The impact of the duration of the palliative care period on cancer patients with regard to the use of hospital services and the place of death: a retrospective cohort study

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Abstract

Background To avoid aggressive treatments at the end-of-life (EOL) and to provide palliative care (PC), physicians need to terminate futile anti-cancer treatments and define the palliative intention of the treatment in time, i.e. make the PC decision. This single center study assesses the impact of the PC decision and its timing on the use of hospital services at EOL and the place of death.

Methods A randomly chosen cohort of 992 cancer patients treated in a tertiary hospital between Jan 2013 – Dec 2014, who were deceased by the end of 2014, were selected from the total number of 2737 identified from the hospital database. The PC decision and use of PC unit services were examined in relation to emergency department (ED) visits, hospital inpatient days and place of death.

ResultsThe PC decision was defined for 82% of the patients and 37% visited a PC unit. The earlier the PC decision was made, the more often patients visited the PC unit (>180 days prior to death 72% and <14 days 10%). The number of ED visits and inpatient days were significantly highest for patients with no PC decision and lowest for patients with both a PC decision and a PC unit visit (60 days before death ED visits 1.3 vs 0.8 and inpatient days 9.9 vs 2.9 respectively, p<0.01). Patients with no PC decision died more often in secondary/tertiary hospitals (28% vs. 19% with a PC decision, and 6% with a decision and a visit to a PC unit).

ConclusionsThe PC decision to initiate a palliative goal for the treatment had a distinct impact on the use of hospital services at the EOL. The earlier the decision the greater the effect. Contact with a PC unit further increased the likelihood of EOL care at primary care.

Background

Cancer patients are often admitted to hospital care during the last months of their life [1]. In some cases this is unavoidable, but an increased number of ED visits is also a characteristic of insufficient PC for patients with advanced cancer approaching their EOL [2,3]. In contrast, patients receiving in-home PC are less likely to visit the ED or be admitted to hospital than those receiving standard care [4,5]. Furthermore, community-based palliative home-care services are not only associated with reduced ED visits, but also with fewer and shorter hospitalizations, lower risk of intensive care unit (ICU) admission, as well as an increased likelihood of a home death [6-9].

In order to avoid futile treatments at the EOL, the treatment focus should be switched from life-prolongation to symptom-centered PC in time. The PC decision to initiate a palliative intention for the treatment [10] should be made in time in order to initiate advance care planning (ACP) including a connection to a primary care or hospice as well as organizing care in the home if possible. A visit to a PC unit may offer one approach for improving the quality and completion of the ACP documentation [11]. Consequently, services for the patients at the EOL should be addressed outside both the ED and hospital. The place of death may indirectly show how well the ACP is carried out and the PC arranged, since the dying patient rarely needs a visit to the ED or admission to a secondary/tertiary care hospital.

Although there are studies showing that earlier PC is associated with improved EOL care, in terms of fewer hospitalizations and increased likelihood of dying at home or in a hospice [12-15], there is no data, to our knowledge, regarding the impact of the PC decision and its timing on these factors in cancer patients. In our earlier study [16], we reported that late PC decisions were associated with anti-cancer treatments continuing until close to the death and low access to a PC unit. Therefore, a well-timed decision to initiate a palliative goal for the treatment might also be related to more appropriate treatment and resource usage in EOL.

The aim of this study was to evaluate whether the PC decision and a visit to a PC unit have an impact on the use of hospital services at the EOL and the place of death. We also investigated the effect of the duration of the PC period on these issues.

Methods

Cohort selection

To cohort consists of a random sample of patients with a cancer diagnosis (ICD-10 C00-C96) who have received treatment in the Helsinki University Central Hospital (HUCH) Department of Oncology between 1.1.-31.12.2013 and were deceased by 31.12.2014. The total number of patients fulfilling the criteria was 2737 and of these, 992 were randomly selected for the study cohort from the hospital register. The final study sample consisted of 949 patients, since 43 patients were excluded because their primary cause of death was other than cancer or they were pediatric cancer patients.

