Identifying elderly cancer patients in need of palliative care assessment in the critical care setting: a prospective single-center observational study

Identificação de doentes oncológicos idosos com necessidades de cuidados paliativos em unidades de cuidados intensivos: estudo observacional prospetivo monocêntrico

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Keywords
Aged; Neoplasms; Critical care; Palliative care; Delivery of health care, integrated.

Abstract

Introduction: Identifying factors that can help move palliative care assessments upstream appears to be potentially beneficial for older cancer patients in the critical care setting.
Aim: This study aimed to determine the profile of older cancer patients admitted to the intensive care unit (ICU) and examine possible associations with criteria for a palliative care assessment.
Material and Methods: Data were collected on demographics and ICU outcome (death vs discharge) from patients aged ≥65 years with advanced cancer admitted to a general ICU from August 2013 to July 2014 in a single institution. Chronic conditions were scored using Charlson comorbidity index (CCI) and geriatric index of comorbidity (GIC). Severity of illness (prognosis) was assessed with simplified acute physiology score (SAPS3) and sequential organ failure assessment (SOFA), and performance status with Karnofsky performance scale (KPS) and palliative performance scale (PPS) on admission and day 7. Patients were screened for unmet palliative care needs on admission (PC1) and day 7 (PC2) using the Center to Advance Palliative Care primary/secondary criteria.
Results: Of 71 patients included, 52.1% were women; mean (SD) age was 76.9 (7.1) years. GIC scores were correlated with PC1 (rs = 0.326, P = 0.005) and PC2 (rs = 0.262, P = 0.027). PC1 was correlated with prognostic scores (SAPS3: rs = 0.236, P = 0.047; SOFA: rs = 0.263; P = 0.027), while PC2 was correlated with both prognostic scores (SAPS3: rs = 0.321, P = 0.006; SOFA: rs = 0.343, P = 0.003) and performance status (KPS: rs = –0.413, P = 0.0003; PPS: rs = –0.505, P = 0.0001). Patients who died in the ICU (N = 39, 54.9%) or were discharged (N = 32, 45.1%) differed significantly in performance status (KPS, P = 0.012; PPS, P = 0.005), but not in prognostic scores (SAPS3, P = 0.31; SOFA, P = 0.41) or comorbidity indices (CCI, P = 0.85; GIC, P = 0.94).
Conclusions: Our findings suggest that early palliative care should be integrated into intensive care to avoid potentially inappropriate interventions or procedures in older cancer patients admitted to the ICU with poor performance status and prognostic scores.

Palavras-chave
Idoso; neoplasia; cuidados intensivos; cuidados paliativos; cuidados de saúde integrados.

Resumo

Introdução: *A identificação de fatores que podem ajudar a antecipar as avaliações de cuidados paliativos parece ser potencialmente benéfica para pacientes idosos com câncer no ambiente de cuidados intensivos.*
Objetivo: *Este estudo teve como objetivo determinar o perfil de pacientes idosos com câncer admitidos na unidade de terapia intensiva (UTI) e examinar possíveis associações com critérios para avaliação de cuidados paliativos.*
Material e métodos: *Foram coletados dados sobre dados demográficos e resultado da UTI (óbito* versus *alta) de pacientes com idade ≥ 65 anos com câncer avançado admitidos em uma UTI geral, de agosto de 2013 a julho de 2014, em uma única instituição. As condições crônicas foram pontuadas usando o índice de comorbidade de Charlson (CCI) e o índice geriátrico de comorbidade (GIC). A gravidade da doença (prognóstico) foi avaliada com escore de fisiologia aguda simplificada (SAPS3) e avaliação sequencial de falência de órgãos (SOFA) e estado de funcionalidade com a escala de desempenho de Karnofsky*

(KPS) e escala de desempenho paliativo (admissão e dia 7). A triagem para necessidades de cuidados paliativos não atendidos na admissão (PC1) e no dia 7 (PC2), utilizando os critérios primários/secundários do Center to Advance Palliative Care.

Resultados: *Dos 71 pacientes incluídos, 52,1% eram mulheres; a idade média (DP) foi de 76,9 (7,1) anos. Os escores do GIC foram correlacionados com PC1 (rs = 0,326, P = 0,005) e PC2 (rs = 0,226, P = 0,027). PC1 foi correlacionado com escores prognósticos (SAPS3: rs = 0,236, P = 0,047; SOFA: rs = 0,263; P = 0,027), enquanto PC2 foi correlacionado com ambos os escores prognósticos (SAPS3: rs = 0,321, P = 0,006; SOFA: rs = 0,343, P = 0,003) e estados de funcionalidade (KPS: rs = -0,413, P = 0,0003; PPS: rs = -0,505, P = 0,0001). Os pacientes que morreram na UTI (N = 39, 54,9%) ou receberam alta (N = 32, 45,1%) diferiram significativamente no* status *de desempenho (KPS, P = 0,012; PPS, P = 0,005), mas não nos escores prognósticos (SAPS3, P = 0,31; SOFA, P = 0,41) ou índices de comorbidade (CCI, P = 0,85; GIC, P = 0,94).*

