DOI: 10.1002/ncp.10737

CLINICAL RESEARCH

The use of nutrition support near the end of life for hospitalized patients with advanced cancer at a reference center: Two realities

Emanuelly Varea Maria Wiegert RD, PhD | **Karla Santos da Costa Rosa RD** | **Rhayara Thacilla Ferreira dos Santos RD** | **Daiane Almeida dos Santos RD** | **Renata de Freitas MD** | **Livia Costa de Oliveira RD, PhD**

Palliative Care Unit, National Cancer Institute José Alencar Gomes da Silva, Rio de Janeiro, Brazil

Correspondence
Livia Costa de Oliveira, Palliative Care Unit, National Cancer Institute José Alencar Gomes da Silva, Rua Visconde de Santa Isabel, 274, Vila Isabel, Rio de Janeiro, RJ 20.560-120, Brazil.
Email: lillycostaoliveira@gmail.com

Abstract

Objective: To assess the frequency and factors associated of the provision of nutrition support (NS) in the last 30 days of life in patients with advanced cancer in the palliative or non-palliative setting.

Methods: Retrospective cohort study in palliative and non-palliative care units at a specialized cancer center for oncology in Brazil. The use of oral nutrition supplements (ONS) and enteral (EN) and parenteral (PN) nutrition in the 30 days before death were assessed.

Results: The 239 patients included were predominantly older (>60 years; 63.2%) and female (61.1%). The use of ONS was lower in palliative than non-palliative care during the last 30 (52% vs. 6%), 7 (42% vs. 4%), and 3 (23% vs. 2%) days before death (all $P < .001$). The use of EN and PN was lower in palliative care, decreasing with the approach of death. The independent factors associated with ONS in non-palliative care were (odds ratio): breast tumor (3.03), hypoalbuminemia (1.10), and nutrition risk (16.98); in palliative care, only the Karnofsky Performance Status (KPS) ≥40% (1.24) was associated to the use of ONS. The use of EN and PN was associated with head-neck (HN) tumor in both settings (5.41) in non-palliative and (8.74) in palliative. Others independent factors were: hypoalbuminemia (3.12) in non-palliative care and KPS (1.31) in palliative care.

Conclusions: The use of NS near the end of life was high in the non-palliative and less frequent in palliative care setting. The factors associated with NS differed according to the clinical oncology setting, with one of the factors in palliative care being a better prognosis.

KEYWORDS
advanced cancer, malnutrition, artificial nutrition, nutritional support, end-of-life

INTRODUCTION

Cancer-related malnutrition and cachexia are among the most prevalent causes of morbidity and mortality in oncology, and occur in more than 50% of patients with advanced disease.[1] Their pathophysiology is complex, and includes a negative protein and energy balance driven by a varied combination of reduced food intake and tissue breakdown, which in turn can result in significant loss of body weight, alterations in body composition, and declining physical function, leading to poor outcomes. It is therefore plausible to argue that nutrition is an important aspect of multimodal cancer care.[2,3]

The third key step emphasized by the expert group of the European Society for Clinical Nutrition and Metabolism (ESPEN) to improve nutrition care for patients with cancer consists of using multimodal nutrition interventions with individualized plans, including care focused on increasing nutrition intake, lessening inflammation, and increasing physical activity.[4] An appropriate nutrition approach is a key component of care for patients with cancer and can help to limit the consequences of cancer-associated nutrition decline to potentially improve prognosis and quality of life.[5,6]

Nutrition strategies can be tailored to meet the needs of patients at different stages of the disease and include patient-centered dietary counseling and the use of nutrition support (NS), which consists of oral nutrition supplements (ONS) and/or enteral nutrition (EN) and/or parenteral (PN) nutrition.[3] For the benefits of NS to be optimized, it should be tailored according to cachexia stage, illness stage, timing of anticancer therapy, and other factors.[2,7,8] In patients with cancer, improvements in nutrition outcomes achieved with the administration of NS are improved nutrition status, weight gain, and increased food intake, despite limited evidence of the actual effectiveness of NS.[5,6,9]

The decision to start NS in patients with advanced cancer depends not only on whether they are malnourished, but also on prognostic and ethical considerations.[10] For patients with cancer who are nearing the end of life, dedicated palliative care is appropriate and has been found to be associated with improved outcomes for patients and caregivers alike.[11] In end-of-life care, nutrition is tailored to the patient's symptomatic needs and is primarily intended to enhance comfort and quality of life.[12] In fact, the implementation of NS in the terminal/dying phase—that is, the point at which it becomes clear that the patient is in a progressive state of decline and has a shorten life expectancy—appears non-beneficial and may even be a health risk (e.g., infectious, respiratory, metabolic disorders), cause discomfort, and incur additional health costs.[13–15] A recent study carried out from the database of French national hospitals found that being in palliative care was a protective factor for the use of artificially administered nutrition (EN and PN) during the final period before death.[12]

The use of NS is generally not recommended for cancer patients with limited life expectancy. This is why it is important to have appropriate selection criteria for NS eligibility to identify those patients who could benefit from it and reduce the burden of its indiscriminate use.[7] Evidence concerning the effects of ONS, EN, and PN in the last days of life is lacking and further research investigating nutrition practices is needed to improve the evidence base for end-of-life care.[7,15] Furthermore, understanding the factors associated with the use of NS may help health professionals better manage its use and may improve communication with patients and families, guide health policies, and reduce costs.

