Pharmacophore

ISSN-2229-5402

Journal home page: http://www.pharmacophorejournal.com

Pharmacophore
an International Journal
ISSN 2229-5402

A STUDY OF COST PRICE OF SERVICES PROVIDED IN CARDIOLOGY SECTOR OF A PUBLIC HOSPITAL

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ARTICLE INFO

Received:
03th Jun 2017
Accepted:
29th Nov 2017
Available online:
14th Dec 2017

Keywords: *Cost price of services, Activity-based costing, Cost price of cardiology sector.*

ABSTRACT

Managers have always encountered many cases in doing each of their tasks and they need to make decisions. In order to make the decisions related to the goals of planning, control, guidance, coordination of forces and facilities, they are in need of information. One of the most important information that they need, is financial information. Accounting systems have been always one of the most important sources of financial information in the organization and an important part of information that managers need in the field of affairs can be provided by costing system. In this study, firstly the research performed on activity-based costing methods based on activity and implementation of it in the field of health services was reviewed and then the cardiology sector of a public hospital in 2015 was examined as a case study. In order to collect the data, accounting documents were examined and in order to determine the logical basis for cost allocation, interview and direct observation were used. The rate deviation and the number of employees were examined by comparing the hourly functions and the salaries of this year and previous years.
According to the results, activity-based cost price method can be used in all hospitals and clinical centers of Iran in order to achieve real and correct costs to prevent the losses resulting from wrong costing and also to achieve greater efficiency.

To Cite This Article: Mehdi KazemPour-Dizaji, Shiva Ehsan Maleki, javad jafari, Mohsen rahimi, shima ehsan maleki, Fatemeh Sheikhan, Shima Ehsan Maleki, Mohammad Varahram, Rahim Roozbehani, (2017), "A study of cost price of services provided in cardiology sector of a public hospital", ***Pharmacophore, 8(6S),*** *e-1173575.*

Introduction

Cost price accounting system is one of the management information system which plays crucial role in the decision-making. Lack of this system in the center affiliated to the organization removes the possibility of accounting cost price and controlling the costs and makes the decision making to provide the better services difficult or even impossible (1, 2).

In recent years, public sector organizations have been faced with increasing pressure in order to improve their efficiency and effectiveness. Policy-makers' tendency to satisfy the people and direct expectations of taxpayers, pressure of private sector to expand the domain and etc. have forced the managers of public sector to think about the issues such as determining the accurate cost price of goods and services, improving services, assessing the options of using external services or privatization and aligning activities with the organization's mission and strategic plan with more operational perspectives (3-5).

Health centers are considered as service firms and their major task is to produce and provide diagnosis – treatment services for inpatient or outpatient patients. Services provided by health centers are highly diverse and each of them has its own content

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and complexity. Health centers provide the services during their activities. So, cost prices of services produced in different operational centers (main and secondary cost centers) called production cost center, are different. Implementation of cost price system provides the possibility of continuously carrying out more effective measures in order to increase efficiency and to optimize the activities of health centers by accurate identification of financial-service processes of required management controls.

Theoretical foundations, background and development of hypotheses

Given the use of activity-based costing method has been largely eliminated the problems of conventional methods, it seems that the method is able to evaluate the performance of various circles of the organization in addition to elimination the problems of conventional costing methods.

With costing and estimating the services costs of that sector, the costs can be compared with the realized revenues of that sector and the reasons for created costs can be identified by identifying costly sectors and activity centers and required decisions can be made in order to reduce the costs and/or some measures can be done in order to strengthen the centers, whose their activity costs are less than their created costs, and also to enhance the level of their activity costs. In any case, the costs caused by inactivity of sector are not absorbed by cost price of production or provided services and they are considered as not absorbed costs in decision-making and financial reports. Ridderstolpe et al. (6), in his study in Italy, examined the activity-based costing pattern designed to measure and control the source consumption and cost for the time of using new technologies in health services processes and they show the importance of designing and implementing appropriate costing system in the health sector. Also, there was s significant difference between the cost of a heart surgery patient and government tariffs.

In designing activity-based costing system to calculate the cost price of services in public hospitals (Martyr Faghihi Hospital), considering existing tariffsystem in hospital in terms of different aspect of designing and implementing a system which can eliminate the existing sharing defects are very useful and essential (7-9).

Mirian (10), in his research, calculated the cost price of services in diagnostic sectors of martyr Dastgheib Hospital, Shiraz in 2005 using activity-based costing method and provided an appropriate pattern. In this study, the cost price of all studied services was more than approved government tariffs and this difference was statistically significant.

Asad (11), in his study, calculated bed occupancy rate in ICU ward at night in Ali Shariati Hospital using activity-based costing method. According to the identification of relationship between activities and sources, there was significant difference between cost calculated using activity-based costing method and the rate announced by the Ministry of Health, Treatment and Medical Education in 2006.

Demeere (12) used time-oriented activity-based costing method in the outpatient clinic to provide the activities leading to overhead costs. It reduces non-value activities, establishes a better relationship between special units and helps managers in evaluating the performance of different sectors of hospital and providing better services with the use of unused capacity.