Conclusões: *Nossos achados sugerem que os cuidados paliativos precoces devem ser integrados aos cuidados intensivos para evitar intervenções ou procedimentos potencialmente inapropriados em pacientes idosos com câncer admitidos na UTI com baixo estado de funcionalidade e escores prognósticos.*

Introduction

Along with increased life expectancy, there has been a significant increase in the population of patients living with chronic life-limiting conditions, such as cancer. The number of new cancer cases is expected to rise dramatically over the next 2 decades, since many risks for specific cancers increase with age.[1]

Great advances in life-sustaining medical technology have undoubtedly provided benefits by optimizing disease control; however, the possibility to prolong life should always be balanced against a person's quality of life.[2,3] Not rarely, the quality of existence is sacrificed – by using medical interventions – for the chance of gaining time later,[4] which adds little or no benefit to terminally ill patients. In these cases, integrative palliative care should be prioritized, especially if such medical interventions are provided in the critical care setting.[5-7]

The challenge of critical care physicians is to provide medical interventions that are not only helpful but also humane to patients on an individual basis.[8-10] Concerns about the circumstances under which intensive care is applicable or whether there is room for palliative care should be addressed, focusing on the demands of the ill person and family members rather than limiting care to the illness, especially in intensive care units (ICUs) of low- and middle-income countries such as Brazil, where palliative care remains underdeveloped.[11-13]

The provision of palliative care in the Brazilian public health system is governed by Resolution No. 41, dated of October 31, 2018, published in the Federal Official Gazette of November 23, 2018, which provides guidelines for the organization of palliative care in light of integrated continued care at any stage of the health care delivery process, including hospital care.[14] However, to date, palliative care has not been well integrated with or incorporated into the management of chronic life-limiting conditions in Brazilian ICUs. For instance, older cancer patients with terminal illness often prefer palliative over life-extending care and also prefer home as a place of death.[15] Nevertheless, these patients are often hospitalized and actually die in the hospital, despite their willingness to remain at home.[16-20] These deaths are usually preceded by decisions to withhold or withdraw life-sustaining treatment,[21] decisions which are often hindered by prognostic uncertainty. Therefore, our motivation for conducting this study was to demonstrate that, although palliative care services are not actually implemented in Brazilian ICUs, there is a high demand for these services in the critical care setting, making their provision imperative.

In view of the foregoing, recognition of factors that can help move palliative care assessments upstream for older cancer patients appears to be potentially beneficial for both patients and physicians. Therefore, the aim of this study was to determine the profile of older cancer patients admitted to a general ICU and examine possible associations with criteria for a palliative care assessment in order to provide data that may serve as the grounds for actually implementing palliative care in the Brazilian health care system, in accordance with Resolution No. 41.

Material and Methods

Design and setting

We conducted a prospective observational study of older cancer patients admitted to the general ICU from August 2013 to July 2014 in a single institution. Eligible participants were all patients aged ≥65 years

with a diagnosis of advanced cancer. Patients who died within 24 hours of ICU admission and those transferred to other hospitals were excluded.

The study setting was an 11-bed medical-surgical ICU in a large private hospital providing tertiary care in the city of Rio de Janeiro, Brazil. The hospital has 350 beds, of which 112 are in ICUs, with 50-70 new admissions per month. Persons 65 years and older account for approximately 65% of all patients admitted, and approximately 30% of cases are cancer-related (10% locoregional, 20% hematologic and/or metastatic). The study was approved by the Research Ethics Committee of the institution (number: 466.896) via *Plataforma Brasil* (www.saude.gov.br/plataformabrasil), under Ethics Approval Certificate number 22679513.0.0000.0062. Informed consent was waived due to the non-interventional design of the study. All investigators signed a data use agreement to ensure the ethical and secure use of the data.

Data sources and outcomes

Demographic data, disease-related data, and ICU outcome were recorded prospectively. Outcome was measured as death or ICU discharge. Nosologic data were collected in an automated database system as part of the ICU routine (EpiMed Monitor System; EpiMed Solutions, Rio de Janeiro, RJ, Brazil). The complete set of data collected included information on diagnosis, severity of illness (prognosis), performance status, readmissions, complications, minor surgical interventions, imaging tests, laboratory tests, antibiotic use, blood transfusion, cardiac arrest and need for cardiopulmonary resuscitation (CPR) maneuvers, presence of do-not-resuscitate (DNR) orders, and length of stay (LOS) in hospital and ICU.