Accordingly, this study aimed (i) to assess the frequency of use of ONS, EN, and PN in the last 30 days of life in the palliative and non-palliative setting; and (ii) to identify explanatory factors associated with its use in patients with advanced cancer followed up at a referral center for oncology in Brazil.

METHODS

This is an observational retrospective cohort study using data collected from electronic medical records on the last 30 days of life of patients with advanced cancer receiving follow-up in cancer care (non-palliative) hospital settings (Cancer Hospitals [CH] I, II, III) and a specialized palliative care unit (PCU) (CH IV) at a referral center for oncology at the José Alencar Gomes da Silva National Cancer Institute (acronym: INCA), located in Rio de Janeiro, Brazil. Run under the auspices of the Ministry of Health, INCA is responsible for the development and coordination of integrated actions for the prevention and control of cancer in Brazil (www.inca.gov.br). It is a specialist training and research center and is responsible for providing cancer treatment and epidemiological information on cancer.

Non-palliative hospital care units offer active anti-tumor and disease-directed treatment with the aim of prolonging life and improving or maintaining quality of life by treating the underlying malignancy. CH I treats cancers of the gastrointestinal (GI) tract, urinary tract, lung, head-neck (HN), respiratory system, skin, central nervous system, and hematological malignancies; CH II focuses on the treatment of all gynecological tumors and bone and connective tissue cancer; and CH III specializes in breast cancer. Lastly, CH IV is a specialized PCU that admits patients referred from CH I, II, and III to receive symptom-oriented palliative care when anti-tumor treatment is discontinued due to lack of effect and/or severe side-effects.

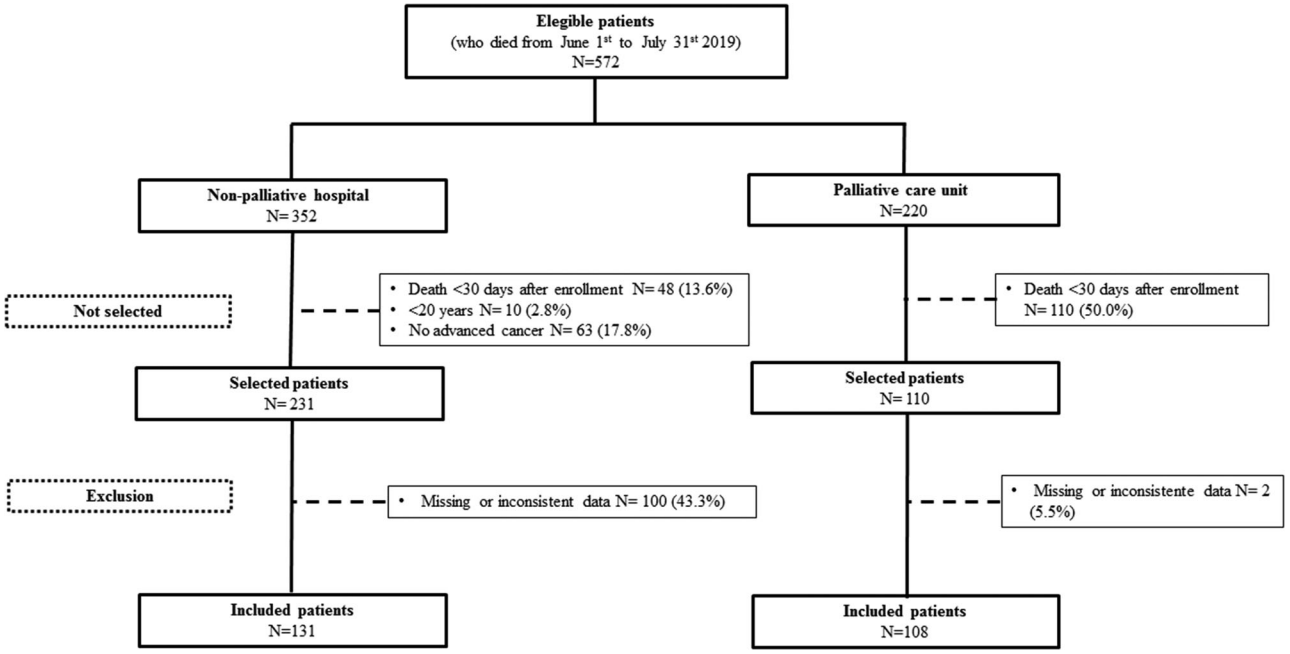

FIGURE 1 Study selection flowchart. Note: N, number of patients

The focus at this stage is on quality of life and stabilization and prevention of symptoms, and includes terminal care, when patients enter a progressive state of decline, whose objective is to alleviate suffering through the acceptance of potential loss of cognitive, emotional, and social function.

