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Specialized palliative outpatient clinic care involvement associated with decreased end-of-life hospital costs in cancer patients, a single center study

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Abstract

Background Studies show that hospital deaths bring significant health care costs, and the involvement of specialized palliative care can help to reduce these costs. The aim of this retrospective registry-based study was to evaluate end-of-life hospital costs in patients dying in a university hospital oncology ward, with or without specialized palliative outpatient clinic contact at any timepoint.

Methods The study population consists of all patients who died in the Kuopio University Hospital oncology ward in the years 2012–2018 ($n=457$). Hospital costs in the last 30 days of life and data on treatment decisions and background factors were gathered. Costs for patients with and without palliative care contact were compared. Effects of various variables on the costs were analyzed using gamma regression model.

Results Both the last 14 days' and 30 days' hospital costs before death were significantly lower among those 65 patients [14.2%] who had had a specialist palliative care contact. This was seen in inpatient day costs, microbiology, radiation therapy, laboratory, drug, radiology, and total costs. In a multivariate analysis including age, gender, year of death, time from diagnosis to death, and cancer type, the costs for 30 days prior to death were 33% lower in those patients who had had palliative care contact.

Conclusions Our results provide first indications that a contact to specialist palliative care in an outpatient clinic may reduce end-of-life hospital care costs in hospital-deceased cancer patients.

Keywords Palliative care, End-of-life care, Cancer, Costs, Health care costs

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Background

Worldwide, cancer is one of the leading causes of death [1] with 10.0 million lost lives in 2019 [2]. It imposes a heavy burden on the health care services and the economy [3], and the costs are expected to increase [4]. According to studies in Western countries, most of the health care expenditure builds up towards the end of life [5]. Utilization of palliative care services, palliative consultant teams and hospital-based and in-home hospices seems to reduce the cost of care [6–8] and the quality of care remains equal, if not better [9]. Many advantages emerge when integrating oncology and specialized palliative care, i.e. improved symptom control and quality of life, reduced use of chemotherapy at the end of life, and diminished anxiety and depression [10]. The burden on health care service systems can be lowered when the transition from active oncological treatment to palliative care is done at the right time, whilst offering the patient better quality of life [QoL] [11]. The American Society of Clinical Oncology [ASCO] recommends that patients should receive dedicated palliative care services simultaneously with active treatment even early in the course of the disease [12]. Many studies have shown that early palliative consultation can reduce hospital costs [6, 13–19]. However, the evidence of cost reduction seems discrepant [20, 21]. Also, many of these studies focus on total and daily costs and originate from the United States [6, 22–24].

Kuopio University Hospital [KUH] is one of the five university hospitals in Finland. A specialized palliative outpatient clinic at KUH was established in 2011, with the aim of improving palliative and end-of-life care in the region. The palliative outpatient clinic is part of the Department of Oncology, and at the time of this study all the patients who were referred to the clinic were cancer patients.

The aim of this study was to evaluate whether contact with the palliative outpatient clinic would make a difference in hospital care costs in the last month of life.

Materials and methods

This study was designed as a retrospective registry-based study.

Study setting and cohort selection

The Finnish health care system covers comprehensive cancer care for all residents with minimal direct financial burden on patients. During the years of this study, the main responsibility for financing social and health care services was on the municipalities, who regionally jointly [hospital districts] also owned the hospitals. The funding was through municipal taxation (60%), government subsidy similar to equalization payment (37%) and from customer fees (3%). All university hospitals receive some more funding form the government, which is directed to those extra costs incurring due to the hospital status as a centralized tertiary care institution and a teaching hospital.

The prices of different services in the hospital are defined annually and are based on cost accounting aiming to cover all costs incurring from the hospital services. To determine the prices for the services the NordigDRG (Diagnostig Related Group) is used as a guideline. The main principle is that the costs collected are the costs covered.

KUH is the main hospital in the Health Care District of North-Savo and it is responsible for cancer care for some 247,000 residents in its catchment area. During the study period, the KUH Oncology ward had a capacity of 18 beds. Most of the patients were referred to the ward from the Emergency Department (ER), others from oncology or palliative outpatient clinics, while some had attended for scheduled treatment.

Palliative care cancer patients are admitted to the oncology ward when they need inpatient care since there is no separate palliative care ward in KUH. Practically across the street from the hospital, there is a hospice run by the city of Kuopio, while basic level palliative and end-of-life care is provided by the wards of other municipal primary health care centers. The palliative outpatient clinic offers multidisciplinary specialist level palliative care. The focus is on comprehensive palliative care including symptom management and advance care planning.

