UNDERNUTRITION PREVALENCE IN CANCER CARE UNITS: TASK TO THE EARLY NUTRITIONAL SUPPLEMENTATION

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Abstract

Objective: To determine the prevalence of undernutrition, its main risk factors and the preventive/corrective dietary strategies adopted to patients just admitted in a regional hospital of cancer care in Brazil.

Materials and Methods: This is a retrospective, cross sectional and descriptive study. The undernutrition was estimated using the Subjective Global Assessment (SGA). The data were collected from medical records of patients just admitted in the hospital, during 12 consecutive days. Information from patients in the intensive unit, under 18 years, unable to answer questions of SGA and unaccompanied were not included in the study. Data from 122 patients included were used.

Results: The overall prevalence of undernutrition was 44.3 %. The most frequent site of malignant neoplasms was in the digestive system, 35.9% of the cases. Age ≥60 years (p=0.032) as well as the digestive system cancer (p=0.002) were associated with increased risk of undernutrition. Only 5.7% of the patients were receiving any nutritional supplementation at the time of the nutritional evaluation.

Conclusions: High rates of undernutrition were found among patients newly admitted to the hospital. Moreover, considering that is a hospital specialized of cancer care and the risk factors identified, it can be assumed that it's interesting whenever it's possible encouraging the early use of nutritional supplements in the hospital of cancer care.

Keywords:

Nutritional supplements; Elderly; Oncology; Cancer; Preventive nutrition.

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Resumo

Objetivo: Determinar a prevalência de desnutrição, seus principais fatores de risco e as estratégias preventivas / corretivas adotadas em pacientes recém-admitidos em um hospital regional de atenção oncológica no Brasil.

Materiais e métodos: Este é um estudo retrospectivo, transversal e descritivo. A desnutrição foi estimada utilizando a Avaliação Global Subjetiva (SGA). Os dados foram coletados de prontuários de pacientes recém-admitidos no hospital, durante 12 dias consecutivos. Não foram incluídas no estudo as informações dos pacientes da unidade intensiva, menores de 18 anos, incapazes de responder a perguntas de SGA e não acompanhadas. Foram utilizados dados de 122 pacientes incluídos.

Resultados: A prevalência global de desnutrição foi de 44,3%. O local mais freqüente de neoplasias malignas foi no sistema digestivo, 35,9% dos casos. A idade ≥ 60 anos (p=0,032), bem como o câncer do sistema digestivo (p=0,002) foram associados com o maior risco de desnutrição. Apenas 5,7% dos pacientes estavam recebendo qualquer suplementação nutricional no momento da avaliação nutricional.

Conclusões: Foram encontradas altas taxas de desnutrição entre os pacientes recém-admitidos no hospital. Além disso, considerando que é um hospital especializado em cuidados oncológicos e os fatores de risco identificados, pode-se supor que é interessante sempre que possível incentivar o uso precoce de suplementos nutricionais no hospital de cuidados oncológicos.

Palavras-chave:

Suplemento nutricional; Idosos; Oncologia; Câncer; Nutrição preventiva.

INTRODUCTION

Cancer has been considered one of the biggest problems in the world's public health system[1]. In 2030, it is believed that 21.4 million new cases of cancer and 13.2 million of death cases by cancer will be reported, as a consequence of the growth and aging population[2]. The epidemic scale of cancer in part, seems to be a result of the process of the world urbanization and industrialization including changes in parameters of production and consume of the society[3]. A combination of environmental, regional, personal habits and aging factors have allowed weakening of the protection of the organisms or a higher exposition of people to carcinogens in foods and tobacco that explain the origin of neoplasic processes[4]. Once "initiated", the carcinogenesis process in general, evolves slowly, until it becomes a visible tumor with clinical repercussion, allowing the onset of the disease. Among the damages, the homeostasis of the organism promoted by cancer is changed by the most frequent disturbance which is the regulation of nutritional reserves of the system. Anorexia, nausea and vomiting are symptoms that can negatively impact the nutritional status of the patient causing a clear loss of weight. The deterioration of the nutritional status also depends of the tumor aggressiveness and its location[5].

