

## Palliative Care Cost Analysis

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### Abstract

**Introduction:** This study aims to determine the costs that emerged in the palliative care unit.

**Methods:** The universe of this cross-sectional retrospective study is the palliative care unit of a training and research hospital in Istanbul. In the study, all necessary medical, administrative and financial records for 2018 were taken as a sample. The full cost model according to the cost scope, the actual cost model according to the time the costs are assessed, the transaction cost model according to the determination method, and the traditional cost model according to the basis of distribution were used in the calculation general production expenses. The expenses were analyzed in Microsoft Excel 2016 program and evaluated in detail.

**Results:** In the research, the highest expense item among the total expense groups was found to be personnel expenses (41%), followed by general production expenses (34%) and raw material and consumable expenses (25%). Inner group evaluations revealed that the highest expense in the personnel expenses group is the additional payments to the doctor and nurse (63.41%), the drug and pharmacological product expenses (62.85%) in the raw material and consumable expenses group, and the legal obligations (26.19%) in the general production expenses group.

**Discussion and Conclusion:** The price set for palliative care treatment in the Tariff on Health Services was found to cover the expenses of the Ministry of Health Education and Research Hospitals functioning with the university for 2018 and to provide a profit of 94.59 TL per inpatient daily.

**Keywords:** Cost; cost analysis; palliative care; health services.

Health expenditures in the gross domestic product of countries have a significant share in overall expenditures. Although the applied health systems differ between countries, significant increases are observed in the share of non-national products and per capita total health expenditures within OECD (Organization for Economic Cooperation and Development) countries [1,2]. For this reason, the

control of economic data in health services has become vital rather than a necessity.

Recently, palliative care units have rapidly appeared in our health system. Today, palliative care units have become a vital need for society due to many factors such as the transition to the nuclear family, the increase in the incidence of cancer and chronic diseases, the rising life expectancy, and

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the isolation of death from the society [3]. In the face of irreversible disease, patients and their relatives need to accept their current situation, be guided, trained on the disease, and provide material-spiritual psychological-social support [4,5].

The number of these units is estimated to increase in the near future [6,7]. From this point of view, in this study, it is aimed to contribute to the relevant stakeholders in the planning and management of these units by calculating the costs of the palliative care service to ensure the effective use of public resources.

## Materials and Methods

### Universe and Sampling

The universe of this research is the Palliative Care Unit of a 709-bed Training and Research Hospital affiliated with the Ministry of Health, located in Istanbul, and functioning together with the University of Health Sciences. In the study, all necessary medical, administrative and financial records for 2018 were taken as the sampling.

### Research Methods and Data Collection Tools

This study is a cross-sectional retrospective data analysis study. In obtaining the data; the hospital's revolving fund, salary trustee, stock management, expense accrual, sterilization, office supply, waste management, technical service, statistics units, and the data of the Administrative and Financial Affairs Directorate were applied, whereas Material Resource Management System (MRMS), Hospital Information Management System (HIMS), Uniform Accounting System records were examined in detail as data processing, and opinions were obtained from the activity center managers and experts when necessary.

In the study, the 7/B option used in the Uniform Accounting System was applied for grouping palliative care expenses. Expenses were grouped under 3 main items as personnel expenses, raw material and consumables (RMC) expenses, and general production expenses (GPE). In the calculation, the directly attributable costs of each group were loaded into the related expense type, and distribution keys were used for the non-attributable costs.

In the study, personnel salaries paid from the general budget (doctor, nurse, etc.) were not included in the cost calculation, unlike private health enterprises, since they did not affect the income-expenditure balance of the hospital. The full cost model according to the cost scope, the actual cost model according to the time the costs are assessed, the transaction cost model according to the determination

method, and the traditional cost model according to the basis of distribution are used in the general production expenses, whereas all costs are calculated including VAT.

### Data Analysis

All data are shown in detail with tables and analyses formed after being analyzed in Microsoft Excel 2016 program.

### Findings

The statistical data of the sampled hospital for 2018 are as follows (Table 1);

#### A. Palliative care expenses

The expenses of the palliative care unit are grouped into 3 main sections as personnel expenses, RMC, and GPE, and the cost items are presented in Table 2.

#### Personnel Expenses

The evaluation revealed that the personnel expenses group consists of direct, indirect, and shift personnel payments. It was determined that a total of 599,255,36 TL was paid from the hospital revolving fund as fixed additional payment (270.183.82) and performance-based additional payment (329.071.54) from the direct personnel payments. 171.452.48 TL of the personnel expenses were made for the shift payments. It was determined that staff not directly contributing to the delivery of health services, the data entry and support services personnel, were under the indirect personnel item and it constitutes a total expense of 174.267.55 TL.

