

## **Original Article**

# **Determination of the Cost of Cesarean Surgery in a Public Hospital of Iran**

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## **Abstract**

**Introduction:** Cost estimation is an important tool which assists the managers to plan and to control the economic functions of the organization. The present study aims to identify the cost of a cesarean surgery in one of the first class public hospitals in Iran.

**Materials & Methods:** Reviewing all expenses of the hospital documents in the financial unit, the cost of a cesarean surgery was determined through real costing.

**Results:** the findings revealed that the cost of such a surgery is 181 dollars, among which the highest level was related to the direct labor possesses with 63 percent and overhead costs with 37 percent of the total costs.

**Conclusion:** Mitigating the tendency toward this surgery is possible through changing in the women's beliefs about the vaginal delivery along with the enhancements in facilities and standards of the vaginal delivery. It is suggested to educate and consult with the families through health centers and media.

**Keywords:** Hospitals, economics; Costs and Cost Analysis; Cesarean Section; Economics, Medical; Hospital Costs

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## Introduction

One of the significant departments of the health and medical ministry is the Obstetrics and Gynecology which provides a proper scheme for the treatment of the patients. In developing countries, there are many young females who die from the disease resulting from pregnancy at the time of childbirth. As observed in developed countries, the main reason of reducing the rate of mother's death is the availability of the medicals and desired expert services during the pregnancy and childbirth<sup>[1]</sup>.

Iran is a developing country and a considerable part of its economic resources is assigned to its health and medical divisions and hospitals. Therefore, it is essential to investigate the economic aspect of the services and determine the cost of the them. This process is going to optimize the utilization of the limited resources.

Atiakhan et al conducted a study to measure the costs of both types of childbirth in the third class hospitals of Islamabad in Pakistan. They compared the average cost of the natural and cesarean childbirth from the both perspectives of patients and hospitals and came to the following conclusions:

They observed that the average cost of vaginal delivery is 40 dollars from the hospital's view; while this costs 79 dollars for the patient. This figure is 162 dollars for the hospital and 204 dollars for the patient for a cesarean surgery<sup>[1]</sup>. Topal and colleagues tried to determine the costs of pancreas illnesses in a

hospital in the United States. Their findings showed that the average cost of the hospital for each patient is 10406 Euro. The largest part of the costs related to pancreas surgery is the personnel and medical costs<sup>[2]</sup>.

Ashish and colleagues aimed to develop safety and eliminate the excessive experiments and reduce the costs of the American hospitals. Their findings revealed that omitting undesirable events which were avoidable leads to 5.5 percent savings in the costs of the patients. A declining number of the experiments prescribed several times by different patients caused 8 million dollars cost saving<sup>[3]</sup>.

Castilho et al (2007) tried to determine the cost of venous hemodialysis in the ICU department of government hospitals in Brazil. They found that the hospitalization period in the ICU was 19.2 days and the average of the operations for each patient was 1.9 hours. They also documented that the average salary of the nurses was 592.04 dollars which shows 28.7 percent of the total costs<sup>[4]</sup>.

Azadi determined the costs of providing services for the obstetrics and the Gynecology Department in Shohada-e- Tajrish Hospital and compared the free tariffs of a private first class hospital in Tehran (Iranmehr). He demonstrated that the total value of the annual services of the hospital's departments was 626523 dollars among which 2.76 percent related to general materials, 43.1 percent related to private materials, 23.6 percent related to labor costs and 10.8 percent of the costs were pertinent to the expenses. The costs

for each bed in this department were estimated to be 10 dollars. The maximum level was also associated with the labor costs and was 39.47 percent <sup>[3]</sup>.

Seydafkan conducted a study aimed at computing the average costs and revenues of a hospitalized patient with the prescribed surgeries of obstetrics and gynecology in expert hospital of 29 Bahman (direct treatment). He also tried to compare it with the average cost of a patient who had an insurance credit (indirect treatment) and had to make an obstetrics and gynecology surgery. The information related to the number of the vaginal delivery, painless childbirth, cesareans and the amount of the related bills were collected during the period. Then the average of a vaginal delivery and an average of the vaginal, painless and cesarean delivery bill were computed and it was identified that the financial load resulting from cesarean in the hospital is increasing along with the average additional cost of each patient. If the trend of these expenses increases annually there might some problems occur in the organizations <sup>[7]</sup>.

Lack tried to compare the cost of general ICU department (clinic ICU and ICU2) in Imam Khomeini hospital in the year of 2003. The findings were as follows:

The average cost of hospitalization in clinic ICU and ICU2 of this hospital used to be 157 dollars and 204 dollars, respectively <sup>[9]</sup>.

Mashhadi found the following points in his study with the purpose of determining the cost of an emergency mission in Yazd province. He discovered that the cost of an emergency

mission in Yazd is 36.3 dollars. This amounts to 36.06 and 36.08 dollars for canceled mission and fatal mission, respectively. The highest level of cost relates to the overhead costs which composes 47.9% of the total costs. This is 42.5% and 9.6% of the direct labor and administrative and general costs, respectively<sup>[4]</sup>.

## Materials & Methods

This is a cross-sectional study which we used descriptive-analytic implementation method. Among the different types of costing methods utilized in determining the cost of services, we have selected real costing.

