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ORIGINAL ARTICLE

Factors associated with palliative care referral among patients with advanced cancers: a retrospective analysis of a large Brazilian cohort

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Abstract

Purpose The purpose of the study is to estimate the proportion of patients who had access to palliative care (PC) and to identify the timing and factors associated with this access.

Methods A retrospective longitudinal study that included patients who died of advanced cancer between the years of 2010 and 2014 was conducted. The proportion of patients who received PC consultations was compared during those years. Sociodemographic and clinical factors, the timing between first PC consultation and death (early, ≥ 3 months; late, < 3 months), and first PC consultation were assessed.

Results Of the 1284 studied patients, 988 (76.9%) were referred to PC and 839 (65.3%) had a PC consultation. The proportion of patients who received late PC consultation increased between the years 2010 and 2014 (44.2 vs. 60.4%, $p = 0.001$). Multivariate analysis revealed that younger age (odds ratio (OR) = 0.98, $p = 0.016$) and gynecologic cancer (OR = 2.17, $p = 0.011$) were associated with a PC consultation. Upper gastrointestinal tract (GIT) cancer (OR = 2.42, $p = 0.001$) and hematologic malignancies (OR = 0.37, $p = 0.001$) were associated with late PC consultations. The median time interval between the first PC consultation and death was 2.66 months: timing differed significantly among cancer subtypes ($p = 0.002$).

Conclusion Most patients received PC consultation before death, and the number of patients with late consultation increased throughout the study. Patients with late referrals could have received PC earlier. The current findings suggest the need to standardize the referral criteria to optimize access to PC.

Keywords Palliative care · Advanced cancer · Referral and consultation · Health services · Quality of health care

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Introduction

Palliative care (PC) aims to improve the quality of life of patients with advanced and life-threatening illnesses by approaching physical, psychosocial, and spiritual symptoms and concerns [1]. PC has a positive effect on symptom burden, quality of life, psychosocial communication, prognostic understanding and decision making, mood, satisfaction with the care received [1–4], and quality of care at the end of life [5–9].

PC is likely more effective if it is integrated early into standard oncology care when advanced terminal cancer is first diagnosed [2, 8, 10–12]. However, PC has typically been delivered late in the course of the disease, when drug therapy is interrupted due to the absence of novel options and/or at the end of life due to difficulty in controlling the symptoms [13, 14]. A significant portion of patients with advanced cancer still die with no access to PC services [13, 14].

The benefits of incorporating PC in oncology care are known, but little is known about factors associated with access to PC or the ideal timing for referral of cancer patients to these services. Furthermore, in Brazil, even with the existence of oncological referral centers and public health policies that recognize PC as an essential component in health care practice, this reality has not yet been incorporated in clinical practice. In the last report of the Quality of Death Index published by The Economist Intelligence Unit [15], Brazil ranked only 42nd among the 80 countries evaluated. However, the absence of information on how and when cancer patients are referred to PC hinders any objective measure to effectively improve the country's current situation.

Given this lack of knowledge, the objective of the present study was to estimate the proportion of patients who had access to PC services and to identify the timing and factors associated with this access. The identification of these factors will help better direct integrated oncological care in patients under PC.

Materials and methods

Study design and setting

This retrospective longitudinal study was conducted in the Barretos Cancer Hospital (Barretos, SP, Brazil), which is one of the main referral centers for the public cancer treatment in the country. The hospital has a specific PC unit with 62 hospital beds, a dedicated multiprofessional PC team, inpatient and outpatient PC units, and a home care service. The PC unit focused on providing comprehensive patient care from the early outpatient management of symptoms to end-of-life care and supporting family and loved ones throughout the disease process. The referral of patients to PC is performed by the medical team responsible for the standard oncology treatment independent of the specialty from both inpatient and outpatient general oncology units.