The effect of cancer on patients' nutritional status is also the result of a metabolic dysfunction acquired by the process of nutrition-disease, and the collateral effects of the primary treatment plan that often impact alterations in the food intake and the digestive process and absorption[5,6]. Furthermore, without a better control of the nutritional status, the effects of undernutrition can be catastrophic to the clinical evolution of the patient[7,8].

The actions considered of high complexity in the Brazilian Public Health System (SUS) are the ones that involve use of advanced technology and thus, higher cost. Since 1998, the area of advanced technology in oncology, the SUS has established criteria to accredit the Centers of High Complexity Assistance in Oncology (CACON) throughout the country. These centers are capable of diagnosing and treating all types of cancer. In the last 10 years, these criteria have been updated, thus empowering and valuing the affiliation of the unities of high complexity with regional similarities. There has been an upgrade of the preventive approach and of early cancer detection through the years.

Currently in Brazil, besides the CACON, the high complexity in the oncology attention net is composed by general hospitals qualified as Unit of High Complexity Assistance in Oncology (UNACON)[9,10]. These both units make the final diagnosis and treat the most prevalent types of cancer in the region where they serve[11]. Owing to their own centralized nature, these units have strategically interesting capacity to facilitate the performance of epidemiological observations, determine risk factors and measure the results of cancer preventive actions inside their regional area. UNACON is also responsible for the treatment and palliative care of the patients, which allows for the analyses of the clinical-therapeutic conclusions in the follow up of oncology patients, under care in the unit. Keeping in line with the national policies that have been adopted, the concern with nutrition and care must be paramount from the epidemiological-preventive to the clinical-therapeutic point of view. The purpose of this study is to determine the prevalence of undernutrtion, describing risk factors and corrective dietary strategies adopted in the admission of patients under a UNACON in their respective region.

MATERIALS AND METHODS

Ethical aspects and study design

The present work is a result of a descriptive study, retrospective and with cross-sectional outline, performed in one single phase in a specialized hospital for cancer patients in the Triangulo Mineiro area, known as a UNACON, located in the city of Uberaba-MG. The data collected was authorized by the Hospital Management and the Board of Ethics in Research of The Universidade Federal do Triangulo Mineiro (under number 922.449).

Selection of participants

The subjects were composed largely of most of the patient data of patients admitted by this hospital during the period of April 14 – 26, 2012, and who underwent a nutritional evaluation performed by the Service of Nutrition and Diet (SND) during the same period. Information from patients in the intensive unit, under 18 years, unable to answer questions and unaccompanied were not included in the study.

Data Collection

Information about sex, age, admission date, origin (urban or rural zone), primary diagnosis (including tumor location), level of education and insurance coverage were obtained from patient records and used in the description of the results or to highlight the sample.

The nutritional screening applied by the hospital SND and used in this study as an indication of their nutritional status was the Subjective Global Assessment (SGA). The nutritional screening was performed within the first 72 hrs after admission. The SGA questionnaire was composed of recollections divided into five evaluations: Weight loss (in percentage), food ingestion, gastrointestinal symptoms, functional state, degree of stress of the disease and information of their physical exam about body reserves of the adipose tissue and muscles. Patients were then classified by the SND team into A, B or C, respectively showing: satisfactory nutritional condition (well nourished), nutritional risk or established undernutrition.

Finally, in search for referent data to the measures adopted as palliative care of patients, we collected information about the hospital diet offered to the patients, at the time of admission.

Organization of Collected Data

A database was created, where the variables were expressed through ratio, frequency of occurrence or medium ± standard deviation, according to its characteristics. To obtain a better analysis and interpretation of this data, we establish criteria of assemblage of data. We considered elderly patients over 60 years of age. To stratify the motive of admission the group "others" was created to aggregate patients admitted for other reasons, not related to cancer, and cases of chronic pulmonary obstruction, multitraumatism amongst others, since hospitals like UNACON cannot be exclusive of treatment of cancer.

In classification by tumor location, the term "female cancer" grouped patients who suffered from breast and uterus cancer, and the term "male cancer" in the classification patients who suffered prostate and penile cancer. We considered malignant neoplasm of the digestive system cancers that bordered the gastrointestinal tract or bordered organs next to it like oral cavity cancer, pharyngeal, esophageal, colon, rectum including malignant gastric and hepatic neoplasm.

