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Scored patient-generated Subjective Global Assessment: Length of hospital stay and mortality in cancer patients

Avaliação Subjetiva Global produzida pelo paciente: tempo de internação e mortalidade em pacientes com câncer

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ABSTRACT

Objective

To determine the association of a scored patient-generated Subjective Global Assessment with mortality and length of hospital stay in cancer patients.

Methods

Cross-sectional study carried out between July and September 2014 using secondary data collection using data from 366 medical records of patients admitted to a hospital recognized as a cancer center of excellence. The present study included patients with hospital stay over than or equal three days and minimum age of 20 years. The patient-generated Subjective Global Assessment scores were calculated and compared with the patients' clinical and anthropometric characteristics and outcomes (death and long length of stay in hospital).

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Results

Of the 366 patients evaluated, 36.0% were malnourished. The presence of malnutrition, according to the scored patient-generated Subjective Global Assessment, was statistically associated with the presence of metastasis (52.4%). On the other hand, malnutrition, according to the body mass index in adults (55.8%) and in older elderly patients (54.2%), was associated with death (55.0%). The adjusted logistic regression model showed that the following factors were associated with prolonged hospitalization: early nutritional screening, presence of severe malnutrition, radiotherapy and chemotherapy, and surgical procedures. As for mortality, the associated factors were: male reproductive system tumor, presence of metastasis, clinical treatment, prolonged hospitalization, and the presence of some degree of malnutrition.

Conclusion

The patient-generated Subjective Global Assessment score is an important risk marker of prolonged hospitalization and mortality rates. It is a useful tool capable of circumventing significant biases in the nutritional evaluation of cancer patients.

Keywords: Death. Length. Malnutrition. Neoplasms. Nutrition assessment.

RESUMO

Objetivo

Associar a Avaliação Subjetiva Global produzida pelo paciente à mortalidade e ao tempo de internação em pacientes com câncer.

Métodos

Pesquisa transversal analítica com coleta secundária de dados, conduzida entre julho e setembro de 2014 em 366 prontuários de pacientes internados entre janeiro de 2010 a janeiro de 2014 de um hospital de referência em câncer. Participaram do estudo pacientes com tempo de internação maior ou igual a três dias e idade mínima de 20 anos. Foi coletado o escore da avaliação subjetiva global produzida pelo paciente e associado às características clínicas, antropométricas e do desfecho dos pacientes (óbito e elevado tempo de internação).

Resultados

Dos 366 avaliados, 36.0% eram desnutridos. A presença de desnutrição pela avaliação subjetiva global produzida pelo paciente se associou estatisticamente com a presença de metástase (52.4%), desnutrição (e morte (55.0%) pelo índice de massa corporal em adultos (55.8%) e em idosos (54.2%) e morte (55.0%). O modelo de regressão logística ajustada demonstrou que foram associadas ao tempo de internação prolongada: *triagem nutricional precoce, presença de desnutrição grave e os tratamentos radio e quimioterápicos associados e o cirúrgico. Já em relação à mortalidade*: *a localização tumoral no sistema reprodutor masculino, a presença de metástase, o tratamento clínico, a internação prolongada e a presença de algum grau de desnutrição estiveram associadas.*

Conclusão

O escore da avaliação subjetiva global produzida pelo paciente é um marcador de risco importante para internação prolongada e morte. Sendo um instrumento valioso, capaz de contornar vieses significativos na avaliação nutricional do paciente com câncer.

Palavras-chave: *Morte. Tempo de internação. Desnutrição. Neoplasias. Avaliação nutricional.*

INTRODUCTION

Malnutrition is a fairly common finding in cancer patients. In Brazil, a study carried out in 45 centers of excellence for cancer diagnosis and treatment estimated a prevalence of malnutrition of 45.1% among the almost five thousand patients evaluated [1].

Factors commonly associated with malnutrition in cancer patients include anorexia, chewing and swallowing difficulties, side effects of cancer treatment, and excessive fasting for tests or procedures [2]. Other factors include low socioeconomic status and previously inadequate eating habits [3].

Thus, malnutrition and cancer tend to lead to reduced food intake, metabolic changes, and increased nutrient demand caused by tumor growth [2].

