



ORIGINAL ARTICLE

Medicine Science 2022;11(2):745-9

An evaluation of cost analysis of palliative care centers

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Received 03 December 2021; Accepted 31 January 2022

Available online 20.03.2022 with doi: 10.5455/medscience.2021.12.391

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Abstract

Palliative care services were established in order to reduce the work and patient burden of intensive care units (ICU) and to reduce the treatment and care costs of patients. We objectives to make a reference study for the determination and planning of expenditure items by making expense analyzes of these centers. The files of 149 patients hospitalized in the palliative care center of Malatya Training and Research Hospital were reviewed retrospectively. The hospital automation system and files were analyzed and recorded for the data of the patients. Demographic data of patients, diagnoses of hospitalization, length of stay, treatment and care costs, including, antibiotics and other drugs, nutrition, wound care, laboratory and imaging studies, consultations, and daily bed costs were recorded and evaluated. 72 (48%) of the patients were male and the mean age was 75.4±13.0 years. The most common indications for hospitalization were malignancy 35.6% (n:53) and cerebrovascular disease (CVD) 33.6% (n:50). The average cost per patient was 7700 Turkish Liras (TL). It was found that the most important expenditure items in the palliative care center were daily cost of bed (6835 TL) per day), non-antibiotic drugs (2395 TL), and nutrition (1087 TL), respectively. Palliative care services are very effective units in reducing the care and treatment expenses of hospitals, which reduces the work and patient burden of intensive care units. In this respect determining and analyzing the costs of expenditure items will play an important role in health planning.

Keywords: Palliative care, care costs, cost analysis, cerebrovascular disease, malignant diseases, trauma patient

Introduction

Today, life expectancy of chronic care patients has increased, thanks to the technological developments in the field of medicine and increasing quality of care in intensive care units. However, the long hospital stays of critically ill patients brought along problems of effective use of intensive care beds. For this reason, palliative care centers have been established for chronic care patients who do not need intensive care but need to continue their treatment in the hospital.

Another purpose of palliative care centers is to reduce the financial burden of chronic care patients on the health system. Palliative

care includes many components such as daily doctor visits, consultations when necessary, nursing care, nutrition, pain control, relief of symptoms such as nausea-vomiting, cough, tracheostomy care, evaluation of imaging and laboratory findings, and infection treatment [1]. All these components bring a cost to the patients and their relatives, as well as to the palliative care centers within hospitals. Cost analyzes of palliative care centers and determining the expenditure items will enable using the center more efficiently by reducing costs. However, there are few studies evaluating the care costs in these centers.

In this study, we purpose to examine the care and treatment costs of patients treated in palliative care centers according to patient populations. Studies on the costs of palliative care centers established in the hospital are limited. For this reason, this study will be a reference for other studies.

Materials and Methods

This study was planned to be a cross-sectional retrospective cross-sectional study. Ethical approval was obtained from the Clinical Research Ethics Committee of Malatya Turgut Özal

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University with registration number of 2021/15. The study was conducted in accordance with the Declaration of Helsinki and the Strobe checklist. Based on similar studies, the minimum sample size was calculated to be 140 patients, for an alpha error of 0.05 and a beta error of 0.8. A total of 149 patients over the age of 18 hospitalized in the palliative care center of Malatya Training and Research Hospital, between January 01, 2020 and December 31, 2020 were included in the study. The patients younger than 18 years of age, those who were transferred to the ICU, and those who were hospitalized in the palliative service for less than 15 days were excluded from the study. The hospital automation system and files were analyzed and recorded for the data of the patients. Written informed consent was obtained from all patients or their legal guardians. The patients' demographic data, indications for hospitalization, and length of stay were recorded. The cost analysis of the patients was calculated in terms of Turkish Liras (TL). United States dollars (USD) to TL exchange rate was 5.94 at the beginning of the year 2020 and 7.37 at the end of the year 2020, when the study was completed. The daily cost of bed (including physician visits, consultations and nursing care services), consumables used, enteral and/or parenteral nutrition, wound care, laboratory and imaging studies, and consultations, antibiotics and other medications used for the patients were examined and recorded. References for the study were searched in Pubmed, Scopus, Google Scholar, and TR indexes.

