Invest Clin 50(3): 347 - 357, 2009

Demographic, epidemiological and nutritional profile of elders in home enteral nutritional therapy in Distrito Federal, Brazil.

Ana Lúcia Ribeiro Salomon Zaban[1], Maria Rita Carvalho Garbi Novaes[1,2].

[1]Faculdade de Ciências da Saúde / Universidade de Brasília, Brazil, and
[2]College at Escola Superior em Ciências da Saúde/ESCS/FEPECS/SES/GDF. Brasilia, Brasil

Key words: Health services for the aged, enteral nutrition, home care services.

Abstract. According to statistical projections of the World Health Organization, during the period between 1950 and 2025, the group of elderly in Brazil will have increased 15 times. Chronic-degenerative diseases are the illnesses that most affect the elderly population, directly related to the growing demand for Enteral Nutrition Therapy. The objective of this study was to analyze the demographic, epidemiological and nutritional profile of elderly patients assisted at the public hospitals in the Home Enteral Nutrition Therapy Program, of the State Health Department of Distrito Federal. This is a retroprospective, cross-sectional and analytical study, based on primary data, which enrolled 141 elderly patients who were prescribed home enteral nutrition. The collected variables corresponded to age, gender, clinical diagnosis, enteral route and nutritional status at the beginning of Home Enteral Nutrition Therapy. The association between variables was analyzed through the t-Student and chi-square tests, with a significance level of 0.05 and a Confidence Interval (CI) of 95%. There was a higher number of female patients (53.9%) when compared to male (46.1%), average age 75.82 years old for both groups. The most prevalent diseases were cerebro-vascular accident sequels and cancer (42.6% and 22.7% respectively). It was observed a prevalence of malnutrition equal to 69.7%, independent of age and gender. The most used enteral route was the nasal. Though Brazilian policies concerning assistance to the elderly have advanced during the last few years, the need for public policies for nutritional recovery of such patients persists, to promote a better quality of life for them.

Corresponding author: Ana Lúcia Ribeiro Salomon Zaban. SQS 102 – bloco "G" - apto. 201. 70.330-070 Brasília, Distrito Federal, Brazil. E-mail: ana.salomon@gmail.com

Perfil demográfico, epidemiológico y nutricional de ancianos en terapia nutricional enteral domiciliaria en Distrito Federal, Brazil.

Invest Clin 2009; 50(2): 347 - 357

Palabras clave: Servicios de salud para ancianos, nutrición enteral, servicios de atención de salud a domicilio.

Resumen. De acuerdo con estimados de la Organización Mundial de la Salud, en el período de 1950 y 2025, el número de personas ancianas aumentó cerca de 15 veces en Brazil. Las enfermedades crónico-degenerativas que más afectan la población anciana, demandan la terapia nutricional enteral. El objetivo de este estudio fue analizar el perfil demográfico, epidemiológico y nutricional de enfermos ancianos asistidos en el Programa de Terapia Nutricional Enteral en los hospitales públicos de la Secretaria de la Salud del Distrito Federal (SES/DF). Este estudio fue retroprospectivo, transversal, analítico, con base en los datos primarios de 141 ancianos que recibieron nutrición enteral a domicilio. Los datos fueron edad, diagnóstico clínico, via enteral de la administración y perfil nutricional. La asociación entre las variables fue analizada con los tests Student y chi-Cuadrado, con un nivel de significancia de 0,05 y con un intervalo de confianza de 95%. Fue observado un mayor número de ancianas (53,9%) que ancianos (46,1%), con una edad media de 75,82 años para ambos grupos. Las enfermedades con mayor prevalencia fueron secuelas de accidentes cerebro-vasculares y cáncer (42,6% y 22,7%, respectivamente). La prevalencia de desnutrición fue de 69,7%, independientemente de la edad y el género. La ruta más usada en la administración fue la nasal. Las políticas de salud brasileñas en la asistencia a ancianos han mejorado en los últimos años; sin embargo, persiste la necesidad de políticas públicas para la asistencia nutricional a este grupo con el propósito de promover una mejor calidad de vida.

