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Performance of Patient-Generated Subjective Global Assessment (PG-SGA) in Patients With Advanced Cancer in Palliative Care

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Abstract

Background: The purpose of this study was to evaluate the prognostic significance of the Patient-Generated Subjective Global Assessment (PG-SGA) in patients receiving palliative care for advanced cancer. *Methods:* The PG-SGA was used to assess nutrition status of 120 patients admitted to the Palliative Care Unit at the National Cancer Institute in Brazil. *Results:* According to the PG-SGA, 94.2% (n = 113) of the patients were evaluated as malnourished. The PG-SGA evaluated that xerostomia was the only symptom associated with a short survival (odds ratio [OR], 2.54; 95% confidence interval [CI], 1.2–5.38; $P = .014$). Survival was found to be significantly higher in well-nourished (PG-SGA A) than malnourished (PG-SGA B [$P = .021$] or C [$P = .013$]) patients. Total PG-SGA score (hazard ratio [HR], 1.06; 95% CI, 1.001–1.09; $P = .045$) and Karnofsky Performance Status of 20%–30% (HR, 15.4; 95% CI, 1.63–92.9; $P = .001$) and 40%–50% (HR, 10.0; 95% CI, 1.22–64.9; $P = .031$) were found to be independent prognostic survival factors. *Conclusion:* The scored PG-SGA is an independent prognostic factor of survival and thus can be a useful tool for nutrition evaluation in palliative care. (*Nutr Clin Pract*. 2017;32:675-681)

Keywords

PG-SGA; nutritional assessment; nutritional status; cancer; palliative care; prognosis; survival

Cancer is a global public health problem, and in general, most individuals with cancer in developing countries are already at an advanced stage of the disease at the time of diagnosis.[1] Malignant neoplasm is the second leading cause of death in Brazil.[2] The incidence of cancer will increase considerably over the coming years, making access to palliative care essential.[1,2]

In palliative care, healthcare teams should base their decisions both on the preferences of the patient and on prognosis and survival assessment. An adequate evaluation results in an improvement of treatment strategies, a better assistance for care planning, and an efficient use of available resources.[3,4]

The prognostic parameters have been extensively studied, and in some cases, prognostic scoring systems have been developed to help in the decision-making process.[5,6] However, finding prognostic factors that are reliable and easy to incorporate into clinical routine practice can be difficult.[6,7]

Nutrition status is recognized as a prognostic factor in advanced cancer, and malnutrition is common in advanced neoplastic disease, manifesting itself in the form of body mass depletion, decreased performance status, and reduced quality of life and survival.[7–10] It is important to understand that the denomination "patient with advanced cancer" is a quite general concept, including those with palliative treatment in case of incurable disease. Thus, nutrition treatment may need to be adapted according to the trajectory of the disease.[1,11]

In an end-of-life phase patient, the goal of nutrition assistance is notably to promote comfort measures for the remaining hours or days, but for those with a longer survival estimation of weeks or months, nutrition factors modify symptom control and improve food intake, and nutrition therapy can be beneficial for the disease outcome.[9,11,12] Therefore, nutrition screening in the palliative care phase should be intensified, in an attempt to individualize the nutrition status and due to its effect on survival prediction.[13,14]

The Patient-Generated Subjective Global Assessment (PG-SGA) is a noninvasive clinical instrument of nutrition status evaluation and is the reference method for the assessment of nutrition status of patients with cancer[15] recommended by expert groups, such as the Oncology Nutrition Dietetic Practice Group of the American Dietetic Association (ADA) and Brazilian Consensus on Oncological Nutrition.[16,17] In addition, the PG-SGA is the most complete method for

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nutrition assessment because it simultaneously evaluates very relevant prognostic aspects for patients with advanced cancer such as changes in body weight, food intake, nutrition impact symptoms, performance status, and physical examination.[17] Previous studies demonstrated that the PG-SGA is related to objective measures of nutrition evaluation, prognostics, and quality of life in advanced cancer,[18–22] but there are very few studies in a specific palliative care population and an inexistence of previous studies on this topic in Brazil.

The PG-SGA may be able to determine what elements are influencing nutrition status as well as indicate more possibilities of intervention for the patients, the benefits of nutrition support, or the need for management and monitoring the effectiveness of nutrition therapy.[23–25] It is important to evaluate the effects of incorporating, into daily practice, a nutrition assessment method recommended for a cancer population and to establish care strategies based on specific clinical outcomes for these patients, precisely because of their reduced survival.