Study population

Advanced cancer patients (men and women) who died between the years of 2010 and 2014 and were 18 years and older were included. Patients needed to have at least 3 months of clinical follow-up in the hospital immediately before death. Advanced cancer was determined as any type of cancer that was incurable or metastatic, including hematologic malignancy, or in the case of solid tumors, a recurrent inoperable disease.

Data collection

Data were obtained from patient records by means of a medical record composed of sociodemographic data (birth date, sex, marital status, school education, and date of death), clinical data (date of cancer and advanced cancer diagnosis, type of cancer, and last antineoplastic treatment), and data on the referral to PC (referral to PC, date of referral to PC, PC consultation, and date of first PC consultation).

Sample size

Based on the data from the hospital record, 19,442 deaths occurred between the years 2010 and 2014. In a simple random sampling technique, approximately 20% of the death records were obtained from each year. The sample size was estimated considering the proportion of patients receiving early and late PC consults from a previous study [12]; the minimum study sample size was estimated at 1273. The sample size was calculated with an a priori power analysis using GPower software, version 3.0 [16], at a level of significance of 1% with a two-tailed hypothesis and a power of 90%.

Data analysis

The patients included in this study were divided into two groups: PC consultation and no PC consultation. Those in the PC consultation group were further subdivided into early consultation (≥ 3 months between first PC consultation and death) and late consultation (< 3 months between first PC consultation and death) based on a previous study demonstrating improved outcomes associated with referrals > 3 months before death [12].

Comparisons were made with the non-parametric Mann-Whitney and Kruskal-Wallis tests for continuous variables and with Pearson's chi-squared or Fisher's exact test for categorical variables.

The proportions of patients with or without a PC consultation and those with early or late PC consultation were compared throughout the study using Pearson's chi-squared test for linear trends and Bonferroni's correction for multiple comparisons. Median time from PC consultation until death (TCD) and median time from advanced cancer diagnosis until death (TACD) were compared using the Kruskall-Wallis test. Additionally, both TCD and TACD were correlated with the year of death using Spearman's correlation test.

To better understand when patients have PC consultations within the continuum of cancer evolution, all patients who had at least one PC consultation were plotted in a scatter diagram with TCD on the *x*-axis and TACD on the *y*-axis. The categories of TCD used in the study were adapted from Hui et al. [17]: much too late (< 1 month), too late (1 to 3 months), appropriate (3 to 6 months), appropriate/ideal (6 to 24 months), and much too early (> 24 months). Additionally, late consults in patients with poor survival (< 6 months from diagnosis of advanced cancer and death) were plotted separately.

Independent factors associated with PC consultation (yes vs. no) and its timing (early vs. late) were identified by including all sociodemographic and clinical variables with $p < 0.2$, which were identified by a univariate analysis using the chi-squared or Mann-Whitney test and the multivariate logistic regression model. For the final model, variables with $p < 0.05$ were selected (stepwise regression, Wald test).

SPSS software v. 21.0 was used for the statistical analyses; p values < 0.05 were considered significant.

Ethical issues

The present study was approved by the Barretos Cancer Hospital Research Ethics Committee (number 897.470/2014) and agrees with resolution number 466/2012 of the Brazilian National Council of Health.

Results

Sociodemographic and clinical characteristics

A total of 1284 patients were included in this study. The mean (standard deviation [SD]) age was 61.6 (13.7) years. In total, 710 (55.3%) of the patients were men, 844 (65.8%) were married or lived with a partner, and 994 (77.5%) had a low educational level. Upper and lower gastrointestinal tract (GIT) and urological tumors were the most frequent and represented by 188 (14.6%), 175 (13.6%), and 164 (12.8%) patients, respectively. Chemotherapy was the last antineoplastic treatment in 654 (50.9%) patients (Table 1).