Received: 12-11-2008. Accepted: 18-02-2009.

INTRODUCTION

According to the United Nations, in developing countries, individuals aged 60 or older are considered elderly. This concept derives of a lower life expectancy in these countries (1). In Brazil this is also a transition age period which defines what is considered an elder, according to the Ministry of Health (2).

As technological advances have allowed early clinical diagnosis as well as the development of health treatments, a world-wide demographic transition has taken place, which resulted in a larger elderly population in parallel with the reduction in fecundity. According to statistical projections of the World Health Organization –WHO– during the period between 1950 and 2025, the group of elderly in Brazil will have increased 15 times, while the total population five times only (3).

The elderly population itself is aging and has been divided in two age groups: the

young elders (60 to 79 years old) and old elders (80 years old and older). Inside these age groups, it has been observed the phenomenon of feminization of old age, which predisposes older women to higher risks of developing physical and mental deficiencies (3, 4).

Aging corresponds to the gradual decline of three great organic systems – immune (in which the most vulnerable group of cells are t-linfocytes), endocrine and nervous. This is directly related to increase of infection susceptibility, tumors and self-immune phenomena (5, 6), jeopardizing the nutritional status of the elders. It is important to highlight the fact that weight loss itself is considered a good predictor of poor clinical outcome (7, 8) and that protein-energy malnutrition is associated with higher (two-fold risk) long-term mortality (9).

Several studies report a prevalence of malnutrition that varies from 10% to 60% in institutionalized and non institutionalized aged individuals (5, 10). In Brazil reality is no different (11). Thus, early detection of malnutrition and its reversion can be of great value for the prevention of infectious events in this population, which would, otherwise, have fatal consequences.

Brazilian laws define home care as care provided to the elderly with some level of dependence, having as goal the promotion of autonomy, permanence at their own domicile and reinforcement of family and neighborhood bonds (12). This modality of care tends to reduce costs by 20 to 70%, when compared to the same interventions carried through in hospital environment (13).

According to August *et al.* (14), specialized enteral support can be defined as the administration of products through other than oral route to supplement or replace oral intake of nutrients.

Chronic-degenerative diseases correspond to certain clinical conditions of evolutionary and incapacitating course that cannot be controlled. These are the illnesses that most affect the elderly population, directly related to the growing demand for Enteral Nutrition Therapy (ENT) in this group (15).

The present study was designed to analyze the demographic, epidemiological and nutritional profile of elderly patients assisted at the Home Enteral Nutrition Therapy (HENT) Program, of *Secretaria de Estado de Saúde* –State Health Department– of Distrito Federal (SES/DF), Brazil; as well as to evaluate routes used for this therapy, based on the hypothesis that this therapy may potentially benefit the nutritional status of these patients and consequently their quality of life. It is worth highlighting the fact that this is the fist study to analyze HENT situation in DF, Brazil, since its regulation was issued in 2004.

PATIENTS AND METHODS

Organizational aspects

The Brazilian Health Care System, *Sistema Único de Saúde (SUS)*, is based on the Federal Constitution and national legislation, which define the general rules for providing health care, and on Regional Health Care Systems by which the administrative regions provide health care to their residents. The administrative regions are autonomous, being able to publish their own regulations in order to better fulfill the health need of their population, provided that these regulations respect national legislation.

Distrito Federal is a federal unit, which is divided in several Health Regions, 13 of which applie ENT in a hospital environment. Each single region is provided with local health care units (hospital and health centers), which are the operative arms of the Regional Health Care System, called *Secretaria de Estado de Saúde do Distrito*

Federal (SES/DF) –Distrito Federal Health Department.

Regarding HENT, the local health care units are empowered by a Regional Regulation (16), issued for the fist time in November 2004, to give treatment to patients in need of such therapy. The DF Regulation defines the type of HEN approved, the referral centers and the management of the treatment. The HEN Programme concerns patients discharged by the hospital or outpatients, on request of hospital multidisciplinary team that evaluates the patient's clinical and nutritional status, plans the nutritional therapy and runs a training course on HEN self-management to the patients or their families. The Regulation also establishes that patients have to be followed up by nutritionists every 3 months, to reevaluate nutritional status, patient's adherence to HEN therapy, complications and intercurrent illnesses.