Thus, considering the importance of identifying the PG-SGA's capacity of predicting patient outcome and because of the scarce information concerning PG-SGA performance in patients with advanced cancer in palliative care, the principal aim of this study was to evaluate the prognostic significance of the PG-SGA in patients receiving palliative care for advanced cancer.

Patients and Methods

Study Population

This is an observational study undertaken with a cohort of hospitalized patients admitted to the palliative care unit throughout November 2012. A total of 120 consecutive patients with advanced cancer were included in this study.

Study exclusion criteria were as follows: <20 years old, inability to answer the necessary information to complete the PG-SGA and/or not accompanied by someone capable of completing it, and Karnofsky Performance Status (KPS) of 10%, for clearly being moribund.

Measurement Instruments

To obtain nutrition status of the sample group, a validated Brazilian Portuguese version of the PG-SGA[24] was used and each patient was evaluated by trained nutritionists within 24 hours of hospital admission. The Portuguese version of the PG-SGA was done as a "non–International Society of Pharmacoeconomics and Outcomes" version and was used with permission given retrospectively.

The scored PG-SGA consists of a questionnaire divided into 2 sections. The first section consists of 4 boxes that were completed by the patient or responsible caregiver. Box 1 focuses on weight history with a maximum score of 5, box 2 on food intake with a maximum score of 4, box 3 on nutrition impact symptoms with a maximum score of 23, and box 4 on functional status with a maximum score of 3.[17] The remaining questions, in the second section, were completed by a trained and expert nutritionist. They focus on patient history such as diagnosis, age, metabolic demand, use of corticosteroids, and physical examination, including loss of subcutaneous fat, muscle wasting, and edema or ascites. On the basis of the global assessment, the patient was subjectively classified as well nourished (A), moderately malnourished (B), or severely malnourished (C), and numerical scores were produced.[16,17]

Performance status was evaluated by KPS, which is a percentage scale (0–100) that classifies patients based on their ability to perform active work and self-care and their need for regular medical care due to greater symptoms of disease.[26] This scale has 11 categories, and it is scored with increments of 10; the lower the score, the lower the function (0, death; 100, full function). The same professional who carried out the PG-SGA at the time of hospitalization also classified these patients for KPS with scores between 20 and 100.

Statistical Analysis

We processed statistical analyses using the SAS software package (version 6.11; SAS Institute, Cary, NC). We used nonparametric methods, and the minimum level for statistical significance was set at 5%. Patient survival was determined as the time interval between the date of the nutrition assessment until the date of death due to oncological complications or until the end of follow-up time (90 days). Date of death was ascertained through patients' medical record. For survival analysis, patients were dichotomized into survival ≤30 or >30 days.

We used the Kruskal-Wallis analysis of variance and Dunn's multiple-comparison test to compare differences on the overall PG-SGA scores between the 3 groups (A, B, and C). We analyzed the association between PG-SGA and KPS using the Fisher exact test and the associations between symptoms with death by using the χ^2 test, and we used the Mann-Whitney test to compare median variables between 2 groups.

Receiver operating characteristic (ROC) analysis was performed to determine the PG-SGA score with the most accurate value for predicting death. We used the Kaplan-Meier curve to evaluate survival, and the log-rank test was used to compare survival according to different PG-SGA nutrition status classifications. In addition, a multivariate survival analysis using a Cox proportional hazard model was performed to identify the most important subset of independent variables associated with prognostic factors. In the multivariate analysis, only those variables with a P value ≤.25 were included in univariate analysis. The final model was obtained through the stepwise forward procedure, and it included all variables with $P < .05$.

Ethical Considerations

This study received ethical approval (protocol number 338.885), and all the patients or their responsible caregivers provided written informed consent before joining the study.

Results

The characteristics of the patients are summarized in Table 1. The median (range) age was 56.5 (28–88) years, with a predominance of females (59.2%, n = 71). The most frequent types of tumors were gastrointestinal (25.8%, n = 31) followed by gynecological (cervix, ovarian, endometrium, vulva, and vagina; 25%, n = 30), head and neck (20.8%, n = 25), and lung (10%, n = 12), which represents a total of 81.6% (n = 86) of the sample. According to the PG-SGA, 94.2% (n = 113) of the patients were moderately or severely malnourished (B and C), and the median (range) PG-SGA score was 21 (6–37) points.