Data Analyses

We calculated the prevalence of undernutrition by adding the total number of patients with some degree of undernutrition (nutritional risk and undernutrition) and divided by the total number of patients evaluated in during this period. To investigate relations between the variables, we used the Fisher Test. The statistical tests were done using the Sigmastat software 2.03 (Jandel Scientific Corp., San Rafael, CA, USA). The level of significance of 5% was considered.

RESULTS

In the current study, 122 patient records aged 21-93 years old evinced the medium age of 59.6 ± 17.3 years; the control group composed of 50.8% were elderly patients. The subjects evaluated had similar distribution in sex, there being 49.2% female subjects and 50.8% male subjects. In relation to schooling, 57.4% of the subjects had not finished high school. The SUS was responsible for the coverage of health (financial support of the diagnosis and treatment) of about 80% of the patients evaluated. Table 1 summarizes the relation of socioeconomic variables with the nutritional diagnosis indicated by the SGA.

Table 1 — Subjective Global Assessment of the study subjects according to the socio-economic data

			Subjective Global Assessment (%)		
	N	%	Well nourished	Nutritional risk	Undernutrition established
Age Group					
Adults	60	49.2	65.0	25.0	10.0
Elderly (>60y)	62	50.8	46.8	33.9	19.4
Habitation					
Rural	9	7.4	66.7	33.3	0.0
Urban	113	92.6	54.0	31.0	15.0
Marital Status					
Single	28	23,0	32.1	42.9	25.0
Married	63	51.6	71.4	17.5	11.1
Widower	23	18.9	43.5	43.5	13.0
Divorced	8	6.6	50.0	37.5	12.5
Educational Level					
Illiterate	10	8.2	50.0	20.0	30.0
Fundamental education incompleted	60	49.2	51.7	31.7	16.7
Fundamental education completed	28	23.0	50.0	42.9	7.1
Middle education completed	19	15.6	78.9	10.5	10.5
Higher education	5	4.1	60.0	40.0	0.0

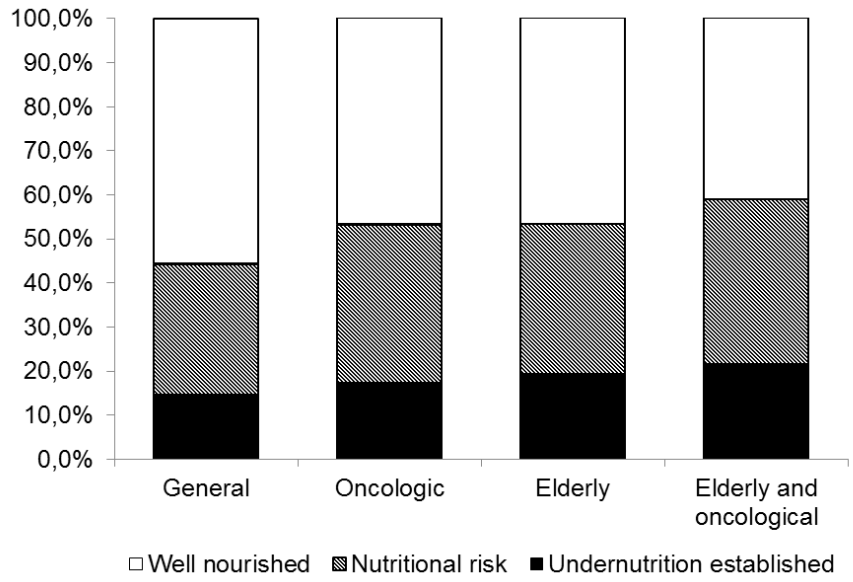
The principal diagnosis was cancer in 75.4% of the patients. Benign tumors and cardiac pathology were respectively, the reason for admittance according to 7.4% and 3.3% of the records evaluated (Table 2).