Dejenga (13) used time-oriented activity-based costing method as a tool for allocating costs to activities and by comparing it with activity-based costing method used for manufacturing firms, distribution, agricultural centers and also, areas of services, particularly hospital, it was found that the advantages of time-oriented activity-based costing method are very important for fair allocation of costs. It is useful not only in designing accounting system and new information and profitability but also for daily activities of the organization.

After calculating the cost price of radiology services in Shafa hospital in Kerman using activity-based costing method in 2010, it was found that %55.70 of total costs of this sector was allocated to the cost of employees' revenues, in fact, the highest share of costs was allocated to them. So, cost price of services can be reduced by improving the performance, especially correcting the measures of human resources management and also standardizing the consumption in order to reduce the consumed costs (14,15).

Investigating the fundamental principles of time-oriented activity-based costing model as an appropriate tool for allocation of costs has been addressed as the topics of costing and compared with previous costing models. Time-oriented activity-based costing model was able to measure the unused capacity in addition to eliminating the problems of traditional activity-based costing models and it can help managers to evaluate the performance of different circles of organization by calculating the cost of unused capacity (16 ,17).

Although, a few studies have been performed on the effects of costs on cost price of hospital services in Iran, but the studies performed on health sectors in advanced countries show that the costs related to hospitals affect the cost price of services (11,18).

Foroughi (19) in his study, said that a research on description of a model in order to analyze the process, to implement activity-based costing and activity-based management in a cardiology sector of a hospital in Sweden, the results showed that implementing activity-based costing system creates a new capability of activity and process analysis, calculates the cost price and leads to more appropriate strategic and operational decision-making.

Mohammadi et al. (18), in his study, calculated the cost of service units between 1977-1998 in a health center in Peru, the results showed that calculated cost was much more than the prices received from customers.

According to provided background, research hypotheses are developed as follows:

a. With the use of activity-based costing method, how much capacity is there in cardiology sector?
b. What effects does activity-based costing have on real interest of cardiology sector?

Method

This study is documentary and field-study and it was performed based on studying required sources, documents, interviews and observations.

The process of study can be explained as follows:

- The study of cost price accounting system, principles and standards related to it;
- The study of sources related to hospitals' management, accounting principles of hospitals, budgeting and financial accounting and cost price principles
- Sufficient knowledge of information and services processes of health centers and hospitals
- The study of in order to implement the cost price accounting systems according to the conditions and characteristics of activities and tasks of health centers.

Results

Since the main components of the cost price of provided services are direct materials, direct labor and manufacturing overhead (provided services) and services provided in hospital are health services, so, in a hospital, consumed material (drugs and equipment), direct labor related to each sector of operational sectors (health services sector) and support circles, by related cost centers, are identified and can be tracked. For example, in cardiology sector of hospital, the costs of drugs and equipment and direct labor are 335.17 $ and 404.80 $, respectively. These costs have been directly tracked by studied sector. Overhead production cost (overhead of provided healthcare units) consists of two general parts:

1. First part of the initial sharing: Indirect production or operating costs (the units providing healthcare services)
2. Second part of the secondary sharing: The costs of support unit are shared to using sectors of services such as production or operating units (healthcare units).since support circles don't service to each other, the sharing of these circles with each other is considered zero, so, in this regard, direct sharing method is used.

About the first part, which is related to indirect costs of providing units of healthcare services, this part is performed through first sharing of indirect costs to operating units (units providing healthcare services) and support circles. In this regard, paid remuneration costs of employees and doctors can be pointed out that 307.92 $ was allocated to operating sectors of cardiology sector (health care).

About second part, all remuneration costs and other overhead costs were allocated to support circles. Its value is identifies and shared between operating sectors (health care) such as cardiology sector and other health sectors according to logical base.

Given that the costs of remuneration and labor, year-end bonuses, salaries and transportation, maintenance and communication, maintenance of office equipment, publication and purchase of journals, water, electricity, fuel, etc. related to support sectors such as laundry, nursing office, medical records, medical engineering, services office, facilities and repairmen and other support sectors is 6233.29 $ and these costs are considered as common costs, these costs is shared between all healthcare sectors based on the revenues of each sector. Secondary sharing is listed in table 1-1.

Table1-1: common costs sharing (secondary sharing)

No.	Operating sectors(source of income)	Amount of income $	Share of each sector from common costs
1	The operating room, anesthesia and surgery	1902.60	1072.17
2	Laboratory	192.20	108.31
3	oncology	685.46	386.28
4	ICU	1360.20	766.51
5	Pediatrics	344.89	194.34
6	Bronco	139.69	78.71
7	Medical imaging	144.31	81.31
8	Internal diseases	2771.51	1561.82
9	Kidney and dialysis	152.86	86.11
10	TB	940.74	541.58
11	Heart	951.80	536.37
12	Mycobacteriology	263.37	148.40
13	ENT department	64.914	36.57
14	Emergency room	154.05	86.80
15	The breath test	298.88	168.42
16	Audiology sector	4.51	25.42
17	Physiotherapy	11.34	6.37
18	Sleep test	17.60	9.91

19	Lungs	28.97	16.34
20	Transplant clinic	41.28	23.28
21	clinics	330.08	186.11
total		10801.24	6121.13

It should be noted that since servicing of the circles of hospital to the operating units is not consistency with the basis of building area and the number of employees and according to this basis, in the secondary sharing, greater costs are allocated to a sector which has greater building area and lower revenue than other sectors and also received less services from common circles. So, the proportion of the labor used for realization of revenue is considered as more accurate and more appropriate basis for secondary sharing, so these costs (common costs) have been prorated between operating units or sectors (healthcare) in proportion to revenue of each unit.