There was a significant difference (P = .0001) in the median of numerical PG-SGA scores for each of the subjective classification groups (A, B, and C). According to our findings, the numerical score of group C, or severely malnourished, was significantly higher than groups A and B, and group B was significantly higher than group A (C > B > A), as shown in the Table 1.

It was observed that 89.2% (n = 107) of the patients had a KPS ≤50 at the time of hospitalization. The nutrition status classification determined by the PG-SGA was strongly associated (P = .0009) with KPS-defined performance. More than half (53.3%, n = 64) of the sample died within 30 days, but median (range) survival was 28.5 (1–90) days.

The most prevalent symptoms were xerostomia (60%, n = 72), pain (59.2%, n = 71), loss of appetite (53.3%, n = 64), constipation (50%, n = 60), dysphagia (46.7%, n = 56), nausea (44.2%, n = 53), vomiting (30.8%, n = 37), early satiety (27.5%, n = 33), dysgeusia or ageusia (25%, n = 30), and dysnomia (20.8%, n = 25). Xerostomia (odds ratio [OR], 2.54; 95% confidence interval [CI], 1.2–5.38; P = .014) was the only symptom associated with a shorter survival, as noted in Table 2.

In addition, according to the ROC curve, a PG-SGA score ≥20 points was the best cutoff point for classifying death or nondeath by day 30, with 59.4% sensitivity and 53.6% specificity. The area under the curve was 0.63 (95% CI, 0.53–0.73; P = .015).

During the 3-month study period, 83.3% (100) of the patients died and 16.7% (20) were censored. Patients classified as PG-SGA A had a median survival time of 82 days, with all surviving for >30 days, while those who were PG-SGA B had a median survival time of 28 days (95% CI, 12.4–43.6 days), and those who were PG-SGA C had a median survival time of 25 days (95% CI, 13.2–36.8). The survival curve stratified for the 3 categories of the PG-SGA is illustrated in Figure 1, which shows that survival was significantly higher in PG-SGA A than in PG-SGA B (P = .021) or C (P = .013), but there was no significant difference between PG-SGA B and PG-SGA C (P = .61).

However, significant differences in food intake (P = .009), symptoms (P = .0001), and activities and function (P = .002) were observed in patients who had been classified as B or C when the differences between the scores of the medians of the PG-SGA elements were evaluated individually, as presented in Table 1.

Table 1. Characteristics of 120 Patients With Advanced Cancer in Palliative Care.

Characteristic	Median (Range)	No. (%)
Age, y	56.5 (28–88)	120 (100)
<65		82 (68.3)
≥65		38 (31.7)
Sex		
Female		71 (59.2)
Male		49 (40.8)
Diagnosis		
Gastrointestinal		31 (25.8)
Gynecological (cervix, endometrium, ovarian, vulva, and vagina)		30 (25.0)
Head and neck		25 (20.8)
Lung		12 (10.0)
Breast		10 (8.3)
Others (melanoma, connective tissue, encephalon, urinary bladder, and sarcoma)		12 (10.0)
PG-SGA categories		
A (well nourished)		7 (5.8)
B (moderately malnourished)		54 (45.0)
C (severely malnourished)		59 (49.2)
PG-SGA score[a]		
A (well nourished)	12 (6–16)	
B (moderately malnourished)	19 (9–26)	
C (severely malnourished)	25 (10–37)	
PG-SGA domains[b]	21 (6–37)	
Weight change	3 (0–5)	
Food intake	3 (0–4)	
Symptoms	8 (0–17)	
Activities and function	3 (0–3)	
Physical examination	2 (0–3)	
PG-SGA nutrition impact symptoms		
Xerostomia		72 (60.0)
Pain		71 (59.2)
Loss of appetite		64 (53.3)
Constipation		60 (50.0)
Dysphagia		56 (46.7)
Nausea		53 (44.2)
Vomiting		37 (30.8)
Early satiety		33 (27.5)
Dysgeusia or ageusia		30 (25.0)
Dysnomia		25 (20.8)
Diarrhea		9 (7.5)
Mouth sores		9 (7.5)
KPS, %	40 (20–80)	
20–30		29 (24.2)
40–50		78 (65.0)
≥60		13 (10.8)
Death (30 days)		
Yes		64 (53.3)
No		56 (46.7)
Survival (days)	28.5 (1–90)	120 (100)

KPS, Karnofsky Performance Status; PG-SGA, Patient-Generated Subjective Global Assessment.
[a]PG-SGA score categories are significantly different from one another; P = .0001 (Kruskal-Wallis test).
[b]PG-SGA score domains: food intake, symptoms, and activities are significantly different in categories B and C (Mann-Whitney test).