The impact of this process is expected to encumber the health services and is largely

associated with negative outcomes, such as: increase in morbidity and mortality, infections and complications, length of hospital stay (six days or over), and hospital costs and decrease in healing capacity, immune response, and tolerance to anticancer treatment [4,5].

The scored Patient-Generated Subjective Global Assessment (PG-SGA) has been considered as the standard method of nutritional assessment for patients with cancer in several robust studies comparing it with different methods of nutritional assessment [3,5-8]. It is a practical method that allows quick identification and includes low cost, objective, and subjective assessment instruments [9].

Thus, the use of the PG-SGA combined with a protocol that includes cancer treatment can screen patients who may benefit from a specific intervention [7,9].

This is a subjective method composed of questions about changes in weight and dietary intake, gastrointestinal symptoms, and functional capacity, which are answered by the patient. It also includes a form containing data on increased nutritional needs due to the disease, metabolic demand, and physical examination. Each item is scored, and the sum of the scores obtained in each domain is classified according to the following SGA classification: SGA A (well-nourished), SGA B (moderately malnourished) and SGA C (severely malnourished) [9].

Therefore, the present study aimed to associate the scored PG-SGA with mortality and length of hospital stay in cancer patients.

METHODS

This is an analytical cross-sectional study carried out between July and September 2014 using secondary data collection using data from 366 medical records of patients admitted to a hospital recognized as a cancer center of excellence between January 2010 and January 2014.

Patients diagnosed with malignant neoplasm, aged at least 20 years and with a minimum hospital stay of and 3 days, and who had been evaluated using the PG-SGA were included in this study. Patient gender was randomly chosen. Medical records of pregnant women or those that were illegible or with incomplete data were excluded. All eligible medical records were selected using probability sampling.

The calculation of sample size was based on a total of 1,193 PG-SGA forms registered at the Hospital's Nutrition and Dietetics Service between January 20110 and January 2014, with a statistical power of 95%, margin of error of 5%, and a prevalence of malnutrition of 45.1% among cancer patients [1]; 15% of sample loss were added to the calculation resulting in a minimum sample of 333 patients.

Patient-Generated Subjective Global Assessment was the basis of information collection (anthropometric data, changes in dietary intake, presence of symptoms, functional capacity, disease data and their association with nutritional needs, and physical examination). This questionnaire incorporates a numerical score and a global rating, in which higher scores are indicative of greater nutritional risk. In the present study, the classification of the instrument was divided into scores as follows: score <17 referred to well-nourished patients; scores ≥17, referred to patients with some degree of malnutrition; score <22 referred to moderately malnourished patients; and score ≥22 referred to severely malnourished patients [9].

Clinical data were collected from the medical records: age; gender; place of origin (city of *São Luís*, state of *Maranhão*, Brazil), Metropolitan Region, or inland cities in the state); disease diagnosis according to the International Classification of Diseases; cancer treatment (chemotherapy, radiotherapy, combined treatment, surgical treatment); length of hospital stay (≥10 days); length of administration of PG-SGA ≥2 days (yes or no) and length of administration of PG-SGA ≥5

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days (yes or no); patient outcome (hospital discharge or death); weight loss in one and six month-periods; Body Mass Index (BMI); and total PG-SGA score. It is worth emphasizing that in terms of BMI, the patients were classified as: malnourished (BMI <18.5kg/m² for adults and <22.0kg/m² for elderly patients), well-nourished (BMI≥18.5–24.9kg/m² for adults and ≥22.0–27.0kg/m² for elderly patients) and overweight/obese (BMI ≥25.0kg/m² for adults and ≥27.0kg/m² for elderly patients) [2].

Patient-Generated Subjective Global Assessment scores were tabulated using Microsoft Office Excel® spreadsheets, version 2013 (Microsoft Corporation, Redmond, Washington, United States). Data analysis was carried out with Stata® version 12.0 (Stata Corp LP, College Station, Texas, United States). The Shapiro-Wilk test was used to test the normality of the variables.