This retrospective study was done with the permission of the authorities of HUCH. According to Finnish legislation, no ethics committee approval was needed.

The vast majority of Finnish cancer patients are treated at public university hospitals and central hospitals. HUCH is the largest university hospital in Finland providing cancer care for approximately 1.6 million residents in Southern Finland. During the time of this study, the HUCH Department of Oncology was responsible for all radiation therapy treatments for cancer patients and for the systemic cancer treatments of all patients except pediatric (<18 years), hematological, gynecological and lung cancer patients. There is a PC outpatient unit in the Department of Oncology, but municipalities, who in Finland organize primary care, are also responsible for EOL care. Early integrated PC was not systematically organized at HUCH at the time of the study.

Data sources and collection

The data and data sources used in the study are the same as in [16], but some new variables were considered in addition to those in [16]: DNR decisions, visits to the ED, inpatient episodes in

secondary/tertiary hospital, visits to the PC unit, timing of the PC decision in addition to the date and place of death. Most data used in this study was available in a structured format and exported directly from the electronic medical records. Information on the PC decision, DNR decision and place of death were manually extracted by two of the authors (L.Grönholm and O.Haltia). Due to the nature of the data, there were no missing values as it is mandatory to record all the parameters used. The only missing or imprecise information was in the death certificates concerning the place of death (3%).

The cancer diagnoses were grouped in the same way as in [16] into 13 groups. When the patient had more than one malignancy, the cancer diagnosis was recorded to match the primary cause of death.

Division of categories and service usage

PC decision and PC period are defined as in [16]. For the purposes of this study patients were divided into three separate categories: 'no PC-decision', 'PC-decision', and 'PC-decision and visit to a PC unit'. This definition is operated in a dynamic fashion in the analyses to ensure correct chronology of events: the patient's category was changed if their PC decision or visit to a PC unit had not taken place before the time period studied. The service usage of all patients was studied 14, 30, and 60 days before the time of death. Thus, in each analysis, the patients we categorized depending on the timing of the PC decision and PC unit visit with respect to the time period studied. Service usage is enumerated by two measures, the number of visits to an emergency department ('ED visits') and the number of nights spent in the hospital ('inpatient days'). At the time, in the 24 municipalities of Southern Finland, there was one hospice, one PC ward and seven home care teams specialized in PC.

Statistical analysis

Means, standard deviations, and distributions were used for patient characteristics. The frequency of DNR orders and the distribution of the places of death were analyzed by cross-tabulation. Pairwise Pearson's chi squared tests were conducted to statistically test for the differences between the three categories with respect to DNR and place of death. The difference between the three categories with respect to ED and inpatient service usage was tested with pairwise t-tests (pooled standard deviation and p-values adjusted with the Holm method). The association of the PC decision and PC-unit visits on hospital service usage was also studied by testing the difference between the three groups with linear regression models. The measurements were studied in logarithmic form, and a categorical variable was created to measure the effect of the PC decision and PC unit visit while keeping other measures constant. Log transformations for the dependent and explanatory variables were conducted to normalize the residuals in the regression models. All analyses were performed by using R-studio version 1.1.447 and its packages.

Results

Characteristics of the patients are presented in Table 1. For most patients (82%) a decision for PC had been made and 37% of the patients had visited the PC unit.

INSERT TABLE 1 HERE

Resource use

Table 2 describes the timing of the PC decision with respect to the time of death, and proportion of patients visiting the PC unit. The earlier the PC decision was made, the more often patients also visited the PC unit.

Time between the PC decision and death	Number of patients	patients visited the PC unit
<14 days	171 (22%)	17 (10 %)
14-30 days	141 (18%)	50 (35 %)
31-90 days	206 (27%)	105 (51 %)
91-180 days	113 (15%)	75 (66 %)
>180 days	142 (18%)	102 (72 %)

Figures 1 and 2 depict the average resource usage of the three categories of the patients in the hospital ED and inpatient wards 14, 30 and 60 days prior to death. The average number of ED visits (Figure 1) and the average number of inpatient days (Figure 2) were highest for patients with no PC decision and lowest for patients with both a PC decision and a visit to a PC unit.