Table 2 — Main diagnosis at admission of the patients

Diagnosis	N	Frequency (%)
Cancer	92	75.4
Others	14	11.5
Benign tumors	9	7.4
Heart problems	4	3.3
Infection	3	2.5

The general prevalence of undernutrition detected by SGA performed during the first 72 hrs after admission in the UNACON was of 44.3%, there being 29.5% of the subjects classified as a nutritional risk and 14.8% with evident undernutrition. Among the patients with primary diagnosis as cancer, 53.3% were malnourished, including the 35.9% classified with nutritional risk and the 17.4% with evident undernutrition. These statistics are graphically represented in figure 1.

Figure 1 — Undernutrition prevalence in patients admitted to the cancer care unit in the region of the Triangulo Mineiro, MG - Brazil. The prevalence of undernutrition was estimated by the Subjective Global Assessment (n=122)



The data of patients who had cancer were then subdivided according with the location of the tumor. The most frequent location of the malignant neoplasm was in the digestive system in 35.9% of the cases, followed by male cancers with 16.3% and female cancers with 14.1% of the cases. Considering the most frequent locations of the malignant neoplasm, the prevalence of undernutrition by area of the tumor was 78.8% (nutritional risk + defined undernutrition) among patients with neoplasm in the digestive system and 75% among patients with cancer in the respiratory system (Table 3).

Table 3 — Prevalence of undernutrition according to the primary focus of cancer (n=92)

Location			Subjective Global Assessment (%)		
	N	%	Well nourished	Nutritional risk	Undernutrition established
Digestive System	33	35.9	21.2	60.6	18.2
Male cancer	15	16.3	73.3	13.3	13.3
Female cancer	13	14.1	69.2	23.1	7.7
Respiratory System	8	8.7	25.0	50.0	25.0
Head	6	6.5	50.0	33.3	16.7
Urinary	5	5.4	60.0	40.0	0.0
Endocrine	4	4.3	75.0	25.0	0.0
Integumentary	4	4.3	100.0	0.0	0.0
Hematological	2	2.2	50.0	50.0	0.0
Hidden	2	2.2	0.0	0.0	100.0

The majority of the complaints of gastrointestinal symptoms by oncology patients in the admission were anorexia (51.1%), nausea (38.0%) and vomiting (26.1%). Dysphagia and diarrhea were present in 14.1% and 12.0% of the cancer patients, respectively.

The Fisher Test indicated that the elderly (p=0.032) like the group with cancer in the digestive system (p=0.002) are more likely to be malnourished (Table 4).

Table 4 — Risk factors for undernutrition in patients admitted to the cancer care unit (n=122)

Fisher test	Statistical significance
Elderly vs Adults	p=0.032*
Cancer vs Infection	p=0.460
Cancer vs cancer + metastasis	p=0.239
Female cancer vs Cancer	p=0.073
Respiratory System cancer vs Cancer	p=0.180
Digestive cancer vs Cancer	p=0.002*
Digestive cancer vs digestive cancer + metastasis	p=0.718

* p < 0.05 -Statistical significance by Fisher Test

According to Table 5, the great majority of patients were on oral diets (89.3%), at the moment of the evaluation by the SGA. Only 5.7% were receiving nutritional supplements.

Table 5 — Risk factors for undernutrition in patients admitted to the cancer care unit (n=122)

	n	Frequency (%)
Via supply		
Oral (VO)	109	89.3
Probe nasogastric (NE)	7	5.7
Simultaneously VO-NE	6	4.9
Use Supplementation		
Food or multivitamin supplement	7	5.7
None	115	94.3

* p < 0.05 -Statistical significance by Fisher Test

DISCUSSION

Recently in 2014, the Brazilian government divulged data of the first national inquiry about the nutritional outline of the cancer patient at the moment of admission, The Brazilian Inquiry of Oncology Nutrition (IBNO)[12]. These statistics allow a unified and also sectional management of the information produced about cancer cases in the UNACONs and CACONs. The creation of Brazilian public policies allows an organization of monitoring protocols as well as quicker and orchestrated action against cancer and some of its principal clinical damages, like undernutrition. In fact, during the last decade, the relative aspects of the nutritional outline of the oncological patients were analyzed in distinct regions of the country, valuing regional aspects of the assisted population, even outside of the contexts of UNACONs and CACONs[13,14,15,16,17]. In this sense, statistics referent to the nutritional aspects of the people that make use of the UNACONs, especially in the Triangulo Mineiro region are rare, underlining the importance in data generated by the present study.

