

Activity based Costing: A Practical Model for Cost Price Calculation in Hospitals

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Abstract

Background: Activity based Costing is an accounting method that allows organizations to determine actual costs associated with their services based on the resources they consume. It is an advanced cost calculation method that allocates resource costs to products based on activity consumption. **Objectives:** In this study, ABC method was used for calculating cost price of remedial services in hospital. **Methods:** To apply ABC method, Valie_asr Hospital was selected. Six steps should be followed when applying activity based costing to hospital procedures: 1. Defining activity centers, 2. Activity analysis in activity centers, 3. Determining output for each center; 4. Calculating activity center costs, 5. Allocating costs of administrative centers to activity centers, 6. Calculating cost price of services and 7. Cost price of remedy activity was calculated. **Results:** Hospital costs are predominantly determined by personnel cost. Because of the differences in tariffs and the cost price of hospital services, most parts of the hospital are losses and government is forced to subsidize them. **Conclusion:** activity-based costing model is a practical tool to evaluate the actual cost structure of hospital. ABC represents useful information about the amount and combination of cost price services. Hence, it is suggested to Health and care department to take into their consideration the use of information on cost price based on ABC in determining the tariffs for services.

Keywords: Activity Based Costing (ABC), Cost price, Hospital

1. Introduction

One of the most significant issues in developing countries is needed resources in the health sector, because over 5% of GNP and about 5% to 10% of Government expenditure has been allocated to this part¹. One of the many possible ways to reduce fiscal deficit is to trim down the government expenditure wherever possible. According to World Bank studies hospitals consume about 50% to 80% of the health sector budget because of cost growth of medical equipments, medicines, skilled manpower etc². This increased cost expands the healthcare budget allotted to an individual unit or hospital, and throws a challenge to the hospital administration to provide high quality services with constrained resources. Therefore, it becomes crucial to understand the cost at different activity levels

of a hospital in order to control the same and make a hospital more cost efficient³. The hospital uses a number of standard accounting costing methodologies.

The predominant approaches used widely were Activity Based Costing (ABC)⁴. ABC is a cost calculation technique that helps organizations determine their actual costs associated with their services on the basis of the resources they consume^{5,6}.

Traditional cost accounting leads to over-costing and under-costing problems because of the inability to align allocation bases with cost drivers. From the cost control view point, ABC allows prioritization of cost-management efforts by providing summary costs of organizational activities by providing more detailed cost information on the activities of the hospital, which could typically result into better cost reduction and cost management⁷.

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With ABC, manufacturing or service overhead costs are assigned to cost objects, such as products or services, by identifying resources, activities, costs, and quantities needed to produce output. A cost driver is used to calculate the resource cost of a unit of activity. Then, each resource cost is assigned to the product or service by multiplying the cost of each activity by the quantities of each activity consumed in a given period⁸. By allocating costs as they relate to the activity, ABC methodology “paints a picture” of both the output and revenue of an organization and its expenses/profitability⁶. This type of accounting system has been used to calculate costs in various other healthcare outlets, including radiotherapy, laboratory testing, and overall hospital management⁹. It can be noted to studies by Brian Aird in Weston Park Hospital in the Sheffield Teaching Hospitals¹⁰, Lievens in calculating the cost of services at radiotherapy department⁵, Kerry’s estimation for operating expenses¹¹. In a study that has addressed enhancing patient-based costing in DRG system in England and Germany, it has been stated that Activity Based costing (ABC) must be used in costing systems in DRG systems¹².

Another study done with Goals use of TDABC to measure the value of process improvement initiatives that reduce the costs of performing a preoperative assessment while maintaining the quality of the assessment performed. They quantified an overall reduction in time spent by patient and personnel of 33% that resulted in a 46% reduction in the costs of providing care in the center. The performance improvements resulted in a 17% decrease in the total number of full time equivalents needed to staff the center and a 19% increase in the numbers of patients assessed in the center¹³. Obtaining costs that are more accurate by using the activity-based costing approach will enable hospital managers to analyze and interpret their costing decisions. Using the activity-based costing method also will allow them to determine their pricing policies and to make more accurate decisions on budgeting and strategy planning¹⁴.