Chronic conditions were scored using the Charlson comorbidity index (CCI) and the geriatric index of comorbidity (GIC). Elevated CCI scores are associated with increased mortality, with a maximum score of 37 (a ratio was calculated to estimate 10-year survival [%]). Patients were classified according to severity scores (sequential organ failure assessment [SOFA] and simplified acute physiology score [SAPS 3]) and performance status (Karnofsky performance scale [KPS] and palliative performance scale [PPS]), which were measured at the time of admission and 7 days after admission.

The primary and secondary criteria developed by the Center to Advance Palliative Care (CAPC)[22] were used to screen patients for unmet palliative care needs at the time of admission (PC1) and on ICU day 7 (PC2). Briefly, the CAPC developed 2 checklists containing primary and secondary criteria, one to be used for screening at the time of admission aiming to identify patients whose conditions clearly warrant a basic palliative care assessment and one for daily patient rounds, aiming to identify evolving patient issues that may trigger the need for a basic palliative care assessment. Primary criteria are global in nature and should be used as the minimum expected standard of care (e.g., frequent admissions), while secondary criteria are more specific and should be used as supplementary criteria to implement a more comprehensive systems-change approach (e.g., cognitively impaired and transplant-ineligible patients).[22]

In the present study, primary criteria accounted for 5 items in both checklists, while secondary criteria accounted for 8 items in the checklist applied at the time of admission (PC1; total of 13 items) and 5 items in the checklist applied on ICU day 7 (PC2; total of 10 items) (Additional file 1). For analysis purposes, 1 point was given for each (primary and secondary) criterion if present, and a total score was obtained by summing the points assigned to present criteria. Therefore, the maximum total score was 13 for the PC1 checklist and 10 for the PC2 checklist. Of note, the purpose of summing these criteria was solely to illustrate quantitatively the potential demand for palliative care services, and not to suggest that patients meeting more criteria have more unmet needs—since meeting any of these criteria is grounds for a palliative care assessment for potentially unmet needs.

PC1 and PC2 scores were correlated with severity scores, performance status, LOS, and laboratory variables. Patients were then divided into 2 groups according to outcome (death or ICU discharge) for comparison.

Sample size

Sample size was calculated based on a pilot study of 20 cases.[23] With a 5% significance level and a power of 80%, a sample size of at least 84 patients was needed to detect a correlation of 0.30 or 46 patients to detect a correlation of 0.40 between PC1/PC2 scores and severity scores/performance status. Therefore, this study was designed with a target sample size of at least 65 patients.

Data analysis

Quantitative data were expressed as mean (SD), median and interquartile range (IQR), and minimum and maximum values, while categorical data were expressed as frequency (n) and percentage (%). Nonparametric tests were used when data were not normally distributed (Shapiro-Wilk test). Spearman's correlation coefficients (r_s) were calculated to assess the degree of association of PC1 and PC2 scores with quantitative variables. Comparisons between the 2 groups (death vs ICU discharge) were performed by Student's *t* test for independent samples, the Mann-Whitney test for quantitative data, and the chi-square test or Fisher's exact test for categorical data. Data were analyzed using SAS version 6.11 (SAS Institute, Inc., Cary, NC, USA), and a *P*-value ≤0.05 was considered significant.

Results

A total of 71 older cancer patients admitted to the general ICU between August 2013 and July 2014 were included in the study. Of these, 37 (52.1%) were women and 34 (47.9%) were men. Mean (SD) patient age was 76.9 (7.1) years. Gastrointestinal cancer was the most common type of malignancy (*N* = 26, 36.6%), followed by urinary tract cancer (*N* = 15, 21.1%). The median time since the diagnosis of cancer was 242 days (IQR, 30-1277.5 days; min-max, 1-5110 days). As for ICU outcome, 39 (54.9%) patients died and 32 (45.1%) were discharged from the ICU. The main causes of death were infection, sepsis, and septic shock, with pneumonia as the most frequent diagnosis (*N* = 13, 33.3%), followed by urinary tract infection (*N* = 7, 17.9%). The main characteristics of the study population are shown in Table 1. A complete data set of this table is available as supplementary material (Additional file 2).

GIC scores were correlated with both PC1 (r_s = 0.326, *P* = 0.005) and PC2 (r_s = 0.262, *P* = 0.027). PC1 was correlated with prognostic scores (SAPS 3: r_s = 0.236, *P* = 0.047; SOFA: r_s = 0.263; *P* = 0.027), while PC2 was correlated with both prognostic scores (SAPS 3: r_s = 0.321, *P* = 0.006; SOFA: r_s = 0.343, *P* = 0.003) and performance status (KPS: r_s = −0.413, *P* = 0.0003; PPS: r_s = −0.505, *P* = 0.0001) (Table 2).