INSERT FIGURE 1 HERE

INSERT FIGURE 2 HERE

Factors related to ED visits and inpatient days in the regression model is presented in Table 3. The model confirms the negative association between the PC decision and PC unit visit and resource usage prior to death, even when considering potential controlling factors.

Table 3: Coefficients of the regression model for association of patient categories, control variables and services usage 14, 30 and 60 days prior to death (OLS, Log-Log).

	Dependent variable					
	Emergency department visits			Inpatient days		
How many days before death?	14	30	60	14	30	60
Intercept	0.41**	0.38*	0.59**	1.12**	1**	1.65**
log age	-0.16**	-0.11	-0.17*	-0.27*	-0.13	-0.37
log days from diagnosis to death	0.00	0.01	0.00	-0.03*	-0.05	-0.09
Cancers of urinary tract	0.00	0.00	0.08*	0.04*	0.1	0.15
Colorectal cancers	0.02	0.03	0.04	-0.02*	0.07	0.04
Gynecological cancers	0.01	-0.01	-0.04	0.01*	0.05	0.10
Head & Neck (H&N)	-0.05	-0.08	-0.09	-0.16*	-0.15	-0.04
Lung	0.04	0.04	0.03	0.04*	0.05	0.05
Lymphomas	-0.01	0.01	0.02	0.18	0.21*	0.22*
Melanoma and other skin cancers	0.00	-0.02	-0.04	-0.12*	-0.13	-0.12
Others	0.00	0.02	0.02	0.13	0.26**	0.28**
Primary CNS malignancies	-0.05*	-0.09**	-0.11**	-0.25**	-0.21**	-0.22*
Prostate cancers	0.03	0.04	0.06	0.03*	0.05	0.06
Sarcomas	-0.05	-0.09*	-0.10	-0.17*	-0.12	-0.13
Upper gastrointestinal	0.03	0.04	0.05	0.02*	0.09	0.08
PC decision	-0.06**	-0.09**	-0.06**	-0.28**	-0.37**	-0.31**
PC decision and visit to a PC unit	-0.07**	-0.11**	-0.12**	-0.36**	-0.44**	-0.45**
Adj. R2	0.05	0.08	0.06	0.13	0.18	0.16
F-stat	4.43	6.1	4.98	10.15	14.14	11.99
Res. SE	0.15	0.19	0.23	0.44	0.47	0.5

**' Significant at 0.01, '*' Significant at 0.05, Breast cancer is the reference group for diagnoses

Place of death

The association of the PC decision and PC unit visit with the place of death is presented in Table 1. The significant difference between the categories seems to be that patients with no PC decision die more

often in secondary/tertiary care wards (28% vs. 19% and 6%, respectively) whereas patients with a PC decision or both a PC decision and a PC unit visit are more likely to die in primary care wards (46% vs. 56% and 59%, respectively).

Discussion

In this assessment of cancer patients at a Finnish university hospital, a PC decision to initiate a palliative intention for the treatment had a distinct impact on both the number of ED visits and the inpatient days in the hospital, and it clearly influenced the place of death. The number of ED visits and inpatient days were highest for patients with no PC decision and lowest for patients who had both a PC decision and a PC unit visit. Patients with no PC decision died more often in secondary/tertiary care wards compared to the patients with a PC decision whose place of death was more likely a primary care ward. The decision together with a visit to a PC unit further reduced the likelihood of dying in a secondary/tertiary care ward.

Internationally, the terminology of the PC period and its timing and content is somewhat confusing. However, in the Lancet Oncology Commission [10] the terms are identified according to the treatment intention, that is curative, life prolonging, or palliative. When the primary treatment goal is set to be palliative, the period of PC has started. In our study this moment is called the PC decision.