2. Objectives

Considering the importance of accurate costing of services to reduce costs and favorable potential ABC method, this study estimated the cost of inpatient part of Vali Asr hospital using ABC method.

3. Materials and Methods

This study is an analytic-descriptive study, through observation and review financial documents; filling cost and statistical forms from different parts of hospital extracted. Study the cost price of services has been carried out regarding ABC technique by having the financial information for the year 2006. ABC estimates costs, using activities as a base for calculations¹⁵⁻¹⁷. The following steps were used to design the ABC system.

3.1 The First Step: Defining Activity Centers

The ABC process starts by developing an activity map, which outlines the sequence of activities that are involved in the performance of a procedure¹⁸. Activity analysis is performed to identify the resources used for each activity and then which cost pools are drawn from for each resource^{19,20}. To select the activity centers in hospitals it should be noted to type of work and defined purpose of each hospital part. Because commensurate to function and purpose of each activity center outputs can be defined and basis for sharing costs achieved.

3.2 The Second Step: Activity Analysis in Activity Centers

Defined activity centers in hospital divided to administrative, diagnostic, and operational centers. Operational centers are centers that directly involved in the process of providing services to their patients Such as Surgical wards and Inpatient care units. Diagnostic activity centers are involved in providing diagnostic services to operational units and patients like Laboratory, radiology, and Support Activity Centers carry out the public and support services for operational and diagnostic centers that are not involved in providing services to patients directly like accounting unit.

3.3 The Third Step: Determine Output for Each Center

In this step, all the activity centers are divided based on output, and costing operations are carried out based on outputs. According to the division of activity centers based operations, the outputs were mainly determined based on occupied bed day for each part.

3.4 The Fourth Step: Calculating Activity Center Costs

In this stage, all charges such as human resource costs, General and specified Materials cost, cost of drugs, energy costs, depreciation allowance and capital gain. Depreciation of equipment and building have been extracted for each activity center²¹. It is noteworthy that depreciation costs were calculated based on direct depreciation method.

$$C - S/N = D$$

(Useful life of the asset = N, Residual Value = S, Purchasing Cost = C, Depreciation = D).

3.5 The Fifth Step: Allocating Costs of Administrative Centers to Activity Centers

In hospital system in addition to the operational units that are directly involved in patient care, some of the lateral sections are created to serve operational units. Cost drivers originally devised as a means of allocating indirect costs were pressed into service as non-financial performance indicators for departments²² and used to transfer costs of activities into services. It describes why an activ-

ity or a chain of activities is performed¹⁴. The annual quantity of the cost driver is estimated according to the nature of the cost driver. For example Employee cost driver is time and material cost driver is number of items used²³. After this, the costs relating to lateral activity centers must be allocated to operating sectors. For example wage costs were allocated to the different activity groups on the basis of the percentage of time spent per type of personnel to that activity. The defined time estimates per type of personnel, per activity, and per product type were used to calculate this percentage (or proportion) of time per activity group and per type of personnel, on the basis of the product-mix of the year under investigation⁵.

3.6 The Sixth Step: Calculating Cost Price of Services Cost Price

After determining the final cost of operational centers or centers with outlets to calculate the cost price of each output, total expenditures allocated to each activity center divided on the number of defined outputs and thus the cost price can be achieved for each output. In addition to fulfilling the costing operations, generating income

Table 1. Cost price of remedy activity centers with ABC method (Ria)

Activity centers	Activity unit of each center	Cost price without Overhead and depreciation costs	Cost price with Overhead and depreciation costs	Cost price with depreciation costs
Neurology	Occupancy Bed Day	211655	289688	2070603
<i>Pediatrics</i> NICU	Occupancy Bed Day	307646	475410	3776440
Infectious	Occupancy Bed Day	297326	388778	2514316
Cardiovascular	Occupancy Bed Day	246861	358979	2695186
CCU	Occupancy Bed Day	293157	440219	3352971
ICU	Occupancy Bed Day	782857	1158867	7710153
Ear and eye	Occupancy Bed Day	454674	562381	1256889
Surgical unit	Surgery Number	579281	826260	2170344
Obstetrics and Gynecology	Occupancy Bed Day	297148	390779	711902

