Original Article

Use of a qualitative nutritional screening for cancer patients: a pilot study

Uso de triagem nutricional qualitativa para pacientes com câncer: estudo piloto

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Larissa Silva Pinho Caetano[1]
Juliane Lima Pessini[1]
Ranyell Matheus Spencer Sobreira Batista[2]
Fernanda Ramos de Oliveira Pires[3]
Thaís Manfrinato Miola[4]
Natalia Leonetti Couto Lazzari[5]

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Address for correspondence
Thaís Manfrinato Miola
Rua Professor Antônio Prudente, 211 – Liberdade – São Paulo, SP, Brasil – CEP 01509-010
E-mail: thais.miola@accamargo.org.br

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ABSTRACT

Introduction: Malnutrition of cancer patients in the hospital setting has been examined in the past several decades. However, a practical and easily applicable nutritional screening tool to identify early nutritional risks in such patients has not been developed. The purpose of this study was establishing a nutritional screening tool for cancer patients who undergo chemotherapy, with or without concomitant radiotherapy, or who are planning elective surgery. **Methods:** This observational study comprised 100 patients with head and neck cancer or gastrointestinal tract cancer during their hospitalization. The proposed nutritional screening and Patient-Generated Subjective Global Assessment (PG-SGA) were performed in all patients. **Results:** A significant difference was observed between methods in classifying nutritional status ($p<0.0001$), wherein 100% of patients who were considered to be at nutritional risk by the PG-SGA presented with nutritional risk through our nutritional screening. **Conclusion:** Our nutritional screening early identifies patients who are at risk of malnutrition and efficiently provides immediate and integral nutritional information in cancer patient care.

RESUMO

Introdução: A desnutrição em âmbito hospitalar tem sido amplamente investigada nas últimas décadas, logo, a utilização de uma ferramenta de triagem nutricional prática, de fácil aplicação e exclusiva para pacientes oncológicos, possibilita a identificação precoce de risco nutricional e a intervenção nutricional adequada e imediata. O propósito desse estudo foi estabelecer uma ferramenta de triagem nutricional qualitativa, em pacientes oncológicos submetidos à quimioterapia eletiva, concomitante ou não à radioterapia ou à cirurgia eletiva. **Método:** Estudo observacional composto por 100 pacientes, realizado no período de setembro de 2017 a fevereiro de 2018, com câncer de cabeça e pescoço e trato gastrointestinal durante a internação. Realizou-se triagem nutricional e Avaliação Subjetiva Global Produzida Pelo Paciente (ASG-PPP) em 100% destes pacientes. **Resultados:** Observou-se diferença estatística significativa entre os métodos utilizados para classificação do estado nutricional do paciente (<0,0001), onde 100% dos pacientes classificados com risco nutricional pela ASG-PPP apresentavam risco nutricional pela triagem nutricional. **Conclusão:** A triagem nutricional proposta possibilitou identificar precocemente pacientes em risco de desnutrição e proporcionar uma atuação nutricional imediata, eficiente e integral no cuidado ao paciente oncológico.

1. Nutricionista, Residente em Nutrição, A.C. Camargo Cancer Center, São Paulo, SP, Brasil.
2. Médico, Departamento de Cirurgia Pélvica, A. C. Camargo Cancer Center, São Paulo, SP, Brasil.
3. Nutricionista, Gerente de Nutrição, A.C. Camargo Cancer Center, São Paulo, SP, Brasil.
4. Nutricionista, Supervisora de Nutrição, A.C. Camargo Cancer Center, São Paulo, SP, Brasil.
5. Nutricionista, A.C. Camargo Cancer Center, São Paulo, SP, Brasil.

INTRODUCTION

Malnutrition is common in cancer patients and is more prevalent in hospitalized ones, reaching rates up to 66%. The factors that are involved in this process are attributed to the inability to maintain good nutritional status due to the disease or treatment[1]. In addition, many antineoplastic therapies trigger or increase the likelihood of weight loss due to their frequent gastrointestinal side effects or problems with chewing and swallowing[2]. Thus, early identification of nutritional risk might allow early intervention and improve the nutritional care for such patients[3,4].

