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Cater with Care® factsheet

Increasing protein intake in elderly people

1. Background

Cater with Care® is a public-private consortium developed at the initiative of the Foundation Nutrition Alliance. Wageningen UR, Gelderse Vallei Hospital, NIZO Food Research, Heinz, Sodexo, Stichting Promotie Kalfsvlees, Pure4You, and Carezzo are partners in this Cater with Care project. This project is co-financed by the European Regional Development Fund (Gelderland / Overijssel)

The goal of Cater with Care is to increase protein intake in elderly people with or at risk of undernutrition. This was done by developing a variety of scientifically supported tasty, high-protein and protein-enriched foods and drinks and evaluating new services.

In Cater with Care the key partners in the care chain worked together on **scientific research and food innovation, driven by insights from consumers, the health care professionals, and the care market**. Prior to the development of the products and the studies within the target group, literature analyses and interviews with stakeholders on perspectives towards innovative products were performed.

These insights, together with the definitions used throughout the Cater with Care project, have been laid down in this Cater with Care factsheet.

Cater with Care® is registered by Stichting Alliantie Voeding Gelderse Vallei. In the Cater with Care approach Wageningen University, Gelderse Vallei Hospital, and Foundation Nutrition Alliance work together with industry, care and knowledge institutes in research, innovation, implementation and knowledge dissemination to contribute to optimal health status in care and prevention.

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The partners in this Cater with Care project (2012-2015, EFRO grant number 2011-016066-251111) are Wageningen UR, Gelderse Vallei Hospital, Heinz, NIZO, Carezzo Nutrition, Pure4You, Sodexo and Stichting Promotie Kalfsvlees.

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2. Working definitions and scope of the project

2.1 Target groups

Different definitions were used for the target group of Cater with Care.

Cater with Care products and services were developed for consumers who are unable to meet nutrient recommendations. We chose for **elderly** as the target group, because undernutrition is most prevalent in this group (Landelijke Prevalentiemeting Zorgproblmen; Senioren Welzijn Organisatie Ede). Products and services in Cater with Care were meant to be used independent on the living situation of the elderly. Therefore, we specifically added: elderly **who are unable to meet dietary requirements, living either at home, in nursing or residential care homes, or in hospital**. In practice, the majority of this target group will be aged 75 or over (Schilp et al, Nutrition 2012;28:1151-6), but age has not been included in the definition of the target group.

Elderly who live at home are seldom screened for undernutrition or adequate food intake. This makes the definition unsuitable for practice. Therefore, a **working definition** was made for the target group of Cater with Care: **elderly who receive medical and/or functional care** (revised version, by NT (22/01/13)). This definition was also used for study purposes. Inclusion criteria slightly varied for the interviews, descriptive intake studies, and effectiveness studies carried out in this project.

It should be noted that for **marketing purposes**, a wider definition can be used. The target group of Cater with Care products and services could be **anyone who is unable to reach the recommended intake with normal foods**.

2.2 Undernutrition

In Cater with Care, the term **undernutrition** is used; not malnutrition. Undernutrition is the lack of adequate calories, protein, or other nutrients needed for tissue maintenance or repair[1].
It is caused by inadequate intake and/or increased requirements, impaired absorption, altered transport, and altered nutrient utilization. Undernutrition is frequently (but not always) characterized by weight loss (JPEN 2012;36:275-83).

Prevalence of undernutrition
Prevalence estimates differ widely and depend on selected populations and screening criteria. The *Landelijke Prevalentiemeting Zorgproblemen* (LPZ) presents the following numbers with regard to undernutrition in the Netherlands:

- 16% of elderly receiving home care[2]
- 21% of elderly in nursing homes[2]
- 33% of elderly in hospitals[2]
- 35% of elderly receiving home care[3]

[1] Dietitians and clinicians use the terms malnutrition (defined as *any* nutrition imbalance: too much or too little) synonymous with undernutrition.
[2] Findings based on the following criteria: BMI, weight loss, and food intake.

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Risk and degree of undernutrition
Risk of undernutrition is not clearly defined in the literature. It is a possible outcome of screening tools of undernutrition. Usually it is used for people who score positive on just one of the criteria for undernutrition (low BMI, involuntary weight loss within a certain time frame, or reduced intake/appetite).

Severe/moderate/mild undernutrition are not defined but are also outcomes of screening tools for undernutrition. This distinction was not used for the selection of the target group.

Undernutrition may be called 'chronic' when it lasts 3 months or more, as opposed to 'acute' when diagnosed recently (Natl Inst Health Statistics, USA). Again, this distinction was not made in the Cater with Care project.