Statistical analysis were conducted by using IBM SPSS Statistics 21.0 (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.). The data were expressed as number (n) and percentage (%). The normal distribution of the data was examined by Kolmogorov-Smirnov test. Cost analyses were performed by Kruskal Wallis and ANOVA tests. A value of $p < 0.05$ was considered statistically significant. In Tables 2 and 3, groups are coded with the letters a, b, c, d for statistical convenience and simplification (a: CVD, b: malignancy, c: trauma d: cardiac diseases). Groups with statistically significant height are indicated with these letters.

Results

The mean age of the patients included in the study was 79.5 ± 23.0 (min:25-max:98) and 48.3% (n:72) of them were males. When the distribution of patients was examined according to the age groups, it was found that, 22.1% (n:33) of the patients were 65 years old and younger, 18.1% (n:18) were 66-76 years old, 35.6% (n:53) were 76-85 years old and 24.2% (n:36) were 85 years old and older. The most common indications for hospitalization were found to be cancer, with a rate of 35.6% (n:53) and CVD, with a rate of 33.6% (n:50). Sociodemographic data are given in Table 1.

In the analysis of average patient care costs, the most important expenditure items were found to be, bed cost (6700 TL), non-antibiotic drugs (2356 TL), and nutrition (Enteral: 423.2 TL, Parenteral :496.5 TL) respectively. The distribution of average costs is given in Table 2. Looking at the cost analysis on a daily basis; bed cost and non-antibiotic drugs were important expenditure items. Daily cost analysis is shown in Table 3. The average cost of care per person was found to be 7700.2 TL (Table 4). When total costs were compared according to diagnoses, the care costs of the CVD and trauma group were found to be significantly higher compared to the patients with malignancy (Table 4).

In the diagnosis-based detailed cost analysis, it was found that there were no significant differences between the diagnosis groups in terms of duration of hospitalization, nightly bed cost, antibiotics, and other examinations (except for laboratory and imaging) ($p > 0.05$). We found that wound care costs were higher in the trauma, CVD, and multiple diagnosis groups compared to the malignancy group ($p < 0.001$). In addition the costs of laboratory studies were higher in the patients with trauma and multiple diagnoses compared to the malignancy group ($p:0.007$). The costs of medical consumables were higher in the trauma and CVD groups compared to the malignancy group ($p < 0.001$). The costs of non-antibiotic drugs were higher in trauma patients compared to the malignancy patients ($p:0.022$). Diagnosis-based cost analyses are shown in detail in Table 6.

Table 1. Socio-demographic characteristic

	n	%
Gender		
Male	72	48.3
Female	77	51.7
Age		
65 and younger	33	22.1
66-75	27	18.1
76-85	53	35.6
86 and older	36	24.2
Diagnosis		
CVD	50	33.6
Malignity	53	35.6
Trauma	4	2.7
Cardiac Diseases	17	11.4
Multiple diagnoses	25	16.8
Total	149	100.0