The costs of HEN are funded by the Government of DF and include the delivery of nutritional products and the infusion set.

Before the SES/DF regulation was published, all heads of Nutrition Services of the 13 hospitals and all technical sponsors for Enteral Nutrition Therapy (ENT), were trained regarding ENT and Good Manufacturing Practices of Enteral Nutrition. After the regulation's publication, there were scheduled meetings with the same crew, in order to set the protocols about procedures necessary to implement HEN supply.

Study design

This is a cross-sectional analytical study, with quantitative and qualitative variables, which enrolled elderly patients who were prescribed home enteral nutrition. The collected variables corresponded to age, gender, clinical diagnosis, enteral route and nutritional status at the beginning of Home Enteral Nutrition Therapy.

Sample

Medical registers of 141 elderly patients enrolled in HENT program of SES/DF were evaluated according to regulations of HENT procedures established by the Brazilian decree number 156/2004-SES/DF (16). The patients studied were assisted from January to December, 2005. All patients enrolled in the SES/DF HENT program were analyzed.

The criterion for inclusion in the present study were: elderly patients who lived in Distrito Federal, Brazil, users of Home Enteral Nutrition (HEN), according to this definition through edict number 63/2000 of *Agência Nacional de Vigilância Sanitária* (*ANVISA*-National Agency of Sanitary Surveillance) (17). In order to receive HEN industrialized formulas, patients or their legal sponsors had to present the following reports, from which all information on clinical diagnosis and nutritional status were obtained: clinical (from their doctors), nutritional and social. Furthermore, they had to present copies of personal documents, as required by the decree mentioned above.

Nutritional diagnosis was determined by nutritionists who were in charge of the patient's follow up in each health region of the DF, according to the criteria defined by the *Sistema de Vigilância Alimentar e Nutricional-SISVAN* (Food and Nutritional Surveillance System), established by Brazilian Health Ministry (18), which commends the use of the classification of Body Mass Index (BMI) –the ratio between weight (in kilograms) and square height (in meters)– according to Lipschitz, as described below:

- BMI equal or lower than 22 kg/m^2 – Malnutrition;
- BMI higher than 22 kg/m^2 and lower than 27 kg/m^2 – Eutrophy;
- BMI higher than 27 kg/m^2 – Overweight. (18)

Moving out from DF and absence of reference to SES/DF were considered as criterion for exclusion.

Statistical analysis

In order to analyze the obtained data, frequencies of variables were used as well as their association, through chi-square and t-Student tests for independent variables. Qualitative variables were categorized into classes, in order to allow their quantitative analysis. For analytical purposes it was considered a probability of significance (p) lower than 0.05 and a Confidence Interval (CI) of 95%. For the chi-square (χ^2) test, when more than 20% of the cells showed a value of expected frequency lower than 5, exact chi-square test was applied.

Statistical Package for Social Sciences (SPSS) 15.0 was used to analyze data.

Ethical aspects

The research project was approved by the *Comitê de Ética em Pesquisa* (Ethics Research Committee) - SES/DF, according to Protocol number 187/2006.

RESULTS

In relation to the studied group, no losses were observed throughout the development of this work, being the final sample composed of 141 elders. Out of these, 12 (8.5%) died during data collection owing to several causes inherent to the process itself or various diseases.

As for the demographic characteristics of the studied population, it was observed a higher number of women (53.9%), when compared to men (46.1%). When the group of young elders was stratified by gender, it showed equal number of men and women (50% each, n=84). However when old elders were analyzed, the number of women was higher than that of men (59.7% and 40.3% respectively).

When analyzing mean age divided into 2 categories, that is, young elders and old elders, it was observed that men were slightly older.

Table I shows the demographic characteristics of the studied population, concerning age and gender.

