Prognostic tools in palliative care: a scope review

Ferramentas prognósticas de sobrevida em cuidados paliativos: revisão de escopo

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ABSTRACT

BACKGROUND AND OBJECTIVES: The uncertainty of death's exact timing necessitates accurate survival predictions for better end-of-life care. This study was to map and guide the use of prognostic tools in palliative care (PC), despite the lack of comprehensive comparisons. The objective of this study was to identify the available evidence of the validated Prognostic Survival Scales used in patients in PC.

CONTENTS: A scope review was performed using the Joanna Briggs Institute method, with PCC methodology (population, concept, and context) in the Excerpta Medica Database (EMBASE), Medline (via EMBASE), Cumulative Index to Nursing and Allied Health Literature (CINAHL) Plus with Full Text, Latin American Literature in Health Sciences (LILACS) and SCOPUS. The review covered 504 studies published between 1999 and 2020, of which 40 remained after three selection stages. The study presents 13 different tools found and their prognostic factors in table form and characterize them one by one. The PPI (Palliative Prognostic Index) scale was present in 52.5% of the studies, appearing in the highest number of publications.

CONCLUSION: This scope review shows a still small number of studies related to prognostic tools in PC, in particular, addressing other life-threatening diseases, making it difficult to build international policies, as well as demonstrating their cost-benefit and effectiveness. The large number of different prognostic factors makes each scale more indicated and effective depending on the scenario, confirming the need for research to evaluate the applicability and effectiveness of these, not only in one, but in several different environments and situations.

Keywords: Death, Palliative care, Prognosis.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A incerteza quanto ao momento exato da morte exige previsões de sobrevivência precisas para melhorar o cuidado no final da vida. Este estudo visou mapear e orientar o uso de ferramentas prognósticas em cuidados paliativos (CP), apesar da falta de comparações abrangentes. O objetivo deste estudo foi identificar as evidências disponíveis sobre as Escalas Prognósticas de Sobrevida validadas utilizadas em pacientes em CP.

CONTEÚDO: Foi realizada uma revisão de escopo utilizando o método do Instituto Joanna Briggs, com a metodologia PCC (população, conceito e contexto) nas bases de dados *Excerpta Medica Database* (EMBASE), Medline (via EMBASE), *Cumulative Index to Nursing and Allied Health Literature* (CINAHL) *Plus with Full Text*, Literatura Latino-Americana em Ciências da Saúde (LILACS) e SCOPUS. A revisão cobriu 504 estudos publicados entre 1999 e 2020, dos quais 40 permaneceram após três etapas de seleção. Apresenta-se em 13 diferentes ferramentas encontradas e seus fatores prognósticos em formato de tabela e as caracterizamos uma a uma. A escala Índice Prognóstico Paliativo (PPI) estava presente em 52,5% dos estudos, aparecendo no maior número de publicações.

CONCLUSÃO: Esta revisão de escopo revelou um número ainda pequeno de estudos relacionados a ferramentas prognósticas em CP, especialmente abordando outras doenças com risco de vida, o que dificulta a construção de políticas internacionais, assim como demonstra o custo-benefício e a efetividade dessas

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HIGHLIGHTS

- This study pioneered the use of prognostic scales in cancer patients under palliative care.
- To identify the most commonly used scales in palliative care for cancer patients, this study compiled them in terms of objectivity, subjectivity and which used prognostic factors had the greatest impact on the scale.
- There is a scarcity of comparative studies, and those that do exist are limited to comparing the most widespread scales, such as the Palliative Prognostic Index and PaP (Palliative Prognostic Score). For this reason, it was not possible to carry out an investigation and determine more objectively which scale would be most effective

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ferramentas. O grande número de diferentes fatores prognósticos torna cada escala mais indicada e eficaz dependendo do cenário, confirmando a necessidade de pesquisas para avaliar a aplicabilidade e a efetividade destas, não apenas em um, mas em vários ambientes e situações diferentes.
Descritores: Cuidados paliativos, Prognóstico, Morte.

INTRODUCTION

There is great uncertainty around the exact moment of death[1]. An accurate survival prediction is essential for clinical, organizational, and ethical reasons, especially to prevent harm, discomfort, and inappropriate treatments in vulnerable patients, as well as to plan specific care strategies. This must be done considering that numerous studies have proven the efficacy of Palliative Care (PC) in improving quality of life and survival outcomes in severe conditions, both cancerous and non-cancerous[2].

Complex decisions on PC, including symptom management, artificial nutrition or end-of-life hydration and sedation, as well as difficult decisions regarding health, family, and personal life, depend on the patient's prognosis. For patients and family members, maintaining independence and improving communication and decision-making in the last days or weeks of life is a high priority[3]. Therefore, preparing for an unwanted functional state by predicting functional survival can help patients cope with it and can enable them to act and achieve goals while it is still possible to do so[4]. Using statistics or predicting mortality to convey a prognosis can offer a very narrow focus so both physicians and patients could benefit from broader views of prognostic communication[3].

In an attempt to improve prognostic accuracy, the European Association of Palliative Care (EAPC) published in 2005 recommendations on the use of prognostic markers in patients with advanced cancer[5] and other life-threatening diseases. These recommendations were informed by eight studies that examined different prognostic tools, which were published in the previous decade (1993-2003) and recommended a series of prognostic tools and their use[6].