Table 2. Cost analysis by diseases

	CVD (a)	Malignity (b)	Trauma (c)	Cardiac Disease (d)	Total	P ^o	*
Age (Years)	84 (12)	62 (16)	76 (44)	81 (6)	79.5 (23.3)	0.000	a
Day Of Hospitalization (Days)	26 (250)	39.5 (37)	52 (39)	26.5 (31)	33.5 (31.8)	0.192	
Enteral Nutrition (TL)	530 (505.7)	263.5 (447.2)	668 (1681.5)	357 (218.5)	423.2 (485.1)	0.000	c
Parenteral Nutrision (TL)	308 (580.3)	1031.5 (1065.5)	1385 (1225)	339.5 (1329.5)	496.5 (910)	0.143	
Wound care (TL)	355 (359.7)	272.5 (183.8)	692 (442.5)	285.5 (128.4)	337.7 (245)	0.000	a,c
Laboratory (TL)	541 (607.1)	463 (423.8)	1179 (1768)	795.7 (890)	559.5 (685.3)	0.001	
Radiology (TL)	197 (275.7)	123 (125.8)	331 (395.5)	242 (433.2)	179 (225)	0.001	c
Other Tests (TL)	544 (351.5)	521 (258.5)	906 (428.5)	479.6 (444.3)	565.5 (312.7)	0.052	
Antibiotics (TL)	1236 (1044.3)	889 (1790.3)	1268 (3872.5)	843.2 (1052.4)	987.7 (1077.3)	0.557	
Medical Consumables (TL)	452.2 (618.4)	498.7 (652)	620 (2584)	405.5 (1040.1)	488 (639.1)	0.002	c
Other Medications (TL)	2043 (1652)	2557.5 (1843)	2587 (4915.5)	1076 (2932)	2356 (1893)	0.051	
Daily bed cost (TL)	5200 (5000)	7900 (7300)	10400 (7800)	5300 (6700)	6700 (6350)	0.201	
Total cost (TL)	12882 (8236.5)	15932 (15206)	24811 (13462.5)	10182.2 (12497.9)	14412.1 (10817.3)	0.013	c

*:statistically high group/s^o: *Kruskall Wallis test used. Values are presented as Median (Inter Quartile Range). CVD: Cerebrovascular diseases. Costs are given in Turkish Liras (TL). The letters a, b, c, d are used in the tables in order to identify the different groups

Table 3. Daily cost analysis by diseases

	CVD (a)	Malignity (b)	Trauma (c)	Cardiac Disease (d)	Total	P ^o	*
Enteral Nutrition (TL)	19.4 (16.3)	8.1 (9)	12.8 (34.9)	10.6 (11)	12.2 (13.5)	0.000	a,c
Parenteral Nutrision (TL)	10.1 (21.7)	22.3 (34)	15.2 (21.7)	13.1 (25.2)	15.4 (24.2)	0.260	
Total nitrision (TL)	29.4 (33.7)	38 (37)	40.8 (43.6)	27.5 (15.9)	32.6 (29.4)	0.224	
Wound care (TL)	10.2 (11.9)	7.5 (4.8)	16.8 (8.1)	9.4 (11.9)	9.6 (9.3)	0.001	a,c
Laboratory (TL)	24.9 (33.5)	8.6 (11.9)	30.2 (33.6)	14.7 (29.6)	15.3 (29.6)	0.011	a,c
Radiology (TL)	8 (16.3)	2.6 (4.7)	6.4 (14.5)	6.3 (17.3)	4.9 (10.7)	0.010	a,c
Other Tests (TL)	18.8 (13.3)	12.3 (4.5)	17.4 (8.7)	15.5 (22.3)	13.8 (9.8)	0.204	
Antibiotics (TL)	30.9 (25.1)	28.5 (27.1)	32.5 (77.4)	26.1 (41.5)	29.8 (37.1)	0.801	
Medical Consumables (TL)	20.6 (27.5)	10.6 (9.9)	17.8 (38.4)	14.4 (22.3)	12 (23.7)	0.001	
Other Medications (TL)	70.4 (71.3)	61.4 (61)	65.4 (78)	45.2 (66.2)	64.5 (59)	0.126	c
Daily bed cost (TL)	200 (0)	200 (0)	200 (0)	200 (13.2)	200 (0)	0.126	
Total cost (TL)	464 (148.9)	391.6 (151.4)	477.1 (173.3)	351.2 (149.6)	429.2 (143)	0.011	

*:statistically high group/s^o:*Kruskall Wallis test used. Values are presented as Median (Inter Quartile Range). CVD: Cerebrovascular diseases. Costs are given in Turkish Liras (TL). The letters a, b, c, d are used in the tables in order to identify the different groups