According to table1 and other information about cost price of cardiology sector, the result of performance (interests and losses) and small costs of this sector are as follows:

Interest of sector= revenue obtained from provided services- cost price of provided services

Interest of sector= 951.80-606.08=345.72

Also, small costs of cardiology sector are calculated as follows:

	amount ($)	amount ($)
Materials (drugs and equipment) consumed in sector		
Wages of sector	335.17	
Overhead costs of sector (mainly including remuneration)	404.80	
Total cost (directly) in sector	30.77	1047.88
Following items are added:		
The amount of indirect costs shared by circles of support and common sectors according to table1		536.37
The amount of the taken costs		1584.25
Following items are deducted:		
Costs of Education and Research		
Fixed administrative cost of personnel	554.40	
Total costs of Education and Research and fixed administrative cost of personnel	107.57	662.05
The amount of the incurred costs (Regardless of activity (percentage) of sector)		922.20

Now this issue must be examined that how many percentages was this sector active during the fiscal year of 2014 or in other words, how much is the rate of bed occupancy in this sector during mentioned year. Since average bed occupancy rate in cardiology sector (all parts) in mentioned year was 65.72%, so, a part of 922.20 $ of incurred cost was related to 34.28% of unused capacity, its cost is not considered in price cost of the mentioned sector. So, 65.72% of above costs is reflected as cost price of cardiology sector as follows:

Cost price of cardiology sector= total incurred cost of cardiology sector*65.72%=606.08

So, the monetary effect of inactivity or unused capacity which is called not absorbed cost, is obtained and accordingly, management can plan and perform some measures to reduce these costs (not absorbed costs).

According to the number of employees (45 employees for last year and 35 employees for present year), personnel performance and the salary and benefits of last year and present fiscal year, the swings of the cost of salary and rights (including salary and rights reflected in the headlines of rights and remuneration reflected in the headlines of production overhead) are justified as follows:

Table2. Comparative information of hourly performance of personnel

	Staff working hours in 12 months	Working hours of one personnel in 12 months
Working hours in 2015	23331.20	66.60
Overtime hours in 2015	488.45	139.57
Working hours in 2014	255.20	52.65
Overtime hours in 2015	512.60	11.40

Table3. Comparative information of annual salary of personnel

	Total salaries of all personnel in 12months	Salary of one personnel in 12 months
Salary in 2015	20363013.09	1696917.77
Salary in 2014	10871949.40	905995.77
difference	9491063.68	

Rate deviation= (salary of each person in present year-salary of each person in last year)*number of employees in present year
Rate deviation=(20363013.09-10871949.40)*35=332187229.70
Deviation of number of employees= (number of employees in present year- number of employees in last year)* salary of last year
Deviation of number of employees=(35-45)* 10871949.40=108719494.00
Sum of the deviations of rate and number of employees= rate deviation- Deviation of number of employees
Sum of the deviations of rate and number of employees=332187229.70 -108719494.00 = 223467735190
Now, given the obtained cost price which is equal to 606.08 $ and capacity of number of existing bed, cost of each bed per year is calculated as follows:

$$\text{Cost of each bed} = \frac{\text{Cost price}}{\text{Capacity of active bed}}$$

$$\text{Cost of each bed} = \frac{606.08}{18} = 33.65\ \$$$

Percentage of bed occupancy × number of existing beds= percentage of active bed
17.1874 =27*65.72% = percentage of active bed

Conclusion

In this study, it is tried to use activity-based costing methods to allocate the correctly and really. Also, its advantages and disadvantages can be practically examined and analyzed by implementing and applying the method in cardiology sector of a hospital in Tehran and using real data. Management can use information obtained from unused capacity to revise the cost of unused capacity and also it can used value engineering technology to determine how the cost of unused resources can be reduced in next periods to use obtained sources of the cost for other services and elsewhere. This increases the efficiency and effectiveness of costs in other sectors.

Since there is a certain tariff in hospitals and health centers, there is no possibility to increase the revenues through the increased rate. So, with correct analysis of costs and activities with activity-based costing method and removing additional costs and using unused capacities, the costs can be reduced and efficiency can be increased and high quality services can be provided.

It is suggested to researchers to study on other costing methods and to compare them with mentioned method in future studies. Also, designing mentioned method in other sectors of health centers and hospitals will be applicable.

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