Even with all the recommendations of the European Association of Palliative Care (EAPC), several prognostic tools have emerged over the years, however, to date, no study has presented all these tools and compared them. Therefore, the objective of this review was to map all available evidence on prognostic assessment tools developed and validated, used in the prognosis of survival of patients with life-threatening diseases and in PC and guide professionals, active or not in this area, as to their choice and use, in order to offer improvement in end-of-life care.

CONTENTS

The scope review was developed following the Joanna Briggs Institute methodology[7] and the PRISMA -ScR[8;2] with a protocol registered in the OSF Home: osf.io/34twb.

Inclusion Criteria

The Population, Concept and Context (PCC) methodology was applied to guide data collection and inclusion of studies. The Population listed was of adult patients (over 18 years) with severe, progressive disease that threatens the continuity of life and in Exclusive Palliative Care. The Concept encompassed all the validated prognostic survival scales, which, according to Schettino et al. in 2006, were developed as evaluation mechanisms to estimate the severity of diseases through scores, thus evaluating the effectiveness, cost and benefit of treatments, therapeutic decision and comparing survival results. Context is related to the prognostic evaluation of these patients in a hospital setting.

Experimental and quasi-experimental study designs were considered, including randomized controlled studies, non-randomized controlled studies, before and after studies and interrupted time series studies, analytical observational studies, descriptive observational study designs, theses, texts, opinions, text articles and opinion. Finally, only articles published from 1999 up to June 2020 were considered.

Data Sources

The databases selected for the scope review were Excerpta Medica Database (EMBASE), Medline (via EMBASE), Cumulative Index to Nursing and Allied Health Literature (CINAHL) Plus with Full Text, Latin American Literature in Health Sciences (LILACS), SCOPUS, Google Scholar, and gray literature.

Research strategy

Searches were performed in five electronic databases through the association of descriptors and free words using Boolean search corresponding to the conceptual blocks aimed at recovering studies on prognosis, survival, PC, and cancer. Studies published in English, Spanish or Portuguese were included. The review considered all published studies relevant, with no limit on the dates of publication. An article filter was applied with an abstract available for analysis, as described in table 1.

Selection of sources of evidence

The 504 records were imported into the Endnote Basic reference manager (by Clarivate Analytics), 37 duplicates were removed and 467 selected according to title and abstract and, afterwards, the full texts recovered were analyzed. The studies were analyzed by two independent examiners according to the eligibility criteria, resulting in 104 articles. Subsequently, 64 were excluded, totaling 40 articles eligible for the study (Table 1), according to the selection flowchart (Figure 1), which specifies each stage of the analysis, following the PRISMA 2009 *Flow Diagram* model[9].

RESULTS

In the 40 studies included in the review, 13 different prognostic tools were found, the detailed summary of which is shown in table 2. The following were identified: the PPI (Palliative Prognostic Index) in 52.5% (n = 21) of the studies; PaP (Palliative Prognostic Score) in 40.0% (n = 16); PPS (Palliative Performance Scale) in 25.0% (n = 10); OPS (Objective Prognostic Score) in 15% (n = 6); GPS (Glasgow Prognostic Score) in 7.5% (n = 3); Chuang PS (Chuang Prognostic Scale) in 7.5% (n = 3); KPS (Karnofsky Performance Status), D-PaP (Delirium-Palliative Prognostic Score), ECOG-PS (Eastern Cooperative Oncolo-

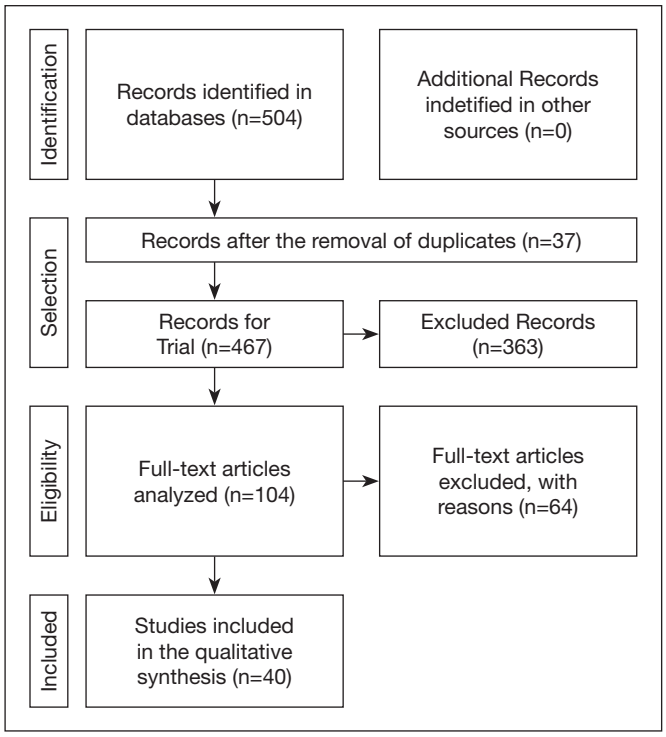

Figure 1. Flowchart of the inclusion and exclusion process of the studies

gy Group Performance Status) and PiPS (Prognosis in Palliative Care Study) in 5% (n = 2); and BCI (B12/CRP Index), mGPS (modified Glasgow Prognostic Score), OPPS (Objective Palliative Prognostic Score) with 2.5% (n = 1) each.