Table 1 Patient characteristics ($n = 1284$)

		Frequency	
		$n = 1284$	%
Mean age, years (SD)	61.6 (13.7)	–	–
Gender			
Female	574	44.7	
Male	710	55.3	
Marital status			
Single	141	11.0	
Married or with partner	844	65.8	
Divorced/separated	147	11.5	
Widowed	151	11.8	
Education			
< 8 years	994	77.5	
≥ 8 to 11 years	188	14.7	
> 11 years	101	7.9	
Cancer type			
Upper GIT	188	14.6	
Low GIT	175	13.6	
Urological	164	12.8	
Breast	152	11.8	
Lung	145	11.3	
Head and neck	127	9.9	
Gynecologic	104	8.1	
Skin and soft tissue	80	6.2	
Hematologic	70	5.5	
Others	79	6.2	
Last treatment			
Chemotherapy	654	50.9	
Target therapy	55	4.3	
Radiotherapy	327	25.5	
Surgical	113	8.8	
Endocrine therapy	89	6.9	
Others	46	3.6	

Others: no treatment, bisphosphonate, transplant, iodine therapy, and samarium

SD standard deviation, *GIT* gastrointestinal tract

Timing of palliative care referral

Of the 1284 patients, 988 (988/1284, 76.9%) were referred to PC and 839 (839/1284, 65.3%) received PC consultations. Among those who received PC consultations, 392 (392/839, 46.7%) and 447 (447/839, 53.3%) received early and late consultations, respectively. Median TCD values differed significantly among the different years of death (2010, 4.1 months; 2011, 3.4 months; 2012, 2.7 months; 2013, 2.5 months; and 2014, 1.9 months; $p = 0.009$; Supplementary Table 1). A negative correlation between TCD and year of death (rho = − 0.11, $p = 0.001$) confirmed the observed visual trend of reduction in TCD times (Supplementary Fig. 1). Regarding TACD, although median values differed significantly among the years of death ($p < 0.001$; Supplementary Table 1), any visual trend was observed (Supplementary Fig. 1). Furthermore, a weak positive correlation was identified (rho = 0.064, $p = 0.023$).

During the years 2010 to 2014, an increasing number of patients received PC consultations; however, this finding was not statistically significant ($p = 0.140$). Furthermore, the proportion of patients with late PC consultations within the studied timeframe increased from 44.2% in 2010 to 60.4% in 2014 ($p = 0.001$) (Table 2).

The distribution of the mean time for the referral of patients to PC was also assessed. The mean time (SD) between advanced cancer diagnosis and the first PC consultation was 11.6 months (13.4). The mean time interval (SD) between referral and the first PC consultation and between the first consultation and death was 41 days (92.6) and 6.1 months (9.8), respectively.

Supplementary Table 2 includes data comparing the time interval and number of consultations between the different

Table 2 Trend of palliative care consultation during the 5-year study period

Year of death							
Variable		2010 *n* (%)	2011 *n* (%)	2012 *n* (%)	2013 *n* (%)	2014 *n* (%)	*p* value[a]
PC consultation	No	87 (33.6)	96 (37.5)	98 (38.1)	96 (37.4)	68 (26.7)	0.140
	Yes	172 (66.4)	160 (62.5)	159 (61.9)	161 (62.6)	187 (73.3)	
PC consultation	Early	96 (55.8)a	82 (51.2)a,b	69 (43.4)a,b	71 (44.1)a,b	74 (39.6)b	0.001
	Late	76 (44.2)a	78 (48.8)a,b	90 (56.6)a,b	90 (55.9)a,b	113 (60.4)b	

