# 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 In order to avoid unnecessary use of hospital services at the end-of-life, palliative care should be initiated early enough in order to have time to initiate and carry out advance care planning (ACP). 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 (the decision to terminate life-prolonging anticancer treatments and focus on symptom centered palliative care) and use of PC unit services were studied in relation to emergency department (ED) visits, hospital inpatient days and place of death.

Results The 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 had an appointment at the PC unit (>180 days prior to death 72% and <14 days 10%). The number of ED visits and inpatient days were highest for patients with no PC decision and lowest for patients with both a PC decision and an PC unit appointment (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 an appointment to a PC unit).

Conclusions The PC decision to initiate a palliative goal for the treatment had a distinct impact on the use of hospital services at the EOL. 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 emergency department (ED) visits, inpatient hospital admissions, or dying in an acute-care setting is also a characteristic of insufficient palliative care (PC) for patients with advanced cancer approaching their end-of-life (EOL) [2,3]. In contrast, patients receiving in-home PC are less likely to visit the ED or to be admitted to a 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].

It has been demonstrated that early integrated PC leads to less aggressive EOL care, including reduced chemotherapy and longer hospice care [10]. The longer the hospice care period the better the quality of life [11]. Early integrated palliative care also reduces the rates of hospitalization and ED visits [10,12]. Thus, the palliative decision making is preponed.

Internationally, the terminology of the PC period and its timing and content is somewhat confusing. In the Lancet Oncology Commission paper [13] the terms are defined based on the treatment intention: curative, life prolonging, or palliative. However, PC should be integrated at any stage of the disease trajectory, irrespective of the primary intention of the treatment. When the primary treatment goal is set to palliative, and the disease modifying treatments end, the period of PC begins. In our study this moment is called the PC decision.

The transition into PC earlier can be one way of reducing the use of hospital services at the EOL. It gives more time to initiate and carry out advance care planning (ACP) including a connection to primary care or a hospice as well as organizing care in the home, if possible. An appointment at a PC unit may offer one approach for improving the quality and completion of the ACP documentation [14]. Consequently, service needs of the patients at the EOL should be addressed outside both the ED and the secondary or tertiary care hospital. The site of death may then indicate the quality of end-of-life care, as the majority of patients with the serious illness want to die at home rather than in an institutional setting [11].

Although there are studies showing that an earlier introduction (one to more than three months prior to death) of PC is associated with improved EOL care, in terms of fewer hospitalizations and increased likelihood of dying at home or in a hospice [15-18], there is no data, to our knowledge, regarding the impact of the transition from life-prolonging anticancer treatments to PC and its timing on the hospitalizations and site of death in cancer patients.

In our earlier study [19], we reported that PC decisions done within the last month prior to death were associated with anti-cancer treatments continuing until close to death, and the access to a PC unit becoming more unlikely. Therefore, a well-timed decision to initiate a palliative period might also be related to more appropriate treatment and resource usage at the EOL.

The aim of this study was to evaluate whether the PC decision and a referral to a PC unit have an impact on the use of hospital services at the EOL and on the place of death.

# Methods

*Cohort selection*

This cohort consists of a 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 January 1 –December 31, 2013 and were deceased by December 31, 2014. The total number of patients fulfilling the criteria was 2 737 and of these, 992 were randomly selected for the study cohort from the hospital register. Randomization was done by sorting the patients in the order of their pseudonymized identifier, creating a random order. 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. HUCH is governed by the representatives of all the municipalities in the region. HUCH provides all secondary and tertiary care for these municcipalities. 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 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 [19], but some new variables were considered in addition to those in [19]: do not resuscitate (DNR) decisions, visits to the ED in the secondary/tertiary hospital, inpatient episodes in the secondary/tertiary hospital, appointments to the PC unit, timing of the PC decision, and 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 [19] 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*

The service usage of all patients was studied 14, 30, and 60 days before the time of death. 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'). The places of death were categorized in five categories: home, primary care wards, secondary or tertiary care wards, hospice, and nursing homes. At the time, in the 24 municipalities of Southern Finland, there was one hospice, one PC ward in primary care and seven home care teams specialized in PC.