The countries of origin of the studies were: Japan in 17.1% (n = 9); South Korea in 14.6% (n = 6); Taiwan in 14.6% (n= 6); the USA in 12.2% (n=5); Spain in 7.3% (n = 3); the United Kingdom in 7.3% (n = 3); Italy in 4.9% (n=2); Mexico in 4.9% (n = 2); and Brazil, Saudi Arabia, Costa Rica, Ireland, Canada, the Netherlands and Australia with 2.4% (n=1) each.

Among the articles, 87.8% (n = 36) were in English, 9.8% (n = 4) in Spanish and 2.4% (n = 1) in Portuguese. Regarding the year of publication, it was observed that the most frequent interval was 2011-2015, in 53.7% (n = 22), followed by 2016-2020, in 24.4% (n = 10), 2005-2010, in 12.2% (n = 5), and the least frequent year interval was 1999-2004, in 9.8% (n = 4).

It is noteworthy that the cohort study was the most frequent and corresponded to 65.9% (n = 27) of the total number of articles found. Separating them into prospective and retrospective, these correspond to 36.6% (n = 15) and 29.3% (n = 12), respectively.

The summary analysis of the 40 included studies allowed the detailed identification of each prognostic tool, the main characteristics and prognostic factors used in its evaluation, as shown in tables 2 and 3.

Table 1. Records identified through search strategies in electronic databases

Database	Search Strategy	Records
Medline (via EMBASE)	(‘palliative therapy’/exp OR ‘palliation’:ti,ab OR ‘palliative care’:ti,ab OR ‘palliative consultation’:ti,ab OR ‘palliative medicine’:ti,ab OR ‘palliative radiotherapy’:ti,ab OR ‘palliative surgery’:ti,ab OR ‘palliative therapy’:ti,ab OR ‘palliative treatment’:ti,ab OR ‘symptomatic treatment’:ti,ab OR ‘hospice’/exp OR ‘hospice’:ti,ab OR ‘hospices’:ti,ab OR palliative *:ti,ab OR terminal*:ti,ab OR ‘advanced cancer’:ti,ab) AND (‘clinical prognosis of survival’:ti,ab OR ‘prognostic assessment’/exp OR ‘prognostic assessment’:ti,ab OR ‘prognostic index’/exp OR ‘palliative prognostic index’/exp OR ‘palliative prognostic index’:ti,ab OR ‘prognostic score’:ti,ab OR ‘palliative performance scale’:ti,ab OR ‘clinical prognostic *’:ti,ab OR ‘palliative prognostic score’:ti,ab) AND (cancer:ti,ab OR tumor*:ti,ab OR onco*:ti,ab OR neoplas *:ti,ab OR ‘neoplasms’/exp) AND (‘survival’/exp OR ‘cancer survival’/exp OR ‘cancer survival’:ti,ab) AND [medline]/lim NOT ([embase classic]/lim AND [medline]/lim) AND (‘article’/it OR ‘in article press’/it OR ‘review’/it)	319
EMBASE	(‘palliative therapy’/exp OR ‘palliation’:ti,ab OR ‘palliative care’:ti,ab OR ‘palliative consultation’:ti,ab OR ‘palliative medicine’:ti,ab OR ‘palliative radiotherapy’:ti,ab OR ‘palliative surgery’:ti,ab OR ‘palliative therapy’:ti,ab OR ‘palliative treatment’:ti,ab OR ‘symptomatic treatment’:ti,ab OR ‘hospice’/exp OR ‘hospice’:ti,ab OR ‘hospices’:ti,ab OR palliative *:ti,ab OR terminal*:ti,ab OR ‘advanced cancer’:ti,ab) AND (‘clinical prognosis of survival’:ti,ab OR ‘prognostic assessment’/exp OR ‘prognostic assessment’:ti,ab OR ‘prognostic index’/exp OR ‘palliative prognostic index’/exp OR ‘palliative prognostic index’:ti,ab OR ‘prognostic score’:ti,ab OR ‘palliative performance scale’:ti,ab OR ‘clinical prognostic *’:ti,ab OR ‘palliative prognostic score’:ti,ab) AND (cancer:ti,ab OR tumor*:ti,ab OR onco*:ti,ab OR neoplas *:ti,ab OR ‘neoplasms’/exp) AND (‘survival’/exp OR ‘cancer survival’/exp OR ‘cancer survival’:ti,ab) AND [medline]/lim NOT ([embase classic]/lim AND [medline]/lim) AND (‘article’/it OR ‘in article press’/it OR ‘review’/it)	67
LILACS	(tw:prognos* OR mh:prognosis OR tw: pronost *) AND (tw: palliat * OR tw:”advanced cancer” OR mh:”Palliative Care” OR tw:terminal* OR tw: hospic * OR tw:”end of life”) AND (tw:index OR tw:index OR tw:scale OR tw:score OR tw:PPI OR tw:PaP OR tw:pcs OR tw:”Palliative Prognostic Index”) AND (tw:survival OR mh:survival OR tw:survival OR tw:survival) AND (tw:cancer OR tw:tumor OR tw: neoplasm * OR mh:C04*)	38
CINAHL	((MH “Palliative Care”) OR (MH “Hospice and Palliative Nursing”) OR (MH “Terminal Care”) OR (MH “Hospice Care”) OR “palliative”) AND (“palliative prognostic index” OR ppi OR “Prognostic Score” OR “Performance Scale” OR pps OR pap) AND (survival AND (cancer* OR tumor OR onc * OR neoplas*))	62
SCOPUS	TITLE ((hospice* OR “End-of-Life” OR palliat * OR “Advanced Cancer” OR terminal*) AND (prognosis OR prognost * OR predict* OR “palliative prognostic index” OR ppi OR “Prognostic Score” OR “Performance Scale” OR pps OR pap) AND survival AND (cancer* OR tumor OR onco* OR neoplasm *)) AND NOT INDEX (medline) AND (LIMIT-TO (DOCTYPE , “ar”))	18
Total		504

