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Standardization of non-industrialized enteral feeding for home care: the experience of Campinas city

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Abstract

Home enteral nutrition is a recent reality and it has expanded, due to increased life expectancy. It is offered to patients in the Unified Health System, but the provision of nutritional supplements and enteral feeding is not guaranteed by this system. Home care aims to provide humane care and better quality of life for sick individuals by promoting health education for relatives and caregivers. A group of nutritionists from public and private hospitals in the Unified Health System and Home Care Services in the city of Campinas-SP, Brazil, has discussed enteral nutrition prescribed in hospitals to standardize non-industrialized enteral feeding at hospital discharge. They aimed at the selection of formulas to meet nutritional needs with lower cost compared to industrialized patterns, ease of preparation and orientation favoring high and home nutritional counseling. Seven diets were standardized, prepared simulating the household situation and sent for chemical analysis to determine their chemical composition. Calculations from food composition tables were compared to the results of chemical analysis. From the results obtained, adjustments in diet will be performed and this protocol will be released in hospitals in that city and region.

Keywords: Nutrition Therapy. Enteral Nutrition. Formulated Food. Home Care Service.

Introduction

The home enteral nutrition (HEN) is considered financially reasonable and safe, since it prevents hospital contamination, reduces the costs of hospitalization and allows patients to have social and family interactions.[1,2]

In Brazil, HEN is a recent reality, especially for patients of the Unified Health System (SUS), but the supply of nutritional supplements and enteral feeding is not provided by this system.[1] It is important to note the fact that home reality differs of hospital conditions, and socioeconomic, cultural and family factors determine the dietary behavior of patients at home.[3,4]

Home care is intended to ensure humane care and provide a better quality of life for sick individuals, besides bringing awareness in health education for relatives and caregivers.[5,6]

Nutritional support is the set of measures needed to identify and correct nutritional issues, by identifying individuals currently presenting nutritional disorders or at risk of developing them, and by suggesting necessary and appropriate nutritional therapies for each patient, in order to reduce the negative consequences of malnutrition, obesity and other diseases, ensuring food and nutrition security through enteral feeding.[6]

Home enteral nutrition is a treatment accompanied by nutritionists and recommended for the prevention of malnutrition and improving of the nutritional status of patients on enteral tube or oral consumption. It is recommended for individuals whose food intake is inadequate to meet their daily nutritional needs, that is, who are at risk of malnutrition, requiring the digestive tract to be fully or partially functional. Individuals with high TGI diseases are also included, along with neurological disorders with an impaired level of consciousness or chewing movements, intubated patients with anorexia of many causes and cancer.[6,7]

HEN, when prescribed correctly, offers clinical benefits to individuals, reducing the length of hospital stay, incidence of complications and improves patient quality of life and care, leading to greater availability of hospital beds and lower expenditure with health.[2,6,7]

According to RDC / 36 of the National Health Surveillance Agency, enteral nutrition is defined as:

> *[...] feeding for special purposes, with controlled intake of nutrients, isolated or combined, of defined or estimated composition, specially formulated and created for probes or oral intake, industrialized or not, used exclusively or partially to replace or supplement oral feeding in malnourished patients or not, according to their nutritional needs, by hospitalization, outpatient or home, aiming at the synthesis or maintenance of tissues, organs or systems.*[8]

Industrialized diets are the most suitable because they are practical, nutritionally complete and secure in microbiological control. However, due to high costs, they are not accessible for the majority of the Brazilian population, and it becomes necessary to recommend non-industrialized diets with adequate nutritional composition, reason why innovation and improvement are sought for the nutritional quality of these formulations. It is estimated that in Brazil, about 50% of hospital work with industrialized diets, although they have been available on the market for over 20 years. The cost of industrialized diets is also in discussion.[2,9,10]

The non-industrialized formulation is an option to provide macronutrients to patients in home enteral nutrition therapy with one type of diet that has good tolerance of most patients assisted by specialized staff.[2] The supply of micronutrients, when insufficient to meet the recommended amounts, is partially met via mixed compounds of minerals and vitamins, ferrous sulfate and supplementation with fruit juices or shakes and industrialized food supplements.

With increasing HEN, non-industrialized enteral formulations are part of nutritional program for low-income patients, prepared with conventional food and ingredients, combined or not with industrialized formulas or supplements. The non-industrialized diets can also be individualized according to some needs or demands arising from diseases not met by the standard formula, and require the exercise of dietary nutritionist technique in empirical attempts, due to the small number of scientific articles and papers published in the field.[9] When possible, it is more appropriate to determine the chemical composition and physical characteristics and physico-chemical (pH, osmolality, viscosity, stability) of the diets in specialized laboratories In addition, several studies have been developed in an attempt to define non-industrialized formulations that may be employed with nutritional and microbiological safety in clinical practice.[2,9,10]

According to Mitne,[11] handmade or homemade diets are defined as those "prepared based on fresh food, food products and / or nutrients modules". The same author states that fresh food are food in its natural state, which are intended to provide nutrients such as milk, eggs, meat, chicken, vegetables, legumes, cereals and fruit. As for food products, they represent foods that have undergone a manufacturing process, such as protein supplements, powdered milk, eggs in lyophilized form, vegetable oils, sugar, corn starch, among others.