In general, national or international studies about the prevalence of undernutrition in the hospitals are rare; therefore, they deserve a deeper reflection to help with comprehension of what happens at the regional level. In the beginning of the last decade, the prevalence of undernutrition among patients admitted for several diseases, in Brazil and in Latin America was estimated in approximately 50%, having risk factors of advanced age and cancer[18,19]. In this study, the general prevalence of undernutrition in hospitals among the evaluated patients

was 44.3%. Considering the elevated number of patients with cancer (75.4%) and the high ratio of elderly patients (50.8%) among the patients admitted in this UNACON, even higher numbers of undernutrition in the admission were expected than the national estimates. On the other hand, more recent data from the Triangulo Mineiro region detected that undernutrition compromised 33.2% of the recently admitted patients in a hospital university[20]. The prevalence of undernutrition among the patients recently admitted in hospitals in Brazil could either have dropped slightly in the last decade and/or, there is a trend of lesser prevalence of undernutrition among the patients recently admitted to hospitals of the Triangulo Mineiro region. Anyway, there is a need for more recent studies about undernutrition in hospitals in Brazil and in the Triangulo Mineiro region to allow better understanding of these results.

When confronted with the results of the IBNO, the statistics of the present study allow a more contemporary national comparison and also a better directed to the oncology group. The prevalence of undernutrition in the hospital admission of cancer patients in the present study (53.3%) was slightly higher than the, 45.1% national media[21]. But the ratio of elderly patients in the IBNO study was 29%, while in the present study it was 55.4%, considering only cancer patients. Therefore, it is possible to relate a small divergence between the results of these studies to a ratio of elderly in the studied population under study along with regional diversity.

In our midst, it seems fundamental to constantly reinforce the importance of applying nutritional care in the cancer treatment centers of reference. Since these centers are specialized in the treatment of cancer patients and it is well known that undernutrition is an important and frequent co-morbidity that ails cancer patients and elderly patients, a consensual parameter of nutritional preventive/therapeutic protocols devoted to these patients in UNACONs and CANCONs is long overdue[18,19]. These actions could promote especially benign results in the minimization of the prevalence of undernutrition in these high complexity oncology assistance centers.

In this study, about 70% of the cancer patients admitted presented gastrointestinal complaints, loss of appetite being the most frequent amongst them (50%). Gastrointestinal symptoms like anorexia, nausea and vomiting, associated with collateral cancer treatment effects, affects the nutritional status and quality of life, heightening the prevalence of undernutrition in cancer patients[5,6]. These symptoms can only be relevant to the development of undernutrition when they occur in an intensive form; frequent and/or persistent episodes have a negative effect in the daily food intake, already considered in the elaboration of the SGA[11]. These symptoms are naturally non-specific to cancer, also being involved in the development of the disease itself, before the existence of a diagnosis and of intervention therapies. As in the present study, the SGA was applied in the hospital admission of the cancer patients; these symptoms could have been influential at the onset of nutritional processes prior to hospital admission of the patients in the evaluated UNACON. In this sense, the development of study protocols that focus in early intervention in patients with higher risk of developing undernutrition associated with cancer seems interesting.

Another group of patients that deserve specialized attention in the centers of reference is patients with cancer in the either the digestive or gastrointestinal system. The patients with this kind of cancer are among the groups more frequently attacked by undernutrition[6,22,23,24]. In the IBNO, oral, esophageal and stomach tumors are found in a percentage of undernutrition or nutritional risk that vary from 62.0% to 84.0% of the patients[21]. Similarly, in this study, undernutrition was also highly prevalent among patients with cancer in the digestive system (78.8%) along with those whose cancer primarily affected the lungs (75%). The diagnosis of the nutritional status and the identification of the location of the malignant neoplasm contribute to the establishment of evaluating methods and control of undernutrition; this improves the prognosis and the quality of life of the cancer patient during treatment.