### Data Analysis

#### a. Calculating Direct Labor

There is a team composed of five members operating in the surgery room which includes a surgeon, anesthesia technician, a surgeon aid and one personnel as a circle. The direct labor computed for a cesarean surgeon is estimated from three steps which are as follows:

##### a.1. Calculating the salary of Anesthesiologist

The earned revenue of the hospital coming from anesthesia is achieved by multiplying the revenue coefficient (K) by the number of the anesthesia. Accordingly, we have divided the earned revenue (339685 dollars) by the revenue coefficient (k) in order to calculate the total number of anesthesia (125809). Then, the total salary paid to the anesthesia specialist is divided by the total number of anesthesia to find the unit cost of anesthesia which amounts to 2.7 dollars. Finally, the number of

anesthesia of a cesarean surgery which is documented to be 14.4 K, is multiplied by the unit cost of anesthesia and the salary of the specialist is measured.

Salary of Anesthesiologist  $\rightarrow 14.4 \times 2.7 = 39$

#### **a.2. Calculating the salary of Gynecologist**

In order to calculate the salary given to the Gynecologist, we have divided the total salaries paid to them by the number of their useful hours of work. The amount of this salary was 44.1 dollars. The average time for a cesarean surgery is one hour.

#### **a.3. Calculating the salary of the technicians**

In order to calculate the salary of the technicians, we have initially divided the total salary paid to them by the total number of useful working hours. This is computed as much as 6.8 dollars. Three technicians are required for each surgeon and the required time for the operations of a technician is 1.5 hours.

$$6.8 \times 3 \times 1.5 = 30.6$$

Finally, the salary cost of a cesarean surgery was calculated by aggregating the salary cost of Gynecologists, anesthesia specialist and technicians which amounts to 114 dollars.

#### **b. Calculating the required medicine and material**

According to the documents, the average amount of the medicines and instruments used in a cesarean surgery is 24 dollars.

#### **c. Calculating overhead costs**

Initially, all costs are classified and the costs related to each cost center are computed and allocated according to the reasonable bases to different operations. Then, the costs of all units

are computed by using a binary allocation method. Finally, the unit overhead cost of a cesarean surgery was computed by considering the services provided by each cost center. The following steps were taken to calculate the overhead cost through matrix table:

#### **c.1. Matrix of cost-cost center**

After recognizing all units and cost centers in the hospital and grouping of all hospital units of the three parts of the facility, intermediary and operating departments, table of cost-cost center was designed to aggregate the costs in the cost pool. Its columns are cost centers and its rows are costs title. Studying and analyzing the costs, the costs related to each unit is segregated and allocated according to a reasonable base to the cost center.

#### **c.2. Matrix of the relations of cost centers**

The costs in a cost pool were accumulated through interviews with the experts and officials of different sections and precise the evaluation of their operations, the relationship between cost centers and their service provision to each other. The related cells were signaled finally. It must be mentioned that the operating units have just received the services from the facility and intermediary units and don't provide any services to other services.

#### **c.3. Matrix of the relations of cost center in terms of percentage**

After identifying the relationship between cost center and according to the allocation bases of costs, the required numbers and figures are exploited and are stated in terms of percentage. This is finally documented in

terms of percentage in the matrix cells of the relationship matrix.

#### c-4- Allocating overhead costs to the supporting units

After preparing a matrix about the relations of percentage of the cost centers, the overhead of this unit is allocated. Using Excel software along with the binary allocation method which is the most accurate method and the percentage of the services provided, the overhead of the facilitating unit is assigned to the intermediary and operational units.

#### c.5. Allocating overhead costs of the intermediary units of the operational unit

After allocating overhead costs to the facilitating unit, the primary costs of the intermediary units plus the overhead cost assigned to the facilitating unit is apportioned to the operational units.

#### c.6. Calculating Overhead costs of a cesarean surgery

In order to compute the overhead costs of the surgery room, the total overhead cost of the surgery room is divided by the number of the rooms (there are 7 surgery rooms and one of them is devoted to the cesarean surgeries). Consequently, the total overhead cost of the cesarean surgery is computed and this figure is divided by the number of cesarean surgeries in order to find the cost of one cesarean surgery.

*Total overhead= indirect labor + the overhead of the surgery room*

$$\text{Total overhead} = 557555 + 92996 = 650551$$

Overhead of a cesarean surgery room  $\rightarrow$   
 $650551 \div 7 = 92936$

Overhead of a cesarean surgery  $\rightarrow 92936 \div$   
 $2181 = 43$

**Table 1.** Calculation the costs of a cesarean surgery

Amount	cost
Direct Labor	114
Drug	24
overhead	43
Total costs of a cesarean surgery	181

### Discussion

Regarding our main objective which is the determination the costs of a cesarean surgery, this analysis are summarized as follows:

The costs of a cesarean surgery are 181 dollars.

Personnel cost possesses the most portion of the costs which has 63 percent of the costs. This is supported by the findings of Atiakhan, Topal, Azadi and Seydafkan.

Direct labor costs of the supporting, intermediary and operational units are 1836703, 1937318 and 1417363 dollars, respectively. The direct overhead costs of the supporting unit amount to 2314953 dollars. In this unit, overhead costs possess the most portion with 56 percent and in intermediary units, the direct labor has 58 percent of the total costs.

### Conclusion

One of the factors affecting the improvement of the costing of the services and financial information of the hospital is determining the position and significance of

the costing and its impact on the decision making. In doing so, the significance of this topic along with the impact of employee's performance in surgery rooms ought to be described and the employees perceive their role and responsibility in costing of the services. It is therefore required to provide enough training for achieving the needed schemes. Additionally, there should be some proper approaches suggested for

discouraging the women of having unnecessary cesarean surgery. This approach should be provided consistent with the cultural and scientific realities of the community. Timely and correct training to the families and consultanting with the families and providing the facilities for painless childbirth are the useful steps that could be taken to enhance the health level of the mothers and infants.

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