#### Raw Material and Consumables

These expense items consist of medicine and pharmacological product expenses, medical consumable expenses, laboratory and imaging expenses, and medical gas expenses.

**Table 1.** General statistical data 2018

General Information	Hospital	Palliative Care
Usage Area	85.935 m <sup>2</sup>	850 m <sup>2</sup>
Number of Employed Personnel	1590	27
Inpatient Bed Availability	709	20
Annual Hospital Occupancy	%71.01	%90.37
Annual Number of Inpatients	46.424	575
Annual Number of Inpatient Day	183.648	6.507
Average Number of Inpatient Days per Month	15.304	542
Bed Turnover Rate	5.4	2.39

m<sup>2</sup>: Square meter; %: Percentage.

**Table 2.** Palliative care cost table

TYPES OF EXPENSES		Annual Total	% Ratio within the Group	% Ratio in Types of Total Expenses	
Personnel Expenses	Additional Payments	599.255,36	63,41	25,91	944.975,39 (%41)
	Shift Payments	171.452,48	18,14	7,41	
	Indirect Personnel Expenses	174.267,55	18,44	7,54	
Raw Material and Consumable Expenses	Medicine and pharmacological product expenses	367.684,37	62,85	15,90	584.998,36 (%25,91)
	Medical Consumables Expenses	55.934,28	9,56	2,42	
	Laboratory and Imaging Expenses	122.262,89	20,90	5,29	
General Production Expenses	Medical Gas Expenses	39.116,82	6,69	1,69	782.695,97 (%34)
	Food Expenses	76.381,25	9,76	3,30	
	Electricity Expenses	44.652,56	5,70	1,93	
	Water Expenses	17.177,19	2,19	0,74	
	Natural Gas Expenses	43.279,64	5,53	1,87	
	Medicine and Hazardous Waste Expenses	9.946,80	1,27	0,43	
	Building Maintenance-Repairment Expenses	7.257,04	0,93	0,31	
	Machinery and Medical Equipment Repairment Expenses	161.652,33	20,65	6,99	
	Sterilization Expenses	39.868,32	5,09	1,72	
	Office Stationery Expenses	1.164,05	0,15	0,05	
	Cleaning Expenses	12.197,50	1,56	0,53	
	Laundry Expenses	78.192,00	9,99	3,38	
	Computer Maintenance- Repairment Expenses	683,10	0,09	0,03	
	Hospital Information Management System Expenses	474,87	0,06	0,02	
	Fixture Depreciation Expenses	55.540,96	7,10	2,40	
	Communication Expenses	1.152,09	0,15	0,05	
	Legal Obligations	204.966,00	26,19	8,86	
Management Services Expenses	28.110,27	3,59	1,22		
Palliative Care Annual Total Expenditures		2.312.669,72 TL			

%; Percentage.

- Medicine and pharmacological product expenses

Data on medicine and pharmacological product expenses were obtained from MRMS and HIMS records via the pharmacy unit. According to the findings, it was determined that the annual cost of medical and pharmacological products for the palliative care unit was 367 684.37 TL.

- Medical consumable expenses

In the cost determination of such expenses, the costs of the materials checked out of the consumable store for the palliative care unit were obtained from the HIMS and stock management unit of the sampled hospital. As a result of the calculation, the annual medical consumable expense of the palliative care unit is 55 934.28 TL.

- Laboratory and imaging expenses

Difficulties in accessing patient-specific data on laboratory and imaging expenses led to the use of the ratio formula in

the cost calculation. According to the findings obtained, the ratio of the annual total laboratory and imaging expenses of the hospital to the income was calculated and the ratio was applied to the annual total laboratory and imaging income of the palliative care. The calculation revealed that the ratio of the hospital's total laboratory income to laboratory expenses was 73.72%, and the ratio of imaging income to imaging expenses was 41.94%. Adapting these ratios to palliative care total laboratory and imaging incomes it was calculated that

Annual palliative care laboratory expense was  $153,515.86 * 0.7372 = 113,171.89$  TL

Annual palliative care imaging expense was  $21,676.20 * 0.4194 = 9,091.00$  TL. The total cost of palliative care laboratory and imaging was found to be 122,262.89 TL.