The study was approved by the INCA ethics committee (number 27854620.0.0000.5274). Two independent and previously trained researchers collected the information, and a consensus was reached between them in case of disagreement. First, patients who died from any cause from June 1 to July 31, 2019, at CHs were identified. Next, all those patients aged ≥20 years with a confirmed diagnosis of an advanced stage malignant tumor (stages III or IV) who had been hospitalized at CHs at least 30 days before the date of death were enrolled. Patients with missing or inconsistent data were excluded. A total of 572 advanced cancer patients who died between June 1 and July 31, 2019, were eligible; 239 met the inclusion criteria, including 131 patients in non-palliative care and 108 patients in palliative care (Figure 1).

All information collected, with the exception of the prescription of NS, refers to the study baseline, namely the 30th day before death.

Nutrition support

We use the generic term "NS" to define any of the following three specialized nutrition therapy options: ONS (multi-nutrient products containing macronutrients and micronutrients in a balanced composition); EN (administration of nutrition by nasogastric, nasoenteric, gastrostomy, or jejunostomy tube); or PN (administration of nutrition by a peripheral vein or a central line). Data on the use of ONS, EN, and PN were collected at 30, 7, and 3 days before the date of death. For the data analysis, ONS was considered alone and EN and PN were grouped together.

Covariate assessment

The following data were obtained: age (in years), sex (male or female), marital status (married or other), education (< or ≥9 years in formal education), type of cancer (gynecological, GI, breast, HN, lung, bone and connective tissue, or others), disease progression (locally recurrent or distant metastasis), previous anti-tumor treatment (yes or no), and serum albumin level (taken from the analyses conducted at each hospital's central laboratory from the date closest to the study baseline (mean: 27 [± 2.8] days before death)).

In addition, data from the Portuguese-validated version of the Patient-Generated Subjective Global Assessment short form (PG-SGA, ©FD Ottery, 2018) were collected from the patients' medical records. The PG-SGA SF consists of a four-part questionnaire based on patient-reported weight (0–5), food intake (0–4), symptoms (0–24), and function (0–3). The total score of the PG-SGA SF is the sum of the scores of these four parts (0–36). The higher the score, the worse the nutrition status. Patients who scored ≥9 were considered at nutrition risk.[16]

The performance status data obtained in the non-palliative care units refer to the Performance Status

Eastern Cooperative Oncology Group (ECOG-PS)—a simpler six-item scale that ranges from 0 (normal activity) to 5 (death);[17] while in the PCU, the Karnofsky Performance Status (KPS) was used—an 11-point scale with scores ranging from 100 (normally active) to 0 (dead).[18] These scales were converted and categorized as PS ≤3 or KPS ≥40% (yes or no), as proposed by Ma et al.[19]

Statistical analyses

All statistical analyses were performed using Stata 13.1 (Stata Corp., College Station, Texas, USA). All results were considered to be statistically significant if *P*-value < .05. Categorical variables were expressed as absolute or relative percentages (%). The comparison of proportions between non-palliative care units (CH I, II and III) and the PCU was tested by the Chi-square test or Fisher's exact test.

To identify factors associated with the use of ONS, EN, and PN, multivariable logistics regression models were used. Two models for each care unit (non-palliative and palliative) were carried out. Variables with *P*-value < .20 in the univariate regression models were included in the adjusted multivariate models by backwards selection, and odds ratios (OR) were reported with their 95% confidence intervals (CI). The final models were obtained through the backward procedure and included all variables with *P*-value < .05.

RESULTS

A total of 239 patients were included in this study. Of these, 131 (54.8%) were from the non-palliative care units and 108 (45.2%) were from the PCU. Most patients studied were older (>60 years; 63.2%), female, (61.1%), with the primary tumor in the breast (20.1%), followed by GI tract (19.7%), and 74.0% presented distant metastasis. Overall, 61.4% of the patients had KPS <40% or PS >3 at the time of inclusion. The prevalence of hypoalbuminemia and nutrition risk was 69.3% and 70.3%, respectively, in the total sample, and was similar in both groups (Table 1).

The use of ONS decreased with the approach of death and was significantly lower in the palliative than the non-palliative setting during the last 30 (n = 68 [52%] vs. n = 6 [6%]), 7 (n = 55 [42%] vs. n = 4 [4%]), and 3 (n = 30 [23%] vs. n = 2 [2%]) days before death (all *P* < .001). Additionally, the prevalence of the use of EN and PN was similar across the two settings (around n = 26 [20%] in the non-palliative to n = 18 [17%] in palliative settings), but its use only decreased significantly with the approach of death in palliative care (n = 18 [17%] vs. 7 days n = 16 [15%] vs. 3 days n = 10 [9%]; *P* = .022) (Figure 2).