The PC decision and the PC period are defined as in [19]. For the purposes of this study patients were divided into three separate categories: 'no PC decision', 'PC decision', and 'PC decision and appointment to a PC unit'. This definition is operated in a dynamic fashion in the analyses to ensure correct chronology of events. For example, if a patient has a PC decision made 40 days prior to death and has visited the PC unit 20 days before death, she will be categorized as 'PC decision' for the analysis of events 30 prior to

death, and as "PC decision and appointment to a PC unit' for analysis of events 14 days prior to death. However, when considering service usage 60 days prior to death, she will be categorized as 'no PC decision', as at that time neither the PC decision nor the appointment have taken place. Thus, in each analysis, the patients were categorized depending on the timing of the PC decision and PC unit appointment with respect to the time period studied.

*Statistical analysis*

Means, standard deviations, and distributions were used for patient characteristics. The frequency of DNR decisions 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 appointments with hospital service usage was also tested with linear regression models including control variables (age, time from diagnosis to death, and cancer diagnosis). Logarithmic transformations for the dependent and independent 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 PC decision was made, and 37% of the patients had an appointment at the PC unit. Frequency of DNR decisions in the 'No PC decision at all' category is statistically significantly smaller than in the 'PC decision at some point' category (p< 0.01), as is the frequency of DNR decisions in the 'PC decision and appointment to a PC unit at some point' category when compared to the 'PC decision at some point' category (p<0.05). However, the differences in the frequency of DNR decisions is not statistically significant between the 'No PC decision at all' and the 'PC decision and appointment to a PC unit at some point' categories. The pairwise comparisons of the distributions of the places of death between the three patient categories are all statistically significant (p<0.01).

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.

**Table 2: Timing of Palliative Care Decision and Proportion of Patients Visiting PC Unit (%)**

| Time between the PC decision and death | All patients with PC decision N (% of all patients) | Patients with PC outpatient unit appointment N (% patients with PC decision within the timeframe) |
|---|---|---|
| <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 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

The results of the regression models are presented in Table 3. The models confirm the negative association between the PC decision and service usage prior to death, as well as between the PC unit appointments and service usage prior to death, even when considering potential control variables, such as age and cancer site. On average, patients with a PC decision and an appointment to a PC unit had 15-24% less ED visits and 56-64% fewer inpatient days than the patients without a PC decision.

**Table 3: Results of the regression model expressed as the proportional change (%) in the patients' services usage 14, 30 and 60 days prior to death resulting from an increase in the covariates by one**

percent. In the case of binary variables, the coefficient depicts the proportional changed in the service in each diagnosis group compared to breast cancer patients.

| | Dependent variable | | | | | |
|---|---|---|---|---|---|---|
| | Emergency department visits | | | Inpatient days | | |
| Number of days before death | 14 | 30 | 60 | 14 | 30 | 60 |
| Age | -0.2** | -0.1 | -0.2* | -0.3 | -0.1 | -0.4* |
| Days from diagnosis to death | 0.0 | 0.0 | 0.0 | 0.0 | -0.1 | -0.1 |
| Binary variable: Diagnosis groups (reference category: Breast cancer) | - | - | - | - | - | - |
| Cancers of urinary tract | -0.4 | 1.0 | 20.2* | 9.2 | 25.8 | 42.7 |
| Colorectal cancers | 4.0 | 7.9 | 9.1 | -5.1 | 16.9 | 10.4 |
| Gynecological cancers | 3.2 | -1.6 | -8.7 | 1.3 | 11.7 | 25.9 |
| Head & Neck (H&N) | -10.2 | -16.7 | -18.5 | -30.6 | -29.8 | -8.1 |
| Lung | 8.7 | 10.8 | 7.9 | 9.0 | 12.8 | 13.2 |
| Lymphomas | -1.9 | 2.0 | 5.7 | 50.8* | 60.3* | 64.2* |
| Melanoma and other skin cancers | -0.6 | -4.9 | -7.9 | -24.1 | -26.2 | -23.8 |
| Others | -0.6 | 5.8 | 5.3 | 33.4 | 81.9** | 89.6** |
| Primary CNS malignancies | -11.7* | -17.8** | -22.1** | -44.1** | -38.1** | -39.4** |
| Prostate cancers | 6.6 | 10.3 | 13.6 | 7.6 | 12.2 | 15.4 |
| Sarcomas | -11.7 | -19.2* | -19.7 | -32.7 | -24.7 | -25.6 |
| Upper gastrointestinal | 6.8 | 8.7 | 12.2 | 5.1 | 22.1 | 20.6 |
| Binary variable: PC categories (reference category: 'no PC decision') | - | - | - | - | - | - |
| PC-decision | -12** | -18.6** | -13.4** | -47.1** | -57.6** | -51.1** |
| PC-decision and admission to PC unit | -15.3** | -21.9** | -24.2** | -56** | -63.4** | -64.4** |
| **Test statistics** | | | | | | |
| Adjusted $R^2$ | 0.06 | 0.08 | 0.06 | 0.13 | 0.18 | 0.16 |
| F-stat | 4.45 | 6.13 | 4.98 | 10.16 | 14.16 | 12.02 |
| Residual standard error | 0.35 | 0.44 | 0.53 | 1.10 | 1.08 | 1.14 |