Letters a and b refer to the post hoc test with Bonferroni. p value < 0.05

PC palliative care

[a] Pearson's chi-squared test with linear association

cancer types. The time interval between the advanced cancer diagnosis and death ($p < 0.001$), the time interval between the advanced cancer diagnosis and PC consultation ($p < 0.001$), the time interval between PC consultation and death ($p = 0.002$), and the number of PC consultations ($p = 0.003$) by cancer type exhibited statistically significant differences. The intervals between advanced cancer diagnosis and death and between advanced cancer diagnosis and PC consultation were the highest in patients with urological cancer (medians = 19.4 and 13.2 months, respectively), lower GIT cancer (medians = 18.7 and 12.2 months, respectively), and breast cancer (medians = 18.4 and 9.7 months, respectively). These intervals were the lowest in patients with cancer of the upper GIT (medians = 7.6 and 4.4 months, respectively) and head and neck (medians = 9.1 and 2.9 months, respectively). The time interval between first PC consultation and death was increased in patients with head and neck cancer (median = 3.7 months) and reduced in hematologic patients (median = 1.0 month). Hematologic patients also had a reduced number of PC consultations (median = 1).

Figure 1 presents the timing of the first PC consultation in patients as a function of time from advanced stage cancer diagnosis to death: late PC/poor survival, $n = 188$ (22.4%) (TACD < 6 months and TCD < 3 months; yellow); much too late, $n = 152$ (18.1%) (TACD > 6 months and TCD < 1 month; dark red); too late, $n = 107$ (12.7%) (TACD > 6 months and TCD > 1 month and < 3 months; light red); appropriate, $n = 127$ (15.1%) (TACD > 6 months and TCD > 3 months and < 6 months; light green); appropriate/ideal, $n = 186$ (22.1%) (TACD > 6 months and TCD > 6 months and <24 months; dark green); and much too early, $n = 43$ (5.1%) (TACD > 6 months and TCD > 24 months; gray).

When assessing the mean time between advanced cancer diagnosis and first PC consultation, 30 (30/839, 3.6%) of the patients were not included given that referral and consultation occurred before the diagnosis of advanced stage disease. One (1/988, 0.1%) patient sought PC without referral by the professionals responsible for care and was hence not considered in the analysis of time between referral and first PC consultation (Supplementary Table 2).

Factors associated with palliative care referral

Younger patients (mean age, 58.4 vs. 60.6 years; $p = 0.002$), women (53.5 vs. 46.5%; $p = 0.078$), those married or with partners (67.1 vs. 32.9%; $p = 0.184$), and patients with upper GIT cancer, lower GIT cancer, urological cancer, or breast cancer were more likely to receive PC consultations. For delayed PC consultation, the variables cancer type ($p = 0.013$) and age at the time of diagnosis ($p = 0.068$) were selected for the multivariate analysis ($p < 0.2$) (Table 3).

The corrected multivariate regression revealed that cancer type ($p = 0.001$) and age (odds ratio (OR) = 0.98, $p = 0.016$) were related to PC consultation. Patients with hematologic cancer exhibited lower chances of receiving PC consultation (OR = 0.37, $p = 0.001$), whereas patients with gynecologic cancers exhibited higher chances of receiving PC consultation (OR = 2.17, $p = 0.011$). Finally, patients with primary tumors of the upper GIT were associated with higher chances of late PC consultation (OR = 2.42, $p = 0.001$) (Table 4).

Discussion

To the best of our knowledge, this is the first study to examine the proportion of patients with access to PC service and to identify the factors associated with PC referrals in the Brazilian population. The results revealed that more than half of the study population had access to the PC service and could receive care from an active multidisciplinary team. Furthermore, we found a trend of an increasing number of patients who received late PC consultations during the 5-year study period (2010 to 2014). Our study identified age and cancer type as determinants to referral time and access to PC service.