Patients who are at risk of malnutrition should be identified through efficient and low-cost screenings[5]. The Global Subjective Nutrition Assessment, Nutritional Risk Screening 2002 (NRS 2002), and 3-Minute Nutrition Screening (3-MinNS) are currently examples of such nutritional screening - all of which have distinct sensitivities and specificities[3]. However, there are no qualitative nutritional screenings that have been standardized specifically for cancer patients in any country in South America, requiring studies to determine the appropriate nutritional screenings for this population.

The Patient-Generated Subjective Global Assessment (PG-SGA) is the recommended tool for oncologic patients, and it can be used for screening and/or nutritional assessment. However, its administration duration (~ 15min) does not favor nutritional screening for hospitalized patients[6].

To this end, we have developed a new qualitative nutritional screening tool, for exclusive usage in cancer inpatients who are undergoing or will initiate some type of cancer treatment, to estimate the intra-hospital nutritional risk faster and guide the selection of effective and anticipatory nutritional interventions.

METHODS

This cross-sectional observational study entailed the collection of prospective data. We evaluated 100 patients between September 2017 and February 2018 who had been hospitalized for cancer treatment at A.C. Camargo Cancer Center. This study was approved by the research ethics committee of our institution (n° 2434/17), and all participants signed informed consent forms (TFIC) for participation in the study.

The inclusion criteria were patients aged above 18 years with one of the following tumors: digestive tract (including oesophagus, stomach, colorectum) or head and neck. Those patients were undergoing cancer treatment, chemotherapy, radiotherapy, or surgery during their hospitalization. Patients who had more than 1 primary tumor or who were administered exclusively palliative treatments were excluded.

The participants were subjected to a nutritional screening during the first 24 hours of hospitalization, according to the institution's nutritional protocol. Patient data – such as diagnosis of the primary tumor, comorbidities, associated pathologies, and previous data on procedures –, anthropometric measurements – such as weight, weight loss rate, and body mass index (BMI) - and demographics were collected from medical records and confirmed during initial contact with the patient.

The weight loss rate was considered to be severe when the patient experienced weight loss > 2% in 1 week, > 5% in 1 month, > 7.5% in 3 months, or > 10% in 6 months[7].

