

Nutritional practices in hospital setting: literature review and qualitative study on oral nutritional supplements

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Abstract

Malnutrition, especially among the elderly in the healthcare environment, is a prevalent problem in The Netherlands, affecting both patients and the healthcare budget. Although oral nutritional supplements (ONS) are often used to restore the nutritional status of a patient, the evaluated current available literature failed to show a coherent picture of the effectiveness of ONS in malnourished patients. In the present study, we used a qualitative research approach to gain insight in the treatment of malnutrition via ONS and food snacks in a single non-academic teaching hospital. Twelve semi-structured interviews with stakeholders (such as dietitians, nurses, care-assistants, physician) were held. Results indicated opportunities for further improvement, for example through the introduction of a screening tool for malnutrition in cognitive impaired patients, better timing for handing out the daily meal plan forms, and improved range and provision of snacks. The stakeholders indicated that taste and physical properties of ONS, but also social environment as well as the physical/mental state and motivation of a patient are important facilitators which should be considered during the prescription.

In conclusion, to optimize treatment of malnutrition using ONS and food snacks, the above mentioned opportunities to better match the needs of malnourished patients have to be tackled. Involvement of the different stakeholders within the healthcare facility will be important to implement required changes in nutritional practice. *Published on* <http://www.has.nl/lectoraten/voeding-en-gezondheid/publicaties> January 2016

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1. Introduction

Despite the fact that access to food is easier than ever in the western society, there is still a group of people who are malnourished or at high risk of getting malnourished (1). Various factors may cause malnutrition, including disease, physical state and social environment (2). Prevention and treatment of malnutrition is important because malnutrition has significant consequences: it impacts both physiological and biochemical systems and affects the overall state of wellbeing. Despite an increased awareness in The Netherlands in the past few years with respect to the causes and treatment, malnutrition is still a common problem in healthcare institutions such as hospitals and nursing homes (3).

Since 2004, the prevalence of malnutrition in The Netherlands has declined. Nevertheless, in 2013, 9.9% of patients in hospitals and 14.5% in the chronic care sector were reported to be malnourished (1).

Malnutrition has a major impact on the national healthcare budget because it can lead to (re-) hospitalization, increased treatment costs, increased length of stay in hospitals and other healthcare institutions (4, 5). Freijer and colleagues estimated the additional costs of managing patients with disease-related malnutrition in hospitals, nursing and residential homes and home care settings at 1.9 billion euros, which equals 4.9% of the total costs of Dutch healthcare in 2011 (5).

The standard treatment of malnutrition consists of prescribing a high protein and energy dense diet. A common used method to achieve this is the provision of extra food snacks and the use of oral nutritional supplements (ONS). ONS are liquid drinks, usually provided in 200 ml packages, with an average energy content of 150 kcal and 5-7 grams of protein per 100 ml. With a wide variety in flavor, composition, and brands, they are considered as a simple way to consume additional energy and protein in a relatively small volume.

Even though ONS is a useful product which can be beneficial for malnourished patients, it also has its limitations. One of the main characteristics of ONS is the distinct taste and its saturating capacity, which can compromise patients' compliance, especially when taken during a longer period of time. Another potential consequence of using ONS is that, when supplied in-between meals, it can diminish the voluntary food intake during main meals, with the effect that total energy and protein intake over the day may remain the same as it would have been without ONS (6, 7). Nevertheless, the prescription of ONS has doubled in The Netherlands since 2007 to 32.6 million euros in 2011 for those who use ONS as the only source of nutrition, and another 11.7 million euros for those who use ONS in addition to their diet (8). Despite the large turnover of ONS, from a scientific perspective there is unclarity about the effectiveness and, consequently, the cost-effectiveness of ONS. The available evidence from recent systematic reviews is briefly discussed below.

2. Review of existing literature on the effectiveness of ONS

A review of six recent publications, mostly systematic reviews of randomized clinical trials (RCTs) (9-14), presented in Table 1, failed to show a coherent picture of the effectiveness of ONS in malnourished patients. This is partly due to the methodical quality of the reviewed

RCTs. There is a huge variation in type and number of participants, type of interventions, measured outcome parameters, methods used to diagnose malnutrition, the use of placebo treatment and blinding which is often impossible because of ethical considerations. In addition there is a suspected publication bias and a trend that many of the positive studies are funded by ONS producing companies.

