. This might influence the available dietetic full-time equivalents (FTE's) and thereby the number of scheduled consultations during CRT and length of dietary treatment. Hospital dietetic services in the Netherlands are paid from a fixed hospital budget. This is in contrast to medical specialists who receive budget for every new HNC patient by opening a diagnose treatment combination (DTC) (Hasaart, 2011). From this case-based budget all hospital services from first consultation until the completion of treatment should be paid, but strangely allied health services do not receive any payment from this DTC. By increasing hospital volume of HNC, the frequency of dietetic contacts and duration of follow up will be lowered as it does not fit available hospital dietetic FTE's. To be able to offer high-quality dietetic care in the hospital, payment of hospital dietetic services need to be changed.

For all of the topics assessed in this survey current literature provides some guidance, as discussed above, which can be used in clinical practice. Although available evidence and level of evidence varies, we should be able to develop concise dietetic guidelines for HNC, as has already been done by the British Association of Head and Neck Oncologists (BAHNO) and Clinical Oncology Society of Australia (COSA) (Findlay et al., 2016; Talwar et al., 2016). These guidelines provide guidance on dietetic intervention and frequency of contact and also for prophylactic gastrostomy placement. To create support for and commissioning of these dietetic guidelines in the Netherlands it should be integrated in the Dutch Head and Neck Cancer guidelines which are currently updated. We therefore advise the NWHHT and PWHHT to combine their knowledge and develop multidisciplinary head and neck cancer guidelines, not focusing solely on medical treatment but on multidisciplinary care, including allied health care as has been done by the British Association of Head and Neck Oncologists.

In conclusion, this study shows considerable variation in dietetic practice between the Dutch Head and Neck Oncology centres. To reduce variation between centres and dietitians, we advise to reconsider the current fixed budget for dietetic services and develop a national training or specialisation to become a HNC. Most importantly, we should develop and implement multidisciplinary HNC guidelines based on the available literature, which provide guidance on dietetic care throughout the whole HNC care process including frequency of contact, nutrition prescription and tube placement.

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CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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