The use of ONS in non-palliative care was associated with (OR; 95% CI) PG-SGA SF ≥9 points (3.53; 1.28–9.71) and its use in the PCU was associated with KPS ≥40% (1.24; 1.08–2.62). The use of EN or PN in non-palliative care was associated with age ≥60 years (4.38; 1.40–13.70), male gender (1.25; 1.09-2.65), and HN tumor site (7.20; 1.53-33.85). In the PCU was associated withmale gender (1.17; 1.05-1.53), HN tumor site (13.25; 3.45-28.32) and KPS ≥40% (1.56; 1.12-3.54) (Table 2).

According to the multivariate models, the independent factors associated with ONS in non-palliative care were (OR; 95% CI): breast tumor (3.03; 1.19–48.54), albumin <3.5 g/dL (1.10; 1.01–1.99), and PG-SGA SF≥9 (16.98; 1.27–22.74), while in palliative care the only factor associated with ONS use was KPS ≥40% (1.24; 1.08–2.62). The use of EN and PN was associated with HN tumor in both care settings (respectively 5.41; 1.50–14.11 and 8.74 (2.37-12.11)). In addition, albumin <3.5 g/dL (3.12; 1.86–6.12) and KPS (1.31; 1.11–2.87) were independent factors associated with the use of EN and PN in the non-palliative and palliative settings, respectively (Table 3).

DISCUSSION

The present study shows that the prescription of ONS, EN, and PN for patients with advanced cancer in the last month of life was significantly lower in the palliative than in the non-palliative care setting. In addition, in palliative care its use was associated with the HN tumor site, probably due to the unfeasibility of oral feeding and the better PS that is associated with a higher life expectancy.[7] On the other hand, in the non-palliative units, more than half of the patients evaluated received ONS in the last 30 days of life and the use of EN and PN was noticeably higher in all the periods analyzed.[20] These results are important because evidence-based clinical practice guidelines usually recommend limiting the use of NS for patients who are expected to survive a few weeks or days. At the same time, the decision not to recommend EN or PN or to suspend it should be considered in the end-of-life setting.

In our study, we observed a decreasing prevalence in the prescription of ONS as the date of death approached, regardless of the care setting, although this prevalence was significantly lower in palliative than in non-palliative care. The comparability of our findings with other findings reported in the literature is limited because, to the best of our knowledge, no previous study has evaluated the prescription of ONS in inpatients with advanced cancer in the last 30 days of life. In the study by Orrevall et al.[21] with 621 cancer patients enrolled in palliative home care services in Sweden, NS was used by 55% of the patients, with 31% on ONS and 14% using artificial nutrition (PN and NP),

TABLE 1 Sociodemographic and clinical characterization of patients with advanced cancer according to care units (N = 239)

Variables	Total N = 239	Non-palliative hospital N = 131 (54.8%)	Palliative care unit N = 108 (45.2%)	*P*-value[a]
Age (years)				
<60	88 (36.8%)	54 (41.2%)	34 (31.5%)	.120
≥60	151 (63.2%)	77 (58.8%)	74 (68.5%)	
Sex				
Male	93 (38.9%)	52 (39.7%)	41 (38.0%)	.785
Female	146 (61.1%)	79 (60.3%)	67 (62.0%)	
Marital status (married)				
Yes	124 (51.9%)	74 (56.5%)	50 (46.3%)	.083
No	115 (48.1%)	57 (43.5%)	58 (53.7%)	
Formal education (years)				
< 9	144 (60.2%)	76 (58.0%)	68 (63.0%)	.722
≥ 9	95 (39.8%)	55 (42.0%)	40 (37.0%)	
Diagnosis				
GIT[b]	47 (19.7%)	21 (16.0%)	26 (24.3%)	.022
Breast	48 (20.2%)	28 (21.4%)	20 (18.7%)	
HN	31 (13.0%)	13 (9.9%)	18 (16.8%)	
Gynecological[c]	39 (16.4%)	27 (20.6%)	12 (11.2%)	
Lung	25 (10.5%)	14 (10.7%)	11 (10.3%)	
Connective and bone tissue	13 (5.5%)	5 (3.8%)	8 (7.5%)	
Others[d]	36 (14.7%)	23 (17.6%)	13 (11.2%)	
Disease progression				
Locally recurrent	62 (26.0%)	39 (30.0%)	23 (21.3%)	.311
Distant metastasis	177 (74.0%)	92 (70.0%)	85 (78.7%)	
Previous anticancer treatment				
No (virgin)	41 (17.2%)	22 (16.9%)	19 (17.6%)	.206
Yes	198 (82.8%)	109 (83.1%)	89 (82.4%)	
PS≤3 or KPS≥40%[e]				
Yes	81 (38.6%)	47 (38.5%)	34 (38.6%)	.745
No	129 (61.4%)	75 (61.5%)	54 (61.4%)	
Albumin (g/dL)[e]				
<3.5	106 (69.3%)	42 (71.2%)	64 (68.1%)	.686
≥3.5	47 (30.7%)	17 (28.8%)	30 (31.9%)	
PG-SGA SF (total score) [e]				
<9	38 (29.7%)	22 (26.2%)	16 (36.4%)	.232
≥9	90 (70.3%)	62 (73.8%)	28 (63.6%)	