In two earlier studies [12,14] early PC referral was considered when a referral-to-death interval was >30 days, whereas in the study by Alsirafy and co-workers [13] it was considered early when it was >90 days, intermediate at >30-90 days and late at <30 days, respectively. In the study by Nieder and co-workers [15], three months before death was chosen as a time point to distinguish between an early and late additional PC. The previous classification did not, however, make a difference between the patients receiving early integrated PC (during the active oncologic treatments), or late PC (after discontinuation of active oncologic treatments). During the study period, no systematic early integrated PC was offered in the center, as recommended by the clinical practice guidelines of the American Society of Clinical Oncology (ASCO), as well as the Lancet Commission of integration of oncology and PC [17,10]. Our cohort represents a late PC after the termination of anti-cancer treatments.

We have earlier demonstrated that a PC decision defining the symptom-centered goal of care was frequently made, but occurred late as the median time from the decision to death was 46 days [16]. Patients with no or a very late decision received more aggressive cancer treatments at the EOL and made infrequent visits to the PC unit. Only 37% of these patients visited the PC unit. The earlier the PC decision was made, the more often patients visited the PC unit (21% of the patients with PC decision made <30 days before death vs. 61% >30 days).

Despite a rather late introduction of PC in our cohort after discontinuation of active oncologic treatments, we did observe the benefit of PC services to reduce the ED visits and inpatient days in hospital, as well as a reduction in deaths in secondary/tertiary care wards; this is discussed below. In the present study, a PC

decision decreased the ED visits especially during the last months of life. In addition to a PC decision, a visit to the PC unit further reduced the ED visits to half compared to what they were without a PC decision and contact to the PC unit. Likewise, the PC decision halved the inpatient days in tertiary hospitals. Furthermore, if the PC decision was combined with a visit to the PC unit the mean number of inpatient days declined to a quarter of that without the decision and a visit. However, the coefficients of determination (adjusted R^2) of the regression models are relatively low – especially in the model for emergency department visits – indicating that there is a lot of variation in the data that the model does not capture. Patients without a decision and especially without a visit to the PC unit more likely died in a secondary/tertiary care ward. A small proportion of the deaths of these patients might have been sudden and due to complications in the treatment [18], however, on average this was not the case. This indicates that a switch to a palliative goal of care should have been defined earlier and an ACP implemented in collaboration with a PC team to improve EOL care.

In line with these results, an earlier study of cancer patients in Finland showed that a visit to the PC outpatient clinic facilitated the connection with the primary care services [11]. As a result, the admissions of the patients to the ED tended to decrease, also reducing the tertiary hospital resources needed. Moreover, there are other studies indicating that PC services decrease the likelihood of ED visits and hospital admittance [2-3]. Earlier PC has also been shown to associate with increased likelihood of dying at home or in an inpatient hospice facility, as well as earlier DNR designation, fewer hospitalizations and less frequent ICU deaths [12-15]. In contrast to these previous studies, we did not observe difference in home or hospice deaths between the patients with or without a PC decision or PC unit contact. The result of many patients dying in a primary care ward in the present study reflects the arrangements in the community-based organization of care at that time. There was only one hospice and one specialized palliative ward in the catchment area of the HUCH during that time. Likewise, during the study period dying at home was rare because there were only a few specialized palliative home care teams available and no general practitioners offering home visits in their daily practice.

From the health care system's point of view, patients dying of cancer make important and well-founded demands on the total resources of the hospital sector, and any reduction in the utilization of hospital wards is also beneficial from the socioeconomic perspective [19]. Indeed, it has been shown that palliative home care support or a proactive PC program reduces hospital use and the costs of care at the EOL [9,20]. However, we did not carry out cost benefit analysis in this study, but this important aspect is warranted research in future studies.

There are some limitations to our study. One limitation is the retrospective nature of the study based on hospital medical records. In addition, the results do not contain the number of ED visits or inpatient days in primary care services since this information is not in our database. The lack of data on the quality of life is also a limitation. The strength of the study is that it is a population-based real life study with a relatively large sample size. The study cohort was epidemiologically representative of the prominent oncological diseases found within the population. The information concerning the PC decision made by

the oncologists or specialists treating the patient and its timing in relation to death, in addition to the data on the referral to a PC unit provided unique information about decision making at the EOL.

