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Research article

The use of Palliative Performance Scale as the Sole Prognostication Tool among Patients Transferred Under Palliative Care: A Single Institution's Experience in Qatar

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Abstract

Background: The demand for cancer palliative care services in Qatar is increasing due to the increase in the number of people with advanced cancer who require supportive measures and end of life care. End-of-life prognostication is a vital step to determine survival; however, this is extremely challenging, and requires precise tools besides clinicians' judgments. The palliative performance scale (PPS) tool is used to prognosticate survival and to assess patients 'symptoms at the National Centre for Cancer Care and Research (NCCCR). Purpose: The aim is to analyse the correlation between PPS and overall survival (OS) and to report the experience of using PPS as a sole prognostication tool among patients transferred under palliative care at NCCCR in Qatar. Method: This is a retrospective cohort study. Data of advanced cancer patients who were accepted under the palliative care program were retrieved from the electronic medical record from January 1, 2017 until December 31, 2021, to test the accuracy of PPS in estimating the prognosis and survival time. The PPS scores were compared with the dates of death for each patient. Result: The findings revealed that the initial PPS is a significant predictor for overall survival, along with the type of cancer, but not with age or gender. There are clinical differences between PPS scores of ≤30% and those of 40% or more; therefore, PPS ≤30% was chosen as a cut-off value in this present study. The results revealed a statistically significant higher OS for patients with PPS of 40% to 80% compared to those with PPS of ≤ 30% (p= 0.03). Conclusion: There is a need to couple PPS with other prognostication tools to achieve accuracy in predicting overall survival time for cancer patients under palliative care.

Keywords: Palliative care, palliative performance score, prognostication tool, survival time, advanced cancer

Introduction

Since the early 1980s, the need for palliative care in overall cancer management has been progressively acknowledged worldwide. It has been reported in the Global Atlas of Palliative Care, 2nd edition, 2020 that more than 58 million patients require palliative care, of whom 28% have cancer-related causes and more than 26 million are nearing their last days of life [1]. The final stages of each disease trajectory are different. Advanced cancer patients may have a relatively good performance status for a long period of time, then experience rapid deterioration until death [2]. Therefore, reaching an accurate prognostication for advanced cancer patients is a crucial step to better coordinating treatment plans between patients, families, and the medical team. This specific information helps patients and their families to bring closure to life matters, such as financial, social, or emotional aspects [3]. It also enables health care professionals to draw up end-of-life plans that fulfill patients' and families wishes and preferences.

In addition, early prediction of the end of life will facilitate patients' transition from active, aggressive care to palliative and end-of-life-care. [4] The stage and progression of cancer influence survival time; however, end-of-life prognostication in palliative care is extremely challenging, even for the most experienced clinicians [2,3]. The complexity of interchangeable factors among patients, families, and the health system influenc-

es clinicians' predictions of end-of-life [4], yet cancer patients with advanced disease as well as their families expect that their primary physicians should provide them with the most accurate prognosis possible, especially when there is uncertainty related to the benefits of further anticancer treatment [5]. Thereby, it is highly recommended to incorporate clinical perception with a validated and reliable prognostic tool [6].

Many end-of-life prognostic tools are available in palliative care. The palliative performance scale (PPS) is one of the most studied prognostic tools in palliative care [5]. The PPS was developed from the Karnofsky Performance Scale to assess physical and functional performance in palliative care patients. At the beginning of its use, it was not meant to be used as prognostication tool [6]. The PPS measures five elements: degree of ambulation, activity level, extent of disease, self-care, oral intake, and consciousness status [2]. The PPS has 11 categories with 10% increments. A patient with PPS 0% means dead, whereas a patient with PPS 100% means fully ambulatory and healthy [2,7].

The Palliative Performance Scale (PPS) has been mainly used as the sole tool to help in assessing prognosis among palliative cancer patients at the National Center for Cancer Care and Research (NCCCR) in Qatar since 2013. The supportive and palliative care department in the NCCCR is the single institution in Qatar that pro-vides palliative care services for all adult cancer patients. One of the expected outcomes of the present study is to enhance the quality of end-of-life care, including the accurate timing of patients' transition from active to palliative care. In addition, it will assist in achieving the National Cancer Framework 2017–2022 objectives in terms of ongoing care for cancer patients.