Table 2. Association Between the PG-SGA Nutrition Impact Symptoms and the Death at 30 Days.

Symptom		Death at 30 Days, No. (%) Yes	No	*P* Value[a]
Xerostomia	Presence	45 (37.5)	27 (22.5)	.014
	Absence	19 (15.8)	29 (24.2)	
Pain	Presence	37 (30.8)	34 (28.3)	.747
	Absence	27 (22.5)	22 (18.3)	
Loss of appetite	Presence	38 (31.6)	26 (21.7)	.156
	Absence	26 (21.6)	30 (25.0)	
Constipation	Presence	28 (23.3)	32 (26.7)	.143
	Absence	36 (30.0)	24 (20.0)	
Dysphagia	Presence	31 (25.8)	25 (20.8)	.678
	Absence	33 (27.5)	31 (25.8)	
Nausea	Presence	30 (25.0)	23 (19.2)	.523
	Absence	34 (28.3)	33 (27.5)	
Vomiting	Presence	22 (18.3)	15 (12.5)	.369
	Absence	42 (35.0)	41 (34.2)	
Early satiety	Presence	18 (15.0)	15 (12.5)	.870
	Absence	46 (38.3)	41 (34.2)	
Dysgeusia or ageusia	Presence	17 (14.2)	13 (10.8)	.673
	Absence	47 (39.2)	43 (35.8)	
Dysnomia	Presence	16 (13.3)	9 (7.5)	.230
	Absence	48 (40.0)	47 (39.2)	
Diarrhea	Presence	5 (4.2)	4 (3.3)	.889
	Absence	59 (49.2)	52 (43.3)	
Mouth sores	Presence	4 (3.3)	5 (4.2)	.578
	Absence	60 (50.0)	51 (42.5)	

PG-SGA, Patient-Generated Subjective Global Assessment.
[a]Significant differences were calculated using the Pearson χ^2 test.

Table 3 provides the results of the univariate and multivariate Cox regression analysis for survival, including the variables age, sex, cancer site, numerical PG-SGA score, weight change, food intake, nutrition impact symptoms, activities and function, categorical PG-SGA ≥20 points according to ROC curve, and KPS. The multivariate Cox regression analysis indicates that the highest PG-SGA score (*P* = .045; 95% CI, 1.001–1.09) and KPS of 20–30 (*P* = .0015; 95% CI, 1.63–92.9) and 40–50 (*P* = .031; 95% CI, 1.22–64.9) were independent significant predictors associated with a survival time of 30 days.

Discussion

The purpose of the study was to obtain preliminary data with regard to the potential predictive value of the PG-SGA for patients with advanced cancer in palliative care. The main finding was that the scores of the PG-SGA showed prognostic significance in survival at 30 days. This is the first study to evaluate the prognostic significance of the PG-SGA for this exclusive cancer population. Given the high incidence of nutrition deficits associated with reduced survival among palliative patients, assessment of PG-SGA prognosis value is important considering the need for a simple nutrition assessment method for routine use in clinical practice.

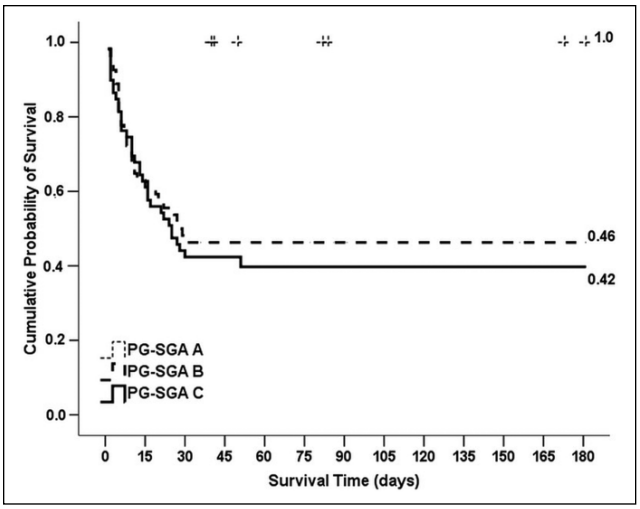

Figure 1. Kaplan-Meier curve. Survival time stratified according to Patient-Generated Subjective Global Assessment (PG-SGA) categories (A, well nourished; B, moderately malnourished; and C, severely malnourished) in patients in palliative care for advanced cancer.