Table 2. Articles selected for analysis and discussion in this scope review

Authors	Objectives	Tool	n	Types studies
Al-Zahrani et al.[10] Saudi Arabia	To test the accuracy of CPS in predicting in-hospital mortality of patients with advanced cancer.	Chuang PS	61	Prospective cohort study.
Alfaro-Campos and Vargas-Bermúdez[11] Costa Rica	To determine the validity of the Palliative Prognosis Index (PaP Score) in cancer patients referred to Costa Rica's National Center for Pain Control and Palliative Care.	PaP	100	Observational descriptive study (case series).
Arai et al.[12] Japan	To investigate the association between changes in PPI over time and survival of terminal cancer patients in a PC unit (PCU).	PPI	374	Retrospective cohort study.
Baik et al.[13] New York	To determine how the PPS tool was used to estimate end-of-life survival.	PPS	-	Systematic review and meta-analysis.
Chen et al.[14] Taiwan	To develop a short-term prognostic prediction method that included objective factors such as medical history, vital signs, and blood tests for use in patients with advanced cancer.	Objective Palliative Performance Score (OPPS)	234	Retrospective cohort study.
Cheng et al.[15] Taiwan	To evaluate the practical usefulness of the palliative prognostic index (PPI) as a prognostic tool used by specialist nurses in a hospice visit in Taiwan.	PPI	623	Retrospective cohort study.
Chou et al.[16] Taiwan	To analyze the applications of PPI, CCI and GPS as prognostic tools in terminal patients with hematological diseases under PC.	PPI/mGPS	217	Retrospective cohort study.
Méndez et al.[17] Spain	To comment on the errors related to prognostic prediction through the PaP scale.	PaP	-	Opinion article.
Naylor et al.[18] Brazil	To estimate the survival time of patients referred to the PC unit of the National Cancer Institute (INCA), using the Palliative Program Prognostic Score (PaP).	PaP	250	Prospective cohort study.
Ohno et al.[19] Japan	To evaluate the accuracy of the Palliative Prognosis Index (PPI) and the prognostic model developed in hospitalized patients under the care of a hematologist.	PPI	14	Retrospective cohort study.
Olajide et al.[20] USA	It explores the application of PPS for its predictive ability related to survival time.	PPS	261	Retrospective cohort study.
Peng et al.[21] Taiwan	To evaluate the usefulness of Eastern Cooperative Oncology Group (ECOG) performance scale assessments on days 1 and 8 of PC, as well as the change in scale between these assessments, as prognostic tools for terminally ill cancer patients.	ECOG-PS	2392	Prospective cohort study.
Pirovano et al.[22] Italy	To Identify clinical and biological prognostic factors and integrate them into a score.	PaP	519	Prospective cohort study.
Simmons et al.[6] UK	To examine progress in the development and validation of prognostic scales.	GPS/B12/CPR Index / PiPS/PPI/PaP/ D-PaP	-	Systematic review.
Sonoda et al.[23] Japan	To clarify the predictive value of PPI and PaPS in PC consultations for patients with advanced AC in an intensive care hospital in Japan.	PPI/PaP	PI: 247 P a P : 187	Retrospective cohort study.
Stone et al.[24] United Kingdom	Description and critical review of various prognostic scales.	PaP/PPI/Chuang PS	-	Narrative review.
Subramaniam et al.[25] UK	To examine the accuracy and evaluate the PPI as a prognostic tool for patients hospitalized with cancer in the United Kingdom.	PPI	272	Prospective cohort study.
Suh et al.[26] South Korea	To develop a new prognostic scale for terminal patients.	OPS	209	Prospective cohort study.
Inomata et al. [27] Japan	To evaluate the usability of PPI for predicting short-term survival in patients with lung cancer and to compare its efficacy in patients with small cell and non-small cell lung cancer.	PPI	84	Observational descriptive study (case series).
Jansen et al.[28] Netherlands	To determine the usability of the PPS in determining the terminal phase.	PPS	78	Observational descriptive study (case series).
Oh et al.[29] South Korea	To examine the association between changes in PPS and survival of patients with terminal cancer.	PPS	606	Retrospective cohort study.
Hung et al.[30] Taiwan	To evaluate the usefulness of sequential PPI measures at admission and week 1 (D8) of hospitalization, the change in PPI score between the two measures, and the combination of initial PPI and change in terminal cancer patients in a PC consulting team service.	PPI	2392	Prospective cohort study.

Coninua...