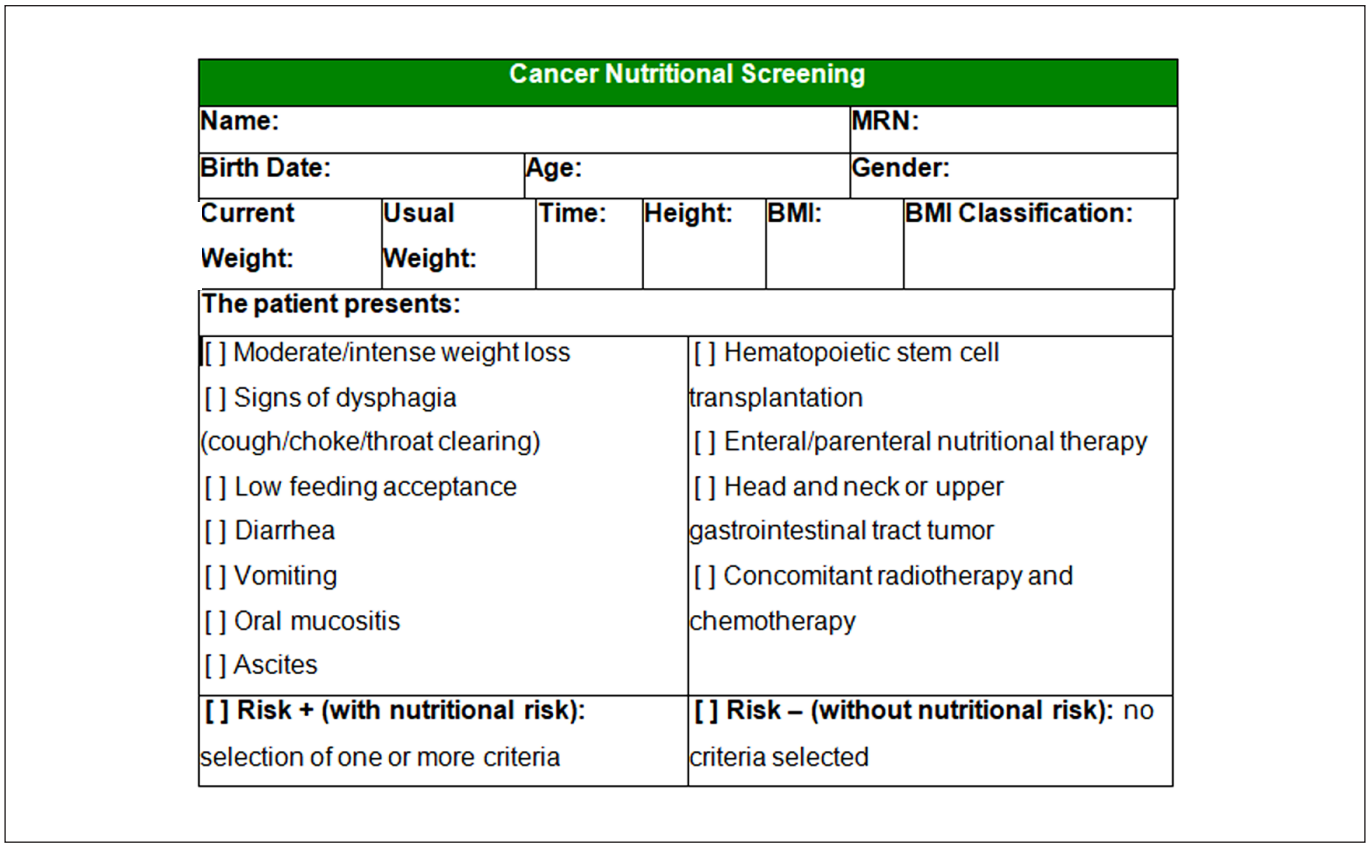
All patients who were evaluated by the proposed Cancer Nutritional Screening (CNS, Figure 1) were also examined using the PG-SGA[2], which has been validated in Portuguese[8] and is recommended as a nutritional screening for cancer patients[9]. The results between the 2 methods were then compared.

Our proposed CNS evaluates the nutritional risk of the patient, including food intake questionnaires, weight loss rate, diagnosis, and treatment and symptoms of the gastrointestinal tract in the last week (Figure 1). The CNS results classify a cancer patient as: Risk+ (i.e., with nutritional risk) if any criteria were selected and Risk- (without nutritional risk) if no criteria are selected. This method takes about 2 minutes to apply.

The PG-SGA comprises 2 sections, the first of which is self-reported, containing questions about current weight and weight change, changes in food intake that could compromise physical and functional capacity. This instrument assesses specific symptoms in cancer patients, such as xerostomia, dysgeusia, early satiety, and pain[8]. The second component evaluates the disease and its nutritional needs, through a physical exam, and changes in metabolic demand (presence of fever or use of corticosteroids). The physical examination component of the evaluation measures fat reserves, muscle, and the presence of edema by inspection and palpation. The PG-SGA classifies cancer patients as: A – well nourished; B – at risk of malnutrition or moderate malnutrition; or C – severely malnourished[8].

Descriptive analysis of continuous variables was performed using measures of central tendency (median, mean, and standard deviation), whereas categorical variables were analyzed in relation to absolute and relative frequencies.

Sensitivity, specificity, and positive and negative predictive values were calculated using the PG-SGA as the reference method. Association tests were used to compare the relationship between categorical variables by chi-square or Fisher test. p values < 0.05 with 80% power. SPSS version 23 was used for all statistical analyses (Chicago, USA).