Table 4. The ratio of expenditure per person in total expenditure

Expenditures	Cost (TL)	%
Wound care	409.9	6.02
Laboratory	790.8	10.39
Radiology	424.4	3.41
Other tests	563.5	8.14
Antibiotics	1278.7	15.05
Medical consumables	751.5	9.76
Other medications	2394.2	34.17
Nutrition	1086.9	13.02
Total cost (TL)	7700.2	100.0

TL: Turkish Liras

Table 5. Comparison of total expenditures according to the diagnoses

	Diagnosis					p
	CVH ^a	Malignity ^{a,b}	Trauma ^b	Cardiac disease	Multiple diseases	
X	7693.1	4964.9	13024.1	5894.9	7410.6	
S.S.	6186.8	3052.8	3998.8	2636.1	6680.4	0.002
Median	6088.5	4608.5	14665.0	5225.6	6355.0	

a,b indicates the groups with difference

Table 6. Comparison of cost items according to patient diagnoses

Diagnosis		Hospital stay	Nutrition (TL)	Wound care (TL)	Laborator costs (TL)	Radiology (TL)	Other tests (TL)	Antibiotics (TL)	Medical consumables (TL)	Other medications (TL)	Bed cost (TL)
CVD	X	35.3	1107.6	513.8 ^b	1023.3	229.1	809.3	1547.9	929.8 ^b	2639.6	7048.0
	S.D.	30.4	1226.9	535.0	1300.8	261.2	1399.4	2599.3	926.0	1903.2	6084.9
	Median	26.0	822.2	380.2	541.0	124.5	476.1	889.0	655.6	2345.0	5200.0
Malignity	X	33.0	1128.4	261.4 ^a	531.3 ^a	110.8 ^a	410.6	1036.9	499.3 ^a	2114.4 ^a	6600.0
	S.D.	23.0	1606.0	185.0	581.6	114.1	206.0	1192.5	619.0	1576.6	4600.8
	Median	22.0	518.0	235.0	308.0	81.0	347.0	616.3	251.6	1854.0	4400.0
Trauma	X	48.7	2569.0	801.0 ^b	1164.5 ^b	536.0 ^b	643.3	1143.0	2752.5 ^b	5983.5 ^b	9750.0
	S.D.	28.3	1660.7	269.0	358.2	356.7	417.7	214.5	1800.4	2459.7	5671.8
	Median	36.5	2964.0	740.6	1058.0	425.0	554.6	1184.0	3126.0	7059.0	7300.0
Cardiac diseases	X	31.4	836.9	409.0	823.2	252.8	442.1	1157.5	836.7	1973.2	6223.5
	S.D.	18.6	1209.5	293.0	603.2	241.0	203.0	872.6	704.2	1304.7	3783.4
	Median	28.0	509.0	297.0	728.7	218.3	381.2	791.3	480.0	2154.0	5600.0
Multiple diagnoses	X	34.2	890.3	454.7 ^b	794.0 ^b	1578.5 ^b	465.9	1357.0	551.4	2208.9	6856.0
	S.D.	21.2	888.8	255.5	657.7	6601.8	258.0	1333.4	563.7	1305.9	4247.9
	Median	31.0	467.0	490.0	524.9	232.1	403.0	1273.0	363.3	2083.0	6200.0
	p	0.400	0.143	<0.001	0.007	<0.001	0.147	0.470	0.001	0.022	0.410

a,b indicates the groups with difference. There is a difference between the cells with different letters