Table 2. Cost Benefit of remedy activity centers (Milion Ria)

Activity centers	Total revenue	Total cost	Difference in total revenue and total cost	Government Subsidies
Neurology	2737	4078	1341-	1341
Pediatrics NICU	886	2339	1453-	1453
Infectious	1765	1628	137	0
Cardiovascular	1685	2809	1124-	1124
CCU	740	908	168-	168
ICU	722	1138	416-	416
Ear and eye	2155	2308	153-	153
Surgical unit	1947	3181	1234-	1234
			Total Governance subside	5889

departments of hospital recognized, and the revenue of each department was calculated. Finally, the benefits from the final activity centers as well as the cost benefited from each department were calculated.

4. Results

According to the results, in average the hospital costs include personnel costs(59%), the public consumption Accessories(3%), drug(10%), specific Accessories(8%), energy cost(2%) and other costs (18%). According to the results of table 1, the highest price cost on the occupied day relates to ICU and the lowest cost on the occupied day relates to neurology sectors, where the highest revenues allots to the neurology sector, where this is deduced due to the highest occupied bed in the neurology sector.

Table 2 shows that the majority of hospital wards are disadvantage so the government had to pay subsidies to offset its cost.

5. Discussion

The study by Olukoga (2007) has been carried out on cost price for the hospitalization days in public hospitals across

southern Africa, using Reductive method, that indicated the personnel costs included the highest costs, consisting of 72%-83% of hospital costs, where this came true with the results of this study, reporting that the highest hospital costs include the costs for personnel²⁴. The major cost component for the hospital were human resources and capital cost, it is supported by another studies^{5,25,26}.

Depreciation cost of buildings and capital items Create a significant increase in the unit cost, Riewpaiboon study confirms similar results²⁷. So personnel and buildings costs have the highest share of the costs in hospital; they are the most important priority in cost control.

One of the other important results of this research is the identification the highest cost price in occupancy bed day in Intensive Care Unit (ICU). This is similar to results of Garattin study in Italy as wards with the highest cost price are ICU (US\$650.689) and ophthalmology (US\$483.322)²⁸. As well Rajabi study showed ICU has the highest cost price for occupancy bed day²⁹. The main reason for high costs in occupancy bed day is due to costs of equipments depreciation, facilities, manpower costs and low number of occupied bed day. Regarding the high amount of costs, their full capacity has not been used and the total fixed cost of these activity centers is only allocated to occupancy bed day. Therefore, the cost of every

occupied bed day has increased significantly. As most sectors of Valiasr hospital are injured, the government pays about 5889 millions to supply the costs to these sectors as Subsidies. Hence, reforming hospital services tariffs must be drawn into attention by government and health politicians.

6. Conclusion

The present costing system is also incompetent to establish a sound management control model in a hospital setup as it is inept to answer a few vital questions of management perspective that requires analysis of cost at micro level of the organization.

ABC method is an essential management decision tool to provide more accurate product costing information, to compare the profitability of the product diversity, and to identify lost leaders and unprofitable products and services. Therefore, in this paper, an ABC model is proposed and developed in a public sector hospital of Iran to cost its entire range of services. Thus, the information obtained from adoption of the ABC model on cost of various activities in the hospital is more accurate, reliable and comprehensive which can aid the government to propose effective operational, tactical and strategic measures for budgeting and planning.

Since the medical service tariffs are determined based on fixed prices and ABC is a suitable tool to determine cost price for services, so it is suggested to use the information on cost price based on ABC in determining tariffs for services. ABC allows the costs of each activity and therapy, or combination of therapies, to be determined and aids measures to improve management. It is recommended to use this costing method to determine the cost price of hospital services and determination of Diagnosis Related Groups (DRGs). In DRGs patients are classified into groups having the same condition (based on main and secondary diagnosis, procedures, age), complexity and needs which can be used in hospital performance based budgeting.

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8. References

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