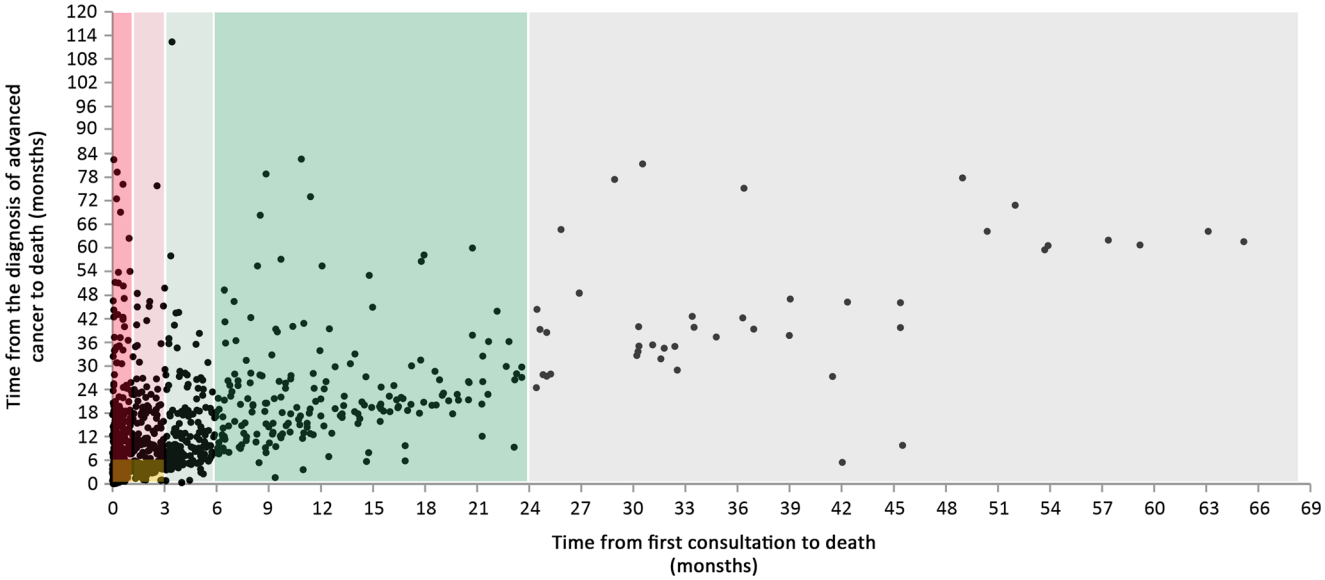

Fig. 1 Plots of survival times based on the first palliative care consult and diagnosis of advanced diseases. All cases with at least one PC consultation were plotted in a scatter diagram, with "time from consultation until death (TCD)" on the *x*-axis and "time from advanced cancer diagnosis until death (TACD)" on the *y*-axis. Thus, categories of potential PC referral "problems" were created and marked with colors on the graph: yellow represents late referral for cancer that was diagnosed late (prevention problem) or was extremely aggressive; red represents late referral of cases that could have been referred earlier (dark red: much too late < 1 month; lighter red, too late, > 1 and < 3 months); green represents cases with PC consultations at least 3 months before death (light green, appropriate > 3 and < 6 months; dark green, appropriate/ideal > 6 and < 24 months); and gray represents cases with PC consultations more than 24 months before death, possibly suggesting excessively early referrals (much too early)

