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Absolute Cost of Hernia Operation using Activity Based Costing (ABC)

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ABSTRACT

Background: Activity-based cost evaluation is used as a tool for accurate assessment and calculation of the cost of any operation .The goal of this study was to estimate the absolute cost of an operation on hernia in Shahid Sadughi hospital of Yazd using Activity Based Costing (ABC) method in 2012.

Methods: This applied, descriptive, cross-sectional, and retrospective study was conducted in 2012. The required data were collected through interview with hospital officials and personnel of related units, observance of surgical wards' activities, studying documents and notebooks in these sections, as well as other official and supportive units. In order to estimate the cost share of other sectors in surgical wards' services, initially the allocation bases were determined. Afterwards, by applying two-way partitioning method (mathematics), costs were estimated. Finally, by using Activity-Based Costing (ABC) approach, and applying the Excell software, the absolute cost of an operation on hernia was calculated.

Results: Studies showed that the absolute cost of an operation on hernia is 307.56 $ (1$ = 12050 Rials). The cost of personnel is 165 $ which is 53.69 %, and the cost of medications and consumed products is 96 $ which is 31.2 % of the total absolute cost of a hernia operation.

Conclusion: Based on the findings, the absolute cost of services can be reduced by improving performance, especially by reforming operations of human resources management and standardizing consumption.

Key words: Absolute Cost, ABC Method, Hospital, Operation on Hernia

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Introduction

The history of medicine shows that hernia disease has existed since ancient times and many individuals suffered from it. But today, its prevalence has increased. Statistics show that the number of patients with hernia surgery in the US was more than a half million people in 1989, however, this rate has increased to seven hundred thousand individuals in 2005 (1). The surgery on hernia is one of the services rendered by governmental hospitals. Since these kinds of hospitals have the most responsibilities in rendering public services and also because the nature of issue is so that usually there is no logical relationship between services and costs, currently management systems of costs are applied increasingly for efficient utilization and effectiveness of financial resources (2).

A costing system is attributed to all methods for identifying and determining costs of services or products. The main goal of a costing system is to link costs with certain goods and services and also to specify costs to relative financial periods. A costing system specifies methods of allocating costs to rendered goods and services (3). ABC is a developed costing method and is a way of managing commercial institutions which is well developed and used in western countries and had many interests (4). ABC by using numerous cost stimulants in resource and various activities' levels estimates the cost of products/services. The effective elements of the ABC method in health and medical organizations result in better management and produce information for accurate costs in various activities. This contributes the institution to render realistic funds, determine lack of competence, adjust the unit price of each rendered service, increase costumers' benefit, and increase competition in organizations (5).

Based on this, in recent years the health care organizations invested more on using costing accounting systems like ABC (6,7).

Numerous studies about ABC have been carried out in various sections and wards of medical units (8-16). But so far, no study has been carried out regarding the cost of hernia operation. Regarding the importance of services' correct costing in the process of decreasing costs and by taking into account desirable capacities of ABC, and also by paying attention to the increasing prevalence of hernia, this study aimed to calculate the cost of operation on hernia using ABC in Shahid Sadughi hospital as the biggest medical training hospital of Yazd province.

Materials and Methods

This applied, descriptive, cross-sectional, and retrospective study was conducted in 2012 in Shahid Sadughi hospital of Yazd as the biggest governmental (medical-training) hospital of Yazd province. The relative data were gathered by interviewing with experts, hospital personnel, and different wards' staffs, their activities were also observed, documents in financial sections and the software system of the hospital were next studied. Afterwards, the absolute cost of the operation was calculated using ABC and Excell software.

The following stages were applied to calculate the absolute cost of an operation on hernia (17,18):

The first stage: recognizing all activities included in the process of rendering services (operation on hernia)

In this stage 10 various activities were recognized which were categorized into two groups; primary and secondary (indirect overhead).

A. Recognition of primary activities: In this step, activities directly related to surgery process on hernia were recognized. These activities include 7 groups of 1. reception and urgency, 2. diagnosis, 3. preparation of patients before the operation, 4. operation and recovery, 5. care after operation, 6. discharge, and 7. filing.

B. Recognition of secondary activities (indirect overhead): In this step, the secondary activities were recognized, i.e., the activities which are not directly related to the operation on hernia but support the first group. These activities include: 1. Supporting unit activities, 2. Mediatory units' activities, as well as 3. Operational units' activities.

Initially, all operation steps through which a patient with hernia problem should pass since

hospitalization were recognized. Following that activities related to the three secondary activities were determined.

The second step: costing in activity centers

Costs in each activity center were categorized into personnel, consumed materials and equipment, and the extra costs (18).

1. Personnel costs include all costs paid to personnel.

The issues used in calculation of salaries and profits are as follows:

The payments of profession and employee, difference in adjustment, overpayments of management, bad weather, sacrificing, less developed areas, and job difficulty, the assisting payments for family members and children, the least payment, and finally the payments for being exposed to rays, pass of years, occupational rank, occupational class, housing, overtime, fees, rewards, kindergarten, new year, per case, clothes, transportation, and time shifts.

2. Costs of consumed materials and equipment include costs of all consumed materials, equipment, and medications in the centers of primary and secondary activities received from the goods and medicine storerooms.

3. Extra costs are all depreciation costs of properties, equipment, building, and costs of water, electricity, telephone, and fuel consumptions for the primary and secondary activities. This also includes all secondary activities which could be specified to the primary activities.

The third step: Determination of the relationship between different activities and costs sharing.

Cost stimulants are recognized to determine their underlying relations with activities. A cost stimulant is the factor of cost allocation to activities.

The fourth step: The allocation of resources to cost

Allocation of costs in costing systems is one of the most important steps and is very effective on the accuracy of absolute costs of services. In this study, the mutual multiplex (math) method was used for secondary allocation of secondary activities' costs to the first ones.