2.3 Screening and diagnosing

In hospitals and institutions, undernutrition or *risk* of undernutrition is assessed by screening tools or questionnaires. Which tool is used depends on the setting and the age group. Hospital Gelderse Vallei uses the Malnutrition Universal Screening Tool (**MUST**) for the general patient population. This tool calculates a score (0, 1, ≥2) based on BMI, weight loss and food intake which is translated to one of the categories: *well nourished, at risk of malnutrition,* or *malnourished*.
For geriatric patients in Hospital Gelderse Vallei the **Short-Form Mini Nutritional Assessment (SF-MNA)** is used. This screening tool additionally takes into account mobility, stress, disease and neurological problems, and is better suitable for subjects aged 65 years and over. The SF-MNA yields a score between 0 and 14. With the SF-MNA, more elderly patients show a risk of undernutrition than with the MUST (Thesis Ingrid Heemels, geriatric ward ZGV, 2010).

We used the SF-MNA to assess (risk of) undernutrition in our studies. A score of <11 points on the SF-MNA was used to define 'possible undernutrition'.

Diagnosing undernutrition
There is no gold standard for the diagnosis of undernutrition in adults/elderly. Despite its frequent use, the measurement of serum (pre)albumin levels– is not useful (JPEN 2012;36:292-8).

In our data collection, we followed the advice of the 2012 Consensus Statement of the Academy of Nutrition and Dietetics and ASPEN to assess:

- energy intake (two categories: at ≤50% or <75% of estimated energy requirements, assessed by a dietician)
- weight loss (last week, 1 mo, 3 mo)
- loss of body fat
- loss of muscle mass
- fluid accumulation
- reduced hand grip strength

[3] $SNAQ^{65+}$ MUAC <25 cm and/or involuntary weight loss ≥4 kg in the past 6 mo (Schilp et al, Nutrition 2012)

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According to the Consensus Statement, when 2 out of 6 of these criteria are positive, the diagnosis of undernutrition can be made, with distinctions between mild and moderate forms of undernutrition. These criteria can be used to 1) describe our study populations and 2) as effect outcomes. *They were not used as screening/selection criteria.*

Inadequate intake of protein and energy
The current recommendation for protein in elderly in the Netherlands is 0.8 g/kg/d (Gezondheidsraad).

Estimates of Dutch studies show mean protein intake in the following groups:

- Hospitalised patients: 0.9 g/kg/d (Neelemaat 2012). In the same study, 49% of the study group had an intake of ≤0.8 g/kg/d.
- Institutionalised elderly: 0.76-0.9 g/kg/d (Mathey 2000; Manders 2006). In another study, 35% of the elderly had an intake of ≤0.7 g/kg/d (Tieland 2012). Protein intake in the main meal is 26 g (Mathey 2000).
- 'Frail' elderly living at home: 1 g/kg/d (De Jong 1999; Tieland 2012).
- Elderly receiving home care: 1.2 g/kg/d (Schilp, in press).

In short, mean intake is at or above the current recommendation. However, up to 50% (depending on the setting) of elderly does not meet the recommendation.

2.4 Treatment of undernutrition

Detailed guidelines on the treatment of undernutrition can be found in a recent Dutch guideline (Dieetrichtlijn Ondervoeding 2012). Preferably, nutritional status should be restored or stabilized by *normal foods*. The advised amount of calories and macronutrients for individual elderly is based on actual and desired intakes.

On a group level, the following recommendations have been made:

Protein intake: 1.2-1.5 g/kg/day (consensus in case of undernutrition, in debate for all elderly, but recommended in Leidraad Ondervoeding Geriatrische Patiënt).

Energy intake: according to requirements (Harris&Benedict formula +30%).

If protein recommendations are met by protein-rich foods and drinks, energy intake is usually sufficient (expert opinion dieticians Cater with Care). Changes in body weight or body composition can be used to monitor whether energy requirements are met (keeping fluid disturbances in mind).

It is common practice (interviews with dieticians) to advise elderly to take foods and drinks at least 6 times per day (**3 main meals and at least 3 snacks**). High volumes of non-caloric drinks should be avoided because they decrease appetite.

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2.5 Vitamins and minerals

Literature research showed that enrichment with vitamins and/or minerals was not necessary in this Cater with Care project. Reports of the Gezondheidsraad (2009) and the Voedingscentrum both show that **vitamin and mineral requirements should be met by a variety of normal foods, if the required amount of energy and protein is consumed**.