Our study is representative of the local population treated at the foremost centers for the prevention and treatment of cancer in Brazil, and the palliative care unit is the only unit specializing exclusively in oncology palliative care in our national public health system.

As expected, our findings demonstrate that most patients receiving palliative care are malnourished; unfortunately, this is a common finding in the routine of nutrition assistance in patients with advanced cancer. The prevalence of malnutrition was slightly higher than the 81% reported by Marín Caro et al,[27] who previously used the same method. The results reported by Thoresen et al[19] and Kwang and Kandiah[21] indicate that 65% and 69%, respectively, of patients in a palliative care unit were malnourished.

The PG-SGA also was shown to be accurate in identifying the well-nourished patients from the moderately or severely malnourished, which is consistent with the findings of other authors.[19,20,23] This is important because as the PG-SGA is a subjective method, it relies on the observer's ability to collect and interpret information, which can result in an evaluator bias.[24] However, our findings demonstrate that this shortcoming can be offset if the professionals employing the PG-SGA are well trained and have experience with this clinical instrument.

Table 3. Univariate and Multivariate Analysis of Prognostic Factors for Survival of 30 Days in Patients With Advanced Cancer in Palliative Care.

	Univariate					Multivariate[a]				
Variable	Regression Coefficient	SE	*P* Value	HR	95% CI	Regression Coefficient	SE	*P* Value	HR	95% CI
Age ≥65 years	0.06	0.27	.82	1.06	0.63–1.79					
Sex female	0.06	0.25	.81	1.06	0.64–1.75					
Disease site										
Gastrointestinal/head and neck	Reference									
Gynecological/breast	0.05	0.29	.86	1.05	0.60–1.85					
Lung	0.54	0.37	.14	1.72	0.84–3.53					
Others	−0.57	0.53	.28	0.56	0.20–1.61					
PG-SGA score	0.05	0.02	.005	1.06	1.02–1.11	0.04	0.02	.045	1.04	1.001–1.09
Weight change	0.05	0.06	.41	1.05	0.93–1.21					
Food intake	0.17	0.08	.03	1.19	1.02–1.39					
Symptoms	0.03	0.03	.30	1.03	0.97–1.11					
Activities and function	0.32	0.14	.02	1.38	1.04–1.83					
Physical examination										
No deficit	Reference									
Mild deficit	0.60	0.62	.33	1.82	0.53–6.22					
Moderate deficit	0.56	0.61	.35	1.76	0.53–5.88					
Severe deficit	0.82	0.61	.18	2.27	0.68–7.63					
PG-SGA score ≥20 points	0.33	0.25	.18	1.40	0.85–2.31					
KPS										
≥60%	Reference									
50%–40%	2.30	1.01	.02	10.0	1.37–72.7	2.18	1.01	.031	8.9	1.22–64.9
30%–20%	2.73	1.02	.007	15.4	2.06–114.4	2.51	1.03	.015	12.3	1.63–92.9

HR, hazard ratio; KPS, Karnofsky Performance Status; PG-SGA, Patient-Generated Subjective Global Assessment; SE, standard error.
[a]Multivariate model: stepwise forward.

The cutoff point of a PG-SGA score ≥9 is frequently used to indicate a critical need for improved symptom management and/or nutrition intervention.[17,18] Nevertheless, in this study, the cutoff point that was best associated with risk of death was a PG-SGA score ≥20 points, which represents >50% of the total score. Our results may suggest that defining the cutoff point ≥9 might not be suitable in clinical practice for the triage of palliative care patients, since it was observed in the study that most of the patients had scores above this cutoff point (98.3%, n = 118), including patients with a very short survival (<30 days). These patients, for example, probably would not benefit from the specialized nutrition intervention.

Because there is no previous study similar to this with palliative care patients, presumably because routine nutrition assessments have not been performed in this type of patient, comparison of the current results with any other study is hampered.