The Chi-square test was used to evaluate the associations between the frequency (absolute and relative) of variables. Adjusted and unadjusted logistic regression models were used to analyze the independent and dependent variables, employing the Backward method. Data were shown in tables, and all statistical associations were considered as significant when alpha value was <0.05.

The study was approved by the Research Ethics Committee of the *Hospital Universitário* of *Universidade Federal do Maranhão* (Protocol nº 711.819/2014).

RESULTS

There were no statistically significant associations between the presence of malnutrition and gender, age, and place of origin. There was a high frequency of malnutrition (36.0%). The highest prevalence of malnutrition was found among women (40.2%) aged 59 years or older (40.6%) and who were from the metropolitan region of *Maranhão* state (45.8%), according to Table 1.

There was higher frequency of malnutrition (37.6%) among individuals with tumors in the digestive system. The presence of metastasis was statistically associated (p=0.019) with a higher frequency of malnutrition (52.4% of the patients). There was a statistically significant (p<0.001) higher frequency of malnutrition (55.0%) among the patients who had died (Table 2).

Table 1. Association between the presence of malnutrition according to the scored patient-generated Subjective Global Assessment and identification characteristics of cancer patients. *São Luís* (MA), Brazil, 2015.

Variables	Malnourished (score ≥17)		Well-nourished (score <17)		*p*-value
	n	%	n	%	
Gender					0.088
Male	56	31.6	121	68.4	
Female	76	40.2	113	59.8	
Age (years)					0.257
Up to 40	17	33.3	34	66.7	
40–58	48	32.0	102	68.0	
≥59	67	40.6	98	59.4	
Place of origin					0.255
São Luís	68	38.6	108	61.4	
Metropolitan Region	11	45.8	13	54.2	
Inland cities	53	31.9	113	68.1	
Total	234	36.0	132	64.0	

Table 2. Association between the presence of malnutrition according to the scored patient-generated Subjective Global Assessment and characteristics of disease' diagnostic and hospitalization among cancer patients. *São Luís* (MA), Brazil, 2015.

Variables	Malnourished (score ≥17)		Well-nourished (score <17)		*p*-value
	n	%	n	%	
Tumor location					0.576
Digestive system	38	37.6	63	62.4	
Male reproductive system	14	34.1	27	65.9	
Female reproductive system	32	44.4	40	55.6	
Respiratory system	9	28.1	23	71.9	
Skin	3	23.1	10	76.9	
Breast	8	25.0	24	75.0	
Head and neck	5	45.5	6	54.5	
Urinary tract	4	40.0	6	60.0	
Hematopoietic tissue	10	43.5	13	56.5	
Others	9	29.0	22	71.0	
Metastasis					0.019
Yes	22	52.4	20	47.6	
No	110	34.0	214	66.0	
Type of discharge					
Death	44	55.0	36	45.0	<0.001
Hospital discharge	88	30.8	198	69.2	
Total	234	36.0	132	64.0	

Unadjusted logistic regression was carried between the variable length of hospital stay (≥10 days) and the variables of interest (gender, age, primary tumor location, treatment, length of administration of PG-SGA of two and five days, presence of some degree of malnutrition, presence of severe malnutrition, and type of discharge). There was statistical significance ($p<0.05$) only in the association of the combined treatment (radiotherapy and chemotherapy) with five-day administration of PG-SGA.

Adjustment was applied to factors of the logistic regression and it was found that length of administration of PG-SGA of up to 5 days and surgical treatment were significantly associated ($p<0.05$) with a reduction in the length of hospital stay (≥10 days). The administration of PG-SGA of up to 5 days led to 91% reduction in the cases of hospital stay ≥10 days. The combined treatment (radiotherapy and chemotherapy) was associated with an increase in the length of hospital stay (*odds ratio*=4.12, $p=0.015$). Similarly, the presence of severe malnutrition according to the PG-SGA (PG-SGA score greater than or equal to 22) indicated at least five times greater risk of longer hospital stay (≥10 days), $p=0.047$ (Table 3).

The unadjusted logistic regression for mortality showed that it was statistically significantly associated ($p<0.05$) only with tumors located primarily in the male reproductive system, presence of metastasis, clinical and combined treatments (radiotherapy + chemotherapy), and presence of malnutrition (PG-SGA ≥17).