In 2011, the Dutch Health Council also concluded that the current state of science does not provide sufficient evidence for the effectiveness of extra energy and protein supplementation in the form of ONS (9).

A reduction in the risk of complications was found in three (11, 12, 14) out of five publications (10-14), as shown in Table 1. Stratton and Elia (14) provided an overview of multiple systematic reviews. These authors reported a consistent reduction in mortality by ONS as compared to routine care, predominantly in undernourished patients and in acute, ill, hospitalized, and elderly patients with varying conditions (14). However, more recent reviews did not confirm these findings (10-12).

Other clinical outcomes, for example length of stay in hospital, re-admission to hospital, or functional parameters such as hand grip strength, were not appraised in all reviews.

Nevertheless, these papers also yielded varying positive and negative results. In all six above mentioned publications, a significant improvement in overall energy and protein intake and/or changes in BMI (weight gain) was found, but this did not necessarily result in better clinical outcomes with respect to length of stay and/or mortality in the same RCTs (9- 14).

The cost-effectiveness of ONS was also evaluated in several publications (7, 9, 15-18) which are presented in Table 2. Although heterogeneity of the data, such as variation in intervention group, used product and method of cost calculation hampered comparison of these studies, five out of seven publications indicated a positive cost-effectiveness of ONS use (7, 15-18) (Table 2). However it is important to consider the specific parameters examined in those studies and reviews. An increased energy intake and weight gain cannot automatically be linked to cost savings. A better nutritional status can potentially reduce the risk of disease or complications, but it is not a definite marker for a better clinical outcome and thus reduction in medical costs. Therefore making a hard statement about the cost-effectiveness of ONS is not possible.

The Dutch Health Council came to a similar conclusion in its report which was focused on the broad group of elderly people: *'The current state of scientific knowledge on the effect of treating malnutrition with energy-protein supplementation is insufficient. The question if there are any effects, and if so, which health benefits are achievable if elderly receive energy-protein supplementation cannot be answered due to lack of good quality research'* (9).

Consequently, the question can be raised whether ONS are the best available option for treating malnutrition, with the current cost of malnutrition and the increasing provision and consequently the cost of ONS in mind.

Table 1: Review and studies on the effectiveness of oral nutritional supplements (ONS)

Auteur	Study design	Number of studies	Parameters	Results	Conflict of interest
Stratton/ Elia 2007 (14)	Review of Reviews and meta-analysis	13 reviews and meta- analysis in adults/elderly,	Mortality	Meta-analyses consistently indicate reduction in mortality in acutely ill, hospitalized and elderly patients, a range of conditions, predominantly in the undernourished	Supported by Nutricia UK
		6 reviews: variety of conditions	Complication rate	Consistently indication of fewer complications	
		7 reviews: Specific disease groups	Body weight	Consistently significant in acutely ill patients and chronically ill patients	
			Nutritional intake	Consistently indicate that ONS are effective in increasing total energy/nutrient intake. Tend not to suppress food intake of appetite	
Milne 2009 (12)	Meta-analysis	49 studies	Mortality	No effect, RR ¹ =0.92 (CI ² 0.81 to 1.04), p=20, studies 28	Not declared
			Length of stay	No effect, -1.98 day (CI -5.20 to 1.4), with significant heterogeneity	
			BMI ³ Changes	Positive change with 2.2% (CI 1.8 to 2.5), p=0.0001, studies 43	
			Risk on complications	Reduction of 15%, RR=0.79 (CI 0.64 to 0.97), p=0.030, studies 23	
Cawood 2012 (11)	Systematic review/ meta- analysis	36 studies and 11 systematic reviews	Mortality	No effect, OR ⁴ 1.23 (CI 0.91 to 1.66) p=0.177, studies 15	Supported by Nutricia Advanced Medical Nutrition.
			Length of stay	Reduction of 10%	
			Risk on complications	Reduced effect, OR 0.68 (CI 0.55 to 0.83) p=<0.001, studies 10	
			Energy /protein intake	Higher intake, p=<0.001	
			Re-admission	Reduction of 30%, OR 0.59 (CI 0.41 to 0.84), p=0.004, studies 2	
			Weight Gain	Positive effect for high protein ONS	
			High VS normal protein ONS	No difference	