The population of this study consists of all patients who died in the KUH oncology ward between 1 January 2012 and 31 December 2018.

Methods

In KUH all patient data is in electronic format. The information about treatment decisions and background factors (including cancer diagnosis, age, and treatment decisions) were retrieved from the electronic patient records (EPR). The researchers (authors AT and KT) reviewed all the medical records. Whenever the patient had more than one cancer, only the cancer the patient was being treated for at the time was included in the final analysis. Patients were categorized based on whether they had a specialized palliative care contact (PC) or not (non-PC). Patients were included in the PC group if they had made at least one visit to the palliative outpatient clinic.

The costs within 30 days and 14 days prior to death were retrieved from the KUH controller unit. The invoicing of the municipalities is solely based on the controller data. The data allowed separately recording the costs of laboratory tests, radiation therapies, inpatient days, outpatient visits (including palliative outpatient clinic costs

as well as other outpatient visits in other departments of the hospital), blood transfusions, intensive care, microbiological tests, and radiology scans (CT, MRI, ultrasound, x-rays) in those time periods. Furthermore, the total costs (all costs combined including pathology investigations and other costs which were not divided separately) were recorded in those time periods. Basic drugs (analgesics, antihypertensive drugs, anticoagulants) were included in the inpatient day costs and only separately ordered drugs (mainly chemotherapies and other cancer drugs) were shown in the drug costs, which explains the small costs in drugs.

Statistical analysis

All statistical analyses were performed using IBM SPSS 27 software. The Chi-square test was used to test the difference between categorical variables, and the non-parametric Mann–Whitney U-test was used to investigate the differences between the continuous variables. The cost data was mainly not normally distributed, but means for costs are reported rather than medians, as this was perceived to be more informative. For multivariate analysis for 30 days' total costs, a gamma regression model was used.

Ethical aspects

This retrospective registry-based study was permitted by the KUH administration authority. The North-Savo Health Care District Ethics Committee performed an evaluation and approved the study.

Table 1 Baseline characteristics of patients with a specialized palliative care contact PC] or not (non-PC]

	PC (*n* = 65)		Non-PC (*n* = 392)		
	n	%	*n*	%	*p*-value for difference
Sex					0.4
Female	29	44.6	153	39.0	
Male	36	55.4	239	61.0	
Age, median [range]	67	[39–87]	68	[20–94]	0.9
Cancer type					*0.02*
Breast cancer	7	10.8	54	13.8	
Lung cancer	14	21.5	106	27.0	
Colorectal cancer	13	20.0	38	9.7	
Pancreatic cancer	11	16.9	34	8.7	
Other cancer	20	30.8	160	40.8	
Time from diagnosis to death					*< 0.001*
< 30 days	0	0	72	18.4	
30 days–1 year	27	41.5	164	41.8	
> 1 year	38	58.5	156	39.8	
DNAR decision made	53	81.5	324	82.7	0.8
Palliative care decision made before death	63	96.9	183	46.7	*< 0.0001*
End-of-life care decision made before death	53	81.5	253	64.5	*0.007*

Results

The key characteristics of the population are presented in Table 1.

There were 457 patients (60.2% males, $n=275$, and 39.8% females, $n=182$) included in the study and 65 (14.2%) of them had an appointment at the palliative care outpatient clinic. Most patients in the study had solid tumors, since at that time almost all lymphomas were treated at the Hematology Unit of KUH. The most common cancer types were lung, breast, colorectal, and pancreatic cancer. The group "other" consisted of all the other cancer types (Supplementary Table 1). In the whole population, the proportion of prostate cancer was 4.6% ($n=21$) and of lymphomas only 2% ($n=9$). In 86.9% of the patients, the diagnosis of cancer was biopsy-based and pathologically verified, while the rest had a clinical diagnosis based e.g. on radiology findings. A second malignancy had been diagnosed for 7% ($n=32$) of the patients; most often it was colorectal or prostate cancer. Almost one out of five in the non-PC cohort had the diagnosis of cancer within less than a month before death. In the PC cohort the cancer diagnosis was made significantly earlier.

In the study population 14.2% ($n=65$) of the patients had had an appointment at the specialized palliative care outpatient clinic (PC group). The visit was also planned but did not take place for another 8.8% ($n=40$) of the patients. Nearly two out of three patients who visited the clinic (63.1%) had only one visit, while 36.9% ($n=23$) had more than one appointment, and only a few of them had three or more visits. For almost all patients, the palliative care contact happened during the last six months of life.