Abbreviations: N, number of observations; %, frequency; GIT, gastrointestinal tract; HN, head and neck; PG-SGA SF, Patient-Generated Subjective Global Assessment short form; PS, Performance Status; KPS, Karnofsky Performance Status

[a] *P*-value refers to the chi-square test for proportions or Fisher's exact.

[b] GIT upper and lower.

[c] Uterus, endometrium, ovary and vulva.

[d] Central nervous system, kidney and urinary tract, male genitals, peritoneum, mediastinum, hematological and unrecognized site.

[e] Variables with missing data.

with 65% of the patients with less than one month survival receiving NS.[21]

Issues concerning nutrition are an important aspect of advanced cancer patient care in their last days of life. However, the limited number of published studies on the use of artificial nutrition (i.e., EN and PN)[7,12,20,21] highlights the importance of our findings. We found that EN and PN were prescribed for 17%, 15%, and 9% of the patients admitted to the PCU and 20%, 20%, and 18% of the patients admitted to non-palliative care 30, 7, and 3 days before

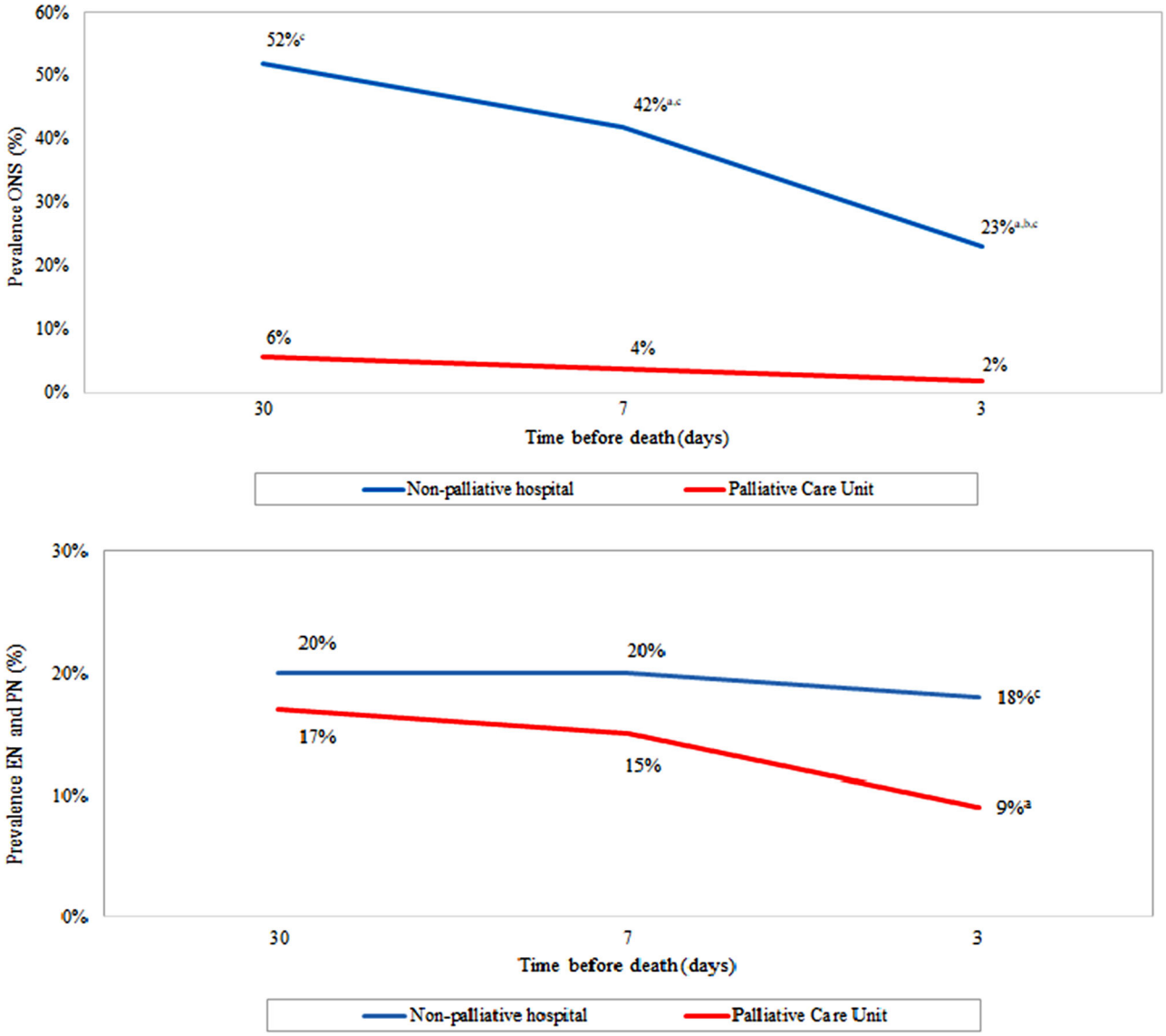

FIGURE 2 Prescription of oral nutrition supplements and enteral or parenteral nutrition in patients with advanced cancer in the last 30 days of life according to treatment units (non-palliative care units N = 131 and palliative care unit N = 108). Note: ONS: oral nutrition supplements EN, enteral nutrition; PN, parenteral nutrition. According to the chi-square test for proportions or Fisher'' exact test: [a]statistically significant difference in relation to prevalence of prescription in 30 days before death; [b]statistically significant difference in relation to prevalence of prescription in 7 days before death; [c]statistically significant difference in relation to prevalence of prescription in palliative care unit

death, respectively. A study carried out in France by Kempf et al.[20] with 4,031 esophageal cancer and 10,423 stomach cancer patients demonstrated that more than 15% of them received EN and PN in the last week of life. The majority (75.3%) of them were in hospitals that were not specialized in oncology, 20.4% were in specialized cancer centers, 18.3% were at university hospitals, and 16.4% were at large public hospitals. Baumstarck et al.,[12] in a retrospective cohort study with 398,822 cancer patients who died in hospitals in France between 2013 and 2016, observed the use of EN and PN in the order of 5% in the last 31 days before death and less than 3% in the last week of life. The use of EN and PN in the PCU in our study was similar to that reported by Kempf et al.[20] and higher than that found by Baumstarck et al.[12] Previous studies have also noted that health professionals from care homes and centers specialized in palliative care are more concerned with the implications generated by NS in the last weeks of life, being more conservative in its prescription.[22,23]