According to NCCCR guidelines, the PPS is a tool that must be used when a patient is first evaluated for pal-liative care. However, the accuracy of this tool in end-of-life prognostication has not been tested, evaluated alongside the clinicians' predictions, or compared with the overall survival time for patients with advanced progressive cancer, who transferred completely under palliative care.

Literature has reported that the PPS tool was not specifically developed as a prognostic tool [6]. The PPS, which is modified from the Karnofsky Performance Tool, was initially developed to measure physical status in palliative care patients [8]. In addition, it has previously been used to categorize patients into prognostic groups [6]. Accurate prognostication in palliative care, especially at end-of-life, is crucial as it governs sensitive and im-portant clinical decisions in this specific group of patients. This goal can be achieved through meticulous re-porting on the use of PPS as a sole prognostication tool and the need to couple it with other tools that have proven accuracy in prognostication.

The aim of this study is to analyze the correlation between PPS and overall survival (OS) and report on the use of PPS as a sole prognostication tool among patients transferred under palliative care at NCCCR in Qatar.

Materials and Methods

Study design

This is a retrospective cohort study. Data were retrieved from the electronic medical record (EMR) for all advanced cancer patients who are not candidates for any cancer-directed therapy and were transferred under palliative care in NCCCR in Qatar from January 1st, 2017 to December 31st, 2021. Demographic data included were age, gender, and the primary site of cancer. The PPS scores that have been recorded at the first day of acceptance under the palliative care program were obtained. To define the direct survival time, the difference between the day of death and the date of first acceptance under palliative care was calculated for each patient to represent the direct OS of those patients.

Population

All adult patients (>14 years of age) with the diagnosis of advanced, progressive cancer, whether oncology or hematology, who were admitted to the National Center for Cancer Care and Research (NCCCR) and accepted under the supportive and palliative care program were included in this study. The study excluded patients who had no initial PPS assessment documented in the EMR when transferred under the palliative care program. Patients who preferred to return to their home country permanently were also excluded due to a lack of direct OS.

Statistical analysis

Descriptive statistics were used in this study to summarize data from the sample utilizing indices, including means, SD, median, IQR, percentages, and frequencies. The log rank test was used to see the difference in sur-vival time in days by PPS, and Kaplan-Meier (KM) survival curves by PPS were calculated to demonstrate the difference in OS according to the initial PPS score. A $p < 0.05$ was considered statistically significant for all statistical tests. Statistical analysis Data was analyzed using Statistical Package STATA 17.0 software.

Results

Patient Characteristics

The present study included 400 eligible patients over five years. The median age of patients was 62 years, with a higher percentage of patients (44%) in the middle-aged group, between 45 and 64 years old. There were 209 (52%) female patients, and 191 (48%) male patients. A minority of patients included (3%) had hemato-logical malignancies. Patients with oncological malignancies were grouped according to the most common primary tumor. Gastrointestinal tumors (20%) were the most common, followed by hepatobiliary and breast tumors (18%) and (14%), respectively. Primary brain tumors (4%) were the least common tumor type. The characteristics of the patients of this cohort study are shown in table 1.

Initial PPS

The majority of patients in this study (74%) had an initial PPS between 30% and 40%, while patients with an initial PPS of 10% to 20% (7%) and between 50% and 80% (19%) were minority. Patients with a PPS of ≤ 30% were (57%) compared to those with a PPS of 40%-80% were (43%) (Table 2). There were no included pa-tients with an initial PPS score of 90% or 100%.

Overall Survival by PPS

The overall median survival time for the whole group was 17 days (IQR:7 to 40 days) (Table 3 and figure 1). To test the correlation between initial PPS and overall survival, patients were

Table 1. Participant characteristics

Variables	Level	Value
N		400
Age, mean (SD)		61 (14)
No. of patients per age group(yrs.)	<45 yrs.	56 (14%)
	45 to 64 yrs.	174 (44%)
	65 to 74 yrs.	101 (25%)
	75 to 84 yrs.	56 (14%)
	>=85 yrs.	13 (3%)
Gender	Male	191 (47%)
	female	209 (52%)
Type of cancer	Brain	17 (4%)
	Breast	56 (14%)
	GI	80 (20%)
	Gynecology	51 (13%)
	Hematology	13 (3%)
	Hepatobiliary	71 (18%)
	Lung	34 (9%)
	Other	78 (20%)