Conclusions

Our study revealed that although for most cancer patients the PC decision as regards a symptom-centered palliative goal for their care was frequently defined, for less than half of the patients this was in collaboration with a PC team. The lack of a PC decision or postponing it to the last weeks of life without collaboration with a PC team reflected a significantly increased risk of visits to ED, inpatient days in hospital, and further, dying in a secondary/tertiary care ward. An early integrated PC should be offered more systematically to ensure a timely ACP and access to palliative and EOL care.

Abbreviations

PC: palliative care; EOL: end-of-life; ED: Emergency Department; ACP: advance care plan; DNR: do-not-resuscitate; ICU: intensive care unit; HUCH: Helsinki University Central Hospital

Declarations

Ethics approval and consent to participate

Not applicable; the present study is based on the hospital registry data, and, since the data has already been collected for clinical purposes, no patient interventions were performed; therefore, the legislation does not mandate any ethics committee approval. However, the institutional board of TUH evaluated the study protocol and gave the permission to conduct it according to the rules of the Helsinki declaration.

Consent for publication

Not applicable.

Availability of data and materials

All data and material related to the manuscript have been archieved and maintained by the authors at the University hospital of Helsinki, according to organizational and ethical regulations. The raw data of this article is archived by the corresponding author and will not be published to preserve patients´ privacy. Upon request authors share the data in suitable way.

Competing interest

The authors report no conflicts of interest.

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Authors' contributions

All authors participated in the design of the study and read and approved the final manuscript. R-LL and SV performed the statistical analysis. OH and R-LL drafted the manuscript, the tables and the figures which all the authors revised.

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Tables

Table 1: Characteristics of the patients

Measure	Category			Total
	No PC decision at all	PC decision at some point	PC decision and visit to a PC unit at some point	
Number of patients, N (%)	176 (19 %)	424 (45 %)	349 (37 %)	949 (100 %)
Gender, N (%)				
Male	86 (49 %)	225 (53 %)	188 (54 %)	499 (53 %)
Female	90 (51 %)	199 (47 %)	161 (46 %)	450 (47 %)
Age (years) at death, mean (Stdev)	64 (11,9)	67 (11,8)	68 (12,5)	67 (12,1)
Cancer diagnoses, N (%)				
Upper gastrointestinal	29 (16 %)	83 (20 %)	106 (30 %)	218 (23 %)
Colorectal cancers	17 (10 %)	52 (12 %)	54 (15 %)	123 (13 %)
Lung *	27 (15 %)	75 (18 %)	16 (5 %)	118 (12 %)
Breast cancer	24 (14 %)	53 (13 %)	29 (8 %)	106 (11 %)
Prostate cancers	13 (7 %)	19 (4 %)	35 (10 %)	67 (7 %)
Cancers of urinary tract	6 (3 %)	29 (7 %)	26 (7 %)	61 (6 %)
Primary CNS malignancies	16 (9 %)	30 (7 %)	14 (4 %)	60 (6 %)
Lymphomas	6 (3 %)	20 (5 %)	11 (3 %)	37 (4 %)
Invasive skin cancers	6 (3 %)	17 (4 %)	9 (3 %)	32 (3 %)
Sarcomas	5 (3 %)	10 (2 %)	15 (4 %)	30 (3 %)
Gynecological cancers *	9 (5 %)	8 (2 %)	11 (3 %)	28 (3 %)
Head & Neck (H&N)	8 (5 %)	12 (3 %)	8 (2 %)	28 (3 %)
Others	10 (6 %)	16 (4 %)	15 (4 %)	41 (4 %)