Cancer Nutritional Screening					
Name:				**MRN:**	
Birth Date:		**Age:**		**Gender:**	
Current Weight:	**Usual Weight:**	**Time:**	**Height:**	**BMI:**	**BMI Classification:**
The patient presents:					
[ ] Moderate/intense weight loss [ ] Signs of dysphagia (cough/choke/throat clearing) [ ] Low feeding acceptance [ ] Diarrhea [ ] Vomiting [ ] Oral mucositis [ ] Ascites			[ ] Hematopoietic stem cell transplantation [ ] Enteral/parenteral nutritional therapy [ ] Head and neck or upper gastrointestinal tract tumor [ ] Concomitant radiotherapy and chemotherapy		
[ ] Risk + (with nutritional risk): selection of one or more criteria			**[ ] Risk – (without nutritional risk):** no criteria selected		

Figura 1 - *Data collection using the Cancer Nutrition Screen (CNS). BMI: body mass index; MRN: medical record number.*

RESULTS

The mean age of hospitalized patients was 59.5 years; colorectal cancer was the most prevalent tumor (54%), followed by upper digestive tract and hepatobiliary and pancreatic tumors. Most patients were hospitalized for surgery (60%) (Table 1). The mean current weight was 71.09 kg, and the percentage weight loss during the treatment was 3.21%. The CNS measures BMI, the mean of which was 25.86 kg/m^2. The median PG-SGA score was 6.03, ranging from 1 to 21 points.

Table 1 – Patient characteristics.

Variable	n (%)
Sex	
Male	53 (53)
Female	47 (47)
Age	59.5 (sd* 12)
Diagnosis	
Head and neck	18 (18)
Upper digestive tract	28 (28)
Colorectal	54 (54)
Reason for hospital stay	
Surgery	60 (60)
Chemotherapy	28 (28)
Chemotherapy and radiotherapy	12 (12)

Continuation Table 1 – Patient characteristics.

Variable	n (%)
BMI classification	
Malnutrition	20 (20)
Eutrophic	38 (38)
Overweight	23 (23)
Obesity	19 (19)
CNS	
Risk+	66 (66)
Risk-	34 (34)
PG-SGA	
SGA – A	55 (55)
SGA – B	22 (22)
SGA – C	23 (23)

*sd = standard deviation

There was a significant difference between the methods that were used to classify the patient's nutritional status (<0.0001), wherein 100% of patients who were considered to be at nutritional risk or have malnutrition by the PG-SGA (PG-SGA B and PG-SGA C) were Risk+ per the CNS proposed. Only 40% of the sample was well nourished (PG-SGA A) but were Risk+ by the CNS due to their diagnosis of head and neck or upper gastrointestinal tract cancer (Table 2), indicating the need to monitor nutrition, beginning from the diagnosis, as a preventive measure of malnutrition. The sensitivity of both methods was 100% and the specificity was 61.8% to diagnose nutritional risk.

When we associate the types of treatments with the CNS and PG-SGA results, 95% of nonsurgical patients were classified as being at nutritional risk (Risk+), most likely due to the side effects of treatment with chemotherapy, with or without concomitant radiotherapy or by the fact that tumors of the head and neck and upper gastrointestinal tract are already considered nutritional risk (Table 3).

In the association between the clinical diagnosis and CNS scores, 100% of patients who were diagnosed with head and neck cancer and upper digestive tract tumors were Risk+. These patients, even if they did not present with malnutrition at the diagnosis, were at greater nutritional risk due to the negative effects of surgery and the side effects of radiotherapy and chemotherapy, requiring nutritional support and follow-up from the beginning of treatment (Table 4).

A total of 27.8% (n = 5) of patients with head and neck tumors and 42.9% (n = 12) of patients with tumors of the upper digestive tract were well nourished (ASG-PPP A), but on re-evaluation, within these 17 patients, the nutritional status of 9 subjects worsened - 7 and 2 being reclassified as ASG-PPP B and ASG-PPP C, respectively.