The end-of-life care total costs were significantly lower in the PC cohort (Table 2; Fig. 1). This result was seen at both 14 and 30 days before death and was also separately observed in costs originating from radiological scans, microbiological tests, radiation therapies, laboratory tests, drug costs (which were mainly anti-cancer drugs) and inpatient days. Likewise, the number of tests and examinations (e.g. laboratory tests and radiology scans) was significantly lower in the PC cohort (Table 3). The PC cohort had more outpatient visits in the 14 days prior to death. There were no significant differences in blood transfusions or intensive care administration between the cohorts.

In the multivariate analysis (Table 4), the costs at 30 days prior to death were 33% lower in the PC group after taking into account age, gender, year of death, time from diagnosis to death, and cancer type. The costs decreased by 1% with every year of age added. An increase of about 6% on an annual basis occurred in the last 30 days' cost.

Table 2 Hospital costs per patient in euros [€] 14 and 30 days before death

Cost	14 days					30 days				
	PC (*n* = 65)		Non-PC (*n* = 392)			PC (*n* = 65)]		Non-PC (*n* = 392)		
	mean	SD	mean	SD	*p*-value for difference	mean	SD	mean	SD	*p*-value for difference
Radiology	171.9	220.6	410.7	742.7	*< 0.0001*	305.3	349.0	644.3	893.4	*< 0.0001*
Microbiology	41.6	95.0	62.2	81.9	*< 0.0001*	59.5	100.1	102.8	141.6	*< 0.001*
Radiation therapy	21.1	146.4	223.0	588.0	*< 0.001*	51.1	272.8	428.1	966.9	*< 0.0001*
Laboratory tests	124.8	131.5	236.7	217.0	*< 0.0001*	207.8	202.5	358.5	276.7	*< 0.0001*
Inpatient days	1,356.8	883.1	1,728.2	1,236.4	*0.014*	1,769.7	1,198.4	2,409.2	1,657.4	*0.002*
Drugs (mainly anti-cancer therapy)	0.0	0.0	19.1	176.1	*0.024*	0.7	5.3	153.6	643.2	*0.001*
Blood supplies	76.2	225.3	125.3	433.1	0.965	111.5	291.4	176.9	550.9	0.546
Outpatient cost	442.9	372.2	346.2	289.9	*0.028*	696.0	434.9	646.4	418.3	0.400
Intensive care	0.0	0.0	81.3	770.4	0.316	0.0	0.0	98.0	854.4	0.246
Total hospital costs	2,701.8	1,557.3	3,958.1	3,085.5	*< 0.0001*	3,780.8	2,094.8	6,155.6	4,171.4	*< 0.0001*