Table 2. Articles selected for analysis and discussion in this scope review – continuation

Authors	Objectives	Tool	n	Types studies
Tarumi et al.[31] Canada	To validate the PaP and evaluate the diagnostic capacity of the clinical tools used and the diagnosis of delirium in a population (cancer and non-cancer) referred for consultation in a PC service.	PaP/PPS	958	Prospective cohort study.
Trejo-Ayala et al.[32] Mexico	To establish whether PPI, Charlson comorbidity index (CCI) or other factors are predictors of survival of patients in PC.	PPI	32	Retrospective cohort study.
Arias et al.[33] Spain	To determine the predictive capacity of PPSv2 in patients with advanced cancer and determine the characteristics and survival in a cohort of patients admitted to a PCU.	2 PPSv2	157	Prospective cohort study.
Yoon et al.[34] South Korea	To evaluate the usability of OPS in a population independent of Korea and identify other prognostic factors associated with life expectancy with OPS.	OPS	104	Observational descriptive study (case series).
Yoon et al.[35] South Korea	Prospective validation of OPS for patients hospitalized with cancer in South Korea in a multicenter study.	OPS	217	Prospective cohort study.
Yoon et al.[36] South Korea	To compare the accuracy between 4 prognostic scores in life expectancy prediction.	PaP/D-PaP/ PPI/OPS	94	Observational descriptive study (case series).
Kim et al.[37] South Korea	To provide important information related to the treatment of terminal cancer patients by examining clinical parameters associated with survival time and analyzing survival times using prognostic scores.	PPS/PPI/PaP	415	Observational descriptive study (case series).
Krishnan et al.[38] USA	Discuss data informing prognosis in patients with incurable solid tumors, advanced, including physician's assessment of life expectancy, prognostic factors and prognostic models in this population group.	KPS/PaP/PPI	1500	Systematic review.
López-Nogales[39] USA	To establish by the work team of the PC clinic a treatment and follow-up plan, according to the needs of the patients, which implies scheduling or reprogramming the number of consultations or home visits, as well as establishing a basis for the management of agony, emergencies at home, which leads to a better attention of the patient/family binomial. In addition, to provide an answer to the sick person and their family that is satisfactory about the course and future of their illness, in the face of the classic question "how long do I have to live?", which allows them to adjust their resources and time to prepare themselves in the face of imminent death.	PaP	128	Retrospective cohort study.
Ermacora et al.[40] Italy	To verify the accuracy of the PSC in predicting the survival of patients within 30 days, to evaluate the agreement between two different and experienced oncologists and a nurse in estimating the prognosis and between the estimated and actual survival and to test the role of laboratory results, along with clinical and social factors in predicting survival.	PaP/OPS/PPI	334	Prospective cohort study.
Farinholt et al.[41] USA	To compare the prognostic accuracy of PSC and PPI in patients with advanced cancer.	PPI	215	Cross-sectional study.
Mei et al.[42] Singapore	To prospectively evaluate the prognostic value of PPS in predicting survival in patients with advanced cancer;	PPS	296	Prospective cohort study.
Morita et al[43] Japan	To develop a scoring system for valid prognostic forecasting.	PPI	450	Retrospective cohort study.
Morita et al.[44] Japan[43]	To establish whether clinicians' prediction of survival can be improved using PPI and in which situations physicians have poorly estimated the patient's prognosis.	PPI	258	Prospective cohort study;
García et al.[45] Spain	To review of published papers on prognostic scales in advanced cancer between 1993 and 2013.		-	Narrative Review.
Glare et al.[46] Australia	To evaluate the predictive accuracy of PaP in patients with advanced cancer under the care of the oncologist.	PaP	100	Prospective cohort study.
Hiratsuka et al.[3] Japan[3]	To develop a functional prognostic scoring system for patients with advanced cancer.	FPPI	1896	Prospective cohort study.
Hui et al.[47] USA	To provide an updated view of prognostic models in advanced cancer and highlight the value of prognostic calculators.	PPS/PaP/PPI/OPS/ PiPS/ GPS/other models	-	Narrative review.

PaP = Palliative Prognostic Score; PPI = Palliative Prognostic Index; PPS = Palliative Performance Score; OPPS = Objective Palliative Performance Score; ECOG-PS = Eastern Cooperative Oncology Group Performance Score; GPS = Glasgow Prognostic Score; mGPS = Glasgow Prognostic Score; Chuang PS = Chuang Prognostic Score; D-PaP = Delirium-Palliative Prognostic Score; OBS = Objective Palliative Score; PPSv2 = Palliative Performance Score version 2; KPS = Karnofsky Performance Score; FPPI = Functional Palliative Prognostic Index; PiPS = Prognosis in Palliative care scales. PC = palliative care.

Table 3. Prognostic tools for predicting survival and the main factors used in its evaluation

		Prognostic Tool													
	Performance Status	PaP X KPS	D-PaP X KPS	PPI X PPS	PPS X PPS	KPS X KPS	GPS	mGPS	PiPS-A X ECOG-OS	PiPS-B X ECOG-PS	BCI	ECOG-PS X ECOG-PS	HUANG OS X COG-OS	OPS X ECOG-PS	OPPS
Clinical Markers	CPS (clinical prediction of survival)	X	X												
	Deliriousness		X	X											
	Dyspnea	X	X	X					X					X	
	Edema			X											
	Decreased oral intake/anorexia	X	X	X					X	X				X	
	Dysphagia								X						
	Fatigue									X			X		
	Ascites												X		
	Previous weight loss								X				X		
Disease variables	Global Health								X	X					
	Heart rate								X	X					X
	Mental status								X	X			X		
	Breast cancer								X						
	Male genitalia								X	X					
	Distant metastasis								X	X					
	Bone metastases								X	X					
	Hepatic metastases								X				X		
	Pulmonary Metastases												X		
	History of chemotherapy														X
Laboratory markers	Albumin						X	X		X					
	C-Reactive Protein						X	X		X	X				
	Vitamin B12 levels										X				
	Lymphocyte Count	X	X							X					
	Leucocytes Count	X	X							X				X	X
	Neutrophils									X					
	Platelets									X					X
	Urea									X					
	ALT									X					
	Alkaline Phosphatase									X					
	Creatinine													X	X
	Potassium														X
	Bilirubin													X	
	DHL													X	