The nutrient module is characterized as a food product that provides a type of nutrient. Baxter & Waitzberg[12] have added the concept of homemade diet when reporting that it is "liquefied and prepared by hand in home or hospital kitchen." Borges et al.[13] confirm this idea and underscore the need for awareness, education and training of those involved with the preparation of the homemade diet in terms of home enteral nutrition therapy.

The Home Care Service (SAD) in Campinas aims to continue to dietary prescriptions discharge. Thus, it was proposed the standardization of non-industrialized enteral feeding to discharge, aiming at developing formulas that meet the most nutritional needs at a lower cost compared to industrialized, ease of preparation and favoring high nutritional guidance and monitoring at home.

The objective of this paper is to present the results of a process of standardization of non-industrialized diets held in Campinas.

Methods

The process of standardization of diets began in late 2005, with a meeting between nutritionists from public and private hospitals with beds from SUS and home care services in Campinas-SP, to discuss enteral nutrition prescribed in hospitals. The goal was to standardize non-industrialized enteral feedings at discharge, for cost and feasibility, to facilitate nutritional counseling at home.

From that meeting, a working group of nutritionists was formed in the following units: SAD from Campinas, Hospital Municipal Mário Gatti (HMMG), Hospital and Maternidade Celso Pierro (HMCP/PUC-Campinas) and Hospital das Clínicas (HC/UNICAMP). Thus, it was proposed the standardization of non-industrialized enteral feeding to discharge, aiming at developing formulas that meet the most nutritional needs at a lower cost compared to industrialized, ease of preparation and favoring high nutritional guidance and monitoring at home.

The proposal was to improve the actions involving HEN, aiming at the development of formulas that meet the nutritional needs at a lower cost compared to industrialized diet, ease of preparation and favoring high nutritional guidance and monitoring at home.The working group held monthly meetings in 2006 and discussed the diets to be standardized from the practice of each institution and the SAD practice, according to the needs of patients and families of characteristics (socioeconomic, cultural, level of schooling). The criteria for determining the seven non-industrialized enteral feeding were: presence of food with nutritional quality, practicality, preparation time, less risk of contamination and calculation of economic value to identify the diet of lower cost.

Nutritional characterization of the formulations was performed by the Micronutrient Laboratory of the School of Nutrition / Central Life Sciences, Pontifícia Universidade Católica de Campinas (PUC-Campinas).

The choice of the diet was based on the following criteria: quality, practicality, preparation time, less risk of contamination and lower cost. From the selection criteria, the diets were defined based on the following nutritional guidance scheme adopted by the Home Care Service of the municipality:

Type of diet	Characteristics	Recommendations
GENERAL	Polymeric, normocaloric and normoproteic	Malnutrition Pre and post operative
Hypercaloric and hyperproteic	Hypercaloric Hyperproteic	Elevated need for energy and restriction of volume cardiac insufficiency Increased need for protein Wounds
Diabetes	No sacarose Rich in fiber	Diabetes type 1 and 2 with difficult glycemic control Intolerance to glucose by metabolic stress
Imunodepressive	Lactose free Hyperproteic Hypercaloric	Imunodepressive patients AIDS Infection GI surgery post operative

The diets were determined from the presented nutritional calculations and criteria already mentioned. To carry out this calculation, the following food composition tables were set: TACO – 2006[14]; USDA – 2006;[15] and for soluble and insoluble fibers Mendez et al., 1995[16]. From the chemical composition calculations, percentage of macronutrients, caloric density and diet costs, selected diets were prepared in 1,000 ml / 1,000 kcal of each formulation and sent for chemical analysis.

For the analysis of chemical composition of the diets was prepared in accordance with the preparation of standardization roadmap, always using the same equipment and utensils in one lactation center, the Hospital e Maternidade Celso Pierro/PUC-Campinas, simulating the preparation of the diet at home.

After preparation of the diets, the frozen samples were then lyophilized (Flexy-Dry Freeze Dryer, Kinetics, USA) and submitted in duplicate analysis in the following determinations of chemical composition:

- moisture by gravimetry, according to the method proposed by Pearson;17
- crude protein, from the determination of nitrogen by the semi-micro method Kjeldahl[18], using specific nitrogen conversion factors; [19]
- total lipids by double extraction in methanol and chloroform, according to procedure proposed by Bligh & Dyer;[20]
- ash by calcination followed by incineration in a muffle; [21]
- carbohydrates, by difference.