Patients with colorectal cancer in its early stages tended to experience less malnutrition, due to the absence of symptoms with a nutritional impact. As noted above, 61.1% of patients had no nutritional risk or were Risk-.

DISCUSSION

Acknowledging the nutritional status of cancer patients — in screening cases with or without the risk of malnutrition and identifying those who will benefit from targeted and early nutritional intervention — is paramount during treatment, allowing weight to be maintained or increased during nutritional

Table 2 – Comparison of CNS nutritional risk results with PG-SGA.

	PG-SGA A n (%)	PG-SGA B n (%)	PG-SGA C n (%)	*p
Risk+	22 (40)	22 (100)	23 (100)	<0.0001
Risk-	33 (60)	—	—	

*Pearson's chi-square test.

Table 3 – Association between types of treatments and CNS and PG-SGA scores.

Variable	Variable	Surgery (n=60) (%)	Nonsurgical (n=40) (%)	*p
CNS	Risk+	28 (46.7)	38 (95)	<0.0001
	Risk-	32 (53.3)	2 (5)	
PG-SGA	PG-SGA A	44 (73.3)	11 (27.5)	
	PG-SGA B	9 (15.0)	13 (32.5)	<0.0001
	PG-SGA C	7 (11.7)	16 (40.0)	

*Fisher's exact test.

Table 4 – Association between tumor site and CNS and PG-SGA scores.

	Variable	Head and neck n (%)	Upper digestive tract n (%)	Colorectal n (%)	*p
CNS	Risk+	18 (100)	28 (100)	21 (38.9)	<0.0001
	Risk-	—	—	33 (61.1)	
PG-SGA	PG-SGA A	5 (27.8)	12 (42.9)	38 (70.4)	
	PG-SGA B	6 (33.3)	8 (28.6)	8 (14.8)	0.011
	PG-SGA C	7 (38.9)	8 (28.6)	8 (14.8)	

*Pearson's chi-square test.

therapy. To this end, the PG-SGA scale is the chief method of predicting the risk of malnutrition in most centers[10].

According to the guidelines of the European Society for Clinical Nutrition and Metabolism (ESPEN)[11], published in 2003, hospital institutions must have a policy and a specific set of protocols to identify patients who are at nutritional risk and administer nutritional care plans. It is suggested that an action be taken facing a nutritional risk situation, such as performing a nutritional screening in all patients on admission to the hospital, and that it should be a quick and simple process. Further, the importance of this screening is linked to a plan of action, which should maintain continuity, such as a weekly screening for patients without nutritional risk and a new, more detailed evaluation for those who present with some nutritional risk[11].

PG-SGA is a validated method that has been accepted by the Oncology Nutrition Dietetic Practice Group of the American Dietetic Association as the standard screening and nutritional assessment in cancer patients[12].

In our study population, the prevalence of the risk of malnutrition by the PG-SGA was 68.2% (PG-SGA B or C), confirming its value, once cancer patients have the highest incidence of malnutrition when hospitalized[13].

Studies about cancer impact on nutritional status have shown that the disease is a frequent cause of malnutrition and that around 80% of such patients are already malnourished at the time of the diagnosis, which increases the morbidity and mortality associated with the disease, the length of hospitalization, and hospital costs[14].

One advantage of our proposed nutritional screening (CNS) is to consider the signs and symptoms that might negatively affect the nutritional status of a patient. This prevalence of symptoms due to nutritional impact is consistent with other studies that have evaluated cancer patients[15]. In addition, unless the symptoms that have clinical relevance to patients, such as decreased appetite, vomiting, and diarrhea, are adequately addressed, it is unlikely that nutritional progress will be made, adversely affecting the nonsurgical treatment phase of these patients[16].

Most patients with head and neck cancer are treated with chemoradiotherapy, which is associated with higher rates of toxic effects compared with other modalities, such as surgery[17].