Table 2. Initial PPS score

Variables	Label	N (%)
Initial PPS score in the day of admission	10%	12 (3%)
	20%	17 (4%)
	30%	200 (50%)
	40%	96 (24%)
	50%	52 (13%)
	60%	5 (1%)
	70%	17 (4%)
	80%	1 (0.3%)
Initial PPS score in the day of admission	<=30%	229 (57%)
	40%-80%	171 (43%)

subdivided into two groups, those with a PPS of ≤ 30% versus those with PPS of 40% to 80%. The median survival time of patients with ≤ 30 % PPS score was 15 days (IQR: 5 to 36 days) versus those with a PPS score of 40% to 80% of initial PPS score was 21 days (IQR: 11 to 45 days) (Fgure 2). The results of the current study showed a statistically significant higher OS for patients with PPS of 40% to 80 % compared to those ≤ 30% (p= 0.03).

Discussion

The PPS in this study was measured using the PPSv2 to predict overall survival time by palliative care physi-cians and nurses initially at the time of acceptance of patients under the supportive and palliative care pro-gram in the NCCCR. Results of the present study showed a statistically significant difference in overall sur-vival between palliative care patients with an initial PPS of 30% or less compared to patients with an initial PPS of 40% to 80% (p=0.03). These findings are consistent with the majority of earlier research that demon-strated the PPS's prognostic utility in differentiating between palliative care patients in terms of overall survival [9-12].

The findings of this study revealed that differences in gender and age among participants did not significantly affect the overall survival time. However, cancer types among participants showed significant differences in overall survival times. For instance, patients with GI cancer, which included cases of colorectal cancer, and gynecology had higher survival rates than those with hepatobiliary cancer. When PPS was utilized in other studies, cancer type was a significant factor impacting total survival time [2,4,13]. This study's findings are contradictory with a Canadian study in 2006, initial PPSv2 was affected by gender and age but not by cancer type, and this difference had a statistically significant impact on overall survival [14]. In Vankun and col-leagues' (2022) study, it was reported that gender, cancer type, and non-cancer conditions significantly af-fected overall survival, while age did not significantly affect OS [13,15]. In the present study, a PPS of 30% was chosen as a cut-off value because of the clear clinical differences between PPS scores ≤ 30% and those of 40% or more, especially in these elements of PPS: totally in