Although it is not considered an ideal rate, the results reveal that the proportions of patients who were referred to PC and had a PC consultation were relatively high compared with studies from other countries [12, 13, 18–20]. This finding might be related to growing evidence on the benefits of PC integrated into standard oncology care and to the fact that the Barretos Cancer Hospital has a unit dedicated exclusively to PC, which is composed of a multiprofessional team that offers comprehensive care focused both on the early management of symptoms (outpatient unit) and end-of-life care (inpatient unit and home care program). Additionally, a significant increase was noted in the proportion of patients with late PC consultation during the study. Although it has not been evaluated in the present study, the literature indicates that late access to PC has a negative impact on the management of various physical and psychosocial symptoms and quality indicators of end-of-life care compared with timely access [13]. This unexpected trend might be related to advancements in the field of medicine in recent decades, which has allowed for greater knowledge on cancer and has thus promoted the introduction of novel effective systemic therapies, such as targeted drugs, immunotherapy, and new chemotherapeutic agents [14, 21]. Prior to 2010, BCH's clinical oncology and radiotherapy teams treated patients with all types of primary neoplasia. After 2010, the teams were gradually grouped in different workstations; each doctor began to treat only specific types of tumors. Unfortunately, members of the palliative care team did not participate in any workstation. Parallel to this change, there was a structural improvement of the Clinical Research Unit of the hospital and an administrative stimulus for referral of patients for participation in clinical trials. Oncologists with better knowledge about new treatment options and the availability of new drugs in a clinical research context could partially explain the observed trend for the late PC referral. Additionally, oncologists also report difficulty making decisions about the ideal time to initiate a discussion about follow-up by a PC team and about discontinuing palliative chemotherapy [22]. In a previous Brazilian qualitative study [23], researchers found that advanced cancer patients had little knowledge about PC and the forthcoming strategies for their clinical follow-up when their chemotherapy was stopped. In addition, there was a clear misperception that the PC unit is only "a place to die." The aforementioned contents could function as barriers to referral to PC in Brazil.

The present study evaluated the factors related to PC access. Female sex and being married or living together were associated with increased chances of referral to PC. A possible

Table 3 Univariate analysis for clinical and sociodemographic predictors associated with palliative care referral

Variable		Consultation PC		p value[a]	Consultation PC		p value[a]
		No n (%)	Yes n (%)		Early n (%)	Late n (%)	
Gender	Male	184 (41.3)	390 (46.5)	0.078	187 (47.7)	203 (45.4)	0.507
	Female	261 (58.7)	449 (53.5)		205 (52.3)	244 (54.6)	
Marital status	Single/separated or divorced/widowed	163 (36.6)	276 (32.9)	0.184	133 (34.0)	143 (32.0)	0.534
	Married or with partner	282 (63.4)	562 (67.1)		258 (66.0)	304 (68.0)	
Education	< 8 years	338 (76.0)	656 (78.3)	0.412	306 (78.1)	350 (78.5)	0.983
	≥ 8 to 11 years	66 (14.8)	122 (14.6)		58 (14.8)	64 (14.3)	
	> 11 years	41 (9.2)	60 (7.2)		28 (7.1)	32 (7.2)	
Cancer type	Breast	50 (11.2)	102 (12.2)	< 0.001	55 (14.0)	47 (10.5)	0.013
	Urological	56 (12.6)	108 (12.9)		55 (14.0)	53 (11.9)	
	Upper GIT	65 (14.6)	123 (14.7)		40 (10.2)	83 (18.6)	
	Head and neck	34 (7.6)	93 (11.1)		53 (13.5)	40 (8.9)	
	Low GIT	66 (14.8)	109 (13.0)		55 (14.0)	54 (12.1)	
	Lung	58 (13.0)	87 (10.4)		37 (9.4)	50 (11.2)	
	Gynecologic	20 (4.5)	84 (10.0)		43 (11.0)	41 (9.2)	
	Skin and soft tissue	32 (7.2)	48 (5.7)		18 (4.6)	30 (6.7)	
	Hematologic	41 (9.2)	29 (3.5)		12 (3.1)	17 (3.8)	
	Others	23 (5.2)	56 (6.7)		24 (6.1)	32 (7.2)	
Age diagnosis	Mean (SD)	60.6 (14.3)	58.4 (13.2)	0.002	57.6 (12.9)	59.2 (13.5)	0.068

SD standard deviation, *PC* palliative care, *GIT* gastrointestinal tract

[a] Univariate analysis using Pearson's chi-squared and Mann-Whitney test. p value < 0.2

explanation is that women receive fewer end-of-life medical interventions due to their preferences regarding treatment and care [12]. The spouse may also represent the patient in decision making [13]. Age was considered an important factor for access to PC. The lower the age was, the higher the chances of having a PC consultation. A previous study found that younger patients (< 60 years) received more PC consultations [24]. Younger patients also required more palliative support due to the presence of a higher symptom burden and more traumatic physical and mental impact by the disease [13].