Baldwin 2012 (10)	Systematic review/ meta- analysis	26 studies	Mortality	No effect, RR 1.12 (CI 0.86 to 1.46), studies 18	No conflict of interest
			Energy intake -no effect for counseling	Yes, but strong heterogeneous effect	
			ONS vs. usual care	Mean difference 158 kcal (CI -66 to 382), p=0.17, studies 7	
			Weight gain	Mean difference 1.7 kg (CI 0.86 to 2.55), but heterogeneous effect,	
			Subgroup analyses for above parameters	No effect	
Philipson 2013 (13)	Retrospective study (From 2000 to 2010)	Database analyses	Length of stay	Reduction of 2.3 days (21% decline, CI -2.42 to -2.16)	Funded by Abbot Nutrition Consulting fee from Abbot Nutrition for 2 of the authors
			Episode cost	Reduction in cost with € 3674,61, (21.6% decline, CI - € 3690 to - € 3659)	
			Probability of 30- days re-admission	Reduction of 2.3 percentage point (-6.7%, CI -0.027 to -0.019)	
Dutch Health Council(9)	Review	Based on publication of Milne, including 12 extra studies		Current available scientific knowledge is not sufficient to make a statement about the effectiveness of using extra energy and protein as dietary treatment	No conflict of interest

¹RR: Relative risk; ²CI: 95% Confidence interval; ³BMI: Body mass index; ⁴OR: Odds Ratio.

Table 2: Reviews and studies on the cost-effectiveness of oral nutritional supplements (ONS)

Author	Study design	Study population	Intervention	Outcome	Conclusion (by Author of article)	Conflict of interest
Simmons 2010 (7)	RCT ¹ N=63	Nursing home residents	ONS or Between-meal snacks for six weeks or usual care (control)	Cost control: € 0.03 cost ONS: € 2.10 Cost Snack: € 2.06 - Increase in energy intake by ONS - decline in normal meal intake	The snack intervention was more cost-effective than the supplement intervention, considering caloric gain, staff time, refusal rates, and costs	No conflict of interest
Norman 2011(17)	RCT N=114	Gastrointestinal disease	ONS + dietary counseling for 3 months or only dietary counseling (control)	Health status utilities was higher in intervention patients vs. control (0.731, SD ² 0.015 vs. 0.671, SD 0.016, P=0.028). Intervention associated with higher costs (incremental cost-effectiveness ratio (€ 9.497 and € 12.099/additional QALY ³) but deemed cost-effective according to international thresholds (<50 000/ QALY).	Cost-effective according to international benchmark	Financially supported by a grant from Fresenius Kabi
Neelemaat 2011 (16)	RCT N=210	Elderly after hospital discharge	Dietary supplement + counseling for 3 months or usual treatment (control)	No statistically significant differences in quality of life and physical activities Functional limitations decreased significantly (mean difference -0.72, CI ⁴ -1.15 to -0.28). No differences in costs between groups. For functional limitations = a 0.95 probability that the intervention is cost-effective in comparison with usual care for ceiling ratios >6500	ONS leads to significant improvement in functional limitations and is neutral in costs.	No conflict of interest
Freijer 2012(15)	Health economic analysis	Elderly in community setting	No intervention	overall Cost of DRM ⁵ € 275.643, Cost of DRM with ONS € 205.322 Cost of ONS € 57.335	Total annual saving of €13 million (18.9 %), additional costs of ONS (€ 57 million) is balanced by a reduction of other health care costs e.g. re-hospitalization (€ 70 million).	No conflict of interest