Table 3 shows the results of the comparison of clinical variables, laboratory variables, and scores between patients divided by ICU outcome. There was

Table 1 – Main characteristics of the study population (N = 71)

Variable	Mean (SD)	Median (IQR)	Min-max
Age, years	76.9 (7.1)	77 (72-83)	65-93
ICU length of stay, days	8.20 (9.45)	6 (4-9)	1-73
Hospital length of stay, days	22.0 (22.4)	16 (10-26)	2-155
SAPS 3, score	60.2 (11.2)	60 (54-65)	36-91
Probability of death, %	43.3 (21.8)	40.4 (25.7-57.8)	4.01-85.8
SOFA, score	3.21 (3.13)	2 (1-5)	0-14
Karnofsky performance scale, %	31.3 (11.8)	30 (20-40)	10-80
Palliative performance scale, %	30.7 (15.1)	30 (20-40)	10-80
Charlson comorbidity index, score	5.58 (3.12)	5 (3-8)	2-17
10-year survival, %	45.5 (28.3)	21 (21-77)	21-90
Geriatric index of comorbidity, score	10.3 (3.7)	10 (8-12)	2-21
PC1, total score (max. 13)	6.39 (1.18)	7 (6-7)	3-9
PC2, total score (max. 10)	5.96 (1.20)	6 (5-7)	3-8
Creatinine, mg/dL	1.61 (1.27)	1.17 (0.79-2.13)	0.17-6.06
Albumin*, g/dL	2.70 (0.62)	2.7 (2.2-3.1)	1.4-4.1
Total bilirubin†, mg/dL	0.87 (1.19)	0.46 (0.33-0.78)	0.14-5.58
Lymphocytes, %	19.3 (16.4)	15 (10-25)	2-100
Hemoglobin, g/dL	9.70 (2.34)	9.5 (8.1-11.5)	5-15

ICU, intensive care unit; IQR, interquartile range (Q1-Q3); PC1, palliative care checklist applied at the time of admission; PC2, palliative care checklist applied on ICU day 7; SAPS 3, simplified acute physiology score; SD, standard deviation; SOFA, sequential organ failure assessment.

* Data were available for only 65 (91.5%) patients.

† Data were available for only 64 (90.1%) patients.

Table 2 – Correlations between PC1 and PC2 scores and study variables

Variable		PC1	PC2
ICU length of stay, days	r_s	0.029	**0.688**
	P	0.81	**0.0001**
Hospital length of stay, days	r_s	0.072	**0.381**
	P	0.55	**0.001**
SAPS 3, score	r_s	**0.236**	**0.321**
	P	**0.047**	**0.006**
Probability of death, %	r_s	0.230	**0.288**
	P	0.054	**0.015**
SOFA, score	r_s	**0.263**	**0.343**
	P	**0.027**	**0.003**
Karnofsky performance scale, %	r_s	−0.204	**−0.413**
	P	0.088	**0.0003**
Palliative performance scale, %	r_s	−0.187	**−0.505**
	P	0.12	**0.0001**
Charlson comorbidity index, score	r_s	0.194	0.201
	P	0.10	0.092
10-year survival, %	r_s	−0.202	−0.182
	P	0.092	0.13
Geriatric index of comorbidity, score	r_s	**0.326**	**0.262**
	P	**0.005**	**0.027**
Creatinine, mg/dL	r_s	0.204	0.073
	P	0.088	0.55
Albumin*, g/dL	r_s	−0.161	−0.164
	P	0.20	0.19
Total bilirubin†, mg/dL	r_s	0.179	0.209
	P	0.16	0.097
Lymphocytes, %	r_s	−0.211	**−0.253**
	P	0.077	**0.033**
Hemoglobin, g/dL	r_s	−0.152	−0.137
	P	0.20	0.25

ICU, intensive care unit; PC1, palliative care checklist applied at the time of admission; PC2, palliative care checklist applied on ICU day 7; r_s, Spearman's correlation coefficient; SAPS 3, simplified acute physiology score; SOFA, sequential organ failure assessment.

* Data were not available for 6 patients.

† Data were not available for 7 patients.

Bold indicates significant values.

no significant difference between death (*N* = 39) and ICU discharge (*N* = 32) groups in prognostic scores (SAPS 3, *P* = 0.31; SOFA, *P* = 0.41) or comorbidity indices (CCI, *P* = 0.85; GIC, *P* = 0.94). However, the 2 groups differed significantly in performance status (KPS, *P* = 0.012; PPS, *P* = 0.005).

Although mean PC1 and PC2 scores did not differ between the 2 groups (Table 3), some specific criteria differed significantly between the groups when analyzed individually: at the time of admission (PC1) – the primary criterion "*5. Decline in function, feeding intolerance, or unintended weight loss (e.g., failure to thrive)*" (death: 37 [94.9%] vs discharge: 25 [78.1%], *P* = 0.039) and the secondary criterion "*8. Metastatic or locally advanced incurable cancer*" (death: 36 [92.3%] vs discharge: 22 [68.8%], *P* = 0.012); on ICU day 7 (PC2) – the secondary criterion "*8. Patient / family / surrogate request for palliative care*" (death: 8 [20.5%] vs discharge: 0 [0.0%], *P* = 0.006).