The present work also demonstrates that patients diagnosed with a hematologic malignancy had reduced access to PC,

Table 4 Multivariate logistic regression analysis for clinical and sociodemographic predictors associated with palliative care referral

		Consultation PC (yes)			Consultation PC (late)		
Variable	Category	N (events)	OR (95% CI)	p value[a]	N (events)	OR (95% CI)	p value[a]
Age diagnosis	–	1284 (839)	0.98 (0.98–0.99)	0.016	–	–	–
Cancer type	Breast	152 (102)	1	–	102 (47)	1	–
	Urological	164 (108)	1.12 (0.69–1.83)	0.639	108 (53)	1.12 (0.65–1.93)	0.664
	Upper GIT	188 (123)	1.03 (0.64–1.63)	0.899	123 (83)	2.42 (1.41–4.17)	0.001
	Head and neck	127 (93)	1.43 (0.85–2.41)	0.177	93 (40)	0.88 (0.50–1.55)	0.667
	Low GIT	175 (109)	0.87 (0.55–1.39)	0.576	109 (54)	1.14 (0.66–1.97)	0.615
	Lung	145 (87)	0.82 (0.50–1.33)	0.428	87 (50)	1.58 (0.88–2.81)	0.119
	Gynecologic	104 (84)	2.17 (1.19–3.95)	0.011	84 (41)	1.11 (0.62–1.99)	0.710
	Skin and soft tissue	80 (48)	0.76 (0.43–1.34)	0.346	48 (30)	1.95 (0.96–3.93)	0.062
	Hematologic	70 (29)	0.37 (0.21–0.68)	0.001	29 (17)	1.65 (0.71–3.82)	0.236
	Others	79 (56)	1.25 (0.69–2.26)	0.461	56 (32)	1.56 (0.80–3.01)	0.184

PC palliative care, *OR* odds ratio, *CI* confidence interval, *GIT* gastrointestinal tract

[a] Multivariate logistic regression analysis. p value < 0.05 Wald test

underwent less PC follow-up, and had fewer PC consultations compared with patients with solid tumors. PC consultation began at a median of only 1 month prior to death. The results of the present work are consistent with the literature, demonstrating that patients with a hematologic malignancy exhibit substantial physical and mental symptom burdens, which results in the frequent administration of end-of-life chemotherapy, hospitalizations, and deaths in the hospital, including in intensive care units. Thus, these patients are more prone to receiving aggressive end-of-life care [25]. The reason for this observation lies in the particularities of prognosis, the evolution of the disease, therapeutic options, the intensity of treatment, and the clinical interventions offered to patients with this type of malignancy [26]. These differences reflect what is already known in clinical practice and suggest the need for specific interventions ranging from education to the adaptation of services to integrate this type of cancer in PC [26].

A large proportion of patients with upper GIT cancer frequently received late referral to PC and had late PC consultations. This finding may be related to the late diagnosis of the disease and to a deficiency in the prevention and primary medical care, which leads to late arrival at the health care services with a relevant burden of symptoms due to the aggressiveness of the disease itself. Additionally, patients with gynecologic cancer had better access to PC, were typically referred to PC within the ideal time (median time of 6.9 months between advanced cancer diagnosis and first PC consultation), and had early consultations (median time of 3.1 months between first PC consultation and death). This result might be due to the high symptom burden among patients with gynecologic cancer, which are effectively improved by PC [27, 28]; the few therapeutic options for this resistant disease; and the cultural influence of gynecologic oncologists to refer patients to PC [13, 28]. In the current study, the physicians who referred the patients to the PC service were not examined. Physicians' knowledge and personal stigma about PC likely interferes with the PC referral patterns [13, 29]. Further research is needed to investigate whether PC referral really differs among different oncology subspecialties or according to physicians' personal characteristics (age, nationality, gender, PC education background, etc.).