At least 90% of patients with head and neck cancer develop acute symptoms of malnutrition during the evolution due to the tumor location and treatment[16,18]. Such symptoms as dysphagia, xerostomia, oral mucositis, trismus, pain, and sensory or gustatory changes are the main influential causes for nutrition failure and weight loss. These symptoms can develop acutely during diagnosis and treatment[19] or can be chronic, persisting after treatment during the follow-up[17].

Malnutrition is an independent predictor of unfavorable outcomes after surgery. It is a complex multimodal pathology present in 30% to 50% of surgical patients[20]. Thus, patients who are nutritionally optimized during preoperative period have better postoperative results[21,22].

Martin et al.[23] demonstrated that one-fifth of patients who undergo esophagectomy lose at least 20% of their preoperative weight in 6 months and that their postoperative malnutrition usually stabilizes within 1 year after surgery. The loss of body weight is related to a poor quality of life after the surgical procedure, and postoperative weight loss of more than 10% is related to events such as death and recurrence after esophagectomy due to esophageal cancer.

The sensitivity of our tool was 100%, detecting all cases under nutritional risk, whereas the specificity was 61.8%. Yet, we believe that overestimating nutritional risk does not lead to any impairments, because interventions that monitor and guide the nutritional status of these patients more intensively only improve their care. In contrast, approximately 53% of patients who were considered to be PG-SGA A were reclassified as B or C, experiencing deteriorating nutrition throughout the therapy - a result that we anticipated with the application of the proposed risk scale.

We were motivated to perform this study because the PG-SGA is difficult to use in a hospital setting, given that it cannot be applied quickly, requiring more time and the availability of the professional to follow its administration - the first component is self-reported, and the scale fails to consider oncological diagnoses with greater nutritional risk, as discussed.

One of the study limitations was that we included only patients with a diagnosis of head and neck cancer, upper digestive tract tumors, and colorectal cancer who were hospitalized for treatment with surgery, chemotherapy, or radiotherapy. However, we believe that for the first 2 types, oncological cases are at greater risk for nutritional deficits when important pathways in swallowing and digestion are compromised. In colon and rectal cancer, malnutrition is not frequent in the early stages, due to the lower compromise in food intake, the absence of nutritional disruptions, and minimal metabolic changes[24,25].

Other methods, such as anthropometric assessments and BMI, can be used to complement subjective evaluations. BMI, although it is widely used, is a nutritional diagnostic parameter and should not be considered a nutritional screening tool. Moreover, BMI is not reliable, because it merely reflects the total body weight of an individual and does not consider the total body composition, which can mask the current weight in the presence of massive ascites or edema, for example. Patients who are overweight or obese, based on BMI, might present with inadequacies in their body composition and be sarcopenic instead - as can even the malnourished - thus interfering in the response to treatment and the prognosis[26].

When we compared the classification of nutritional risk by CNS and PG-SGA with BMI, 60.9% of patients who were considered to be overweight by BMI were at nutritional risk by

CNS, and 26% were categorized as having nutritional risk or moderate malnutrition by PG-SGA. Further, 47.4% of patients who were obese by BMI were at nutritional risk by CNS, and 15.8% had severe malnutrition by PG-SGA. Finally, 50% of patients who were malnourished per BMI were classified as being well nourished by PG-SGA.

When combined with subjective evaluations, anthropometry can help in deciding the type of nutritional intervention and more favorable clinical outcome. Despite the poor agreement between subjective and anthropometric assessments, patients who had been classified into more severe stages of malnutrition by subjective evaluations experienced proportionally greater impairments in body mass supplies by anthropometry method. These findings justify that subjective methods correctly classify patients according to body composition[26].

In conclusion, the CNS is a simple and effective nutritional screening tool compared with PG-SGA, which is considered the standard evaluation method for cancer patients.

This tool is consistent with the literature, making it possible to identify patients who are at risk of malnutrition early and provide an immediate, efficient, and integral nutritional interventions in the management of the patient, considering all of their needs during all phases of cancer treatment.

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Local de realização do estudo: Hospital A.C. Camargo, São Paulo, SP, Brasil.

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