After carrying out adjusted logistic regression, only the primary diagnosis of the disease in the male reproductive system, presence of metastasis, clinical treatment, longer hospital stay, and presence of malnutrition were

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Table 3. Factors associated with length of hospital stay greater than ten days in patients of a hospital recognized as a cancer center of excellence: adjusted logistic regression. *São Luís* (MA), Brazil, 2015.

Variables	Hospital stay ≥10 days		*Odds ratio*	95%CI	*p*-value
	n	%			
PG-SGA length – up to 5 days	55	25.2	0.09	0.05–0.16	<0.001
RTX + QT[1] treatment	43	19.7	4.12	1.31–12.97	0.015
Surgical treatment	36	16.5	0.35	0.20–0.64	<0.001
PG-SGA ≥22	51	23.4	5.36	1.01–4.14	0.047
Total	218	100.0			

Note: [1]Antineoplastic combined radiotherapy and chemotherapy.
PG-SGA: Patient-Generated Subjective Global Assessment; RTX: Radioteraphy; QT: Chemotherapy; 95%CI: 95% Confidence Interval.

Table 4. Factors associated with mortality in patients of a hospital recognized as a cancer center of excellence: adjusted logistic regression. *São Luís* (MA), Brazil, 2015.

Variables	Number of deaths		*Odds ratio*	95%CI	*p*-value
	n	%			
Tumor location					
Male reproductive system	3	3.8	0.18	0.05–0.68	0.012
Presence of metastasis	16	20.0	2.67	1.26–5.63	0.010
Clinical treatment	26	32.5	2.76	1.49–5.08	0.001
Hospital stay ≥10 days	61	76.3	2.41	1.32–4.38	0.004
PG-SGA ≥17	44	55.0	2.18	1.27–3.74	0.004
Total	80	100.0			

Note: PG-SGA: Patient-Generated Subjective Global Assessment.

statistically associated ($p<0.05$) with mortality (Table 4).

The primary diagnosis of the disease in the male reproductive system was associated with a lower frequency of death ($p=0.012$). On the other hand, the presence of metastasis and malnutrition, the type of clinical treatment, and prolonged hospitalization were statistically associated ($p<0.05$) with an increase in mortality (*odds ratio* >2.0), Table 4.

DISCUSSION

The prevalence of malnutrition found in this study (36.0%) is similar to that reported in the Brazilian Oncological Nutrition Inquiry, which showed a frequency of 45.1% of cancer patients in similar situation [1].

A multicenter research trial carried out in Latin American countries [10] reported much higher frequencies (65.6%) in cancer patients than those found in the present study. Its findings showed that among the factors associated with malnutrition according to the SGA (traditional form) are age >60 years, presence of infection, long hospital stay, and presence of cancer, which was the factor with the greatest impact on the patients evaluated.

Fragas & Oliveira [4], investigating factors associated with malnutrition during hospitalization, found that there was a 3-fold risk of malnutrition in prolonged hospitalizations (up to 15 days). Furthermore, persistent changes in diet, presence of digestive symptoms, recent weight loss and weight loss over the last six months, age, and mainly cancer (tenfold risk) also increase the risk of becoming malnourished.

These data indicate that the factors associated with malnutrition can be first investigated when the patients are admitted to a hospital and can be used in an evaluation that contributes to an adequate nutritional support and recovery.

The different degrees of malnutrition in patients with cancer may indicate the different methods of assessment used, which should consider the reality of the hospital or health care center, usefulness, cost, speed of use, and especially the sensitivity of the nutritional screening tool.

Very different data from those obtained in the present study were reported by Bauer *et al.* [11], who found 76% prevalence of some degree of malnutrition, according to the PG-SGA.

In the present study, sociodemographic factors may have also contributed to the increase the prevalence of malnutrition since a significant number of patients were from inland cities the state of *Maranhão*. These patients may seek health care at a later stage, which may be associated with a significant worsening of their nutritional status due to the disease.

Lenders *et al.* [12] pointed out that the lack of medical awareness regarding patients' nutritional status is an important aggravating factor of malnutrition in the hospital environment. This issue was not the focus of the present study; however, questions about the formal medical education and training should be raised since they may not give due importance to the patients' adequate nutritional. Thus, they should be discussed and revised.