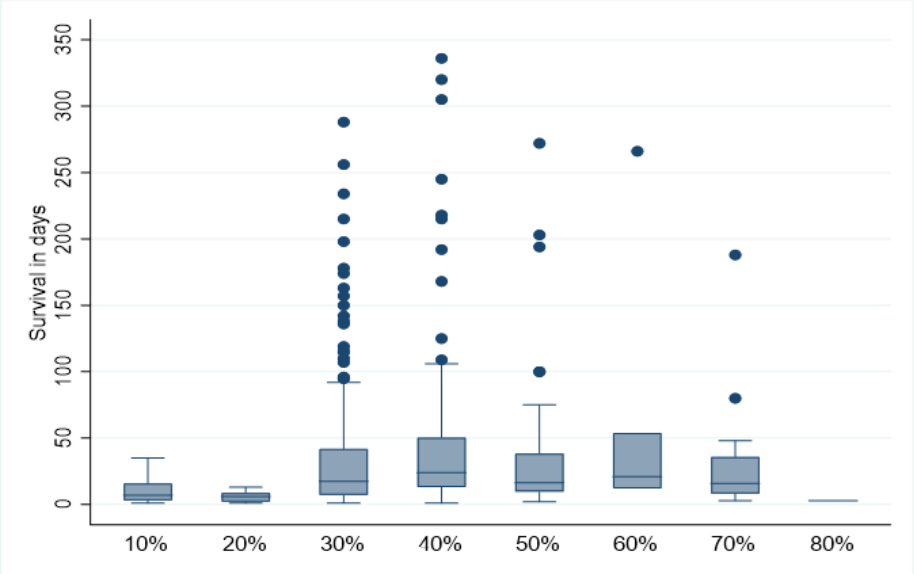

Figure 1. Initial PPS score and Survival time in days

Table 3. Patients' characteristics with survival Time

		Survival Time (In Days)				
Variable	Label	Mean (95% CI)	Median (IQR range)	Range	No. of Patients	Percent
Age	<45 yrs.	31 (21.08,40.24)	17 (8,43.5)	0- 192	56	14
	45-64 yrs.	30 (22.88,36.32)	16 (7,32)	0- 272	174	44
	65-74 yrs.	46 (32.68,58.59)	17 (7, 50)	1-266	101	25
	75-84 yrs.	42 (25.73,57.59)	20 (7.5, 47.5)	0-288	56	14
	85+ yrs.	73 (24.46,122.15)	35 (21, 74)	4-305	13	3
Gender						
	Male	32 (25.63,38.51)	16 (0, 256)	0-272	191	48
	Female	41 (32.92,49.85)	17 (1,305)	0-336	209	52
Type of cancer	Brain	38 (18.26,53.27)	23 (9-50)	1-138	17	4
	Breast	40 (24.96,54.82)	19 (1,39)	1-266	56	14
	GI	36 (22.33,49.05)	14 (7,29.5)	1-320	80	20
	Gynaecology	52 (30.37,72.8)	20 (9,58)	0-336	51	13
	Haematology	21 (5.7,37.07)	12 (7, 20)	2-110	13	3
	Hepatobiliary	28 (18.97,36.78)	15 (6, 31)	0-178	71	18
	Lung	35 (15.94,53.3)	18 (6,39)	0-272	34	9
	Other	39 (27.85,49.36)	23 (9,50)	1-256	78	20
Initial PPS						
	10%	10 (3.48,17.06)	5(1,16)	0-35	12	3
	20%	6 (3.9,7.63)	6 (2,9)	1-13	17	4
	30%	35 (28.3,42)	17(6,41.5)	0-288	200	50
	40-80%	44 (34.32,53.3)	21 (11-45)	1-336	171	43

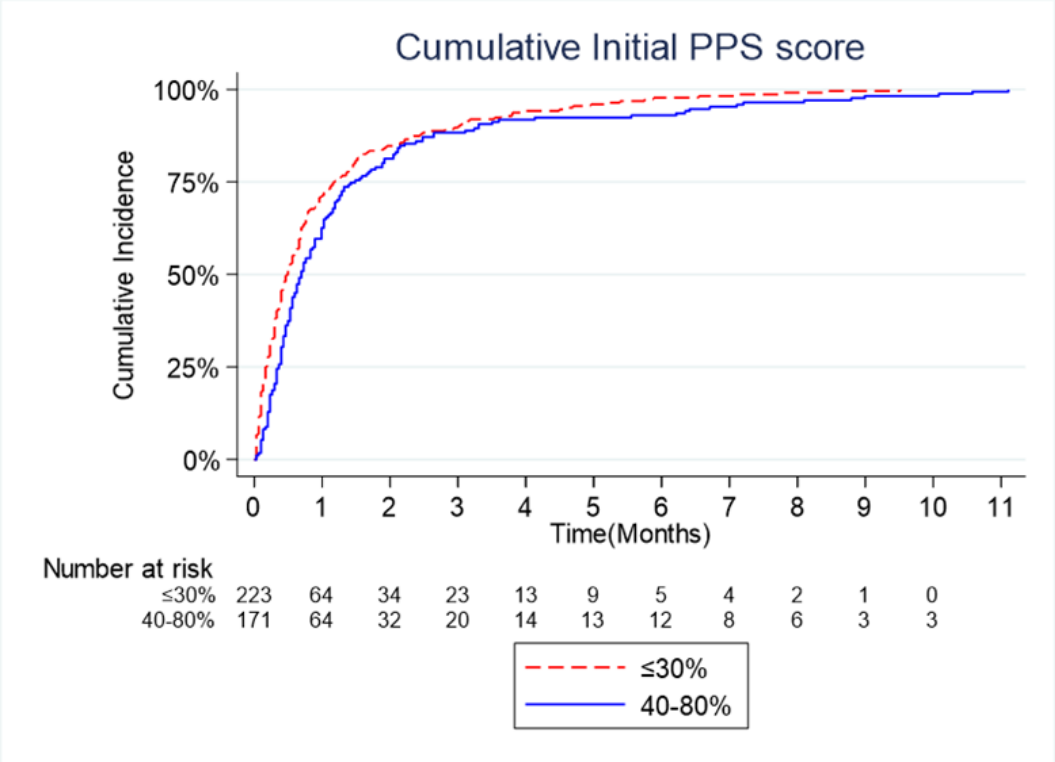

Figure 2. Cumulative incidence by PPS groups.

bed, no ambulation, cognitive status, and self-care. Several studies supported our study's identical conclusion that patients with higher PPS scores had long-er survival times [7, 15,16].