Schilp 2013 (32)	RCT N= 146	Community - dwelling elderly	Referral to dietetic treatment for 6 months or no referral (control)	Weight gain = no significant difference (+ 0.25kg, SD 0.38) Cost – effectiveness of dietetic treatment vs. usual care: p=0.78 for a ceiling ratio of € 5000 for body weight gain p=0.06 for a ceiling ratio of € 20.000 for QALY	Dietetic treatment of older, undernourished community dwelling individuals is not effective compared to usual care	No conflict of interest
Russel 2007 (18)	Systematic cost analysis based on review of studies (1990-2003)	Non-surgical patients Abdominal surgical patients Orthopedic surgery patients In hospital as well community	No intervention	-	Net cost savings for all studies in hospital: -€ 1000 based on bed-day cost - € 350 based on complication cost Cost -savings can be achieved in selected patient groups.	Nothing declared
Health council 2011(9)	Review	Malnourished elderly	No intervention	-	Due to lack of good scientific evidence, a meaningful statement about the cost-effectiveness is not feasible	No conflict of interest

¹RCT: Randomized clinical trial; ²SD: Standard deviation; ³QALY: Quality-adjusted life year; ⁴CI: Confidence interval; ⁵DRM: Disease Related Malnutrition;

3. Qualitative study

Recently, the dietetic department of a non-academic teaching hospital in The Netherlands questioned this matter. This was triggered by various practical problems, for example the observation of low compliance and acceptance of ONS by patients, resulting in the impression that there was a high level of waste. These concerns did not only relate to the time patients stay in hospital, but also in the home environment, where after discharge from the hospital the use of ONS is no longer closely monitored and controlled.

Because of the lack of scientific back up about the (cost-) effectiveness and best way of providing the ONS, a qualitative study with semi-structured interviews was initiated to explore the best ways of providing ONS to patients, increasing their compliance and diminishing waste and costs, by looking for factors that could either facilitate or hinder the consumption of ONS in malnourished patients (I).

In relation to this question, it was also considered important to know, what protocols and processes are involved in the prescription and delivery of ONS and food snacks, not only in the hospital but also in the primary and community care, in order to get a better understanding of the use and usefulness of ONS in the home environment (II).

Subsequently, from this inquiry new opportunities to improve these processes and protocols could be explored. With the main objective to optimize the treatment of malnutrition, via ONS, food snack and/or via a new approach (III).

3.1. Methods

3.1.1 Study location

Data were collected at a single non-academic teaching hospital in a 3-month period in 2013, in addition two primary care facilities in the area were involved.

3.1.2 Data collection by semi-structured interviews

Data collection was done by means of semi-structured interviews with a representative mix of different stakeholders to obtain a full overview of the current situation. The stakeholders were selected based on their involvement with malnourished patients during their daily activities and their involvement and experience with (the provision of) ONS.

In total, twelve stakeholders agreed to be interviewed: five dietitians from the dietetic department of the hospital, two primary care dietitians, and one geriatric physician. Furthermore, one care-assistant from the geriatric ward, one care-assistant from the long-stay ward, one nurse specialized in chronic obstructive pulmonary disease and the head of the kitchen were interviewed. Nine interviews were performed face-to-face and three interviews (two dietitians, one care-assistant) were conducted via a written questionnaire. The questions of the interviews were based on the existing theoretical framework of Shepherd (19). This framework was designed to predict social determinants that are involved in the food choices, and was adapted to better fit the actual hospital situation.

3.1.3 Ethical statement

All participants agreed by written consent to participate after being informed on the purpose of the research, which included assuring privacy and confidentiality at all times. These written agreements were documented. According to Dutch law, observational research in which only written questionnaires, interviews or the use of registration data do not fall under the scope of the Medical Research Involving Human Subjects Act. Therefore no further medical ethical approval was necessary for this study.

3.1.4 Data Analysis

The texts of the recorded interviews were transcribed. For the analysis a systematic approach was used covering four phases of analysis based on the theoretical guideline of Boeije (20). After transcription, the interviews were thoroughly read and relevant parts concerning the research question were highlighted (exploration phase). Codes were made by labeling the relevant highlighted parts (specification phase), and after encoding the entire text, an overview of the used codes was made (integration phase). With the aid of this visualization tool, a second run through the data was performed to clarify if all relevant information had been assessed (reduction phase). Finally, the findings were merged into the overarching themes and summarized with quotes illustrating the opinions and vision of the stakeholders.