In the last stage, the cost resources of each cost stimulants were recognized and the absolute cost of an operation on hernia was calculated.

Further, in the current study all ethical issues were observed based on the Helsinki Declaration.

Results

Regarding the total costs of primary activities of an operation, it was calculated as 206.46 $, from which the highest costs belonged to medicine and consumed equipment with 46.4 % of total of costs. However, the lowest cost belonged to telephone calls; 0.2 % (Table 1).

Regarding the costs of secondary activities, the total cost of an operation, was calculated as 101.103 $ in which the cost of personnel as the largest share of costs was 74.54 % (Table 2).

The final cost of an operation on hernia was calculated as 307.56 $ in which the cost of Personnel was 53.69 % of the total costs (Table 3).

Table 1. The cost of primary activities of an operation on hernia in 2012

Cost	Price ($)	Costs' share (%)
Personnel	88.01	42.63
Consumed medicine and equipment	95.89	46.45
Depreciation (properties, equipment, and buildings)	10.27	4.96
Telephone calls	0.39	0.193
Energy carriers	11.90	5.76
Total ($)	206.46	100

Table 2. The cost of secondary activities of an operation on hernia in 2012

Cost	Price ($)	Costs' share (%)
Personnel	77	74.54
Consumed equipment	14.68	14.64
Depreciation (properties, equipment, and buildings)	2.03	2.02
Energy carriers (water, electricity, telephone calls)	3.6	3.69
Internet and satellite posts	1.01	1.21
Disinfecting materials	1.6	1.68
Nutrition	0.08	0.08
Spraying materials in the hospital	0.01	0.02
Building maintenance	1.21	1.21
Repair and maintenance of medical equipment	0.31	0.31
Security officers	0.20	0.22
Transportation costs	0.170	0.18
Garbage carrying costs	0.202	0.20
Total ($)	101.103	100

Table 3. Cost shares in an operation on hernia 2012

Cost	Price ($)	Costs' share (%)
Personnel	165.05	53.69
Consumed equipment	96	31.2
Depreciation (properties, equipment, and buildings)	12.30	4
Energy carriers (water, electricity, telephone calls)	16	5.21
Others	18.21	5.9
Total ($)	307.56	100

Discussion

Based on the findings of this study, the cost of personnel was 165.05 $ which compromises 53.696 % of the total of costs of an operation on hernia. The results of this study concord with the outcomes achieved from various wards of the hospital (8,9,12). Although, in this study the personnel costs were different from the total costs, in other words, they compromised a high portion of costs among other hospital services. Regarding personnel costs as the main costs in producing goods and rendering services, improvement of performance in managing personnel can have the most important role in reducing final costs of sections and services.

Further, the findings showed that the cost of medications and consumed products compromise 31.2 % of the total costs of an operation on hernia which concords with the studies of Mahani et al. (19), in ICU of Shafa hospital of Kerman, Negrini et al. (20), Lewness et al. (21), and Nikpajooh et al. (22).

Moreover, in this study, the costs related to consumption of water, electricity, telephone, and fuel (energy carriers) were 16 $ in total, which is about 5.21 % of all costs of an operation on hernia. In the previous studies conducted in the ICU of Imam Khomeyni hospital of Tehran (19), the nerves' operation of the Imam Khomeyni hospital of Tehran, Nikpajooh et al. (22), and Negrini et al. (20), these costs compromised respectively 3.5%, 0.7 %, 0.32 %, and 3.5 % of the total costs. In another study, related to the dialysis section of the Sadughi hospital of Yazd (23), the costs of water, electricity, telephone calls, and fuel was 0.15 % of the wards' total costs. Of course, it must be noted that in the studies carried out before 2011, the governmental subsidy was paid for energy consumption which reduced their costs in medical centers. Nevertheless, none of these studies as well as the current one show an acceptable amount of energy consumption.

The total of depreciation costs of an operation on hernia was 12.30 $ which was 4 % of the total

costs of an operation on hernia. Therefore, the cost of depreciation in this study after the one in the ICU of Shafa hospital of Kerman (2% of the total) (19) is lower than the depreciation costs of Nikpajooh et al. (22), and Negrini et al. s'Study (20), which were respectively 6.34% and 7.4 % of the total costs. Similarly, the total costs related to the dialysis ward of Shahid Sadughi hospital of Yazd (23) were 11.17 % of the total (24).

The costs of an operation are affected by the primary (direct) and secondary activities' costs (indirect) to different proportions. Therefore, along with the direct costs which are necessary for operation services, any change in indirect costs affects the final costs. Since in this study the cost of the primary activities (direct) compromised the majority of costs, paying more attention to final costs as well as exact calculation and analysis of them separately specified to rendered service, can be effective factors on determining the budget plans of hospitals or their final costs.

Conclusion

Regarding the findings of this study, establishing an accurate financial system in managing hospitals can not only clarify the defects and the gap between salaries and expenses of each hospital wards, which in turn bring management notices, but also improve management strategies in each hospital section.

This study had some limitations, e.g., lack of managers' familiarity with the ABC system despite some explanations about it, lack of a concentrated data base, high consumption of time for gathering information, information problems in the accounting systems of the hospital for reporting, as well as appropriate and applicable system for distinguishing information.

Conflicts of interest

The authors did not report any Conflicts in interest.

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Code of this project was 654 in 09/ 03/2014.

Authors' Contribution

Zarekhormizi E and Bahrami MA designed research; Zarekhormizi E conducted research; Zarekhormizi E and Bahrami MA analyzed data; and Zarekhormizi E wrote the paper. Zarekhormizi E had primary responsibility for final content. All authors read and approved the final manuscript.

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