Results

Standard diets are mainly based on soy extract and inexpensive ingredients, that are economically viable to families served by services. Were standardized by the working group the following diets: standard, high-protein, diabetes (standard and complete diet diet), gastrostomy, diet based on vegetables and diet with ingredients of the food basket, totaling seven.

Table 1. Ingredients for standardized diets in enteral nutrition therapy Campinas-SP, 2010.

Pattern 1	Pattern 2	Diabetes 1	Diabetes 2	Legume	Gastrostomy	Staple Food
Soy extract	Soy extract	Soy extract	Soy extract	Baked potato	Skim milk fluid	Whole milk fluid
				Cooked carrot	Refined sugar	Soy oil
Soy oil	Soy oil	Soy oil	Soy oil			
Refined sugar	Skim milk powder	Gelatinized corn starch	Skim milk powder	Whole milk powder	Corn powder	Cooked egg white
Powder albumin	Powder albumin	Powder albumin	Powder albumin	Soy oil	Cooked rice	Refined sugar
Salt	Refined sugar	Peeled cooked apple	Gelatinized corn starch	Toasted wheat Flour	Soy oil	Corn powder
Filtered water for liquidification	Peeled cooked apple	Salt	Peeled cooked apple	Refined sugar	Skim red meat	Salt
	Salt	Filtered water for liquidification	Salt	Powder albumin	Baked potato	Filtered water for liquidification
	Filtered water for liquidification		Filtered water for liquidification	Salt	Cooked carrot	
					Salt	

In chemical analysis, all formulations were uniform, with uniform appearance and no phase separation after three hours of preparation. Regarding the fluidity, the formulations passed through without clogging, and the existing concentration of solids in each formulation allows adequate flow of the solution.

Table 2 shows the results of calculations nutritional from the aforementioned food composition tables. Table 3 shows the chemical composition from the results of chemical analysis.

Table 2. Composition of diets – formulations for 1000Kcal from calculations with standard tables of food composition. Campinas-SP, 2010.

Composition	Pattern 1	Pattern 2	Diabetes 1	Diabetes 2	Legume	Gastrostomy	Staple Food
Energy (kcal)	1100.5	1062.55	1144.63	1002.82	928.86	1073.93	1005.55
Protein	40.24	43.22	46.48	47.6	35.09	52.43	33.61
Lipid (g)	39.58	32.79	40.18	32.82	33.12	39.57	30.65
Carbohydrate (g)	145.83	148.65	149.27	129.27	122.62	127.03	148.81

Table 3. Composition of diets – formulations for 1.000 kcal from bromatologic analysis. Campinas-SP, 2010.

Composition	Pattern 1	Pattern 2	Diabetes 1	Diabetes 2	Legume	Gastrostomy	Staple Food
Energy (kcal)	847.73	818.54	834.62	612.30	768.40	509.62	781.69
Protein	33.95	46.40	35.50	37.51	31.48	23.00	30.99
Lipid (g)	34.19	28.73	33.64	22.63	25.90	22.14	27.41
Carbohydrate (g)	126.51	128.37	124.09	92.77	125.93	71.83	125.98

For the most used diets (standard 1 diabetes 1 and 2 diabetes, standard 2), the mean differences between the calculation and chemical analysis were 16%, 14.7%, 29.8% and 10.4%, respectively, demonstrating the importance of setting these diets to meet the needs of patients.

For diets that have more food than modules (diet of vegetables, dietary ingredients of the basic diet and diet gastrostomy), the mean differences were 11.6%, 14% and 49%. The gastrostomy diet because it contains more food and meat has a higher loss in the process of strain formulation, which justifies the significant difference in the results.

Choosing and adapting the sources of nutrients for non-industrialized diets is a difficult and complex task for nutritionists. In addition to appropriating nutritional composition and microbiological quality, it is necessary to define and facilitate the guidelines for the handler and family. Standard diets have easy acquisition of ingredients, preparation of convenience, lower cost and less contamination, ensuring food security by enteral nutrition, can be prescribed for patients seen by the cited SUS services.

Outlook

After comparing the results of the chemical composition analysis of the standardized diets by calculations and by chemical analysis, are the adjustments and changes made to these diets they are to truly meet the nutritional needs of these patients and are viable from the preparation point of view, cost and understanding of caregivers and family members attended by the public health.

In addition, the group intends to carry out the disclosure and publication of the standard protocol for hospitals and health services in the city of Campinas-SP and region, and to submit this protocol to the Ministry of Health.

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