Discussion

In recent years, the number of geriatric patients has increased, thanks to developing technologies and new treatment methods. Palliative care centers have been established in order to address the growing need for the care and treatment of these patients. Palliative care centers have become an important part of the health system in developed and developing countries, as well as in our country. It has been reported that, 20% of hospitalized patients in the UK are given treatment in palliative care centers [2]. Although, the patients hospitalized in palliative care centers are generally geriatric patients, young and middle-aged patients are also treated in these centers [3]. In our study, 59.8% (n:89) of the patients were geriatric patients at the age of 75 years and older, while 22.1% (n:33) of the patients were the age of 65 and younger; and 51.7% of our patients were females. In the study conducted by Hoerger et al., in 2018, 47.4% (n:81) of 171 cancer patients treated in palliative care centers were females and the mean age was 65.44 [4]. In the literature, it has been reported that patients with malignancies and CVD constitute an important part of the patients hospitalized in the palliative care services [3,5]. Similarly, in our study, patients with malignancy and CVD constituted an important part (35.6% and 33.6%, respectively).

With the increase in the use of palliative care centers, an important cost item has occurred in the health system. It has been reported that, palliative care centers have a significant share of 25% in the health expenditures of the USA [6]. In the literature, it has been shown that the cost of palliative care centers is significantly less than the intensive care services [7,8]. Palliative care can be examined in two parts as home care and hospital care. In a literature review

conducted by Smith et al., it was found that home care services are less costly than hospital care services. Lo JC reported similar results in Taiwan [9]. They attributed the difference between the cost of hospital care and home care to personnel costs, consultations, daily bed cost, and frequent laboratory examinations in the hospital care.

Patient care costs in palliative care centers within the hospitals consist of many items. Daily bed fees, nutrition, laboratory and radiological imaging studies, medications, medical consumables, and wound care constitute the main items of the total costs. In our study, we found that the average cost of care per patient was 7700 TL. Medication costs (antibiotics and other drugs) and nutrition ranked first among these costs. In the study of Morrison et al., in the US, it was found that the average cost of patients hospitalized in palliative centers was \$9545 for those who were discharged and \$17765 for those who died in the hospital [10]. In the cost analysis reviews, care and medicines had an important place. The findings of our study were similar to that study. In a multicenter study conducted by Vogle et al., in Germany, the average cost per patient was found to be 7392 €. The expenditures with the highest cost were found to be physician and nurse services [11]. In a multicenter study, conducted by Cowan et al., on 164 patients, in the US, the average cost of care per patient was found to be 65.795 USD. It was reported that 29% of this cost was medical consumables and equipment, 28% was pharmacy services, 22% was laboratory and imaging studies, and 20% was room and bed fees [12]. In the literature, varying care costs have been reported. This variance can be explained by the differences in the time periods of the studies, exchange rates, the development levels of the countries, different patient populations, and whether the palliative centers are public or private institutions.

Another method of cost analysis is cost analysis according to diagnosis. In the palliative care centers cost analysis according to the diagnoses will be guiding in the determination of the needs of the patients and the expenditure items that can be saved. In our study, we determined that the cost of care is higher in patients with trauma, those with CVD, and those with multiple diagnoses. In the literature, there are very few studies on cost analysis according to diagnosis. The studies are generally involved home care services, cost per person analysis, and cost analysis of items. There is need for further studies on this subject.

One of the limitations of our study is it was a single-center study. To obtain more comprehensive data, there is need for multicenter studies. Another limitation is that since most of the consumables and medications were imported by currencies, such as USD and Euro and since exchange rates changed during the year, it was difficult to conduct the analysis of the data, in our study. Another limitation is that our study was conducted on only the patients hospitalized in the palliative center of our hospital. Since patients followed up within the scope of home care services were not included in the study, costs of palliative care in hospital and at home could not be compared.

Conclusion

Palliative care centers have a very important role in the long-term care of chronic patients. In the palliative care centers the patient care is less costly compared to intensive care services. In order to use these services more efficiently, cost analysis and planning should be done considering the patient population. Expanding hospital or home care centers will reduce the burden of the health system and increase patient and family satisfaction.

Conflict of interests

The authors declare that they have no competing interests.

Financial Disclosure

All authors declare no financial support.

Ethical approval

Ethical approval was obtained from the Clinical Research Ethics Committee of Malatya Turgut Ozal University with registration number of 2021/15.

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