- Medical gas expenses

It was informed that only oxygen was consumed as a medical gas in the palliative care unit. Expert opinions and patient instructions were taken into account to obtain information about the oxygen consumption of the patients. Accordingly, the annual cost of palliative care oxygen was determined to be 39,116,82 TL. In the evaluation regarding the raw material and consumable expenses, the total cost was observed to be 584,998.36 TL, and the highest cost item was the medicine and pharmacological product expenses with 367,684.37 TL.

### General Production Expenses

- Food expenses

According to the service purchase contract agreed upon by the hospital, the procurement price for the relevant year was determined as 1.25 TL for breakfast, and 3.55 TL for lunch and dinner. It was observed that the food expenses arose from service providers and patient companions. The calculation of food expenses was based on the annual inpatient days and the cost of palliative care meals annually was observed to be 76,381.25 TL.

- Medical and hazardous waste expenses

According to the data provided by the waste management unit of the hospital, an average of 20 kilograms of medical waste and 5 kilograms of hazardous waste were found to be produced per day from palliative care. The cost of medical waste was found to be 1.005 TL per kilogram and 1.506 TL for hazardous waste.

- Sterilization expenses

An average of 20 clamps per month and an average of 3 gauze pads per day for each patient were found to be sterilized by the sterilization unit. The sterilization cost was 1,598 TL for a clamp and 1,828 TL for a pack of gauze pads. In the calculation, it was determined that the annual total sterilization cost was 39,868.32 TL.

- Office Stationery Expenses

According to the data obtained from the stock management unit, the annual cost of office stationery requested from palliative care was 1,164,05 TL.

- Laundry Expenses

In the one-month follow-up, an average of 120 kg of laundry was observed to come out from the palliative care unit per day. According to the information received from the Administrative and Financial Affairs Directorate of the hospital, the one kilogram of laundry was costed 1.81 TL. The annual cost of the palliative care laundry was calculated as 78,192,00 TL.

- Fixture depreciation expenses

The depreciation rates were determined according to the General Communiqué of the Tax Procedure Law No. 333 of the Turkish Revenue Administration in the study and the fixtures whose acquisition year was 2019 and which have fulfilled their economic life were excluded from the study (Tax Procedure Law General Communiqué, 2004) [8]. The calculation revealed that the highest depreciation expense was for medical monitors and respiratory ventilators, and the annual depreciation cost of palliative care was 55,540.96 TL.

- Legal obligations

The daily fee (450,00 TL) paid in the public price tariff for palliative care treatment constitutes the income of the palliative care unit. For this reason, the annual income of the unit was concluded by multiplying the number of inpatient days in the annual palliative care with the determined price. In the calculation, the annual total income was found to be 2.928.150.00 TL and 7% of this (204.966.00 TL) was paid as a legal obligation in line with the legal regulations.

- Management Services Expenses

The annual management services expenses of the hospital were 2,383,709.95 TL. In determining the financial burden of the palliative unit within the administrative service expenses, 3 main expense categories were created as inpatient services, outpatient services, and emergency services, considering all service areas of the hospital. Palliative care was evaluated in the inpatient treatment group. In the cost calculation, the total cost was divided into these three service groups. As a result of calculation for the share of inpatient services via the number of inpatient days distribution key, the palliative care unit was found to receive a share of 28,110.27 TL annually of the management services expenses.

### Other general production expenses

The share of these sorts of expenses under palliative care was calculated over the total cost of the hospital using appropriate distribution keys (Table 3).

### Palliative Care expense distribution

In the research, the highest expense item among the total expense groups was found to be personnel expenses with 41%, followed by GPE (34%) and RMC (25%). Among all expense types, the highest expense categories were additional payments to personnel (25.91%), medicine and pharmacological product expenses (15.90%), legal obligations (8.86%), and indirect personnel expenses (7.54%), and shifting payments (7.41%), respectively.

Evaluating the expenses separately under their category,

**Table 3.** Palliative care other general production expenses

Type of Expense	Distribution Key	Hospital Annual Total Expenditures	Palliative Care Annual Total Expenditures
Electricity Expenses	m <sup>2</sup>	4.514.380,00	44.652,56
Water Expenses	m <sup>2</sup>	1.737.467,00	17.177,19
Natural Gas Expenses	m <sup>2</sup>	4.375.572,00	43.279,64
Building Maintenance-Repairment Expenses	m <sup>2</sup>	733.692,46	7.257,04
Machinery and Medical Equipment	Number of Inpatient Day	4.983.459,25	161.652,33
Cleaning Expenses	m <sup>2</sup>	1.233.512,21	12.197,50
Computer Maintenance- Repairment Expenses	Number of Computers	78.253,11	683,10
Hospital Information Management System Expenses	Number of Computers	54.500,00	474,87
Communication Expenses	Personnel Numbers	67.860,00	1.152,09

m<sup>2</sup>: Square meters.

the highest expenses (63.41%) were found to be the additional payments (63.41%) in personal expenses, medicine, and pharmacological products (62.85%) in RMC, and the legal obligations (26.19%) in GPE.