Incidence and prevalence of HEN

The incidence (new cases/million inhabitants/year) and the prevalence (total cases/million inhabitants) were calculated on the reference estimated population of Distrito Federal in 2005, which was 2,277,259 inhabitants. Mean incidence and prevalence were 61.92. Since it was the first analysis after the Regulation issue, both incidence and prevalence showed the same results.

When studying the epidemiological profile of the patients, as shown on

TABLE I
DEMOGRAPHIC CHARACTERISTICS OF ELDERS (GENDER AND AGE)
(n = 141)

	Gender		p
	Male (CI) (n = 65)	Female (CI) (n = 76)	
Mean age	75.48 (73.11-77.85)	76.12 (73.86-78.38)	0.697+
YE* Mean age	69.95 (68.01-71.89)	68.71 (66.86-70.57)	0.303×
OE‡ Mean age	85.57 (83.24-87.89)	85.26 (83.62-86.91)	0.303×

*YE = Young Elders. ‡OE = Old Elders.
+t-Student = 0.390. p = 0.697. CI = –2.612;3.895.
× χ^2 = 1.272, p = 0.303.

Tables II and III, one subject was excluded because of lack of information concerning diagnosis (n=140).

Table II shows epidemiological characteristics of the studied population, analyzed according to independent variable age, demonstrating the higher prevalence of Cerebrovascular Sequels between both groups of age categories. The second most prevalent disease among young elders was cancer, while among old elders it was Alzheimer's disease.

Table III shows epidemiological characteristics according to genders. Among women, the most prevalent diseases were cerebrovascular accident (CVA) sequels, cancer and Parkinson's disease, respectively. Among men, the most frequent illnesses were cancer, CVA sequels and Alzheimer's disease, respectively. This difference found between genders was statistically significant.

Table IV shows enteral routes prescribed and made for elders' ENT, according to their clinical diagnosis. For this analysis, two patients were excluded because of lack of information concerning enteral route (n=139).

Nasal routes comprehend the installation of nasogastric or nasoenteric feeding

TABLE II
PREVALENCE OF DISEASES ACCORDING TO AGE CATEGORIES
(n = 140)

	Age categories		Total
	Young elders (%)	Old elders (%)	
CVA* Sequels	34 (40.5%)	26 (46.5%)	60 (42.85%)
Alzheimer's Disease	6 (7.1%)	7 (12.5%)	13 (9.3%)
Cancer	27 (32.1%)	5 (8.9%)	32 (22.85%)
Parkinson's Disease	1 (1.2%)	5 (8.9%)	6 (4.3%)
Other diseases	16 (19.1%)	13 (23.2%)	29 (20.7%)
Total	84 (100%)	56 (100%)	140 (100%)

* CVA = Cerebral-Vascular Accident
$\chi^2 = 14.214$, $p = 0.007$.

TABLE III
PREVALENCE OF DISEASES ACCORDING TO GENDERS
(n = 140)

	Gender		Total
	Male (%)	Female (%)	
CVA Sequels	19 (29.2%)	41 (54.7%)	60 (42.85%)
Alzheimer's Disease	12 (18.5%)	1 (1.3%)	13 (9.3%)
Cancer	20 (30.8%)	12 (16%)	32 (22.85%)
Parkinson's Disease	1 (1.5%)	5 (6.7%)	6 (4.3%)
Other diseases	13 (20%)	16 (21.3%)	29 (20.7%)
Total	65 (100%)	75 (100%)	140 (100%)

* CVA = Cerebral-Vascular Accident
$\chi^2 = 21.748$, $p < 0.001$.