NS can be included in palliative care plans, but requires patients to be evaluated continuously against clinical, prognostic, and bioethical parameters.[4,14,24] However, although its benefits are as yet unclear, the literature indicates that its use in those with a very short life span has no

TABLE 2 Univariate analysis of factors associated with the use of oral nutrition supplements and enteral nutrition or parenteral nutrition in the last 30 days before death in patients with advanced cancer according to the treatment unit

	ONS				EN and PN			
	Non-palliative hospital		Palliative care unit		Non-palliative hospital		Palliative care unit	
Variables	OR crude (95% CI)	*P*-value	OR crude (95% CI)	*P*-value	OR crude (95% CI)	*P*-value	OR crude (95% CI)	*P*-value
Age (years)								
<60	1.00		1.00		1.00		1.00	
≥60	0.88 (0.44-1.78)	.731	0.59 (0.11-3.09)	.536	4.38 (1.40-13.70)	.011	1.23 (0.40-3.80)	.711
Sex								
Male	0.99 (0.50-2.01)	.998	0.21 (0.04-1.20)	.079	1.25 (1.09-2.65)	.004	1.17 (1.05-1.53)	.002
Female	1.00		1.00		1.00		1.00	
Formal education (years)								
< 9	0.82 (0.49-1.38)	.461	1.15 (0.33-4.05)	.824	1.09 (0.56-2.11)	.804	0.84 (0.36-1.95)	.682
≥ 9	1.00		1.00		1.00		1.00	
Diagnosis								
GIT[a]	1.00		1.00		1.00		1.00	
Breast	1.97 (1.19-4.93)	.071	1.12 (0.24-2.75)	.854	3.25 (0.73-9.22)	.115	2.27 (0.13-39.73)	.574
HN	0.49 (0.12-2.10)	.335	0.45 (0.04-4.72)	.506	7.20 (1.53-33.85)	.012	13.25 (3.45-28.32)	.002
Gynecological[b]	2.20 (0.68-7.10)	.187	0.85 (0.13-5.65)	.868	0.40 (0.08-1.91)	.251	1.31 (0.08-22.41)	.850
Lung	0.44 (0.10-1.86)	.264	1.25 (0.87-5.62)	.322	0.25 (0.02-2.38)	.226	0.40 (0.05-2.29)	.134
Connective and bone tissue	3.85 (0.64-23.05)	.140	–	–	2.75 (0.55-13.69)	.217	1.58 (0.98-1.99)	0.111
Others[c]	0.61 (0.15-2.45)	.487	–	–	1.78 (0.40-7.84)	.447	12.50 (0.21-12.87)	.067
Disease progression								
Locally recurrent	1.44 (0.97-2.14)	.068	1.64 (0.47-5.73)	.435	0.53 (0.32-1.88)	.115	1.51 (0.29-1.91)	.065
Distant metastasis	1.00		1.00		1.00		1.00	
PS≤3 or KPS≥40%[d]								
Yes	1.32 (0.44-3.58)	.215	1.24 (1.08-2.62)	.020	2.89 (0.31-4.58)	.342	1.56 (1.12-3.54)	.002
No	1.00		1.00		1.00		1.00	
Serum albumin level (g/dL)[d]								
<3.5	1.31 (1.04-3.09)	.070	1.43 (0.14-14.31)	.763	7.12 (0.86-59.97)	.069	0.39 (0.13-1.18)	.095
≥3.5	1.00		1.00		1.00		1.00	
PG-SGA SF (total score)[d]								
<9	1.00		1.00		1.00		1.00	
≥9	3.53 (1.28-9.71)	.015	0.26 (0.02-3.11)	.287	0.65 (0.19-2.18)	.490	0.33 (0.05-2.25)	.259