'**' Significant at 0.01, '*' Significant at 0.05

*Place of death*

The association of the PC decision and the PC unit appointment with the place of death is presented in Table 1. The significant difference between the categories is 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

appointment are more likely to die in primary care wards (46% vs. 56% and 59%, respectively).

## Discussion

In this assessment of the treatment of cancer patients at a Finnish university hospital, a PC decision to initiate a palliative intention for the treatment decreased the number of ED visits and inpatient days in the secondary/tertiary care hospital. Patients without a PC decision also died more often in secondary or tertiary care hospital compared to the patients with a PC decision. The usage of health care services was further decreased if the patient had an appointment to a PC outpatient unit in addition to a PC decision.

Internationally, the terminology of the PC period and its timing and content are not uniform making the comparison between previous studies and the present study somewhat difficult. Regarding the timing of the PC initiation, in two previous studies [15,17] early PC referral was defined as a referral to PC ≥30 days, whereas in the study by Alsirafy and co-workers [16] the timing of PC referrals were categorized as early (> 90 days before death), intermediate (30-90 days before death) and late (<30 days before death). In the study by Nieder and co-workers [18], three months before death was chosen as a time point to distinguish between an early and late PC. However, the timing of the PC period should be considered together with the content of the PC period, that is, whether patients received only treatments managing symptoms, or also disease-modifying treatments. These studies have not made a distinction between the patients receiving early integrated PC (during the active oncologic treatments), or late PC (after discontinuation of active oncologic treatments). No systematic early integrated PC was offered in the HUCH during the time period of this study, although this has been later 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 [20,13]. Therefore, our cohort represents a late PC, that is PC after the termination of anti-cancer treatments.

We have earlier demonstrated with this same cohort of patients [19] that a PC decision initiating the palliative goal for care was frequently made, but occurred late [11]: the median time from the PC decision to death was 46 days. Patients with no or a very late PC decision (≤30 days) received more aggressive cancer treatments at the EOL and made few visits to the PC unit. Only 37% of these patients visited the PC unit. In this study we further show that patients with no or very late PC decision not only receive more aggressive treatments at the EOL but also use more hospital services and have a higher risk for dying in an acute-care setting. These are indicators for poor quality of end of life care [21].

Despite the introduction of PC in our cohort only after discontinuation of active oncological treatments, we did observe the benefit of PC decisions in reducing the ED visits and inpatient days in the hospital, especially during the last months of life. A referral to the PC outpatient unit further decreased the ED visits and inpatient days. The reduction in the average number of inpatient days per patient was significant (5-7 days per patient). The reduction in average number of ED visits per patient was 0.3 – 0.5 visits. Even the small reduction in the number of ED visits, however, is significant in economic terms: for this study

population it would mean approximately 200 fewer ED visits during the last month of life. In addition, we believe that every unnecessary visit to ED during the last weeks of life are burdensome for a patient. However, the coefficients of determination (adjusted R2) of the regression models are relatively low – especially in the model for ED visits – indicating that there is a lot of variation in the data that the model does not capture. A systematic review and meta-analysis has indicated that PC services decrease the likelihood of ED visits [3]. An earlier study of cancer patients in Finland also showed that a visit to the PC outpatient clinic facilitated the connection with primary care services tending to decrease ED visits and resource usage of the tertiary care hospital [14]. Both these earlier studies are in line with our results. We suggest that, although a switch to a palliative goal of care may modify the EOL care arrangements of a patient, early enough a contact to PC services might have even higher an impact [10].

Early PC (initiated > 1 to > 3 months prior to death depending on the study) has been shown to be associated with fewer hospitalizations, earlier DNR designation, and an increased likelihood of dying at home or in a hospice instead of a hospital or the ICU [15-18]. In line with the previous studies, in our study, patients without a PC decision and especially those without a contact to the PC unit were more likely to die in a secondary or tertiary hospital ward. However, in the present study the majority of the patients died in a primary care ward as there was only a few hospices or ward specializing in EOL care available during that time. Likewise, dying at home was rare due to lack of specialized palliative home care teams.