3.2 Results

3.2.1 Protocols and processes related to nutritional practices

As part of the treatment of malnutrition, many more processes are involved besides providing the additional nutrition to patients with (risk of) malnutrition. The first step is to identify the patients who are malnourished or those who are at risk. For this purpose, the screening tool SNAQ (Short Nutrition Assessment Questionnaire) (21) was used routinely by nurses when patients are admitted in the hospital. This tool was valued quite well by the interviewed dieticians and nurses. Also, the communication on the outcome between the different medical disciplines about the result of the SNAQ for individual patients was rated as good. There was a quick response from the care-assistants, who provided the extra nutrition if needed, and a quick reply from the dietician if extra information was required. In 2012, 96% of the patients were screened on admission (22). However, some practical limitations were mentioned, especially for cognitively impaired patients, who were said to often have a false-negative screening outcome due to difficulty in answering the SNAQ-questions. This is confirmed by literature: The SNAQ65+ was designed especially for geriatric patients, which includes measurement of the upper-arm circumference. As a limitation, it was mentioned that the SNAQ65+ is more time-consuming to administer and the validity of this tool has only been studied for community dwelling elderly, but not in a hospital setting (23).

If screening on admission by the nursing staff indicated the need for extra food snacks or

ONS, these were provided to the patients. The dietician became involved when low intake persisted. In the process of distribution and providing the foods, some problems were noted related to three main themes: the staff and kitchen, the provision of the snacks and the assortment of snacks.

Staff and kitchen

In the hospital, care-assistants were responsible for the direct provision of food to the patients, and for the distribution and collection of meal choice plans on which patients filled in their preference for the main meals. Furthermore, these care-assistants performed other logistic tasks like cleaning the ward and transportation of patients, which could influence and limit the time they could spend on nutrition care. The nurses of the ward had the overall responsibility for the nutritional care of the patients. It was mentioned that the nutrition-related tasks were in some cases too much shifted to the care-assistant, inducing time constraints. For example, the meal plan forms were handed out between 1 and 1.5 days before the time of consumption. According to the interviewed staff members, this resulted in difficulties in choosing, lack of appetite at the moment of consumption, and confused patients. This was in part considered as a logistic problem, as the hospital kitchen worked with an inflexible assembling line which for instance required breakfast to be prepared the preceding evening and then stored overnight in the refrigerator, leading to complains of patients because their sandwiches were cold and unappetizing.

Another related issue mentioned was the education level concerning nutrition of part of the care-assistants and nurses, which needed more attention. It was indicated that nutritional/product knowledge and the ability to select, together with patients, the most suitable products, combined with understanding the necessity of providing extra food snacks/ONS might lead to better nutritional treatment. One solution mentioned during the interviews included an e-learning module which had recently been developed and was being implemented by the hospital, which the staff was obligated to follow in order to increase their knowledge on nutritional care. Another option mentioned was to achieve a better cooperation and delegation of tasks between the nurses and care-assistants, possibly by developing a clinical practice guideline for nutritional care. This guideline should clearly delineate nutrition-related responsibilities in multidisciplinary teams, including the follow-up of patients from hospital via rehabilitation to home setting (24).

Assortment snack

The current assortment of food snacks of the hospital was rated as quite good by most of the interviewed stakeholders. The snacks were said to meet the set nutritional guidelines (additional provision of 200-300 kcal and 12g protein per day), and the assortment was said to be adjusted to the need of the patients (for example low sodium for heart patients). Although the variety in products was evaluated as good, some interviewees mentioned that the variety in snacks for people with swallow and chewing difficulties was limited. Most of the available products were sweet-tasted products, and thus more salty flavored products were said to be warranted. Another raised issue was the voluminous character of some of the snacks. Snacks like a “mini pizza’ or a “Bapao sandwich’ were mentioned to be quite large which was said to influence patients’ appetite for the main meals, especially because patients who used snacks, often already had poor appetite. Snacks with a less satiating effect were therefore requested by some stakeholders, of smaller size, but still with a high energy and protein density.

Snacks had to meet a set of criteria (Table 3) concerning nutritional value, price, preparation and HACCP standards. The already existing criteria as defined by the hospital, were further adopted based on the interviews.