The daily expense for the inpatient palliative care was obtained by dividing the total annual expense for palliative care (2,312 669.72 TL) by the total annual inpatient days (6.507). As a result of the calculation, the daily cost of palliative care was found to be 355.41 TL.

### B. Palliative care incomes

According to the data obtained from the income accrual unit, the payments delivered by the Social Security Institution (SSI) for the 2018 inpatient palliative care unit were 450.00 TL per day, constituting the sole income source of this unit. The annual income of the unit was found to be 2.928.150.00 TL by multiplying the total number of days for palliative care patients (6.507) and the fee paid over the public price tariff (450 TL).

#### Palliative care income-expense relationship

At the final stage, it was observed that the hospital made a profit of 94.59 TL per day of inpatient treatment, which was calculated by deducting the cost per day (355.41 TL) from the price paid per day (450.00 TL) determined in the 2018 Tariff on Health Services (THS). The hospital was found to profit annually from the palliative care unit of  $6.507 * 94.59 = 615.497.13$  TL.

## Discussion

In addition to the existing reasons such as the high level of expertise required for healthcare delivery, the dependence on rapidly developing technology, the increase in chronic diseases and in the aging population, demand-induced

supply, the changes in the global foreign exchange rate causes the prolongation of indebtedness and an increase of the financial burden of the state hospitals. In many studies, it is emphasized that the payments delivered to the cases according to THS by the SSI, which is the main reimbursement institution in our country, do not reflect the costs, and that the prices of the THS should be updated by taking into account the cost analysis, and separate policies should be established for education, research and university hospitals with higher costs<sup>[9-11]</sup>.

The reimbursement amount to be paid for palliative care treatment in THS for 2018 was fixed to 450.00 TL per patient daily in exchange for the operation score, and no changes have been made in the public price tariffs dated 08.01.2020. In our study, the institution was found to have a palliative care expense of 355.41 TL per inpatient treatment daily and a profit of 94.59 TL per daily patient.

The literature review revealed that the publications at the national level on palliative care expenses were quite limited, while international publications were more significant.

Reviewing the international publications, it has been observed that palliative care practices have a positive effect on health expenses in line with our study. Studies have shown that palliative care reduces the number of admissions to the emergency service visits and length of stay in the intensive care unit, which saves resources and reduces costs by 45%. On the other hand, some other studies have shown that these units not only reduce the expenses but also have benefits for cost-effectiveness<sup>[12-17]</sup>.

Examining the national publications, it was observed in a recent thesis questioning palliative care cost analysis, unlike this study, the price paid in THS did not cover the costs with

a daily loss of 54.19 TL [18]. The fact that the laboratory and imaging, medical gas use, building maintenance-repair, sterilization, and management services share were not included in the expenses and that the personnel salaries from the general budget, apart from additional payments, were not included in the income item by being included in the study as a high type of expenditure may explain such a result.

In the light of our findings, the highest expense item among the total expense groups in our study was found to be personnel expenses (41%), followed by GPE (34%) and RMC (25%).

It has been observed in some studies in the literature that in public hospitals, personnel salaries from the central budget are directly processed in the expense item, however, it was found that in the income item only THS payments were taken as a basis, and the general budget salary income processed in the expenditure was not articulated to the income. In order not to make the same mistake and to obtain a more accurate result, personnel salaries from the central budget are not presented in the income and expense items in this study. Despite this, the highest expense category among all-expense groups in the study was still the personnel expenses with 41%. Additional payments constitute the highest expense item in the personnel expenses category. While additional payments were 63.41% in personnel expenses, it ranked first with 25.91% in all expense items. In the unit cost analysis studies, the highest cost item in our study was found to consist of personnel expenses. In the study conducted by Bektemür [19] in which the revolving fund budget expenditures of the hospitals affiliated with Istanbul Beyoğlu Public Hospitals Association between 2012 and 2013 were evaluated and personnel salaries from the general budget were excluded, it was found that the personnel expenses constitute the highest cost item with a rate of 40-42%, a result which is quite compatible with our study. Similarly, in the emergency department unit cost analysis study conducted by Topak [20], an average rate of 48.11% was reported between 2014 and 2017, whereas Aslantaş et al. [21] showed a personnel expense rate of % 49 in their study to determine the patient costs in the IVF unit [20, 21]. There are also studies in the literature review showing that personnel costs are higher. In the study conducted by Bülüç and Ağırbaş [22] in a group B hospital, personnel expenses were ranked first with 57.32%, and in the study conducted by Kısakürek [23], it ranked first with 52%. Compared to these studies, the low rate of personnel expenses in our study can be explained by the fact that the salaries paid from the general budget are not included in the cost.