Moreover, although some vitamin and/or mineral deficiencies are prevalent in the elderly (see table below), these micronutrients are generally unsuitable for enrichment. The following vitamins/minerals are deemed unsuitable for enrichment by several experts: folate (may mask vitamin B12 deficiency), vitamin B12 (low levels are result of low absorption in the intestines (dietary supplements unsuitable; intramuscular injections needed), vitamin D (supplements are advised), iron (risk of accumulation, taste).

Table 1: Deficiencies of micronutrients in elderly Dutch people

Deficiencies not likely	Iodine (I), vitamin A, B1, B2, B3, B6, C, E, copper (Cu), phosphorus (P), magnesium (Mg), selenium (Se), zinc (Zn) (Gezondheidsraad 2008, 2009).
Low prevalence of deficiency	Increased requirements of selenium (Se) are likely during wound healing. Gezondheidsraad: no indication of Se deficiency.
Main deficiencies	Studies in elderly living at home or institutionalized: folate, B12, vit D, Ca, Fe. Folate: 8-25% of elderly have suboptimal levels (<15 nmol/L) (Gezondheidsraad 2008). Deficiency (<7 nmol/L) was *not prevalent* in the B-proof study with healthy elderly. Vitamin B12: 12-25% is deficient (<150 pmol/L) (Gezondheidsraad 2009) Vitamin D: about half of the elderly have insufficient vitamin D status - Deficiency (<25 or 30 nmol/L): 10%-17% - Insufficient (25-50 nmol/L): 37%-53% (Visser 2006, B-proof study, ProMuscle study) All elderly are advised to take supplemental vitamin D (Gezondheidsraad 2012). Calcium (Ca): Deficiencies unlikely, because most elderly have an intake of > 400 mg/d (Gezondheidsraad 2009). Iron (Fe): 23% of elderly women in the Seneca study (Europe) were deficient. Accumulation in elderly possible.

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3. Stakeholders' perspectives

The following stakeholders were defined: dieticians and other health professionals involved in (undernourished) elderly, managers of facility services. These stakeholders have diverse perspectives but the same aim: to provide / receive good food, to maintain or improve nutritional status, and to maintain or improve wellbeing of the elderly. The perspectives of the target group, the elderly people and patients, were also integrated. By identifying the barriers, requirements and chances in relation to the implementation of new products and services, the project partners were able to adapt their product innovations.

3.1 Undernutrition

In general, **elderly do not see themselves as undernourished**, not even when they are treated for undernutrition by a dietitian. They consider health care professionals (doctors, pharmacists and dieticians) to be trustworthy providers of nutritional information. **Dietitians report that the elderly are unable to adhere to recommendations** to eat (more) protein-rich foods, because elderly feel too full, they feel it is unnecessary, they consider it over-indulgent to take double fillings or snacks between meals, or they do not want to change their habits.

3.2 Wish-list for Cater with Care products

Research performed amongst purchasing managers (of hospitals, care homes and nursing homes), dieticians, nutrition assistants and caregivers and a panel of healthy elderly shows that Cater with Care products should:

- Add value to a meal or snack, in terms of energy, protein, or both
- Look and taste the same (or better) than regular products
- Have a price that fits the budget
- Be easy to understand, open, prepare, and consume
- Be used as an *alternative* to regular foods; not as extras (because of reduced appetite)
- NOT be marketed with 'malnutrition' or 'for elderly'

An additional requirement for implementation of products (/services) in care institutions is that products should fit with the preparation system in the institution.
Moreover, dieticians emphasised that more savoury options are needed.

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4. Protein fortification: considerations

4.1 Amount of protein per day and per portion

In Step 2 of the Cater with Care project the (enriched) products were formulated to meet dietary recommendations and/or to restore deficiencies, with emphasis on protein (Figure 1).

For this project the optimal protein intake is set at 1.5 g/kg/d. Reasons for choosing the *upper level* of the proposed intake for undernourished patients:
1) intake in our target group is between 0.8-1.2 g/kg/d. To increase the likelihood of positive effects, an intake of 1.5 g/kg/d seems prudent.
2) in the recent ProMuscle study (PhD thesis M. Tieland, 2014), an intake of 1.4 g/kg/d was reached with protein-supplemented drinks, resulting in positive effects on muscle mass and strength and physical function. These elderly were not undernourished.

To reach an optimal intake of 1.5 g/kg/d, and using a mean body weight of 65 kg, protein intake would be about 100 g/d. We calculated how much extra protein would be needed to reach this intake, using the estimated intake of 0.8 to 1.2 g/kg/d as a reference.