Table 3: Criteria for the snacks in the snack assortment

Criteria used by the hospital:	Additional criteria raised in interviews
- 200- 300 kCal	- Low satiating capacity
- 6 gram protein	- Appetizing appearance/ high palatability
- Small volume	- Stimulating appetite
- Single portion packaging	- Usability in care-facility and at home
- Package must be easy to open (especially for elderly)	- With milk-based product: no slimy/sticky aftertaste
- Preferably without any assembling/preparing time	- Salty flavored snacks
- Multiple flavors, both sweet and salty	
- Separate option for patients with swallowing difficulties	
- Price indication: € 1.00	
- Shelf-life: As long as possible.	

Provision of Snacks

The snacks were provided by the care-assistant during the day. In the evening, this was done by the nursing staff. Some logistical problems were mentioned. First, some large snacks, intended for the evening, were handed out in the afternoon, since the evening shift of the nursing staff had no time or might forget to hand out the snacks in the evening. However, when patients ate their snack during the afternoon, this could strongly affect their appetite for dinner, instead of covering the time gap at night between dinner and breakfast. In addition, sometimes the warm snacks were said to cool down before they were served, and as a solution these snacks were reheated in a microwave, resulting in unappetizing, poor quality snacks. Occasionally, a care-assistant ordered the same snack for the entire week, due to time constraints. These three examples indicate that, although all staff interviewees qualify the snack range as good, the distribution to patients had major practical limitations due to the lack of time of the nursing staff and care-assistants.

Some interviewees suggested that a simple, though time consuming solution for the unappetizing snack would be to use an oven instead of a microwave to preserve the texture of the snack. They also mentioned that more attention could be given to providing the snacks in the evening, and that an improved communication between nurses and care-assistants could support this.

3.2.2 Treatment of malnutrition via ONS

The primary treatment of malnutrition was an energy- and protein-enriched diet. Only when the nutritional intake still remains too low, a switch to ONS in addition to the solid meals is

an option. Several aspects which could facilitate or hinder the consumption of ONS were identified and summarized in Figure 1, and are discussed below.