Abbreviations: ONS, oral nutrition supplements; EN, enteral nutrition; PN, parenteral nutrition; OR, odds ratio; CI, confidence interval; GIT, gastrointestinal tract; HN, head and neck; PS, Performance Status; KPS, Karnofsky Performance Status; PG-SGA SF, Patient-Generated Subjective Global Assessment short form.

[a]GIT upper and lower.

[b]Uterus, endometrium, ovary and vulva.

[c]Central nervous system, kidney and urinary tract, male genitals, peritoneum, mediastinum, hematological and unrecognized site.

[d]Variables with missing data.

Variables with *P*-value <.200 were selected for the multiple model.

In bold *P*-value <.050.

benefit and is disproportionate.[25,26] Patients with advanced cancer near the end of life need resources with the potential to promote the appropriate management of their symptom burden. A setting in which the excessive use of invasive resources, including NS, can cause increased discomfort, impair quality of life and death, and increase health costs.[27,28]

According to the multiple logistic regression analysis, the use of NS in the non-palliative care units was associated with primary tumors in the breast (ONS) and HN (EN and PN), whereas in the PCU NS was associated only with HN cancer. Similar data were published by Baumstarck et al.,[12] who found EN and PN were used more frequently in patients with cancer of the HN and GI tract. NS is a key

TABLE 3 Multivariate models of independent factors associated with the use of oral nutritional supplements and enteral nutrition or parenteral in the last 30 days before death in patients with advanced cancer according to treatment units

	ONS				EN and PN			
	Non-palliative hospital		Palliative Care Unit		Non-palliative hospital		Palliative Care Unit	
Variables	OR adjusted (95% CI)	*P*-value[a]	OR adjusted (95% CI)	*P*-value[a]	OR adjusted (95% CI)	*P*-value[a]	OR adjusted (95% CI)	*P*-value[a]
Diagnoses								
GIT[a]	1.00		–	–	1.00		1.00	
Breast	3.03 (1.19-48.54)	.049	–	–	1.63 (0.41-5.45)	.222	2.27 (0.13-39.73)	.574
HN	2.54 (0.56-8.33)	.089	–	–	5.41 (1.50-14.11)	.041	8.74 (2.37-12.11)	.021
Gynecological[b]	7.04 (0.25-5.35)	.112	–	–	6.91 (0.25-9.33)	.119	1.31 (0.08-22.41)	.850
Lung	0.26 (0.01-6.13)	.408	–	–	5.62 (0.82-9.67)	.079	0.40 (0.05-2.29)	.134
Connective bone tissue	2.89 (0.72-9.11)	.210	–	–	0.79 (0.03-5.87)	.887	1.58 (0.98-1.99)	.111
Others[c]	0.35 (0.01-8.24)	.513	–	–	0.68 (0.11-3.74)	.752	12.50 (0.21-12.87)	.067
PS<3 ou KPS≥40%[d]								
Yes	–	–	1.24 (1.08-2.62)	.020	–	–	1.31 (1.11-2.87)	.003
No	–	–	1.00		–	–	1.00	
Albumin (g/dL)[d]								
<3.5	1.10 (1.01-1.99)	.047	–	–	3.12 (1.86-6.12)	.049	–	–
≥3.5	1.00		–	–	1.00		–	–
PG-SGA SF (total score)[d]								
<9	1.00		–	–	–	–	–	–
≥9	16.98 (1.27-22.74)	.032	–	–	–	–	–	–

Abbreviations: ONS, oral nutritional supplements; EN, enteral nutrition; PN, parenteral nutrition; OR, odds ratio; CI, confidence interval; GIT, gastrointestinal tract; HN, head and neck; PS, Performance Status; KPS, Karnofsky Performance Status; PG-SGA SF, Patient-Generated Subjective Global Assessment short form.

[a]GIT upper and lower

[b]Uterus, endometrium, ovary and vulva.

[c]Central nervous system, kidney and urinary tract, male genitals, peritoneum, mediastinum, hematological and unrecognized site.

[d]Variables with missing data.