In our study, GPE ranks second among the expense groups with 34%. It was seen in the literature that GPE ranked second or third among all-expense groups, a result that is consistent with our findings. In a study conducted in a private hospital by Sonsuz [24], GPE was 32.78% whereas Ağırbaş et al. [25] found it in the second place with 23.5% in the study conducted in a tertiary hospital. The reason for the higher GPE rate in our study compared to other studies may be that the main building of the hospital is a hundred-year-old historical building, and for this reason, the heating, lighting, maintenance, and repair costs are high, and that the hospital building has multiple annexes.

7% of the accrual revenues obtained in the hospitals affiliated with the Ministry of Health were allocated to the deductions stipulated by the laws (SSCPI share, Central share, Treasury share). These deductions, which are included in the GPE group, ranked first in this group with 26.19% and third with 8.86% in all types of expenses in our study.

Machinery equipment and medical device repair expenses were observed to be the second-highest cost item in the general production expenses (GPE) with 20.65%, and the fifth in all-expense types with 6.99%. In the literature review of unit cost analysis studies, the cost arising from the repair of machinery, equipment, and medical devices was loaded to the relevant units due to the use of the staggered distribution method, which is one of the GPE costs distribution methods, in many studies. units and its share in total expenses have not been clearly shown. However, this rate was found to be slightly lower in studies that could be shown compared to our study. For example, while Karaca [26] found this rate as 1.06% in the cost analysis study he conducted in inpatient treatment institutions, it was found as 4.90% in the study conducted by Ataç [27]. In our study, since the unit-based expense record of the hospital's machinery, equipment, and medical equipment repair could not be accessed, it had to be calculated using the distribution key. For this reason, it is thought that detailing the relevant expense item in future studies will reflect a more accurate result, provided that it is recorded regularly in hospitals.

In our study, RMC was founded to ranked third in expense grouping with 25%, and 62.85% of this consisted of medicine and pharmacological products. In the cost analysis example of a public hospital, Özkan and Ağırbaş [11] found the RMC rate to be 26.35%, and Arslan et al. [28] found that 24% of inpatient treatment costs are examination, medication, and consumable expenses. While these rates are similar to the rates in our study, Teker et al. [29] found the cost of RMC to a higher rate, 46.43%, in their study in the adult intensive care

unit. A moderate inpatient cost may be considered reasonable when viewed as a whole for the hospital, because of the fact that the majority of palliative care patients – although they are mostly terminal and care patients- need enteral and parenteral nutrition, oxygen therapy usually, and infection treatment occasionally etc. although the RMC in here is not as high as in the level 2 and 3 intensive care units. It was determined that the medicine and pharmacological product expenses ranked second with 15.90% among all expenses, and it was found to be the highest cost item ranking first with 62.85% within its group. Although medicine expenses for palliative care service vary according to the patient and the condition of the disease, it is related to multiple factors such as interventional or non-interventional methods applied by the physician [for example; epidural catheter insertion for pain management and continuous drug use], the category of the hospital, technology use, physician-nurse practice. The literature review yielded variable results. For example; the study evaluating palliative care costs conducted by Çalışkan [18] revealed that the share of medical and pharmacological product expenses among all expenses was 30%, while it was 82.32% in its group. On the other hand, in the study conducted by Kısakürek [23], the share of medicine in variable costs was presented as 35%. Another study carried out in the adult intensive care unit by Yanık et al. [30] revealed this rate as 17.35%.

As a result, from this point of view, although the price set in the 2018 THS issued by the SSI has not been updated for a long time, it has been observed that it covers the costs, and ensures a profit of 94.59 TL daily per inpatient. From this point of view, it has been determined that palliative care units in the Ministry of Health Training and Research Hospitals are sustainable and it will be a more cost-effective strategy to establish a palliative care unit instead of 1st level intensive care unit with lower THS payments compared to palliative care units.

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