PaP = Palliative Prognostic Score; D-PaP = Delirium- Palliative Prognostic Score; PPI = Palliative Prognostic Index; PPS = Palliative Performance Score; KPS = Karnofsky Performance Status; GPS = Glasgow Prognostic Score; mGPS = Glasgow Prognostic Score; ECOG-PS = Eastern Cooperative Oncology Group Performance Score; mGPS = modified Glasgow Prognostic Score.

Palliative Prognosis Index (PPI)

This prognostic scale model was developed and validated in 1999 by the reference study[44] in Japan, in a population of patients with solid tumors that was later also tested and considered for patients with hematological malignancies, finding, on average, 26 days of survival. It involves five evaluation items: palliative performance scale (PPS), oral intake, edema, dyspnea at rest and delirium[5]. The score is given in intervals of 0-3, 4-5 and 6-10, for patients identified with at least 6 weeks, 3-6 weeks and less than 3 weeks of survival, respectively[48-50]. More recently, the J-ProVal study confirmed its performance in 2361 patients[2].

Palliative Prognostic Score (PaP Score)
Validated in 1999 by the reference authors[51] in a population of 451 patients with advanced solid tumors, this score contains six evaluation items: dyspnea, anorexia, Karfnosfky Prognostic Score (KPS), clinician prediction (CPS), leukocyte and lymphocyte count[51;44]. The score ranges from 0 to 17.5, but ranges from 0-5.5, 5.6-11 and 11.1-17.5, which correspond to the probability of survival above 30 days of 70%, 30-70% and less than 30%, respectively[49;50].

Palliative Performance Scale (PPS)
This scale is a modification of the KPS and scores the overall functionality of the patient through the parameters of level of physical activity and evidence of the disease, ability to walk and take care of oneself, oral intake, and level of consciousness[52]. Validated in 1996 by the reference study[8] in a population of 119 patients undergoing home care and 213 patients in a hospice unit, the PPS has a score ranging from 0 to 100%, with intervals of 10% and progressively higher possibility of survival[8]. One study demonstrated that patients with PPS of 10-30%, 40%-60% and at least 70% had a 30-day life expectancy of, respectively, 0-23%, 50-65% and 82-100%[6].

Objective Prognostic Score (OPS)
Validated in 2009 by reference authors[26] through a multicenter study of 209 terminal cancer patients in six hospitals in South Korea[15], this score is based on seven variables, namely anorexia, dyspnea at rest, Eastern Cooperative Oncology Group Performance Status (ECOG-PS), leukocytosis, bilirubin, creatinine and LDH. The score ranges from 0 to 7, and in the range of 0-3, the sensitivity and specificity for the prediction of survival at 3 weeks were 74.7% and 76.5%, respectively, and overall accuracy of 75.5%[15].

Glasgow Prognostic Score (GPS)
Validated in 2004 by the reference authors[53] and initially tested in inoperable patients with non-small cell lung cancer with survival of approximately 12 months, this score is more useful in patients with longer life expectancy[54,55]. It is based on the levels of C-reactive protein (CRP) and albumin, and the score is made as follows: 0 points for CRP less than or equal to 10mg/L and albumin of at least 25g/L, 1 point for CRP greater than 10mg/L or albumin less than 35g/L and 2 points for CRP greater than 10mg/L and albumin less than 35g/L[11]. The study with 1160 patients in Japan, in 2015, called J-ProVal, found that the average survival for the categories of 0, 1 and 2 points were 58 days, 43 days and 21 days, respectively[52].

Chuang Prognostic Scale (Chuang PS)
In 2004, the author[56] studied 356 patients from their PCunit to construct a prognostic scale, later validated in a group of 184 patients. The Chuang PS is based on the parameters of tiredness, weight loss in the last three months in percentage, ascites, edema, cognitive deficit, Eastern Cooperative Oncology Group (ECOG-PS) performance status and presence or absence of pulmonary and/or hepatic metastasis. Variables score from 0 to 3 according to the severity of each symptom, except for the ECOG-PS, which ranges from 1 to 4. With these scores, weights are attributed to each component: continuous or severe tiredness, with weight 1; weight loss less than 5%, with weight 0.2, between 5-10%, with weight 0.7 and greater than 10% with weight 1; ascites if perceived on physical examination or with the presence of umbilical protrusion with weight 1; edema with positive locker sign with weight 1; cognitive deficit, with weight 0.5 in case of lethargy, confusion or coma; ECOG-PS scoring 2 has weight 1.5, scoring 3 has weight 2 and scoring 4 has weight 3; presence of lung metastasis with weight 0.5 and presence of liver metastasis with weight 0.5, if present. The final score ranges from 0 (best prognosis) to 8.5 (worst prognosis)[56].