TABLE IV
ASSOCIATION BETWEEN CLINICAL DIAGNOSIS AND ENTERAL ROUTES AVAILABLE
(n = 139)

	Enteral routes			Total
	Nasal routes (%)*	Ostomies (%)*	Oral route (%)*	
CVA‡ Sequels*	44 (55.7%)	12 (28.6%)	3 (16.7%)	59 (42.5%)
Alzheimer's Disease*	7 (8.9%)	6 (14.3%)	0	13 (9.3%)
Cancer*	14 (17.7%)	15 (35.7%)	3 (16.7%)	32 (23%)
Parkinson's Disease*	3 (3.8%)	2 (4.7%)	1 (5.5%)	6 (4.3%)
Other diseases*	11 (13.9%)	7 (16.7%)	11 (61.1%)	29 (20.9%)
Total	79 (100%)	42 (100%)	18 (100%)	139 (100%)

* $\chi^2 = 56.049$. $p < 0.001$. IC 99% = 0.000-0.001.
‡ CVA = Cerebral-Vascular Accident.

tubes, while ostomies corresponded to the implantation of gastrostomy, jejunostomy or, most rarely, esophagostomy (2%) catheters.

Among nasal routes, the use of nasoenteric feeding tube was predominant (95%) and among ostomies, surgical gastrostomy was most frequent (71.5%). Oral route was considered for the purpose of this study as Brazilian laws define, that the use of specialized enteral formulas (industrialized ones) through oral route is part of Enteral Nutrition Therapy (17).

In the present work the route most available was the nasal enteral route, followed by ostomies. Oral route was used especially for the purpose of physical rehabilitation of patients, whenever possible.

Though data of 141 patients were collected, when it comes to nutritional assessment of these patients, 109 (77.3%) were evaluated through anthropometric measures (either weight or height, or both). According to nutritionists in charge, the stated reason for lack of evaluation of 32 patients (22.7%) was their inability to leave bed and the absence of equipment to assess nutritional status of patients confined to bed.

For a more refined analysis of the association between nutritional status and gender, four patients who were evaluated by nutritionists were excluded since it was impossible to establish their nutritional diagnosis for lack of parameters to classify their Body Mass Index (BMI) –either weight or height. As mentioned before, nutritional diagnosis was established according to the criteria defined by SISVAN (18).

Table V shows nutrition diagnosis according to genders. For both male and female patients, malnutrition was the predominant nutritional diagnosis, followed by eutrophy.

DISCUSSION

As found in the present work, many authors agree that among elders there is a higher prevalence of women, which could be explained by a higher life expectancy of this group (about 5 years higher), when compared to men (3, 7, 19). However, when ages found in the present work were analyzed –mean age for women was superior by 0.64 years when related to men's– it was noticed that there was no statistically relevant difference (t-Student = 0.390; p=0.697 – IC -2.612; 3.895).

When the age variable was categorized into two classes, that is, young elders

TABLE V
NUTRITIONAL DIAGNOSIS ACCORDING TO GENDER
(n = 105)

	Gender		Total
	Male (%)	Female (%)	
Malnutrition	34 (73.9%)	42 (71.2%)	76 (72,4%)
Eutrophy	12 (26.1%)	13 (22%)	25 (23,8%)
Overweight	0	3 (5.1%)	3 (2,9%)
Obesity	0	1 (1.7%)	1 (0,9%)
Total	46 (100%)	59 (100%)	105 (100%)

$\chi^2 = 3.324$. $p = 0.359$.

(younger than 80 years old) and old elders (80 years or older), and when these classes were stratified by gender, though the percentage of older women remained higher (59.6%), differences found in the present work did not show statistical significance (χ^2=1.272; p=0.303).

The most prevalent illnesses among elders were cerebrovascular accident sequels (CVA), followed by cancer – 42.6% and 22.7% respectively. Such results resemble the ones verified in the studies by Fabrício *et al.* (19) and McMahon *et al.* (20).

When analyzing the prevalence of illnesses according to age categories, one can verify a similarity between the prevalence of CVA sequels, Alzheimer's disease and other diseases among young and old elders. However, when cancer is studied, it is observed a higher prevalence between young elders (32%), when compared to old elders (9%), which could be related to the lethality of this group of illnesses. When analyzing Parkinson's disease, prevalence was higher among old elders in comparison to the young elders (8.9% and 1.2% respectively). According to Borrayo *et al.* (21), the risk of Alzheimer's disease and related disorders rises with age, confirming the findings of the present work. The differences evidenced across age categories show statistically significant results. (χ^2=14.214; p=0.007).