Patients dying of cancer use resources of the hospitals - often for a good reason – but any reduction in the utilization of hospital wards is also beneficial from the economic perspective [22]. Indeed, it has been shown that palliative home care support or a proactive PC program reduces hospital use and the total costs of care at the EOL [9,23]. We did not carry out cost benefit analysis in this study, but this important aspect warrants investigation 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 the hospital databases. Furthermore, we could not rule out the possibility of some sudden deaths or deaths due to complications at secondary or tertiary hospital, however, according to previous studies this could explain only a small proportion of deaths [24]. 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.

## Conclusions

Our study revealed that although for most cancer patients the PC decision (i.e. the decision to switch the treatment goal to palliative) was made, 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 reflected a significantly increased risk of visits to ED, inpatient days in a secondary or tertiary care hospital, and further, dying in a

secondary or tertiary care ward. 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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# Table 1

**Table 1: Characteristics of the patients**

| | Category | | | |
|---|---|---|---|---|
| Measure | No PC decision at all | PC decision at some point | PC decision and appointment to a PC unit at some point | Total |
| 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 %) |

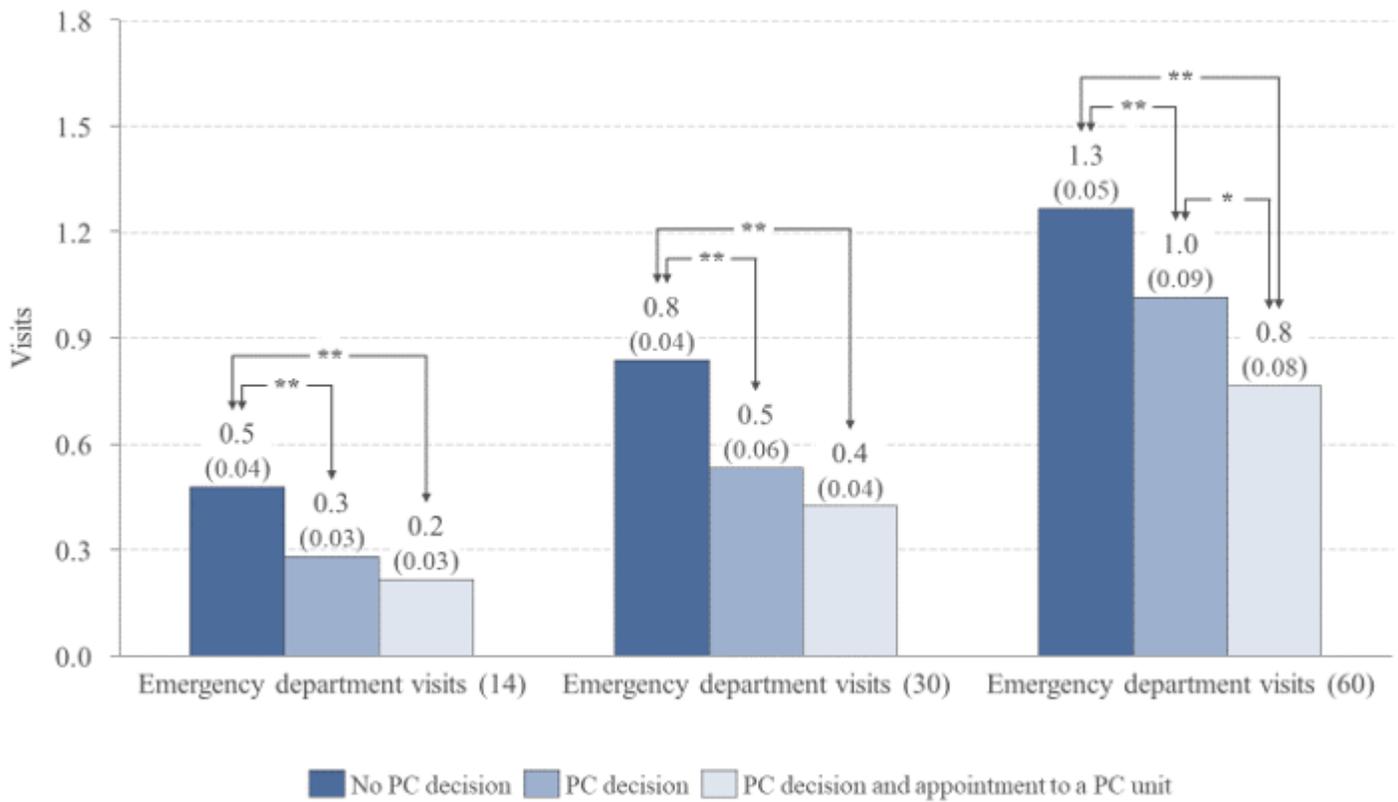
* only patients receiving radiotherapy are included