Additionally, more patients undergoing surgery died in the ICU (death: 9 [23.1%] vs discharge: 2 [6.3%], *P* = 0.049). Patients currently receiving treatment were discharged more frequently (death: 13 [33.3%] vs discharge: 18 [56.3%], *P* = 0.053), especially those receiving chemotherapy (death: 7 [18.0%] vs discharge: 14 [43.8%], *P* = 0.018); there was no difference in ICU outcome between patients receiving radiotherapy (death: 3 [7.7%] vs discharge: 3 [9.4%], *P* = 0.56). As for complications, the groups differed in the occurrence of cardiac arrest (death: 9 [23.1%] vs discharge: 1 [3.1%], *P* = 0.016) and delirium (death: 5 [12.8%] vs discharge: 11 [34.4%], *P* = 0.031). In addition, patients who died in the ICU had significantly more DNR orders (death: 25 [64.1%] vs discharge: 10 [31.3%], *P* = 0.006) and significantly greater use of vasoactive amines (death: 17 [43.6%] vs discharge: 5 [15.6%], *P* = 0.011), mechanical ventilation (death: 15 [38.5%] vs discharge: 3 [9.4%], *P* = 0.005), and feeding tubes (death: 22 [56.4%] vs discharge: 7 [21.9%], *P* = 0.003). All patients underwent laboratory and imaging investigations as part of the ICU routine.

Discussions

The findings of the present study showed that patients with advanced cancer aged 65 years and older were routinely admitted to the ICU with continued care, without integrating palliative care services into oncology care. In our sample, older cancer patients, especially women, stayed a median of 6 days in the ICU, with prolonged hospital stay (median of 16 days), without receiving palliative care during the course of the disease. Based on the collected data, all patients received curative or disease-modifying treatments, with no palliative care being reported at any stage of the illness. However, the cancer had been diagnosed approximately 8 months before ICU admission, a long enough period to initiate advance care planning discussions,[24,25] as

Table 3 – Comparisons between 2 subsets of older cancer patients according to ICU outcome

Variable	ICU outcome		*P*
	Death (N = 39)	Discharge (N = 32)	
Age, years, mean (SD); median	76.5 (7.3); 76	77.5 (6.8); 77	0.49
Sex, n (%)			
Male	17 (43.6)	17 (53.1)	0.42
Female	22 (56.4)	15 (46.9)	
ICU length of stay, days, mean (SD); median	9.51 (12.28); 6	6.59 (3.50); 6	0.76
Hospital length of stay, days, mean (SD); median	23.3 (19.1); 16	20.5 (26.2); 13.5	0.41
SAPS 3, score, mean (SD); median	61.5 (11.0); 62	58.7 (11.3); 59.5	0.31
Probability of death, %, mean (SD); median	46.0 (22.5); 42.9	39.9 (20.8); 38.9	0.29
SOFA, score, mean (SD); median	3.51 (3.36); 2	2.84 (2.82); 2	0.41
Karnofsky performance scale, %, mean (SD); median	29.0 (13.1); 30	34.1 (9.5); 30	**0.012**
Palliative performance scale, %, mean (SD); median	26.7 (16.8); 30	35.6 (11.1); 40	**0.005**
Charlson comorbidity index, score, mean (SD); median	5.62 (3.03); 5	5.53 (3.27); 5	0.85
10-year survival, %, mean (SD); median	46.1 (29.3); 21	44.7 (27.4); 21	0.82
Geriatric index of comorbidity, score, mean (SD); median	10.4 (4.4); 10	10.1 (2.6); 10	0.94
Geriatric index of comorbidity, class IV, n (%)	37 (94.9)	25 (78.1)	**0.039**
PC1, total score (max. 13), mean (SD); median	6.38 (0.96); 7	6.41 (1.41); 7	0.72
PC2, total score (max. 10), mean (SD); median	6.18 (1.12); 6	5.69 (1.26); 6	0.12
Laboratory parameters, mean (SD); median			
Creatinine, mg/dL	1.57 (1.19); 1.24	1.65 (1.38); 1.14	0.95
Albumin, g/dL	2.53 (0.62); 2.5	2.90 (0.57); 2.8	**0.031**
Total bilirubin, mg/dL	0.841 (1.272); 0.4	0.911 (1.101); 0.5	0.16
Lymphocytes, %	16.6 (13.5); 13	22.7 (19.1); 19	**0.048**
Hemoglobin, g/dL	9.42 (2.45); 8.8	10.1 (2.19); 10	0.26