The prevalence of diseases according to genders reached statistical significance (χ^2= 21.748, $p < 0.001$) and the greatest differences were noticed for CVA sequels (higher prevalence in the group of females), Alzheimer's disease and cancer (both higher in the group of men).

In the present study, it was verified that CVA sequels and cancer were the main causes of deaths among young elders (responsible for about 43% of the deaths, each). Among the most aged, CVA sequels were identified as the main cause of death (40%), while cancer represented 20%. These data are consonant to the ones presented in *Plano Diretor de Regionalização* –Directive Regionalizing Plan– of Distrito Federal, Brazil (22), which appoints cardiovascular diseases, (being CVA the most prevalent) and cancer as the main causes of death (external causes excluded).

Camarano (4) related the five more important causes of death among elders, categorizing them by gender, and found out that among women, Circulatory System Diseases (CSD) have been, the more frequent cause of death (39.4%), while cancers accounted for 13%. Among men CSD have been responsible for 36.3% of deaths while cancers for 13%. Diogo and Duarte (13) affirm that in 1990, more than half of deaths occurred among elders, were related to

CSD and 15% to cancer. Though data on mortality in the present study are similar to results found in works previously described when concerning to CSD (amongst which CVA sequels are included), they are insufficient to attest an association due to the restricted number of individuals that passed away (n=12).

In the Distrito Federal, Brazil, the use of nasal route for ENT is predominant. This practice opposes all recommendations shown in the literature where common advise is that, this route should be applied during a short-term ENT only (between 4 to 6 weeks) (20,23) - because of complications associated with these devices. It is important to consider that HENT is generally used for a long-term period (superior to 6 weeks), especially when considering the time of its installation since hospital stay period.

The recommendation for long-term ENT corresponds to ostomies (24), which in the present study accounted for 30% of enteral routes.

In relation to clinical diagnosis, there was a significant association with enteral routes (χ^2= 56.049, p < 0.001 – IC 99% = 0.000-0.001), where it was noticed a predominance of nasal routes in patients with CVA sequels (55.17%). When it comes to other diseases, the use of oral supplements were predominant (61.1%), whereas concerning cancer, ostomies were the main route (35.17%).

Among the mentioned ostomies, jejunostomies call the attention (28.1%), which can be associated to the non-availability of the gastric route by reason of this organ be already injured due to the illness. It must be emphasized that the highest availability of ostomies for cancers bearers may be related to the high surgical demand of this group of illnesses, with the objective of tumor resection, which allows the exploitation of surgery itself for the confection of the ostomy. At SES/DF the surgical access for ostomies remains higher than percutaneous endoscopic one.

An initial evaluation of the nutritional status of 105 patients in HENT, which corresponded to 74.5% of the entire population of elders, showed a high percentage of nutritional status unbalance of all evaluated patients when they entered the program, and the prevalence of malnutrition within the group was equal to 69.7%. This fact justifies the intervention through Enteral Nutrition Therapy and its being extended home, since it is not recommended that patients stay in hospital environment for the recovering of nutritional status through ENT, as it exposes patients to the risks of infectious complications, besides implying higher hospital expenses (25, 26). Cereda and Vanotti (7) found a prevalence of nutritional risk of about 59.5%, in 153 institutionalized elderly.

Elkan and Kendrick (27) reinforce that home visiting and home-based support, are interventions that may be used to reduce costs, enabling older people to remain in their homes as long as possible.

Nickols-Richardson *et al.* (10) affirm that the elders who are at nutritional risks are higher users of health care services than the ones who are not at risk, highlighting the greater costs associated with malnutrition. Persson *et al.* (9) also reinforce that the use of nutrition supplementation and dietary advice to discharged geriatric patients at risk of malnutrition can prevent weight loss and maintain activities of daily life functions, thus reducing costs related to malnutrition complications.