Correia *et al.* [13] conducted a systematic review of almost 70 Latin American studies (totaling more than 29 thousand studies evaluated) to analyze the effect of malnutrition during hospitalization. The authors pointed out that in addition to a high prevalence (between 40% and 60%) on admission to the hospital, there was an increase in the number of malnourished patients with an increased length of hospital stay. This was mainly associated with increased infectious and noninfectious complications, length of hospital stay, and associated hospital costs.

Adjusted logistic regression was used in the present study to identify the isolated impact of malnutrition, according to the PG-SGA, in two important hospitalized patient outcomes: mortality and prolonged hospitalization.

It should be noted that the presence of malnutrition according to the PG-SGA was associated with death ($p<0.001$), which may indicate a risk predictor in this population. The interpretation of this finding is important because it refers to the negative impact of malnutrition alone, evaluated using a practical, inexpensive, and rapid method.

The presence of malnutrition was also associated with long hospital stay, which may implicitly contribute to inadequate bed occupancy and exposure to nosocomial hospital-acquired infections and morbidities and, consequently, higher associated hospital costs. This may affect public health budgets in Brazil.

The high rate of malnutrition among patients with metastatic cancer ($p=0.019$) may reflect the effect of tumor staging on the nutritional status of cancer patients. Studies [14,15] have already shown that more advanced stages are important nutritional risk factors in the increase of catabolism in cancer patients.

Vigano *et al.* [7] found that cancer patients with higher PG-SGA scores (≥9 *vs* 0 to 1) had unfavorable biological markers of cancer cachexia, such as: high white blood cell counts, C-reactive protein, and lower hemoglobin levels, BMI, and fat mass. In addition, there was 12% greater length of hospital stay, a reduction in the doses of chemotherapy, and increased mortality.

Other studies have already investigated the effect of malnutrition on the negative outcomes of hospitalized patients using different methods of nutritional assessment (hand grip dynamometry [6], biochemical measurements

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[7], body composition [8], anthropometric measurements [5], and other subjective methods [5,10,11,16]).

Bauer *et al.* [11] found an association between the presence of malnutrition (PG-SGA scores ≥17) and an increase in the length of hospital stay, similar to the results obtained in the present study. However, unlike our findings, these authors did not find significant association with increased mortality.

It is worth mentioning that the use of subjective nutritional assessment instruments has been shown to be strongly associated with the length of hospital stay of cancer patients [14].

Tappenden *et al.* [17] emphasized the effects of an early nutritional intervention, which may contribute to a reduction in the complication rates, length of hospital stay, readmission rates, mortality, and cost of care. Accordingly, the authors argued that nutritional care should be based on six basic principles: (1) creation of an institutional culture with the collaboration of all health professionals involved in the nutritional care of patients; (2) redefinition of the role of clinical care professionals in nutritional care; (3) identification of all malnourished patients and those at nutritional risk; (4) implementation of periodic nutritional interventions; (5) sharing of nutrition care plans between all sectors involved; (6) development of a comprehensive nutrition care and continuing education plan.

Malnutrition and nutritional screening estimates can contribute to the planning of public health strategies for an early and comprehensive nutritional screening in cancer patients, who may become weak and vulnerable to malnutrition due to several factors reported in the literature, such as: tumor location [15], age [11], loss of fat and lean mass [18], and side effects to cancer treatment [19], among others.

CONCLUSION

The Patient-Generated Subjective Global Assessment score is an important risk marker of prolonged hospitalization and high mortality rates. This tool proved to be useful and capable of circumventing significant biases in the nutritional evaluation of cancer patients. Nutritional impact measures should be taken to greatly reduce malnutrition rates.

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CONTRIBUTORS

AF SANTOS and MBC CHEIN contributed to the project and conception of this study and to data tabulation and discussion of results. AA RABELO JUNIOR and FLB CAMPOS contributed to data collection and tabulation, discussion of results and conception of the study. RML SOUSA and HJF VELOSO contributed to the discussion of results and conception of the study.

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