ICU, intensive care unit; PC1, palliative care checklist applied at the time of admission; PC2, palliative care checklist applied on ICU day 7; SAPS 3, simplified acute physiology score; SD, standard deviation; SOFA, sequential organ failure assessment.
Bold indicates a significant difference.

well as discussions about prognosis, care options, and understanding of advance directives that address goals of care under critical conditions.[16, 26, 27]

In many critical care instances, medical progress may do little more than prolong the death process for older cancer patients, which is accompanied by intense emotional distress and substantial economic burden (both on the patient/family and the health system).[21, 28, 29] More than 40% of our sample were subjected to further treatments by radiotherapy (8.5%) or chemotherapy (29.6%), or even by surgery (14.1%), despite previous treatments and high severity scores, organ dysfunctions, and median performance status of 30% on ICU admission. When the analysis was stratified by ICU outcome, death in the ICU was significantly more common among patients undergoing surgery ($P = 0.049$), but those receiving chemotherapy were more frequently discharged from the ICU ($P = 0.018$). It is worth noting that this is an observational study; therefore, the interventions were performed at the discretion of the health care team, with the collected data being only analyzed here. The same applies to the lower rates of delirium observed in patients who died vs discharged. Delirium is associated with high morbidity, and the observed rates should raise concerns about providing adequate care to prevent delirium.

Moreover, based on the results of the checklist applied on ICU day 7 (PC2), all 8 patients whose family or surrogate had requested palliative care died without receiving any palliative care services. These data support the argument that, especially in a low-to-middle income scenario, patients who die in the ICU are still subjected to a wide range of treatments without even considering the benefits of palliative care. Therefore, taking into account the risks of the treatments offered (surgery, chemotherapy, and radiotherapy), early integration of palliative care

into curative care (in this case, intensive care) may contribute to improving communication about end-of-life care goals, to properly aligning treatments with care planning and advance directives, and to improving the patient's quality of life and patient/family psychosocial support, as well as reducing health care utilization, regardless of disease prognosis or treatment goals.[21, 30-34]

Among the correlations found with the CAPC criteria used on admission (PC1) and ICU day 7 (PC2), we highlight a significant moderate direct correlation between PC2 and ICU LOS ($r_s = 0.688$, $P = 0.0001$), indicating that patients who stayed longer in the ICU were most in need of palliative care assessment. Significant moderate inverse correlations were observed between PC2 and performance scale scores, especially PPS ($r_s = -0.505$, $P = 0.0001$), indicating that better preserved performance reduced the need of palliative care assessment. Also, although weak, direct correlations with SOFA scores (PC2, $r_s = 0.343$) and GIC scores (PC1, $r_s = 0.326$; PC2, $r_s = 0.027$) indicated that patients with worse prognosis and more comorbidities had greater palliative care needs. In this respect, palliative care should be seen as a component of rather than an alternative to critical care, and these services should be offered even when life-sustaining treatment is continuing.[7]

Also of note is a study by Weijers et al.[35] which evaluated whether adding a second, more specific "surprise question" to the CAPC checklist, referring to "living" rather than "dying" ("Would I be surprised if this patient *is still alive* after 12 months?"), would prompt general practitioners to plan for anticipatory palliative care in case the classical surprise question ("Would I be surprised if this patient *were to die* in the next 12 months?") is answered negative. They concluded that the combination of the 2 "surprise questions" appears to contribute to more extensive and anticipatory palliative care planning for those patients of whom general practitioners would be surprised if they were still alive after 12 months, being considered a helpful additional tool to determine the right moment to start palliative care planning.

The correlations found in the present study may help identify, in advance, older cancer patients in the ICU at high risk for unmet palliative care needs, thus increasing access to palliative care services integrated with oncology care and ensuring dignity-conserving care.[36] Also, a well-planned integration of palliative care in health systems can improve service performance.[37-40] For older cancer patients, the presence of an inpatient palliative care unit within the hospital may improve patients' quality of life by, at least in part, reducing anticancer therapy and life-sustaining treatments that are no longer beneficial due to disease progression or poor performance, in addition to reducing costs.[41-43] Although data from low- and middle-income countries are scarce, it appears that the up-front costs required to integrate patient-centered palliative care services into the health system, such as development of policies, purchase of essential medicines, and staff training/development, ultimately "pay off" over time by improving patient outcomes, decreasing health care expenses, and reducing the overuse of hospital resources and nonbeneficial interventions.[44]

This study has some limitations. Because it is a single-center study, our findings may not be generalizable to a larger group of patients or providers. Patients with advanced cancer were included regardless of tumor type, site, or specific staging, which can also be seen as a limitation of this study. However, their inclusion did not compromise the homogeneity of the sample. Actually, the sample obtained allowed us to verify that many older cancer patients are still routinely admitted to the ICU for curative treatment, but the possibility of offering palliative care in conjunction with intensive care is overlooked. Although many of these patients met the criteria for early palliative care referral, there was still an excessive use of—not always beneficial—resources and interventions, particularly of mechanical ventilation, vasoactive amines, antimicrobials, additional tests, and CPR maneuvers. Some of these patients should have received care in specialized units able to meet their real needs, thus ensuring the provision of dignified care to older cancer patients under critical conditions [3] and optimizing ICU bed utilization to serve the needs of patients actually meeting the criteria for this level of care.