The variation of malnutrition prevalence among patients according to age categories was of 65% among old elders and 73.3% among young elders. Although this difference did not reach statistical significance (χ^2= 7.191; p=0.100), it indicates that the maintenance of adequate nutri-

tional status through advancing of life, enhances and prolongs life. These findings concerning the studied sample could also be explained by the major prevalence of cancer in the group of young elders, which increase the prevalence of malnutrition, since it is a consumptive disease. Nickols-Richardson *et al.* (10) also found that advanced age is associated with increased nutritional risk.

One limitation of this study is that inferences about presented data may be applied only to elders in use of HEN at Distrito Federal, Brazil. A large national sample would allow a generalization of results, though HENT is a Regional Program. Nonetheless, these findings provide valid information concerning the studied population.

The data obtained from the present work are alarming when it comes to malnutrition prevalence among elderly patients enrolled in home enteral nutrition therapy in the Distrito Federal, Brazil. But it is important to point out that it corresponded to a study which analyzed the nutritional profile of patients when registered at the SES/DF HENT Program only, when all studied patients had access to industrialized enteral nutrition for home environment use, which would favor their nutritional recovery. However the final results of this Program were not meant to be the objective of the present study.

Although Brazilian policies for the assistance of elders have had considerable advances, the establishments of public policies concerning their nutritional recovery at home-care remains a need, detached from concerns for social costs related to aging, but concerned towards the elders' quality of life and their reinsertion in society.

ACKNOWLEDGEMENTS

We thank Dr Eduardo Freitas da Silva, Professor at Statistics Department, Universidade de Brasília, Brazil, for his precious collaboration during the data analysis.

REFERENCES

1. **Cordeiro RG, Moreira EAM.** Avaliação nutricional do idoso hospitalizado. Rev Bras Nutr Clin 2003;18(3):106-112.
2. **Brasil. Lei 10.741 - dispõe sobre o estatuto do idoso e dá outras providências.** Brasília, DF: Imprensa Nacional, Diário Oficial da União, 2003.
3. **Brasil. Ministério da Saúde. Portaria 135/GM – aprova a Política de Saúde do Idoso.** Brasília, DF: Imprensa Nacional, Diário Oficial da União, 1999.
4. **Camarano AA.** Envelhecimento da população brasileira: uma contribuição demográfica. In: Freitas EV, Py L, Néri AL, Cançado FAX, Gorzoni ML, Rocha SM. Tratado de Geriatria ε Gerontologia. Rio de Janeiro: Guanabara Koogan; 2002. p. 58-71.
5. **Schiffrin EJ, Guigoz Y, Perruisseau G, Blum S, Delneste Y, Mansourian P, Vellas B, Blancher A.** MNA and immunity: nutritional status and immunological markers in the elderly. Nestle Nutr Workshop Ser Clin Perform Programme 1999; 1:23-34.
6. **Veiga AMV**. Imunidade e envelhecimento. In: Freitas EV, Py L, Néri AL, Cançado FAX, Gorzoni ML, Rocha SM. Tratado de Geriatria ε Gerontologia. Rio de Janeiro: Guanabara Koogan; 2002. p. 550-559.
7. **Cereda E, Vanotti A.** The new Geriatric Nutritional Risk Index is a good predictor of muscle dysfunction in institutionalized older patients. Clin Nutr 2007; 26:78-83.
8. **Thomas DR.** Loss of skeletal muscle mass in aging: examining the relationship of starvation, sarcopenia and cachexia. Clin Nutr 2007; 26:389-399.
9. **Persson M, Hytter-Landahl A, Brismar K, Cederholm T.** Nutrition supplementation and dietary advice in geriatric patients at risk of malnutrition. Clin Nutr 2007; 26: 216-224.
10. **Nickols-Richardson SM, Johnson MA, Poon LW, Martin P.** Demographic predictors of nutritional risk in elderly persons. J Appl Gerontol 1996; 15(3):361-375.

