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Performance of Clinicians Regarding Survival Prediction in Advanced Cancer Patients: A Portuguese Multicenter Analysis

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Abstract

Purpose: Clinical prediction of survival (CPS) is based on the physician's opinion. Systematic reviews on the subject show that clinicians tend to more often overestimate than underestimate patients' survival. This study aimed to explore the Portuguese experience in prognostication in advanced cancer patients and assess if some clinician´s aspects or patient characteristics may have any impact on the process.

Design: Multicenter, descriptive study. 33 physicians questionnaires predicting survival based on 19 clinical cases of patients in the metastatic setting. The Spearman correlation coefficient between the actual survival (AS) and the CPS was calculated as was the ratio CPS/AS to examine the concordance between the variables. The prediction of survival time was accurate when the ratio was in the range 0.67–1.33 (±33%). Factors affecting inaccurate prediction were determined by qui-square test or the Kruskal-Wallis test.

Results: The survival estimation was accurate in 28.9% of patients. In 52.8% of cases, the forecasts performed by physicians was underestimated and overestimated in 18.3% of cases. More experienced specialists (5-10y) tend to underestimate prognosis even more than their colleagues. Younger specialists (less than 5y) are the most accurate and the most optimistic. Most physicians acknowledged they based their answer in their experience/intuition and some on the literature.

Conclusions: Although its small sample size and its retrospective design, this study presents a major advantage to the Portuguese reality. Knowing one´s competencies may help Portuguese doctors to admit the need for training and also improve their communication skills and better manage patients´ expectations.

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Introduction

Predicting prognosis is one of the many challenges in oncology. It is particularly important for patients with advanced metastatic disease, who want to obtain information about their prognosis directly and honestly [1].

Inaccurate perceptions not only can lead to unrealistic expectations but also obstruct optimal management and lead either to ineligibility to enroll in clinical trials [2] or to over-treatment and late referral to palliative care [3]. More accurate prognostication can also ensure patients avoid futile treatment and minimize the burden of unnecessary hospital visits in patients with short life expectancies [4].

The clinical prediction of survival (CPS) is based only on the physician's opinion, who uses clinical experience in the decision-making process [5]. Sometimes it is used in combination with prognostic scores that include the presence of physical symptoms [6], performance status, quality of life measures, and biochemical parameters [2].

It is still unclear which method or combination of methods is best to counsel patients and their families and establish a plan for tumor-directed therapies or palliative care programs [7]. There is some controversy in the literature regarding the relationship between prognostic accuracy and professional experience [5] but it is clear that more accurate prognostication is feasible and can be achieved by combining clinical experience and evidence from the literature [8].

Systematic reviews on the subject show that clinicians tend to more often overestimate than underestimate patients' survival [3], especially when it comes to terminally ill cancer patients [2], as most studies are on that setting and not just metastatic setting. Being aware of their tendency to over or underestimate survival is important and accurate prognostication models incorporating clinical prediction of survival are needed [9].

As we know survivors' perceptions of their illness may influence health outcomes [10], also in the metastatic setting this may be true, so accuracy should be a priority. When a prognosis is discussed openly, it can allow both patients and clinicians to engage fully with each other [11] and the prospect of studying and discovering one´s reality may help clinicians improve their practice and their relationship with their patients.

This study aimed to explore the Portuguese experience in prognostication in advanced cancer patients and assess if some clinician´s aspects or patient characteristics may have any impact on the process.

Materials and Methods

Study design

This was a multicenter, observational, descriptive study that included 33 physicians from 4 different Portuguese Oncology Departments.

All physicians were asked to complete questionnaires (appendix 1) predicting survival based on 19 clinical cases of patients in the metastatic setting. They were also asked demographic questions – age, gender, specialty (Medical Oncology; Radio-oncology) and medical experience (intern; specialist less than 5 years; specialist 5-10 years; specialist more than 10 years).

All cases mentioned patients' age, gender, co-morbidities, performance status (PS) type of cancer, symptoms, and proposed therapeutic approach.

Definition of terms/ Defining the key questions:

There were 3 main questions about each clinical case: clinician predicted survival (CPS)

- calculated from the date of diagnosis to the predicted date of death; the basis for the answer (experience/intuition; literature; prognostic index); the decision to refer to palliative care (yes; no).

Ethical approval

Our study was approved by the ethical committee of the primary investigator, CentroHospitalar Barreiro-Montijo.