Conclusion

For older cancer patients admitted to the ICU with poor performance status and prognostic scores, possible life-prolonging treatments may constitute not a benefit but rather a burden in the face of likely death, suggesting that early palliative care should be integrated into intensive care in order to avoid potentially inappropriate interventions or procedures. There is an urgent need to review the care provided to older cancer patients in the Brazilian health care system, especially in the ICU setting, highlighting the

moral implications involved in making end-of-life decisions, the increasing demand for palliative care in view of the risk of therapeutic obstinacy, and the evident lack of an integrated model of palliative care in the critical care setting.

List of abreviations

CAPC	Center to Advance Palliative Care
CCI	Charlson comorbidity index
CCI	Charlson comorbidity index
CPR	cardiopulmonary resuscitation
DNR	do-not-resuscitate
GIC	geriatric index of comorbidity
GIC	geriatric index of comorbidity
ICU	intensive care unit
KPS	Karnofsky performance scale
LOS	length of stay
PPS	palliative performance scale
SAPS3	simplified acute physiology score
SOFA	sequential organ failure assessment

Declarations

Ethics approval and consent to participate: The study was approved by the Research Ethics Committee of the institution (Comissão de Ética e Pesquisa do Centro Universitário São Camilo, number: 466.896) via *Plataforma Brasil* (www.saude.gov.br/plataformabrasil), under Ethics Approval Certificate number 22679513.0.0000.0062. Informed consent was waived due to the non-interventional design of the study. All investigators signed a data use agreement to ensure the ethical and secure use of the data.

Availability of data and materials: All data generated or analyzed during this study are included in this published article.

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Supplementary Files

Supplementary File 1. Criteria for a palliative care assessment in patients aged ≥65 years with cancer admitted to the intensive care unit (ICU).
Supplementary File 2. Characteristics of the study population (n=71).

Supplementary File 1 – Criteria for a palliative care assessment in patients aged ≥ 65 years with cancer admitted to the intensive care unit (ICU).

AT THE TIME OF ADMISSION (PC1 checklist)

A potentially life-limiting or life-threatening condition *and…*

Primary criteria (give 0 if absent or 1 if present)

1. The "surprise question": 'Would I be surprised if this patient died within 12 months or earlier?' ( )
2. Frequent admissions (e.g., more than 1 admission for the same condition within months) ( )
3. Admission prompted by difficult-to-control physical or psychological symptoms (e.g., moderate-to-severe symptom intensity for more than 24-48 hours) ( )
4. Complex care requirements (e.g., functional dependency, complex home support for ventilator / antibiotics / feedings) ( )
5. Decline in function, feeding intolerance, or unintended weight loss (e.g., failure to thrive) ( )

Secondary criteria (give 0 if absent or 1 if present)

6. Admission from long-term care facility or medical foster home ( )
7. Cognitively impaired older patient with acute hip fracture ( )
8. Metastatic or locally advanced incurable cancer ( )
9. Chronic home oxygen use ( )
10. Out-of-hospital cardiac arrest ( )
11. Current or past hospice program enrollee ( )
12. Limited or no social support (e.g., family stress, chronic mental illness) ( )
13. No history of completing an advance care planning discussion / document ( )

Total score: ( )

ON ICU DAY 7 (PC2 checklist)

A potentially life-limiting or life-threatening condition *and…*

Primary criteria (give 0 if absent or 1 if present)

1. The "surprise question": 'Would I be surprised if this patient died within 12 months or earlier?' ( )
2. Difficult-to-control physical or psychological symptoms (e.g., more than 1 admission for the same condition within months) ( )
3. ICU length of stay ≥ 7 days ( )
4. Lack of Goals of Care clarity and documentation (*goals of care*: physical, social, spiritual, or other patient-centered goals) ( )
5. Disagreements or uncertainty among the patient, staff, and/or family (e.g., medical treatment decisions / resuscitation preferences / oral feeding and hydration) ( )

Secondary criteria (give 0 if absent or 1 if present)

6. Awaiting or deemed ineligible for solid-organ transplantation ( )
7. Patient / family / surrogate emotional, spiritual, or relational distress ( )
8. Patient / family / surrogate request for palliative care ( )
9. Patient is considered a potential candidate, or medical team is considering seeking consultation, for: feeding tube placement; tracheostomy; dialysis; ethics concerns; placement of automated implantable cardioverter-defibrillator; indication for long-term acute care hospital or medical foster home disposition ( )
10. Bone marrow transplantation (high-risk patients) ( )

Total score: ( )

Adapted from Weissman & Meier [19].