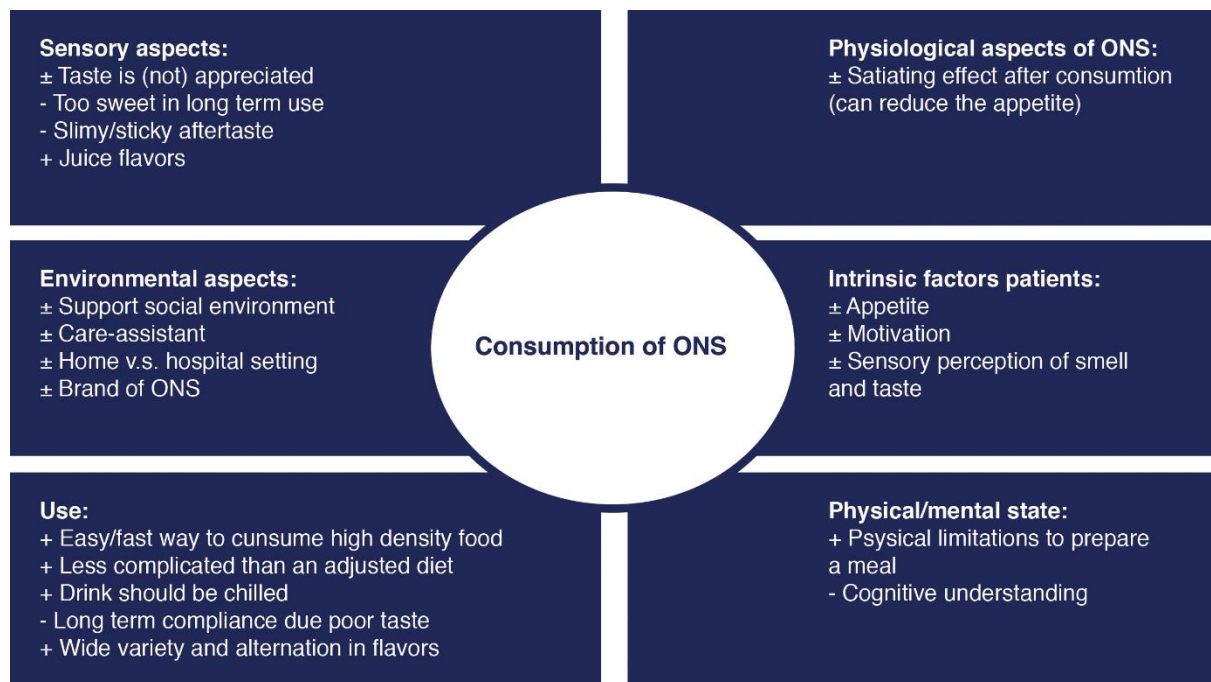


Figure 1. Factors which are neutral to (\pm), can stimulate (+) or hinder (-) the consumption of oral nutritional supplements (ONS). Factors are categorized with the theoretical framework which was constructed for the interviews based on Sheperd (19). It shows the conditions that play a role in the use of ONS.

Sensory and physical properties

One of the main limitations of ONS as mentioned in the interviews, was the very sweet taste. This caused problems, especially during long term use. Temporary use of the ONS was said to be feasible for the majority of the patients, but the pronounced sweet taste and lack of variation was said to make it difficult for many patients to continue taking ONS over a prolonged period. Moreover, milk based ONS products were said to have a slimy/sticky aftertaste in the mouth, and especially by patients with COPD this was not appreciated. Juiced-based ONS was according to some stakeholders more appreciated by the patients. However, most dieticians said they preferred milk based variants because of a higher protein content. Also, as the juice based variant was higher in carbohydrates, this was mentioned to make it less suitable for diabetic patients. In addition, the smell of the drinks was pointed out as very distinctive, even though none of the stakeholders indicated this as a limitation to use the ONS.

The reputation of ONS as a strong satiating drink was confirmed by the majority of the stakeholders. Their reactions varied, but most of them clearly stated that they noticed that the food intake of many patients decreased when they used ONS and that patients gave the same feedback. This satiating effect was said to be especially problematic because of the reduced appetite of patients who were very ill. It was mentioned that under these

conditions, using ONS and eating in general was sometimes a real challenge. As mentioned by a care-assistant: *'patients are ill and have a reduced taste and smell perception, and in generally the appetite is reduced'*. This was particularly said to be a problem in elderly patients, who even more frequently than younger patients suffered from lack of appetite.

To prevent that patients would spoil their appetite for the main meals, some were offered half a bottle of ONS, sometimes combined with a snack, in order to stimulate the food intake of the patient without losing enjoyment of eating. Some dieticians indicated that a small portion of ONS or of a snack multiple times per day might increase the main intake per day. Another suggested option to increase the compliance during long term use was offering a variety of sweet as well as non-sweet products.

The interviewed dieticians mentioned the importance of preventing that the pressure to eat would become too high, since patients might then start to dread eating as they did not like to disappoint themselves, their family and/or the care-giver.

Intrinsic factors

A success factor of ONS, as pointed out in the interviews, was a strong intrinsic motivation by the patient, especially in the home environment. People who gained weight saw the results of their efforts; also, people who received support of their environment, were generally better capable to maintain the use of ONS. One of the dieticians mentioned: *'If people see any result, such as weight gain or feeling better, they are able to maintain the use of the ONS longer because of these positive effects.'* Therefore it was mentioned to be important that prescribers of ONS discuss and check the motivation of users of ONS.

Mental state and environmental factors

One group in which the practical limitations of ONS were clearly visible were elderly patients with cognitive impairment. The use of the ONS by these patients in the home environment was difficult because it is not part of the patient's routine, which often had not changed over the last 40 years. Or they had no longer a daily routine, due to their cognitive limitations. If nobody stimulated the use of ONS, they would not or hardly use it. They were apathetic and passive in their behavior, as was pointed out by different professionals involved in the care of cognitively impaired patients. On the hospital ward the care-assistant could stimulate the use of ONS, but once they are back home, patients would not use ONS without stimulation. Due the lack of cognitive understanding how to use ONS in this group, it was said to be questionable if ONS were the best way to treat their malnutrition, especially in the home situation.