Statistical methods/ analysis

We calculated the Spearman correlation coefficient between the actual survival (AS) and the CPS. The ratio of the CPS to the AS was calculated for each patient to examine the concordance between the variables. The prediction of survival time was considered accurate when the ratio was in the range 0.67–1.33 (that is, a concordance of ±33%). Factors affecting inaccurate prediction were determined by the qui-square test or the Kruskal-Wallis test.

Results

Patient and physicians characteristics

The study enrolled 33 doctors with a mean age of 36 years (28-52), 63.6% (21) were practicing Medical Oncologists and 36.4% (12) were Radio-oncologists. Physicians were stratified according to professional experience: "intern" (10); "specialists with less than 5 years of experience" (11); "specialists with more than 5 years of experience" (9); "specialists with more than 10 years of experience (2).

Nearly 80% of patients had a performance status of 0–1 in the cases presented, with less than 2 co-morbidities, and about one-third of patients had some kind of uncontrolled symptomology. In almost 90% of cases, the patients were proposed for treatment in palliative setting and in 2 cases the patients were considered preferable for best supportive care (BSC).

All cases presented patients in the metastatic setting. Three of the cases were of patients with breast cancer; 6 with hepatobiliopancreatic malignancies; 4 from digestive tract cancer; 3 from urothelial cancer and 1 from melanoma.

Accuracy of Prediction of Survival (CPS/AS)

Table A shows in great detail, the descriptive data from the answers on survival predictions given in the questionnaire.

As shown in Table B, the survival estimation was accurate in 28.9% of patients (CPS/AS ratios between 0.67 and 1.31 (Guideline |0.67-1.33|; concordance ±33%). In 52.8% of cases, the forecasts performed by physicians were underestimated, presenting CPS/AS ratios between 0.04 and 0.65 (Guideline |< 0.67|). In 18.3% of cases, oncologists and radio-oncologists overestimated survival time, with CPS/AS ratios ranging between 1.34 and 23.23 (Guideline |> 1.33|).

These results reveal that there is a high tendency for Portuguese medical oncologists and radio-oncologists to underesti-

mate prognosis in metastatic cancer patients. ($X^2(2)$= 117,244; p<0,001).

Figure 1 shows the Spearman rank correlation coefficient for clinically predicted survival(CPS) compared with actual survival (AS) was 0,440 (p < 0.001), indicating a moderate tohigh significant association. (Spearman, rho=0,440, p<0,001).

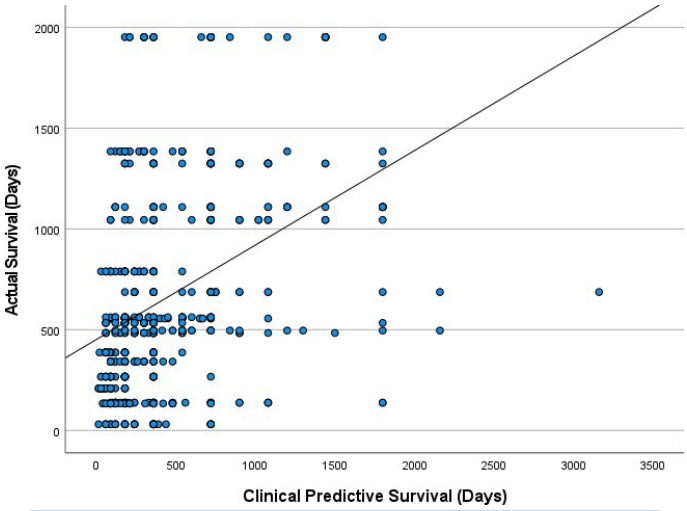

Figure 1: Correlation between Actual Survival and Clinical Predictive Survival.

Comparison between accuracy of prediction and physicians' professional experience

The tendency to underestimate prognosis is present despite the physician's clinical experience.

Despite that, the inference analysis suggests that there is a statistically meaningful difference between degrees of training and their accuracy in predicting prognosis.($X^2(6)$=20,297; p=0,002), as shown in table C.

Specialists with 5-10 years of experience tend to underestimate prognosis even more (62,6%; Res_{Ajust}=2,3), than their colleagues, either with less experience or more experience. (intern; specialist less than 5 years; specialist more than 10 years) Specialists with 5 or fewer years of experience tend to underestimate prognosis lessfrequently (43,1%; Res_{Ajust}=-3,5) than their colleagues and are the ones who more oftenoverestimate prognosis (23,4%; Res_{Ajust}=2,3).