Time (months) from diagnosis to death, mean (Stdev)	33 (44)	37 (43)	41 (46)	37 (44)
DNR decision made, N (% of category)	77 (44 %)[a,c]	240 (57 %)[a,b]	171 (49 %)[b,c]	488 (51 %)
Place of death, N (%)				
Home	26 (15 %)	37 (9 %)	73 (21 %)	136 (14 %)
Hospice	10 (6 %)	53 (13 %)	31 (9 %)	94 (10 %)
Nursing home	3 (2 %)	9 (2 %)	7 (2 %)	19 (2 %)
Primary care ward	81 (46 %)[d]	236 (56 %)[d]	205 (59 %)[d]	522 (55 %)
Secondary / tertiary healthcare	50 (28 %)[d]	80 (19 %)[d]	22 (6 %)[d]	152 (16 %)
Unknown	6 (3 %)	9 (2 %)	11 (3 %)	26 (3 %)

* only patients receiving radiotherapy are included

[a] The difference between these groups is statistically significant (p<0.01)

[b] The difference between these groups is statistically significant (p<0.05)

[c] The difference between these groups is not statistically significant (p>0.05)

[d] The pairwise differences between these groups are statistically significant (p<0.01)

Figures
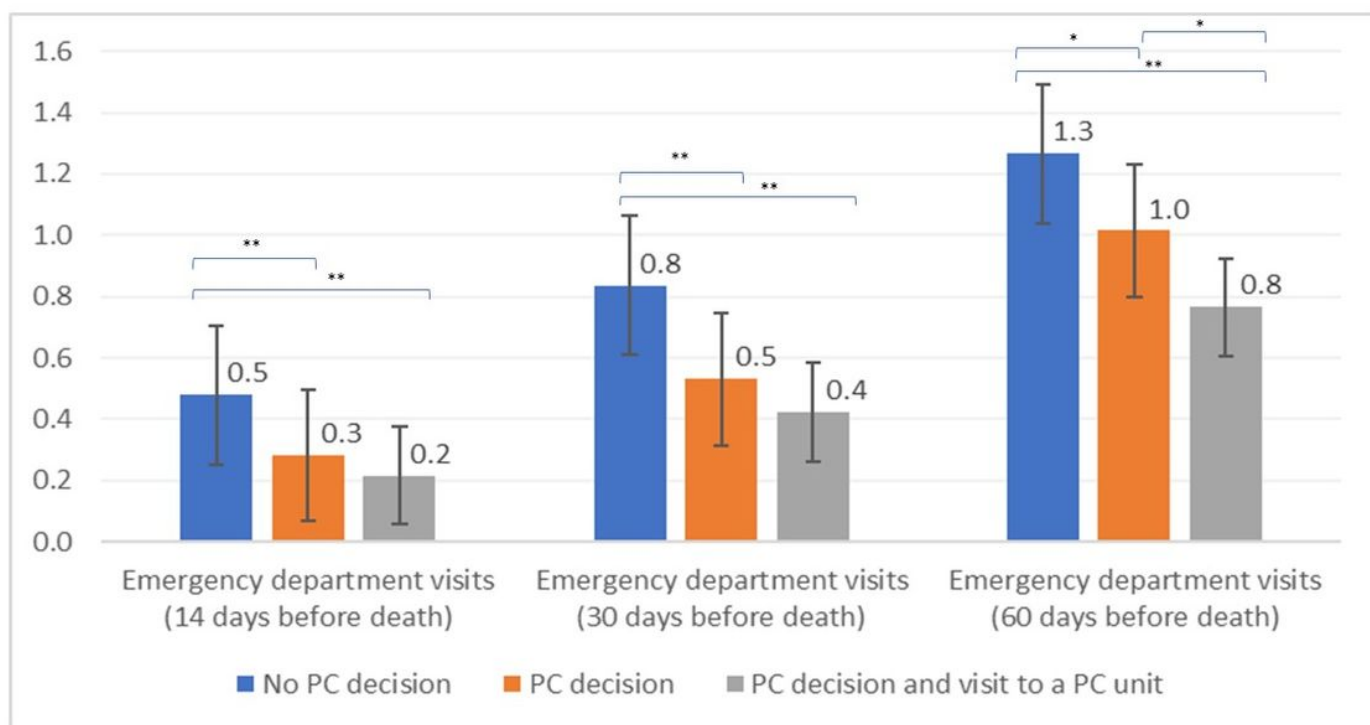
Figure 1