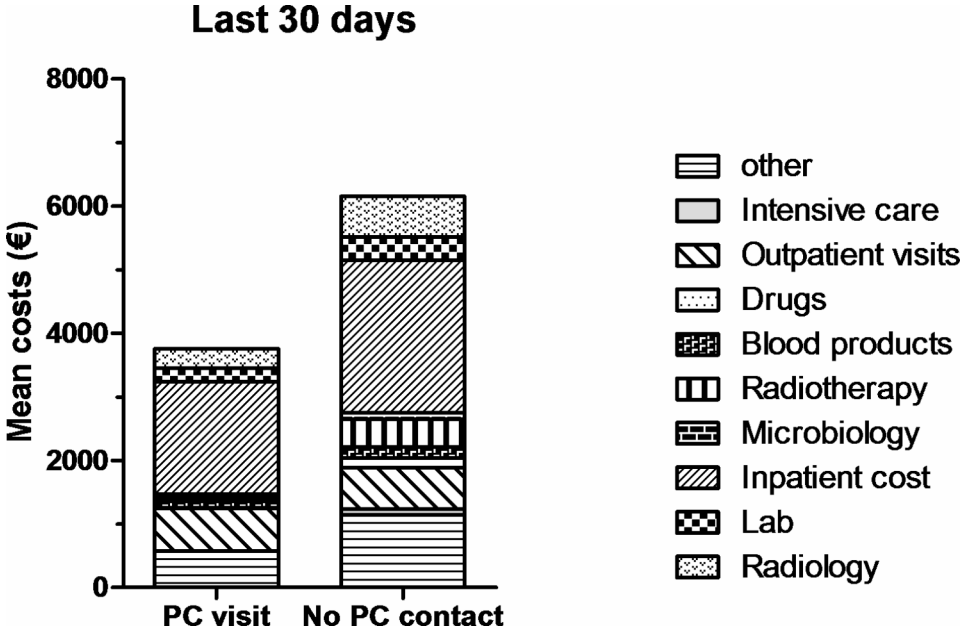

Fig. 1 Hospital costs in the last 30 days

Table 3 Number of items [examination, day, or visit] 14 and 30 days before death

Number (*n*]	14 days					30 days				
	PC (*n* = 65)		Non-PC (*n* = 392)			PC (*n* = 65]		Non-PC (*n* = 392)		
	median	range	median	range	*p*-value for difference	median	range	median	range	*p*-value for difference
Radiology	1	0–7	2	0–17	*< 0.001*	2	0–7	4	0–19	*< 0.0001*
Microbiology	1	0–7	2	0–16	*< 0.0001*	2	0–9	3	0–28	*< 0.0001*
Radiation therapy	0	0–5	0	0–14	*< 0.001*	0	0–8	0	0–18	*< 0.0001*
Laboratory tests	28	0–88	45	0-189	*< 0.0001*	36	5-125	66	0-236	*< 0.0001*
Inpatient days	5	1–13	7	1–14	*0.012*	7	1–29	9	1–29	*0.004*
Drugs (mainly anti-cancer therapy)	0	0	0	0–5	*0.024*	0	0–1	0	0–7	*0.001*
Blood supplies	0	0–5	0	0–25	0.974	0	0–6	0	0–30	0.540
Outpatient visits	2	0–7	1	0–13	*0.015*	3	0–10	3	0–13	0.090
Intensive care	0	0	0	0–8,7	0.316	0	0	0	13,9	0.246

Table 4 Multivariate analysis [gamma regression] for the total 30-day hospital costs

Variable	*n*	Estimated marginal means [€]	exp [β]	95% CI		*p*-value
Age [years]	457		0.99	0.99	1.00	< 0.0001
Sex						
Female	182	4875	ref.			
Male	275	4815	0.99	0.88	1.11	0.8
Year of death	457		1.06	1.04	1.09	< 0.0001
Visited palliative care unit						
No	392	5911	ref.			
Yes	65	3971	0.67	0.58	0.78	< 0.0001
Time from cancer diagnosis to death						
≤ 30 days	72	5694	1.36	1.16	1.60	< 0.0001
30 days–1 year	191	4780	1.14	1.02	1.30	0.03
> 1 year	194	4180	ref.			
Cancer type						
Breast cancer	61	4883	0.85	0.71	1.02	0.08
Lung cancer	120	4859	0.85	0.74	0.96	0.01
Colorectal cancer	51	4781	0.83	0.70	0.99	0.04
Pancreatic cancer	45	4098	0.71	0.59	0.86	< 0.001
Other	180	5742	ref.			

The costs were largest when the cancer diagnosis was made less than a month before death. Overall, age, year of death, a PC visit, time from diagnosis to death, and cancer type significantly predicted the costs of the last 30 days.

Discussion

The hospital costs of the last 30 days of life were significantly lower in patients with a PC contact both in total cost and in the cost of different examinations, inpatient days, and oncology drugs. In this study, the mean total hospital costs for the 30 days before death were €3,781 in the PC group and €6,156 in the non-PC group. Similar results were also seen in a study by Abian et al. [25] In a large Canadian study [26], with 107,253 patients, the per patient costs over the final month of life were 43% higher in patients receiving active care towards the end of life compared to those who were managed less actively. Another Canadian study concluded similarly that early palliative care reduced average health system costs significantly in the last month of life [27]. Moreover, a Finnish study by Rautakorpi et al. [28] showed that for pancreatic cancer patients the medical costs during the last month of life were approximately half for patients with palliative intervention compared to patients with no intervention. A similar result was also seen in our data as the per patient cost with patients having a PC contact was one third lower compared to those who did not.

A large portion of the health care expenditure in Western countries is created at the end of life [5]. The cost savings associated with a PC contact have been shown in many studies [14–17, 22]. It has also been found that a PC contact early in the course of illness can lead to higher cost reductions. A study by Sheridan et al. noted that a reduction of costs was even seen in patients receiving a PC contact within seven days prior to death, although the reduction was larger when that contact occurred more than 28 days prior to death [29]. Early palliative consultation has also been shown to reduce patients' length of hospital stay [13], and this was also seen in our study. Furthermore, May et al. speculated that the biggest driver for cost-savings seems to emerge from reduced inpatient days [30]. There is strong evidence, that if the PC decision is made 30 to 60 days prior to death, there are fewer ER visits or hospitalizations to tertiary hospitals [31, 32]. In the whole population of our study, the median timing of palliative care decisions was only 8 days prior to death, indicating that there was little time for a PC contact. Even so, there was still a significant reduction of costs. It may be speculated that an earlier PC decision could have reduced the costs even more.