In terms of the ability to predict, we can say, with a statistically meaningful difference (Kruskal-Wallis, H(3)= 16,576; p<0,001), that specialists between 5-10 years of experience are the least accurate in predicting the prognosis (MR=275,04) compared with those with less than 5 years of experience. MR=344,91; ResAjust=0,001) (Table D).

No statistical differences were seen between other subgroups. (intern (MR=322,70); specialist more than 10 years (MR=271,46)) (p > 0,05).

Preferred method used for prognosticating

When asked about the basis for the answer, a mean of 55,5% of physicians acknowledged they based their answer on their experience/intuition while a mean of 40% of doctors replied that their method of prognostication was based on the literature.Only a mean of 3,4% of physicians admitted using prognostic indexes to calculate prognosis.

Referral to palliative care

Although every case presented was in the metastatic setting, in only less than half (9) the majority of physicians (more than 72.7%) answered they would refer the patient toa palliative care team. Those included all the patients with an ECOG PS of 3, hepatobiliopancreatic malignancies, gastric cancer and melanoma.

In cases of patients with breast, colorectal and urothelial cancer, clinicians were less frequently (less than 69.7%) inclined to refer the patient to a palliative care team.

No statistical significance was encountered between any clinician´s or patient´s aspect and the decision to refer to a palliative care team impact on the process.

Table A: Actual Survival; Clinical Predictive Survival; Accuracy of Predictive Survival.

Case	Actual Survival	Clinical Predictive Survival (CPS)							Accuracy of Predictive Survival (CPS/AS)		
		Min		*Máx.*	Med.	P_{25}	P_{75}	AIQ	*<0,67*	*0,67-1,33*	*<1.33*
1	556	75	-	1080	360	180	540	360	*60,6*	*36,4*	*3,0*
2	138	90	-	1800	360	180	720	540	*3,0*	*30,3*	***66,7***
3	342	90	-	480	180	120	300	180	*51,5*	***45,5***	*3,0*
4	1045	90	-	1800	720	360	960	600	*39,4*	***51,5***	*9,1*
5	134	42	-	720	180	90	360	270	*15,2*	*30,3*	***54,5***
6	789	30	-	540	180	165	300	135	***97,0***	*3,0*	---
7	1109	120	-	1800	720	360	720	960	*57,6*	*21,2*	*21,2*
8	267	30	-	720	180	90	270	180	*39,4*	*36,4*	*24,2*
9	484	60	-	1500	300	180	450	270	*51,5*	*33,3*	*15,2*
10	209	15	-	180	90	30	90	60	***87,9***	*12,1*	---
11	1952	180	-	1800	720	360	1140	780	***78,8***	*21,2*	---
12	31	15	-	720	240	120	360	240	*3,0*	---	***97,0***
13	562	60	-	720	330	180	540	360	*60,6*	*39,4*	---
14	687	180	-	3160	720	360	750	390	*42,4*	***42,4***	*15,2*

15	1325	180	-	1800	720	360	1080	720	*57,6*	*39,4*	*3,0*
16	496	120	-	2160	540	360	720	360	*21,2*	***48,5***	*30,3*
17	387	21	-	540	180	68	360	292	***72,7***	*24,2*	*3,0*
18	534	60	-	1800	300	180	360	180	*69,7*	*27,3*	*3,0*
19	1385	90	-	1800	300	180	630	450	***93,9***	*6,1*	---

P25-Percentile 25, P75-Percentile 75. < 0,67 Underestimate; 0,67-1,33 Accurately estimated; >1,33 Overestimated

Table B: Accuracy of Prediction of Survival (CPS/AS).

Accuracy of Prediction of Survival	n	%	Min. - Max.	Guideline	$X^2(2)$	p
Survival time underestimated	331	*52,8*	0,04 - 0,65	[< 0,67]	117,244	<0,001
Survival time accurately predicted	**181**	***28,9***	**0,67 - 1,31**	[0,67-1.33]		
Survival time overestimated	115	*18,3*	1,34 - 23,23	[> 1.33]		

Table C: Accuracy prediction of Survival Time by Trainning degree

Trainning degree Accuracy prediction of Intern	Specialist <5y		Specialist 5-10y		Specialist >5y		$X^2(6)$	p
Survival Time (CPS/AS)	**n**	**%**	**n**	**%**	**n**	**%**		
Underestimated (<0,67)	107	*51,2*	90	*43,1*[2]	1057	*62,6*[1]	27	*71,1*	20,297	0,002
Accurately predicted (0,67-1,33)	64	*30,6*	70	*33,5*	40	*23,4*	7	*18,4*		
Overestimated (>1,33)	38	*18,2*	49	*23,4*[3]	24	*14,0*	4	*10,5*		
Total	209		209		171		38			
Adjusted residuals: 2,3[13], -3,5[2]										

Table D: Accuracy prediction of survival time (CPS/AS) by trainning degree.