Delirium-Palliative Prognostic Score (D-PaP)
Evaluating the addition of delirium to the PaP Score as an evaluation criterion, reference authors[57] validated the D-PaP in a study conducted with 361 patients with terminal cancer in 2011. Using the same variables of the PaP score (dyspnea, anorexia, KPS, CPS and leukocyte and lymphocyte count) and adding only delirium (assessed through the CAM tool), it was observed that the same groups A, B and C of the PaP score, which previously had a 30-day life estimate of 87%, 51% and 16% respectively, with the D-PaP had 83%, 50% and 9%, with the reliability of the new scale being statistically significant ($p<0.001$)[57].

Palliative Care Prognostic Study (PiPS)
Developed in 2011 by the reference authors[52] through a study of 1018 patients with locally advanced or metastatic cancer under PC and, independently validated in a study of 2046 patients, PiPS is intended to predict whether the patient will have a survival of days (0-13 days), weeks (14-55 days), or months (greater than 55 days)[2].
This prognostic model is presented in four versions: PiPS-A14, for survival of 14 days and counts with 10 variables (mental test score greater than 3, pulse, distant metastasis, liver metastasis, ECOG score, global health score, lack of appetite, bone metastasis, difficulty breathing and swallowing); PiPS-A56 for prediction of 56 days of survival and also consists of 10 variables (primary breast cancer, primary male genital cancer and weight loss in place of the last three variables mentioned in PiPS-A14); PiPS-B14, also for survival of 14 days and has 12 variables, including blood tests (pulse, leukocytes, platelets, urea, PCR, global health score, ALT, mental test score greater than 3, distant metastasis, bone metastasis, lack of appetite ECOG score); PiPS-B56 to predict 56 days of survival, with 12 variables including blood tests (neutrophils, lymphocytes, AST, albumin, primary male genital cancer and tiredness in place of the last six variables of PiPS-B14)[2].

B12/CRP Index (BCI)
The BCI is a prognostic indicator validated in 2007 by reference authors[58] in 329 terminal cancer patients and has as criteria for scoring the multiplication between the value of serum vitamin B12 (in mmol/L) and C-reactive protein (in mg/dL). Patients were divided according to their BCI score into 3 groups: group 1, BCI less than or equal to 10,000, with a mean survival of 71 days; group 2, BCI between 10,001 – 40,000, with a mean survival

of 43 days; group 3 with BCI greater than 40,000, with a mean survival of 29 days. The average survival in the population studied was 42 days[52].

Eastern Cooperative Oncology Group (ECOG-PS) Performance Status

Developed in 2013 by reference authors[59], tested in 1825 patients and validated in 631 patients with locally advanced or metastatic cancer in several countries (Switzerland, Germany, Denmark, Australia, United Kingdom, Iceland, Austria, Italy, Norway, Sweden and Canada), the ECOG-PS is a performance scale that has as factors the performance status, PROs (Quality of Life C-30 Questionnaire of the European Organization for Research and Treatment of Cancer) and mGPS (PCR and albumin value). In the study, the mean survival of patients was 3.2 months in the test group and 7.03 months in the validation group. When analyzing the factors used in the scale, mGPS and performance status were the most significant to predict survival[58].

Karnofsky Performance Status (KPS)

Created in 1948 and validated in 1980 by reference authors[60], the KPS predicts survival through a score for the performance and physical capacity of the patient, from 0 to 100, as follows: 100 for the "normal" patient, without complaints or evidence of the disease; 90 for the patient who carries out normal daily activities, with minimal signs of the disease or symptoms; 80 for the patient who maintains his daily activities with effort, some signs and symptoms of the disease; 70 for the patient who can take care of himself but cannot maintain his daily activities or do any active work; 60 for those who demand occasional assistance but are able to take care of much of their needs; 50 for those who need considerable assistance and frequent medical care; 40 is attributed to the patient who is disabled, in need of care and special assistance; 30 for those who are severely disabled and that hospitalization is indicated, even if death is not imminent; 20 when the patient is very ill and active supportive treatment and hospitalization are necessary; 10 to the dying patient, with accelerated death process; 0, death[60].

Modified Glasgow Prognostic Scale (mGPS)

The mGPS, a derivation of GPS, is a known marker of systemic inflammatory response and was validated in 2016 by the reference study[61] in 459 patients with advanced cancer, regardless of the use of anti-cancer therapy. The score is given according to each variable, namely C-reactive protein (CRP) < 10mg/L (0 points), CRP >10mg/L (1 point), CRP > 10mg/L and albumin < 35g/L (2 points). For mGPS of 0, 1 and 2, the mean survival rates were 5.7, 3 and 1 month, respectively [62].

Objective Palliative Prognosis Score (OPPS)

Developed in 2015 by reference author[12] in China, the Objective Palliative Prognosis Score is a short-term prediction method. It has as factors are the absence of chemotherapy, heart rate above 120 beats per minute, leukocyte count greater than 11,000/mm³, platelet count less than 130,000/mm³, creatinine greater than 1.3mg/dL and potassium greater than 5mg/dL. If the patient has at least any three of the six factors mentioned above, death in seven days has a sensitivity of 68.8%, specificity of 86%, positive predictive value of 55.9% and negative predictive value of 91.4%[12].

DISCUSSION

The results of this scope review show a still small number of studies related to prognostic tools in PC, especially addressing other life-threatening diseases, in view of the higher prevalence of articles involving cancer patients to the detriment of the others[4;14].

The epidemiological profile, traced and discussed through the results, reflects the real practice of PC: carried out empirically by most countries, with a scenario of precarious scientific production[14].

There is a relative absence of interventionist research, which makes the tools for formulating international policies on this subject limited, making it difficult to demonstrate the cost-benefit and effectiveness of the scales in PC[1;6;63].