Moreover, findings of this study revealed the presence of a tail effect in the PPS, especially at very low levels (PPS 10% to 20%) and high levels (PPS 60% to 80%). This tail effect has also been reported by Lau et al.'s (2009) study, which suggests that this tail effect could be due to other cofounding factors such as tumor type, associated symptoms, presence of other co-morbidities, psychological status, biologic makeup, and the envi-ronment. This tail effect will render it difficult to accurately differentiate between patients with PPS of 10% and those with PPS of 20%, as well as between patients with PPS of 60% and those with PPS of 70% or 80% [4].

It is important to report that there is an inevitable high level of subjectivity when using the PPS tool, especially if it is used as a sole prognostic tool among palliative care patients. PPSv2 is a person-operated tool, and the scoring process is based on how well the user can interpret PPSv2. Clinically, there are minor differences be-tween the parameters of the PPS tool. As a result, health care providers use their clinical judgment to prognos-ticate [12,17]. This can manifest itself, particularly when two health care providers assess the same patient using the PPS. These findings were supported by Leu et al. (2009) that the parameter in PPS has a close reduc-tion in each increment, which makes PPSv2 subjective to best-fit judgment compared to other functional per-formance tools. To increase the accuracy of the PPS tool as a prognostic one, it must be properly read and in-terpreted by health care providers [18]. Some palliative care experts, who were interviewed for Ho and colleagues' (2008) study, found that PPS is more difficult to score at certain PPS levels. Some clinicians reported it is troublesome to differentiate between certain PPS levels, such as between PPS 30% and 40% or between PPS 80% and 90% [19]. Most available prognostic tools (PPS, PaP, and PPI) depend greatly on the assessment of functional status as their primary component. In addition, their scoring systems are relatively complex and somewhat unclear. Furthermore, the majority of prognostic tools, such as PPS, are largely subjective, which may reduce their accuracy [20].

One good clinical example in the NCCCR of the shortcoming of the PPS in accurately predicting OS in this study is a 60-year-old female with the diagnosis of recurrent grade 2 astrocytoma of the brain. She was initial-ly scored with a PPS of 20% because she was unconscious, bedbound, and on a gastrectomy tube feeding; however, she ended up living for five years.

The conclusion drawn from the above findings indicates that PPS cannot be used as a sole prognostic tool among palliative care patients at their initial acceptance, when aiming for accuracy. In a prospective study conducted in South Korea comparing the PPS, Palliative Prognostic Index (PPI), and Palliative Prognostic (PaP) to complement the clinician's prediction of survival (CPS), it was found that CPS and PaP had consistently better performance than PPS or PPI alone [10]. Literature explained that PPS as a sole tool can be rela-tively accurate when there are the right circumstances, such as patients with days to live and experienced cli-nicians [2,10,16,17]. According to Oğuz et al. a shorter time scale was recommended because advanced cancer patients receiving palliative care tend to be frail and their clinical status can rapidly change.

Based on the findings of this present study, it is suggested that the use of PPS as the sole prognostication tool would be less than optimal, especially for very low or very high scores. Combining PPS with another prognos-tication tool such as CPS would lead to a more accurate prediction of survival among patients with advanced cancer diagnoses. In addition, the PPS should be accurately read in order to reach the most appropriate score. This will also eventually decrease the inherited subjectivity of the PPS [19].

Conclusion

The PPSv2 is a good prognostication tool for patients with an advanced, progressive cancer diagnosis under palliative care, but not when used alone. This is due to a high level of subjectivity and a tail effect at both low levels (PPS of 10%–20%), and high levels (PPS of 60%–80%). This study recommends combining PPS with other tools, such as PPI and PaP, to reach a more accurate prognosis for those patients.

Abbreviations

PPS: Palliative Performance Scale; OS: Overall survival; NCCCR: National Center of Cancer care and Research

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