Degree oftraining	n	Mean Rank(CPS/AS)	Kruskal-Wallis H(3)	p	AdjustedResiduals
Intern	209	322,70	16,576	<0,001	0,001[1]
Specialist < 5y	209	344,91[1]			
Specialist > 5y	171	275,04[1]			
Specialist > 10y	38	271,46			

Discussion

In the present study, we investigate the accuracy of CPS estimates in patients in the metastatic setting of solid tumors, not necessarily in the terminal stage of the disease. As far as we are aware, this is the first study to characterize the experience of Portuguese Medical Oncologists and Radio-oncologists in predicting the prognosis of advanced cancer patients.

Although recent reviews like Cheon et. al [3] and G. Paul et al. [9] suggest that clinicians tend to more often overestimate than underestimate patients' survival, this Portuguese cohort reveals to be more pessimistic than optimistic. Generally speaking, Portuguese doctors make a survival prediction below actual survival. In 13 of the 18 clinical cases analyzed, at least 75% of the oncologists and radio-oncologists participating in the study indicated an underestimated expected survival (CPS P75 < Actual Survival).

Despite this fact, the results are in line with various systematic reviews on the subject, and although clinicians consistently underestimate survival, their predictions are highly correlated with actual survival, so they still have the discriminatory ability even if they are miscalibrated [11].

The results of this study also allow us to explore how medical experience can affect Portuguese doctors' ability to prognosticate, an important factor to take into account, as we know that a physician's level of experience in estimating survival might affect howprognosis is formulated [1].

As seen in previous studies like D'Almeida Preto et al. [5], our study showed that medical professional experience did not increase the chance of correct predictions. As also seenin studies like Clément-Duchêne, Carnin, Guillemin et al [12], younger physicians (interns and specialists with less than 5 years of experience) tend to be more accurate than moreexperienced doctors (specialists with more than 5 or 10 years of experience).

As understanding how doctors formulate their predictions can help plan interventions that train inexperienced doctors to make better predictions [9], our study also investigated what clinicians used to help them calculate a patient´s prognosis. The results seen were similar to what is more common in the literature as the Portuguese doctors preferred method remained simple clinical intuition [11]. The less experienced doctors (interns and specialists with less than 5 years of experience) also based their answers on revised literature, something that must have impacted the accuracy of theiranswers as more accurate prognostication can be achieved by combining clinical experience and evidence from the literature [8].

While overly optimistic CPS made by different health care providers has been suggested to be among the major determi-

nants of late referrals to Palliative Care (PC) [7], this study does not suggest the same is true for Portuguese doctors. In fact, in less than half of cases would the doctor chooses to refer the patient to PC, revealing a great tendency for preventing patients from taking advantage of all resources available to them. Still, this relation may be too preliminary because of the small sample size.

Although it can be stressful for the physician, prediction of survival is important for patients with advanced cancer so that they can make the most of the rest of their lives

[1] and that is why subjects like this one remain a priority.

Training in prognostication could improve the accuracy of CPS [8] and studies like this are the first step towards designing some practicing tools for that intent.

Further research should try to identify the factors that can be incorporated into existing prognostic scoring systems and be used to educate other clinicians about how toimprove their clinical skills in prognostication [13].

Conclusions

We believe that the present study, while having some limitations such as the small sample size and its retrospective design, is a major advantage to the portuguese reality. Knowing one´s competencies may help portuguese doctors to admit the need for training and also improve their communication skills and better manage patients´expectations.

Key Messages

What is already known on this topic – Various European and American systematic reviews on the subject of predicting prognosis in cancer patients show that clinicians tend to more often overestimate than underestimate patients' survival. Before this one, there were no studies that reported data on Portuguese medical oncologist population.

What this study adds – This study aimed to explore the Portuguese experience in prognostication in advanced cancer patients, showed that portuguese oncologists and radio-oncologists tend to underestimate survival time, contrary to most data known. We can also conclude that young specialists (5 or fewer years of experience) are the most accurate in predicting prognosis. Most physicians based their answer in their experience/intuition and literature.

How this study might affect research, practice or policy – This study presents a major advantage to the Portuguese reality. Knowing one´s competencies may help Portuguese doctors to admit the need for training and also improve their communication skills and better manage patients´ expectations.

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Competing interests statement: The authors declare that they have no conflict of interests.

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