[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. Standard errors of the mean in parentheses. * 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)

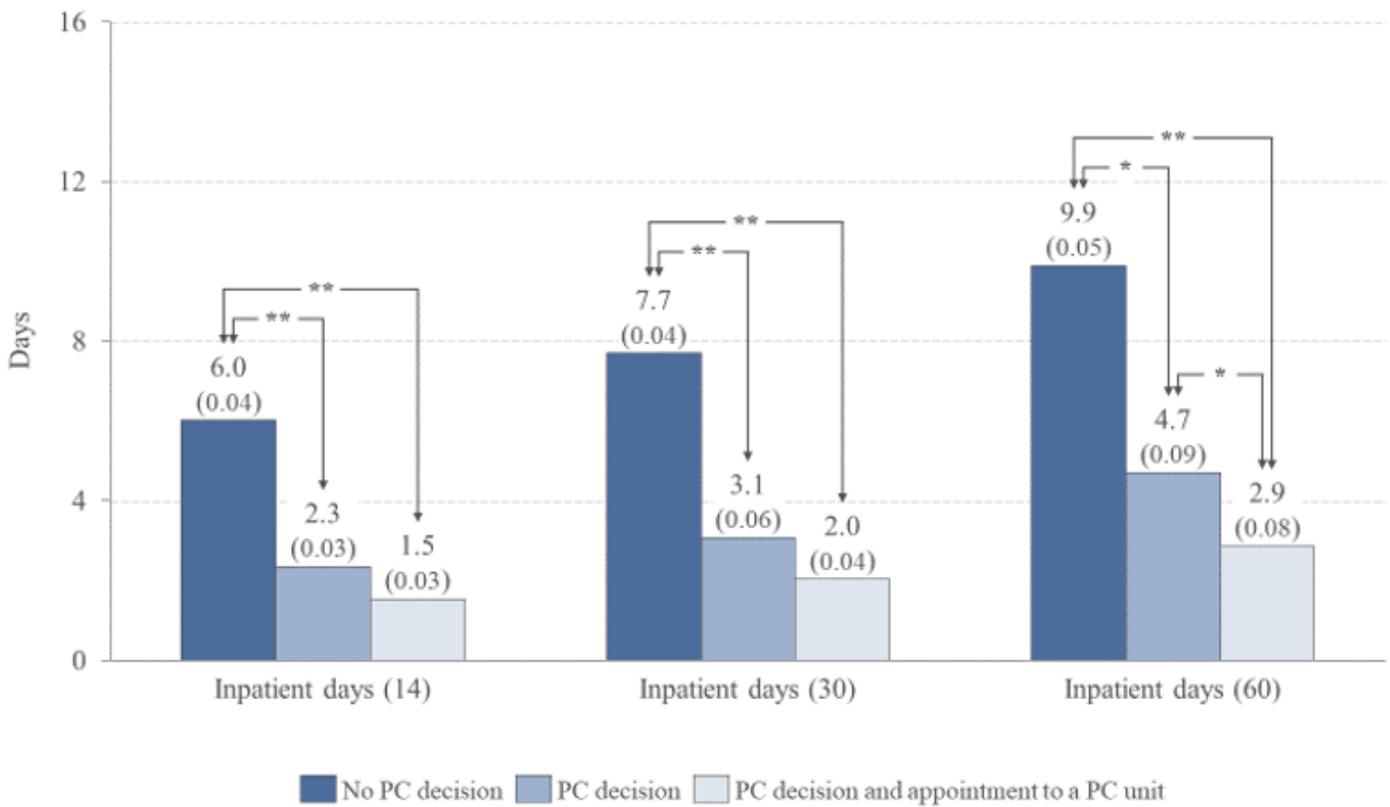



**Figure 2**

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. Standard errors of the mean in parentheses. * 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)