Estimate 0.8 g/kg/d ~ 52 g protein/day: + 50 g/d.
Estimate 1.2 g/kg/d ~ 80 g protein/day: + 20 g/d.

Taking in mind the threshold level of protein *per meal* (for anabolism) of 25-30 g (Paddon-Jones 2009) we propose:

Protein aim: + 50 g/d, distributed as +10 g in the three main meals (breakfast, lunch, dinner) and +10 g in between meals twice a day.

4.2 Physiological, technological, and economical considerations

The treatment of undernutrition was focussed on supplying additional protein up to a dose of **1.5 g/kg/day**. This is achieved by choosing protein-rich foods but also by supplementing foods with extra protein. The question was which sources of protein were the most suitable to use for fortification purposes: plant proteins, animal proteins or a composition of both.

This question was addressed from three different perspectives: physiological, technological, and economical. Work sessions attended by dieticians, researchers, producers and food technology experts resulted in the following conclusions:

Physiology
A minimal protein intake per meal in combination with physical activity, is needed for muscle synthesis. This minimal intake is estimated to be 30 g (per meal, thus 3 times a day), of which ≈10 g is animal protein to ensure sufficient essential amino acids (Paddon-Jones and Rasmussen 2009).

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Technology
Plant protein may be desirable (price, image, sustainability) but protein quality, functionality, and taste may be less. If only one protein source is used, deficiencies in certain amino acids might occur. The advice is to use a mix of proteins.

Economy
Increased protein for elderly is only economically effective if:

- a blend of vegetable and animal proteins can be used
- if taste is good and waste is minimal
- if savings in the medical budget can be used for the food budget.

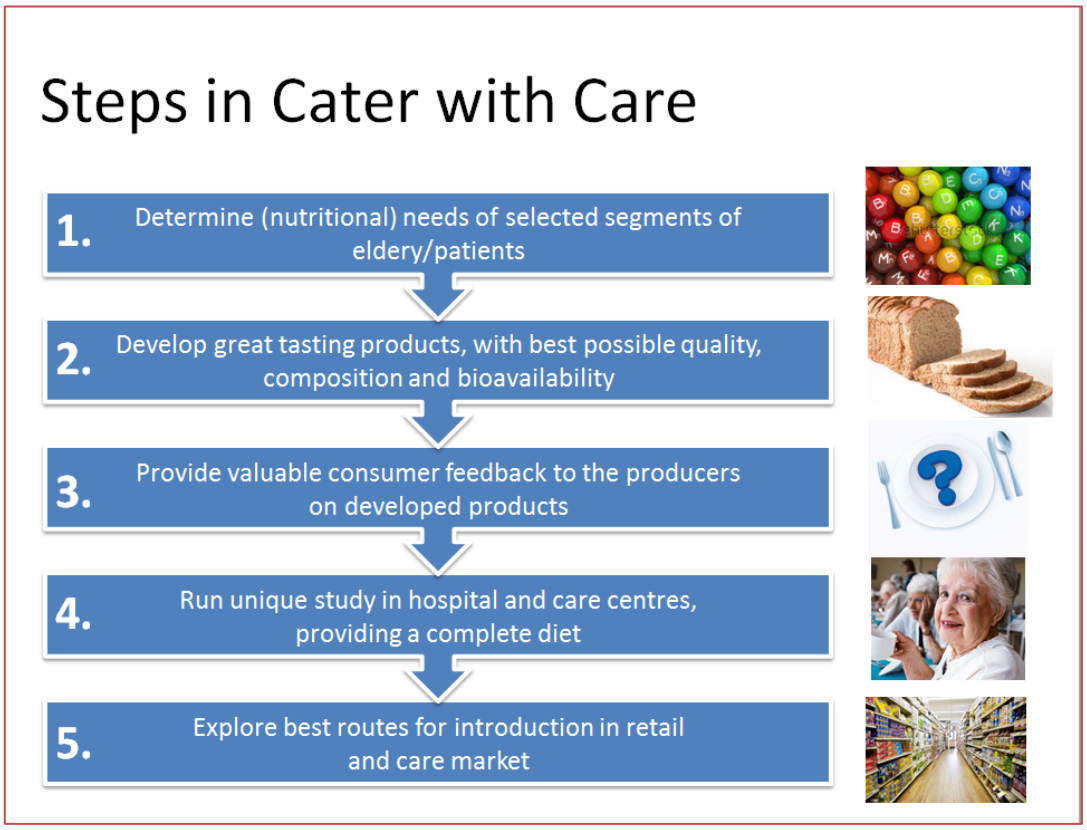

Figure 1: Steps in the Cater with Care project

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