The final model was obtained through the backward procedure and it included all variables with *P*-value <.05.

In bold *P*-value <.05.

component in the care of patients with advanced GI cancer, which could justify its increased prescription in this group.[27] With regard to patients with HN cancer, the prescription of NS may be justified due to the mechanical difficulties often presented with oral feeding, for example, due to dysphagia and trismus, which often make it necessary to establish an artificial administration route to feed.[29]

The other independent factors associated with the use of ONS were nutrition risk and hypoalbuminemia in the non-palliative care units, and KPS ≥40% in the PCU. Although impaired nutrition status is highly prevalent in patients with advanced cancer and can be an important factor for the implementation of specialized ONS,[10,21] in this study there was no significant difference in the mean score of the PG-SGA SF or the prevalence of hypoalbuminemia between the groups. This indicates that given the reduced survival time of these patients, the nutrition assessment must be associated with a prognostic measure for decision-making about the prescription of NS. Patients nutritionally at risk are not necessarily candidates for NS, whose prescription should not depend solely on a parameter of nutritional status. It is important to identify the patients whose nutrition status can be improved and whose prognosis is better, and also to identify situations in which specialized nutrition therapy could be considered disproportionate to the progress of the disease.[10]

The higher prescription of NS in non-palliative treatment units reflects the difficulty in predicting patients who are at the end of life. Therefore, considering that the evidence-based clinical practice guidelines recommend limiting the use of NS in contexts of patients with a limited life expectancy,[30,31,32] we found that in the PCU, more appropriate selection criteria were used to determine the administration of NS, including a prognostic assessment, where patients with KPS ≥40% are more likely to receive NS. When evaluating the administration of EN and PN for 43,474 palliative cancer patients in home care in Italy, Ruggeri et al.[7] found that the KPS remained unchanged in 649 (67.0%), increased in 232 (23.9%), and decreased only in 88 patients (9.1%), after one month. Mean KPS increased in pre-cachectic and cachectic patients who used EN or PN (P <.001). Thus, the authors demonstrate that, in the group

of patients selected based on a prognostic evaluation, NS can be effective in preventing death from malnutrition in 73% of patients and in maintaining or improving KPS in one month in 90% of cases.

In our study, PN was used only in the non-palliative setting and its prevalence was lower than the 9.6% described by Amano et al.[33] in a multicenter cohort study in Japan involving cancer patients in palliative care, and the 12% and 8% found by Orrevall et al.[34] in a study of patients receiving palliative care in hospital and home care, respectively. However, both these studies reported higher oral or EN intake than PN, as our findings also indicate. A systematic review conducted by Tobberup et al.[35] evaluated the effects of current PN treatment on patients with advanced cancer. The evidence was weak for all outcomes analyzed and was predominantly based on observational studies. No benefit of PN in terms of survival has been reported in terminal patients or patients able to feed enterally.

Therefore, one way to meet the needs of patients with chronic diseases and in the final stages of life is to improve prognosis and to provide palliative care, which potentially not only improves the quality of life and death and promotes dignified care, but also reduces unnecessary hospitalizations and the inappropriate use of strategies in health services, contributing to the efficient use of resources.[36] In addition, this type of care tends to reduce hospital costs, improve pain and other distressing symptoms that increase the length of stay in hospital, and reduce the overuse of unnecessary, ineffective, or marginally effective services.[37,38]

As limitations of this study, only hospitalized patients were evaluated and, thus, death conditions at home were not covered, which could lead to an underestimation of the use of NS. In addition, the collection of data on patients who died in a short period of time (two months) meant the sample size per group was small. Finally, the retrospective design of the data collection should be considered.

CONCLUSION

The use of NS near the end of life was less frequent in the palliative setting and was associated with HN tumor and performance status, an important prognostic marker. The explanatory factors of NS differed according to the clinical setting; in specialized non-palliative care, NS was associated with nutrition risk, while in palliative care, it was associated with a better prognosis. Our results highlight areas that need more attention to achieve adequate NS in this patient group, including the need for a nutritional care plan, which should, if possible, be aligned with the advanced care directives. Future studies focusing on patient centered outcomes are necessary to assess the clinical benefits of NS for patients near the end of life.

ACKNOWLEDGMENTS

None declared.

CONFLICTS OF INTEREST

None declared.

ORCID

Emanuelly Varea Maria Wiegert RD, PhD https://orcid.org/0000-0001-5904-5287
Karla Santos da Costa Rosa RD https://orcid.org/0000-0002-0951-8725
Livia Costa de Oliveira RD, PhD https://orcid.org/0000-0002-5052-1846

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How to cite this article: Wiegert EVM, da Costa Rosa KS, dos Santos RTF, dos Santos DA, de Freitas R, de Oliveira LC. The use of nutrition support near the end of life for hospitalized patients with advanced cancer at a reference center: Two realities. *Nutrition in Clinical Practice*. 2021;1-10. https://doi.org/10.1002/ncp.10737