An interesting aspect to be emphasized upon the design of this study is the time when the SGA is applied to the hospitalized patients. In the present study, the SGA was performed in patients recently admitted in the UNACON. When confirmed during the first 72 hrs upon hospital admission, undernutrition should be related, partially or totally, to external causes. After the period of 72 hrs can be related to a deficiency in the absorption of nutrients during treatments[25]. Considering the risk factors showed to the development of the undernutrition associate at cancer, the moment in which the SGAs were performed in the UNACON and the damages and costs associate at the undernutrition it is possible to believe that the high prevalence of undernutrition can be

strugled by preventives approaches of public health, before hospital admission[26], but also in hospital admission it's necessary to emphasize the use of the strong nutritional strategies against the risk of undernutrition[18,19,20]. In face of the need of nutritional attention of the patients with cancer, elevated percentage of undernutrition at admission in the UNACON and anorexia being the most frequent symptom among patients on admission, it would be an advantage to frequently use nutritional supplements before and/or during hospital admission. In this study, even with the high prevalence of undernutrition in the hospital admission and 89.3% of patients using exclusively oral feeding, only 5.7% of the patients used some caloric or protein supplement or multivitamins. Other intervention strategies, like changes in diet consistency, combining adequate diet according to patients preferences and individualized nutritional education, are also used by the SND, in the sense of promoting weight gain and defeating undernutrition. Although it may seem more expensive than other nutritional strategies[27], the nutritional supplements have therapeutic importance in strong debate in the current scientific literature, as a strategy to be employed in a general form to prevent and fight undernutrition including in the cancer patients[28,29,30], similarly to what happens in other nutritional risk groups[31,32,33]. The lack of use in supplements before and during the first few days of admittance encompasses a lack of orientation of the patient and family members about this strategy, high cost and general dislike generated by boring flavor[34]. So, new studies are necessary, but a boost in the availability and use of nutritional supplements as a prevention or as nutritional therapy and, especially, for cancer patients, can be an interesting strategy to fight the voracity of the advance and weakening caused by undernutrition in the health and quality of life of the patients.

Limitations and Conclusions

Our study has obvious limitations, such as regional and age characteristics of the population covered, the duration of data collection and the impossibility of managing patients in clinical urgency thus, hindering free extrapolations of results. Nevertheless, the disclosure of data in the present study is of substantial importance to motivate early and / or intense nutritional interventions in nutritional risk groups before or during hospitalization. In addition, it's may encourage the achievement of specific studies to clarify the power of the early supplementation on nutritional status of patients admitted in a cancer care unit.

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REFERENCES

1 World Health Organization. Cancer control: knowledge into action: WHO guide for effective programmes: module 6.

2 Ministério da Saúde, 2014. ESTIMATIVA 2014: INCIDÊNCIA DE CÂNCER NO BRASIL/ Instituto Nacional de Câncer José Alencar Gomes da Silva, Coordenação Geral de Ações Estratégicas, Coordenação de Prevenção e Vigilância. – Rio de Janeiro: Inca, 2014.124 pp. (versão eletrônica).

3 WORLD CANCER RESEARCH FUND/ American Institute for Cancer Research. Food, nutrition, physical activity, and the prevention of cancer: a global perspective. Washington: American Institute for Cancer Research; 2007. 517 pp. Available in: http://www.aicr.org/assets/docs/pdf/reports/Second_Expert_Report.pdf

4 KEY, T.J.; ALLEN, N.E.; SPENCER, E.A.; TRAVIS, R.C. The effect of diet on risk of cancer. Lancet. 2002; 360(9336):861-8.

5 VON MEYENFELDT, M. Cancer-associated malnutrition: An introduction. European Jounal of Oncology Nursing, Netherlands, v. 9, p.35-38, 2005.

6 GARTH, A.K.; NEWSOME, C.M.; SIMMANCE, N.; CROWE, T.C. Nutritional status, nutrition practices and post-operative complications in patients with gastrointestinal cancer. J Hum Nutr Diet. 2010 Aug; 23(4):393-401.

7 CAPRA, S.; FERGUSON, M.; RIED, K. Cancer: impact of nutrition intervention outcome-nutrition issues for patients. Nutrition. Volume 17, Issue 9, September 2001, Pages 769–772.