Supplementary File 2 – Characteristics of the study population (N = 71).

Quantitative variables	Mean (SD)	Median (IQR)	Min-max
Age, years	76.9 (7.1)	77 (72-83)	65-93
Time since diagnosis*, days	1012 (1442)	242 (30-1277.5)	1-5110
ICU length of stay, days	8.20 (9.45)	6 (4-9)	1-73
Hospital length of stay, days	22 (22.4)	16 (10-26)	2-155
SAPS 3, score	60.2 (11.2)	60 (54-65)	36-91
Probability of death, %	43.3 (21.8)	40.4 (25.7-57.8)	4.01-85.8
SOFA, score	3.21 (3.13)	2 (1-5)	0-14
Karnofsky performance scale, %	31.3 (11.8)	30 (20-40)	10-80
Palliative performance scale, %	30.7 (15.1)	30 (20-40)	10-80
Charlson comorbidity index, score	5.58 (3.12)	5 (3-8)	2-17
10-year survival, %	45.5 (28.3)	21 (21-77)	21-90
Geriatric index of comorbidity, score	10.3 (3.7)	10 (8-12)	2-21
PC1, total score (max. 13)	6.39 (1.18)	7 (6-7)	3-9
PC2, total score (max. 10)	5.96 (1.20)	6 (5-7)	3-8
Creatinine, mg/dL	1.61 (1.27)	1.17 (0.79-2.13)	0.17-6.06
Albumin*, g/dL	2.70 (0.62)	2.7 (2.2-3.1)	1.4-4.1
Total bilirubin‡, mg/dL	0.87 (1.19)	0.46 (0.33-0.78)	0.14-5.58
Lymphocytes, %	19.3 (16.4)	15 (10-25)	2-100
Hemoglobin, g/dL	9.70 (2.34)	9.5 (8.1-11.5)	5-15
Categorical variables	***N***	**%**	
Sex			
Male	34	47.9	
Female	37	52.1	
Current treatment	31	43.7	
Surgery	10	14.1	
Chemotherapy	21	29.6	
Radiotherapy	6	8.5	
Hormone therapy	0	0.0	
Previous treatment	47	66.2	
Surgery	38	53.5	
Chemotherapy	22	31.0	
Radiotherapy	14	19.7	
Hormone therapy	5	7.0	
Do-not-resuscitate order	35	49.3	
ICU outcome			
Death	39	54.9	
Discharge	32	45.1	
Geriatric index of comorbidity, class IV	62	87.3	
Heart disease	4	5.6	
Lung disease	4	5.6	
Kidney disease	4	5.6	
Liver disease	2	2.8	
Dementia disorders	6	8.5	
Frailty	7	9.9	
PC1, present criteria			
Item 1	70	98.6	
Item 2	42	59.2	
Item 3	68	95.8	
Item 4	63	88.7	
Item 5	62	87.3	
Item 6	5	7.0	
Item 7	1	1.4	

Item 8	58	81.7
Item 9	0	0.0
Item 10	0	0.0
Item 11	0	0.0
Item 12	16	22.5
Item 13	69	97.2
PC2, present criteria		
Item 1	70	98.6
Item 2	61	85.9
Item 3	34	47.9
Item 4	69	97.2
Item 5	63	88.7
Item 6	0	0.0
Item 7	63	88.7
Item 8	8	11.3
Item 9	55	77.5
Item 10	0	0.0
Surgery	11	15.5
Complications		
Cardiac arrest	10	14.1
Cardiopulmonary resuscitation	5	7.0
Adverse events	7	9.9
Delirium	16	22.5
Pressure ulcer	4	5.6
Atrial fibrillation	8	11.3
Multidrug-resistant organisms	7	9.9
Seizure	4	5.6
ICU readmission	17	23.9
Laboratory tests	71	100
Imaging tests	71	100
Vasoactive amines	22	31.0
Cardiac device	2	2.8
Packed red blood cell transfusion	10	14.1
Antibiotic therapy	50	70.4
Mechanical ventilation	18	25.4
Tracheostomy	6	8.5
Hemodialysis	4	5.6
Feeding tube	29	40.8
Parenteral nutrition	3	4.2
Gastrostomy	2	2.8
Electroencephalography	4	5.6

ICU, intensive care unit; IQR, interquartile range (Q1-Q3); PC1, palliative care checklist applied at the time of admission; PC2, palliative care checklist applied on ICU day 7; SAPS 3, simplified acute physiology score; SD, standard deviation; SOFA, sequential organ failure assessment.

* Data were available for only 65 (91.5%) patients.

‡ Data were available for only 64 (90.1%) patients.