11. **Waitzberg DL, Caiffa WT, Correia ITD.** Hospital malnutrition: the Brazilian National Survey (IBRANUTRI): a study of 4000 patients. Nutrition 2001; 17:573-580.
12. **Brasil. Ministério da Previdência e Assistência Social.** Portaria 73 – dispõe sobre as normas de funcionamento de serviços de atenção ao idoso no Brasil. Brasília, DF: Imprensa Nacional, Diário Oficial da União, 2001.
13. **Diogo MJD'E, Duarte YAO.** Cuidados em domicílio: conceitos e práticas. In: Freitas EV, Py L, Néri AL, Cançado FAX, Gorzoni ML, Rocha SM. Tratado de Geriatria ε Gerontologia. Rio de Janeiro: Guanabara Koogan; 2002. p. 762-767.
14. **August D, DeLegge M, Ireton-Jones C, Steiger E.** An evidence-based approach to optimal management of vascular and enteral access for home parenteral and enteral nutrition support. J Parenter Enteral Nutr 2005; 30(1):S-5-6.
15. **Silver HJ, Wellman NS, Arnold DJ, Livingstone AS, Byers PM.** Older adults receiving home enteral nutrition: regimen, provider involvement and health care outcomes. J Parenter Enteral Nutr 2004; 28(2):92-98.
16. **Distrito Federal. Portaria nº 156 de 03 de Novembro de 2004.** Aprova o Regulamento Técnico para Fornecimento de Fórmulas Enterais, Lácteas e Não Lácteas para Pacientes em Atendimento Domiciliar. Diário Oficial do Distrito Federal, Brasília, DF, nº 213, 09 de Novembro de 2004, Seção I, p. 15-16.
17. **Brasil. Ministério da Saúde/ANVISA.** Resolução de Diretoria Colegiada, RDC nº 63. Aprova o Regulamento Técnico para fixar os requisitos mínimos exigidos para a Terapia de Nutrição Enteral. Brasília, 06 de Julho de 2000.
18. **Brasil. Ministério da Saúde.** Vigilância Alimentar e Nutricional – SISVAN. Orientações básicas para a coleta, o processamento, a análise de dados e a informação em serviço de saúde. Série A - Normas e Manuais Técnicos. Brasília, 2004.
19. **Fabrício SCC, Wehbe G, Nassur FB, Andrade JI.** Assistência domiciliar: a experiência de um hospital privado do interior paulista. Rev Lat Am Enfermagem 2004; 12(5):721-726.
20. **McMahon MM, Hurley DL, Kamath PS, Mueller PS.** Medical and ethical aspects of long term enteral tube feeding. Mayo Clin Proc 2005; 80(11):1461-1476.
21. **Borrayo EA, Goldwaser G, Vacha-Haase T, Hepburn KW.** An inquiry into latino caregivers' experience caring for older adults with Alzheimer's disease and related dementias. J Appl Gerontol 2007; 26(5): 486-505.
22. **Distrito Federal. Secretaria de Estado de Saúde.** Plano Diretor de Regionalização do Distrito Federal –PDR/DF– versão 2005. Brasília, 2005. [cited 2007 Nov 24]. Available from http://www.saude.df.gov.br. SUPRAC – Planos – PDR.
23. **Grant JP.** Anatomy and physiology of the luminal gut: enteral access implications. J Parenter Enteral Nutr 2006; 30(1):S41-46.
24. **DeLegge MH.** Enteral access in home care. J Parenter Enteral Nutr 2006; 30(1): S13-20.
25. **Arnaud-Battandier F, Malvy D, Jeandel C, Schmitt C, Aussage P, Beaufrère B, Cynober L.** Use of oral supplements in malnourished elderly patients living in the community: a pharmaco-economic study. Clin Nutr 2004; 23:1096-1103.
26. **Baxter YC, Dias MCG, Maculevicius J, Cecconello I, Cotteleng B, Waitzberg DL.** Economic study in surgical patients of a new model of nutrition therapy integrating hospital and home vs the conventional hospital model. J Parenter Enteral Nutr. 2005; 29(1):96-105.
27. **Elkan R, Kendrick D.** What is the effectiveness of home visiting or home-based support for older people? Copenhagen, 2004. WHO Regional Office for Europe (Health Evidence Network report. [cited 2007 Dec 26]. Available from http://www.euro.who.int/Document/e83105.pdf.