8 KISS, N.K.; KRISHNASAMY, M.; ISENRING, E.A. The effect of nutrition intervention in lung cancer patients undergoing chemotherapy and/or radiotherapy: a systematic review. Nutrition and Cancer. 2014; 66(1):47-56. doi:10.1080/01635581.2014.847966. Epub 2013 Dec 9.

9 MINISTÉRIO DA SAÚDE, 1998. Portaria MS/GM nº 3.535, de 2 de setembro de 1998. Estabelece critérios para cadastramento de Centros de Atendimento em Oncologia. Site da ANVISA. Available in: http://portal.anvisa.gov.br/wps/content/Anvisa+Portal/Anvisa/Inicio/Servicos+de+Saude/Assunto+de+Interesse/Legislacao/Oncologia>

10 MINISTÉRIO DA SAÚDE, 2005. Portaria nº 2.439/GM de 8 de dezembro de 2005. Institui a Política Nacional de Atenção Oncológica: Promoção, Prevenção, Diagnóstico, Reabilitação e Cuidados Paliativos, a ser implantada em todas as unidades federadas, respeitadas as competências das três esferas de gestão. Brasília: Diário Oficial da União, 9 dez 2005. Seção 1, p.80-81.
11 DETSKY, A.S.; STRICKER, S.C.; MULLEY, A.G.; THIBAULT, G.E. Prognosis, survival, and the expenditure of hospital resources for patients in an intensive-care unit. N Engl J Med. 1981 Sep17; 305 (12):667-72.
12 MINISTÉRIO DA SAÚDE, 2013. Portaria nº 874 de Maio de 2013. Institui a Política Nacional para a Prevenção e Controle do Câncer na Rede de Atenção à Saúde das Pessoas com Doenças Crônicas no âmbito do Sistema Único de Saúde (SUS). Available in: <http://bvsms.saude.gov.br/bvs/saudelegis/gm/2013/prt0874_16_05_2013.html>
13 SILVA, F.R.; DE OLIVEIRA, M.G.; SOUZA, A.S.; FIGUEROA, J.N.; SANTOS CS. Factors associated with malnutrition in hospitalized cancer patients: a croos-sectional study. Nutrition Journal. 2015 Dec 10;14:123. doi: 10.1186/s12937-015-0113-1.
14 HORTEGAL, E.V.; OLIVEIRA, R.L.; COSTA JÚNIOR, A.L.R.; LIMA, S.T.J.R.M. Estado nutricional de pacientes oncológicos atendidos em um hospital geral em São Luís-MA. Revista do Hospital Universitário/UFMA. 2009; 10(1):14-8.
15 BRITO, L.F.; SILVA, L.S.; FERNANDES, D.D.; PIRES, R.A.; NOGUEIRA, A.D.R..; SOUZA, C.L. Perfil nutricional de pacientes com câncer assistidos pela Casa de Acolhimento ao Paciente Oncológico do Sudoeste da Bahia. Revista Brasileira de Cancerologia 2012; 58(2): 163-71.
16 MIRANDA, T.V.; NEVES, F.M.G.; COSTA, G.N.R.; SOUZA, M.A.M. Estado Nutricional e Qualidade de Vida de Pacientes em Tratamento Quimioterápico. Revista Brasileira de Cancerologia 2013; 59(1): 57-64.
17 SANTOS, C.A.; ROSA, C.O.B.; RIBEIRO, A.Q.; RIBEIRO, R.C.L. Patient-Generated Subjective Global Assessment and classic anthropometry: comparison between the methods in detection of malnutrition among elderly with cancer. Nutriciòn Hospitalaria. 2015;31(1):384-392.
18 WAITZBERG, D.L.; CAIAFFA, W.T.; CORREIA, M.I. Hospital malnutrition: the Brazilian national survey (IBRANUTRI): a study of 4000 patients. Nutrition. 2001 Jul-Aug; 17 (7-8):573-80.
19 CORREIA, M.I.; WAITZBERG, D.L. The impact of malnutrition on morbidity, mortality, length of hospital stay and costs evaluated through a multivariate model analysis. Clinical Nutrition, Belo Horizonte, v. 22, n. 3, p.235-239, 2003.