Mean number of emergency department visits 14, 30, and 60 days before the death of patients with no PC decision, with a PC decision and with both a PC decision and visit to a PC unit before the time frame under consideration. Error bars indicate standard error of the mean. * The pairwise comparison of the mean number of inpatient days is statistically significant (p<0.05) ** The pairwise comparison of the mean number of inpatient days is statistically significant (p<0.01)
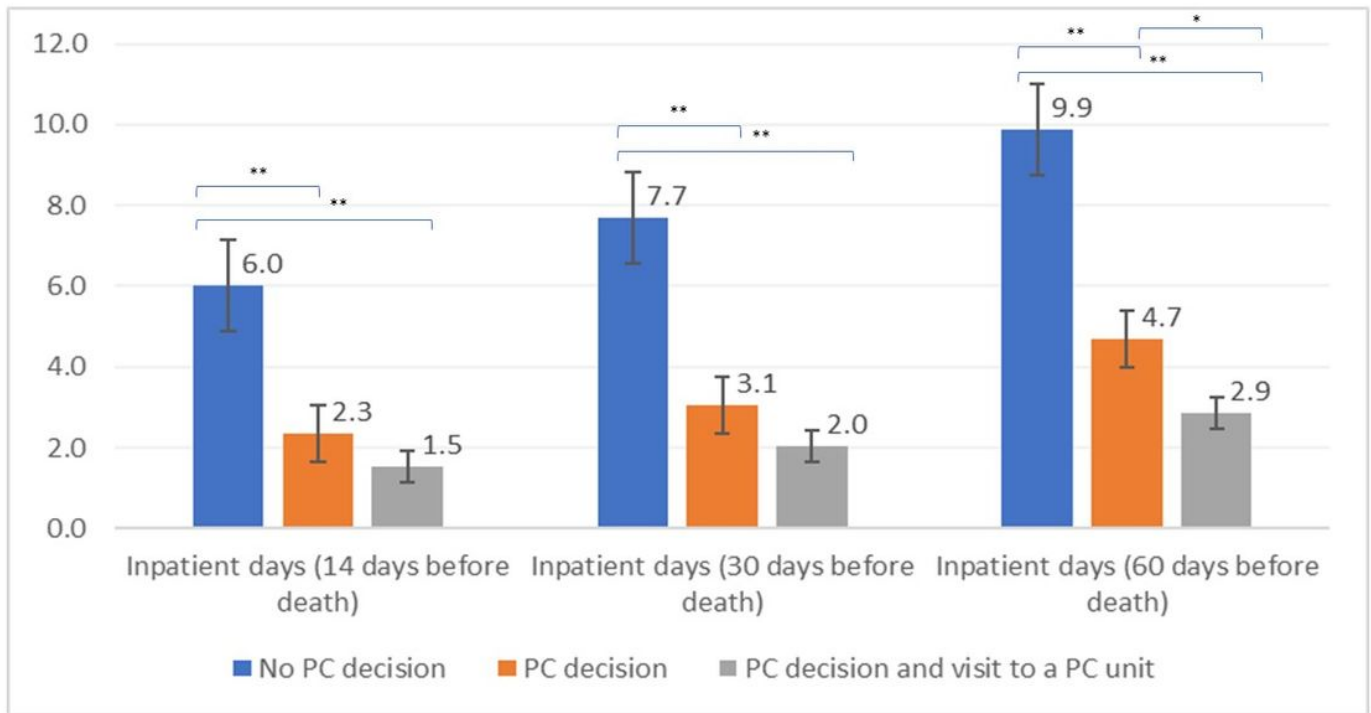
Figure 2

Mean number of inpatient days 14, 30, and 60 days before the death of patients with no PC decision, with a PC decision and with both a PC decision and a visit to a PC unit before the time frame under consideration. Error bars indicate standard error of the mean. * The pairwise comparison of the mean number of inpatient days is statistically significant (p<0.05) ** The pairwise comparison of the mean number of inpatient days is statistically significant (p<0.01)