Our previous study [33] reported that the proportion of end-of-life decisions increased after the implementation of a palliative outpatient clinic, but the decisions were still made relatively late, mainly in the last days of life. The relatively small number of PC visits (only 14.2% of patients) before death is in line with this trend. Then again, over one third of the patients in the non-PC cohort had their cancer diagnosis made more than a year before death, so it may be suspected that the need for palliative care was not recognized early enough. Almost one out of five patients in the non-PC group had a short time between cancer diagnosis and death (less than a month). The total cost of care for these patients was significantly higher compared to patients whose cancer diagnosis was made earlier. It is notable that for many of these patients

the costs incurred in less than a month, since the cutoff was one month before death, and some had their diagnosis just a few days prior to death.

The most common cancer types in our study were lung, breast, colorectal and pancreatic cancers. The cohort "other", with 180 cases, was very heterogenic, consisting of prostate (4.6%), kidney (3.5%), head & neck (2.8%) and gastric (2.6%) cancers and melanoma (3.1%), among others. The costs in this group were higher, while the costs in more common cancer types were relatively similar. It may be speculated that the end-of-life and palliative care for these smaller cancer groups was not as well established. With respect to the volume of prostate cancer in general, this study included relatively few prostate cancer patients, which may indicate that the end-of-life care of these patients took place in primary health care services.

The costs were lower in the PC group, due in part to there being fewer examinations and inpatient days. Similar results have also been seen in other Finnish studies. The previously mentioned study [28] done with pancreatic cancer patients reported lower costs as the patients with a PC contact had fewer radiological examinations and hospitalizations. Another study also showed that when a PC decision was made and an appointment was set at the palliative outpatient unit, there were fewer visits to the emergency department and inpatient days [32].

Notably, our study consisted of patients with a palliative outpatient clinic visit. During the study period (and nowadays in general), a palliative consultation team was working in the hospital, but the team consulted mainly other hospital wards since palliative care is a crucial part of patient care in the oncology ward. Other studies on cost savings are mainly done based on the work done by palliative consultation teams [6, 8, 13, 15, 17, 22–24, 30]. Therefore, the findings of our study bring important information about the work being done by a specialist outpatient clinic.

Limitations and strengths

There are some limitations to the study. Our data included only patients who died in an oncology ward, and we excluded patients who died elsewhere, and thus the results may not be generalizable. For example, our patients may have had more intense symptoms demanding inpatient care in a specialist care unit. Also, almost one in five of the non-PC cohort were newly diagnosed patients and therefore that might have influenced the results. We didn´t consider severity of illness, further comorbidities etc. as covariates and therefore this might have caused bias as some of the non-PC patients may have been too severely ill to visit the outpatient clinic. The PC group only consisted of patients with outpatient clinic visits as at the time the consultation services weren´t available and therefore nowadays the results might be different. The study did not include health care costs incurred outside of the university hospital and therefore it provides somewhat limited data when considering the total health care costs.

The strengths of this real-life study are its relatively large size and that it brings valuable information about the cost of end-of-life cancer care in our region and the work done in a specialist palliative care outpatient clinic. It is also notable that it brings information about real costs, not estimates.

Conclusion

The end-of-life hospital costs vary among patients in university hospital oncology ward. The involvement of specialized palliative care services may help to reduce these costs. In this study, the hospital costs 30 days prior to death were 33% lower in patients who were provided with such services.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12904-024-01633-x.

Supplementary Material 1

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Author contributions
All the authors (AT, AL, VK and KTK) participated in the study design. AT, KTK and AL collected the data and AT and AL did the analysis of the data. AT wrote the first draft of the manuscript. All the authors were involved in interpretation of the data and critical revision of the manuscript.

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Data availability
The data that support the findings of this study are available from the corresponding author (AT) upon reasonable request.

Declarations

Ethical approval
Full ethical approval was obtained from The North-Savo Health Care District Ethics Committee on 11 February 2014, Reference No: 10//2014. Permission to extend the data was approved on 12 February 2019.

Consent to participate
Due to the retrospective nature of the study, informed consent from the patients was not possible to receive.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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