Of all reported symptoms by the PG-SGA in our study, only xerostomia was associated with reduced survival. Other studies have shown that xerostomia is quite prevalent and is 1 of the most distressing symptoms reported by patients with cancer,[28,29] as well as being a prognostic factor in advanced cancer.[7]

For patients with a shorter expectation of survival, nutrition counseling should be considered to alleviate symptoms and the burden of the disease. For example, predominant interventions for xerostomia involve dietary advice and improvement of active mouth care, prescription of artificial saliva, mouthwash, and so on.[29] On the other hand, in patients with a longer expectation of survival, nutrition interventions aim at improving nutrition aspects, including the maintenance or improvement of nutrition status, body weight stabilization, adequate food intake, and improvement of quality of life.[11,12]

We found in this study a strong association between nutrition status and performance status. In fact, malnutrition is an important factor determining patients' poor performance status, because it involves deterioration of muscle function with diminished overall physical function, consequently affecting the ability to do active work and to perform self-care.[30] Besides, most of the patients are unable to do daily activities and need special care, directly affecting the quality of life and decreasing the survival time.[7,9,22]

In this study, we verified that well-nourished patients (PG-SGA A) exhibit significantly longer survival time than malnourished patients (PG-SGA B and C), and the data correspond with studies on nonpalliative oncology patients.[8,20,31–35] In our study, it was not possible to differentiate survival time, according to the Kaplan-Meier curve, among patients classified as moderately malnourished (B) or severely malnourished (C) by the PG-SGA.

This finding may suggest the necessity of reviewing solely the use of nutrition status classification as the presence or absence of malnutrition in the clinical practice of these patients, indicating the importance of using the scores for nutrition risk classification. Statistically significant differences were observed between B and C in the following domains: food intake, symptoms and activities, and functions.

Moreover, in evaluating the prognostic indicators from the PG-SGA, we verified on a univariate analysis that food intake, activities, and function were associated with poor survival. The study by Martin et al[14] demonstrates that weight loss, reduction in food intake, and dysphagia, as well as disease site and performance status, were independent predictors of survival in patients in palliative care for advanced cancer. They also did not explore the prognostic significance of nutrition classification and total PG-SGA score.

Our results can suggest, due to an evaluation of the domains, some potential modifiable aspects through nutrition counseling for patients and caregivers. The benefits for this group of patients include strategies on symptom management and improvement of food intake by meal adaptations (time, quantity, content), specific recipes that increase nutrition values of food and drinks, and/or adequate use of supplements.[36,37]

In our work, multivariate analysis showed that only the KPS and PG-SGA were considered independent risk predictors for death. It is noteworthy that the KPS is traditionally a reliable and routine clinical tool for predicting survival,[3–7] although it is valid only for patients with scores >50,[26] according to our results. Although it is considered a traditional tool for prognostic performance status and also presented prognostic value in our study, the KPS is not as specific a tool of nutrition evaluation as the PG-SGA.

Our results verified that the total score of the PG-SGA showed better prognostic performance, reinforcing the need to reassess cutoff points for patients in palliative care for advanced cancer. Because nutrition intervention adjusted to individual needs may be beneficial to these patients, screening and assessing nutrition deficits are justified and required.[25,29,36,37]

Currently, a large amount of scientific evidence supports the applicability of the PG-SGA in other countries.[17] The limitations of this study were the noninclusion of inflammatory parameters (eg, C-reactive protein and serum albumin level) and the nonassessment of the effect of nutrition intervention in cancer palliative care, since the benefits of nutrition support in malnourished populations are well documented.[36,37]

Nevertheless, the present study identified the possibility of determining the role of the PG-SGA as a potential tool to predict survival in patients with advanced cancer. However, it is still necessary to conduct other studies with large sample sizes to assess the effect of nutrition interventions on PG-SGA performance in cancer palliative care.

Conclusion

This study demonstrates that malnutrition as determined by the PG-SGA was associated with increased mortality, and total score provides prognostic significance in patients with advanced cancer in palliative care. The PG-SGA was able to detect elements that are important contributors to the nutrition burden of patients with advanced cancer, and it may become a useful tool for nutrition evaluation. Healthcare groups can also start considering its routine use in aiming to assess nutrition diagnosis parameters in cancer palliative care.

In addition, anticipation of nutrition needs as well as prevention and effective management of symptoms should also be discussed. Reassessment should be continuous until death, with maintenance or modification of nutrition assessment guided by life expectancy.

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Statement of Authorship

E. V. M. Wiegert, P. C. Padilha, and W. A. F. Peres equally contributed to the conception and design of the research, contributed to the acquisition and analysis of the data, contributed to the interpretation of the data, drafted the manuscript, critically revised the manuscript, agree to be fully accountable for ensuring the integrity and accuracy of the work, and read and approved the final manuscript.

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