20 PASQUINI, T.A.S.; NEDER, H.D. L.; ARAÚJO-JUNQUEIRA, DE-SOUZA D.A. Clinical outcome of protein-energy malnourished patients in a Brazilian university hospital. Brazilian Journal Medical and Biological Research, 2012; Dec 45(12) 1301-1307.
21 MINISTÉRIO DA SAÚDE, 2013. Instituto Nacional de Câncer José Alencar Gomes da Silva. Inquérito brasileiro de nutrição oncológica. Rio de Janeiro: INCA, 2013. 136p.: il. (versão eletrônica).
22 LOPES, J.P.; DE CASTRO CARDOSO PEREIRA, P.M.; DOS REIS BALTAZAR VICENTE, A.F.; BERNARDO, A.; DE MESQUITA, M.F. Nutritional status assessment in colorectal cancer patients. Nutriciòn Hospitalaria. 2013 Mar-Apr;28(2):412-8. doi: 10.3305/nh.2013.28.2.6173.
23 SANCHEZ-LARA, K.; UGALDE-MORALES, E.; MOTOLA-KUBA, D.; GREEN, D. Gastrointestinal symptoms and weight loss in cancer patients receiving chemotherapy. British Journal of Nutrition (2013), 109, 894–897.
24 HÉBUTERNE, X.; LEMARIÉ, E.; MICHALLET, M.; MONTREUIL, C.B.; SCHNEIDER, S.M.; GOLDWASSER, F. Prevalence of Malnutrition and Current Use of Nutrition Support in Patients with Cancer. Journal of Parenteral and Enteral Nutrition Volume 38 Number 2 February 2014 196–204.
25 DELGADO, A.F. Desnutrição Hospitalar. Pediatria, São Paulo, v. 1, n. 27, p.9-11, 2005.
26 MASCHKE, J; KRUK, U.; KASTRATI, K.; KLEEBERG, J.; BUCHHOLZ, D.; ERICKSON, N.; HUEBNER, J. Nutritional care of cancer patients: a survey on patients' needs and medical care in reality. International Journal of Clinical Oncology. 2017 Feb;22(1):200-206. Epub 2016 Aug 2.
27 ALVES, F.R.; GARÓFOLO, A.; MAIA, P.S.; NÓBREGA, F.J.; PETRILLI, A.S. Suplemento artesanal oral: uma proposta para recuperação nutricional de crianças e adolescentes com câncer. Revisa de Nutrição. [online]. 2010, vol.23, n.5, pp. 731-744.
28 Nutritional Supplementation for Patients with Cancer: A Review of the Clinical Effectiveness and Guidelines [Internet]. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health; 2014 Feb 12.
29 POUCHIEU, C.; FASSIER, P.; DRUESNE-PECOLLO, N.; ZELEK, L.; BACHMANN, P.; TOUILLAUD, M.; BAIRATI, I.; HERCBERG, S.; GALAN, P.; COHEN, P.; LATINO-MARTEL, P.; TOUVIER, M. Dietary supplement use among cancer survivors of the NutriNet-Santé cohort study. British Journal of Nutrition. 2015 Apr; 113(8):1319-29.
30 RAVASCO, P. Nutritional approaches in cancer: relevance of individualized counseling and supplementation. Nutrition. 2015 Apr; 31(4):603-4.
31 COLLINS, C.E.; KERSHAW, J.; BROCKINGTON, S. Effect of nutritional supplements on wound healing in home-nursed elderly: a randomized trial. Nutrition 2005; 21:147-55.
32 MILNE, A.C.; AVENELL, A.; POTTER, J. Meta-Analysis: Protein and Energy Supplementation in Older People. Annals Intern Medicine. 2006; 144: 37-48.
33 SCHNEIDER, S.M.; HÉBUTERNE, X. Nutritional support of the elderly cancer patient: long-term nutritional support. Nutrition. 2015 Apr; 31(4):617-8. doi: 10.1016/j.nut.2014.11.005. Epub 2014 Dec9.
34 SCHUEREN, M. A. E. B. Nutritional support strategies for malnourished cancer patients. European Journal of oncology nursing. Elsevier, v.9, p.74-83. 2005.