Another important point is that not all existing prognostic tools were included in this study, such as the Terminal Cancer Prognostic (TCP) and Barretos Nomogram, as these, in addition to the hospital population, also apply the scale in outpatients and home patients, and the present study's population was composed of patients hospitalized in exclusive PC. The variation of environmental context is a process of paramount importance in view of the humanization of the process of death that happens increasingly far from large in patient centers[64,65].

The large number of different prognostic factors makes each scale more indicated and effective depending on the scenario, confirming the need for research to evaluate the applicability and effectiveness of these, not only in one, but in several different environments and situations[4].

Objectivity and subjectivity of prognostic scales

On some scales studied in this scope review – such as PaP and DPaP – clinical estimation (CPS) is a factor evaluated. The inclusion of this as part of prognostic scales values the experience of the applicator, which becomes synonymous with reliability and has a direct impact on the accuracy of the tool, to the detriment of more objective parameters. This is because the CPS is a subjective prediction, and if the health professional responsible for the evaluation and application does not have extensive knowledge about the scale and its use, or is inexperienced in the scope of PC, the use of the tool may not be done correctly, or a reliable prediction is not made[6,23 66].

In the same sense, those assessment instruments that rely on laboratory tests become difficult within environments other than the hospital, although they are more accurate due to their greater objectivity. Linked to this, there is a greater humanization of medicine, which diverts PCto non-hospital axes, such as care homes, "hospices" or the patient's own home. Thus, prognostic scales with objective criteria that require hospital supplies for performance and evaluation are prone to no longer be used as the non-hospital trend of PCmaterializes[23,24].

Clinical signs and symptoms can improve the accuracy of clinical estimation, the most significant being deterioration of performance status, dyspnea, delirium or cognitive failure and cachexia. The systemic inflammatory response, evidenced by high C-reactive protein (CRP), low albumin and leukocytosis, among other

markers, also has independent prognostic value in patients with advanced cancer[67]. This demonstrates that in the groups most studied by the articles included in this review – cancer patients - there is a need for balance between objective and subjective criteria to achieve greater accuracy in predicting prognosis[68].

Factors of greater prognostic impact

Performance status is one of the most important assessments for prognosis in PC. Present in several scales included in this review, the evaluation of the patient's performance can be done in several ways, either by KPS, PPS or ECOG-PS. The *Kanorfsky Performance Scale* (KPS) observes the capacity and autonomy of the patient, which makes it easy to apply and assigns objectivity to it; the *Palliative Performance Scale* (PPS), found in most of the articles studied, is a modification of the KPS and presents high sensitivity and specificity for short-term prognoses and has good applicability in oncological and non-oncological populations; the Eastern Cooperative Oncology Group Performance Status (ECOG-PS) has little known factors within the practice of health professionals, which makes its applicability more difficult when compared to the PPS and KPS. Thus, scales that have the last two as part of their evaluation are easier to implement in health services[20,21].

Inflammatory markers and disease activity also have an impact on survival prediction. We know that laboratory tests are more accurate the longer the patient's survival, and their availability is questionable, given the increasing trend of de hospitalization in PC, which makes it difficult to use scales with these parameters outside the hospital environment, places where more and more patients choose to spend the end of life. On the other hand, there is a known relationship between the patient's inflammatory state and tumor progression, which increases the accuracy of scales that use these factors[19,44].

Death is a fluid process and, therefore, is influenced by several unpredictable factors. In the most diverse scales included in this study, we observed a limitation in relation to acute death processes: Palliative Prognostic Index and Objective Prognostic Score are reliable scales, but they cannot predict sudden deterioration. This can be considered a problem in the relationship between the medical team and the patient support network in PC, because the accuracy of the prediction is important for both, either to provide the best care at the end of life, or to facilitate the process of death and grief. On the other hand, there are scales that try to balance exactly the fluidity of the death process: Chuang Prognostic Scale and Objective Palliative Prognostic Score, which are the most used tools to predict survival in two weeks and seven days, respectively, but both still have limitations in applicability, such as parameters that are difficult to measure, such as weight loss, or invasive, such as creatinine and platelet count[10,12].

A prognostic scale that appeared in 5% of the total articles (n=2) was the Prognosis in Palliative Care Study (PiPS). One of the predictors used in the score is the Abbreviated Mental Test, which was done by medical evaluation and not by symptoms reported by the patient, which is positive on this scale, since a routine and direct evaluation of terminal patients is not possible in most health services. In addition, it is known that the patient is not always able to report his complaints, which makes the objective evaluation of the physician even more positive. However, one point in which PiPs leaves something to be desired is the need for invasive tests to obtain a score, making it difficult to apply in patients in the home environment[6,67].

CONCLUSION

This study was a pioneer in addressing the use of prognostic scales in cancer patients under PC. In order to identify the scales most commonly used in PC in cancer patients, this study compiled them in their objectivity, subjectivity and which prognostic factors used were of greatest impact on the scale.

The scarcity of comparative studies stands out, and the existing ones are limited to comparing the most widespread scales, such as PPI and PaP, and for this reason it was not possible to carry out an investigation and determine more objectively which scale would be more effective. Thus, it would be important to carry out research with this character, to strengthen not only scientific evidence, but also the work tools available to health professionals in general, specialists in the area or not, so that such tools are the support for the inclusion of PCin the public health sphere.

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