In addition to the clinical and sociodemographic factors associated with access to PC, variation in the timing of PC consultation was noted. The timing is ideal when there is sufficient time until death to perform PC and achieve the intended results of this medical specialty. Approximately 30% of the evaluated cases had PC consultations less than 3 months prior to death and had at least 6 months between the diagnosis of advanced stage disease and death. Thus, those patients could have received PC for a longer time if they were referred earlier. We believe that this subgroup of patients should be educated about PC, and actions should be taken to integrate PC with ecology in patients whose PC referral timing is potentially modifiable.

In view of these variations in the timing of PC consultation, we believe that referral protocols must be established with a consensus regarding the criteria that allow for the identification of the ideal timing for PC referral. The American Society of Clinical Oncology (ASCO) provisional clinical opinion recommends early PC referral for all patients with metastatic cancer and/or a high symptom burden [3].

Findings from a recent Delphi Survey conducted by Hui et al. [17] resulted in 11 major and 36 minor criteria for the referral of advanced cancer patients to PC based on the integration among clinical structure, processes and results, education, and research. The implementation of a protocol with referral criteria adapted to each institution is important to standardize the clinical practice, avoid referring patients when it is too late when they can and should be referred earlier, and prevent overloading the high-demand service when patients are needlessly referred early to PC (in our study, ~ 5% of the patients were referred more than 24 months prior to death).

In the present study, 15% of referred patients were not effectively consulted by the PC team (although referred to PC). Based on clinical observation and the literature, several reasons could be considered: lack of standardized criteria for physicians to refer patients to the PC service [17, 29]; late referral, with death occurring before consultation due to the aggressiveness of the disease [13]; stigma, misconceptions, and poor knowledge of PC by the patients [23], which impedes or increases the time to effectively consult on PC; and financial and transportation problems in cases of poor families. Further prospective studies are needed to determine the barriers to PC consultation in our context.

The present study exhibits some limitations. First, the present work is a retrospective study. Second, the possibility of the cause of death having been secondary to cancer was not investigated, which potentially interfered with the results, thus changing the outcome of cancer history. However, all included patients had a diagnosis of advanced terminal cancer, and the probability that death was directly or indirectly related to the disease was very high. Third, anatomical regions rather than specific cancer subtypes were considered (e.g., upper GIT, gynecologic). Additionally, data were based on patients who attended a single service, which might not reflect the overall reality of Brazil, given that few places exhibit a physical and health care structure similar to the one evaluated in the present work. Thus, these limitations may limit the generalizability of our results to other care settings. However, this institution represents the Brazilian population given that it admits patients from all states of the country. Considering that the hospital covers a large geographical area of Brazil, current city of residence (particularly very distant cities) could influence the referral pattern of patients to PC. Unfortunately, these data were not captured from the medical charts. Additionally, it is possible that patients with advanced cancer die outside the city of Barretos, particularly in distant small cities, and the hospital

is not updated. However, the Hospital Cancer Registry is considered very active, and it is currently estimated that less than 5% of the patients can be considered as lost to follow-up secondary to a non-informed death. Finally, the inclusion of patients with at least 3 months of clinical follow-up in the hospital immediately before death possibly affected the results at least partly by excluding patients with short survival. However, the present study is part of a larger project that encompasses and analyzes the impact of PC in the reduction of the aggressiveness of care in the last months of life. Thus, it was necessary to include these patients with follow-up in the last months of life.

Conclusions

The present work demonstrates that greater than half the studied population received PC consultations, and an increase in late PC consultations was noted throughout the study period. Three out of 10 patients had a late referral, even when they could have received PC earlier. Hematologic patients received PC consultations less frequently. Patients with upper GIT tumors received PC consultations later than other patients. Additional studies will be necessary to indicate the reality of other countries and populations. Understanding the different scenarios will improve individualized access to high-quality PC.

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Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

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