4. Discussion

In this paper, we describe the results of a literature review and a qualitative study on the use, barriers and facilitators of oral nutritional supplements (ONS). The lack of effectiveness and cost-effectiveness as shown in the scientific literature (presented in table 1 and 2) casts some doubt on the usefulness of ONS as a treatment of malnutrition. As discussed, the modest methodological quality of many of the trials may explain the inconsistency in the results. In order to make a meaningful statement about the causality of the provision of ONS to malnourished patients and the possibilities to reduce health care cost by preventing or reducing other healthcare use, more and independent methodological well designed studies

would be desirable.

A reason for concern with respect to the existing studies on ONS effectiveness and cost-effectiveness is a possible conflict of interest, since many studies were carried out with financial support from producers of ONS. Because ONS are reimbursed by the health insurance in The Netherlands, only physicians and dieticians are authorized to prescribe ONS. For the producers of ONS, it is thus of vital importance to convince these professionals about the effectiveness and quality of their brand. The fact that a substantial part of the research regarding ONS is funded and/or carried by producers of ONS is not surprising. Nevertheless, a critical attitude when assessing these papers is vital, because a conflict of interest or biased interpretation of results cannot be ruled out.

In our qualitative study, we interviewed hospital staff in a local hospital in order to obtain information on the pitfalls of the application of oral nutritional supplements and snacks in the treatment of malnutrition in in-hospital patients as well as after discharge. For this purpose, a total of twelve stakeholders of different disciplines (dieticians, nursing staff, medical staff) was interviewed with semi-structured interviews. Generally speaking, the stakeholders held the opinion that, in addition to recommended improvements in nutritional practices, ONS could be a tool for patients in need of additional nutritional support. However, the interviews also indicated that it is very important for health care staff to take into account the patient's capability to use ONS in the intended way, especially in the home environment. Barriers and facilitators, as mentioned in Figure 1, should be taken into account when ONS is prescribed.

The interviews identified two main barriers for the consumption of ONS. First, the perception of the sensory attributes, which was considered to be the most meaningful factor in the acceptance of ONS, especially in long-term use. Second, the physiological satiating effect of ONS. These limitations were confirmed by other studies (7, 25, 26). The interviewed medical staff mentioned that they were aware of this problem, especially the satiating effect of the drinks and the poor appetite of the patients are factors they are confronted with every day.

One of the mentioned solutions was a to offer small portion of ONS or of a snack multiple times per day might increase the main intake per day, and a recent study confirmed these statements of the stakeholders. Patients who were offered ONS four times a day had a higher (not significant) mean intake (27).

Our qualitative study has several strengths and limitations. The interviews were conducted with a diverse group of stakeholders, with a large representation of dieticians from different wards and institutions. It was intended to interview at least two stakeholders from each profession, but due to the decline of invitations and time issues of some approached stakeholders this aim was not completely achieved. Despite this limitation, a useful overview could be composed, partly because the interviewer as a graduated dietician was familiar with the diagnosis and treatment of malnutrition in the setting of hospitals and home care . Also, our interviews were limited to barriers and facilitators of ONS, as opposed to enriched energy and protein intake from the normal diet. Finally, our qualitative interviews do not give an indication on the effectiveness of ONS.

Conclusions and perspective

To improve to nutritional care in the hospital setting, sufficient knowledge on malnutrition and its treatment by care-assistants and nurses on the ward is essential. In the hospital where the present study was carried out, the developed e-learning modules as well the definition of clear responsibilities in malnutrition treatment for care-assistants and nurses at the ward may help to improve the treatment of malnutrition. Equally important is an optimal match between supply and demand of nutritional support on the wards. For instance, the routine of ordering meals long before they are consumed will lead to unappealing meals and unsatisfied patients, resulting in less appetite, lower nutritional intake and more waste. An ordering system in which patients can choose at the moment of consumption, for example with a food serving trolley, would be a possible solution, as literature indicates that this can increase patients' satisfaction with hospital food, with higher intake and less food waste as a result (28-31)

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