

# Activity Based Costing in Health Institutions: An Application in Gynecology Clinic of a Public Hospital

## Sağlık Kurumlarında Faaliyet Tabanlı Maliyetleme: Kamu Hastanesi Jinekoloji Kliniğinde Bir Uygulama

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**ABSTRACT Objective:** The aim of the study is to calculate the unit cost of normal labor and cesarean section using Activity Based Costing (ABC) method that is one of the contemporary methods that provide accurate cost allocations for clinical procedures. **Material and Methods:** Financial accounting and other data are obtained from a public hospital operating in Samsun for the year of 2014. In the study unit costs for normal labor and cesarean section are analyzed using ABC method. Unit costs that are calculated for normal labor and cesarean section are compared with billed amount. **Results:** Unit costs for normal labor and cesarean section are calculated according to ABC methods and results are as follows; unit costs for normal labor and cesarean section are correspondingly 814.66 TL(Turkish Liras) and 1.274.21 TL. Finally cost figures for normal and cesarean labors are compared with billed amounts to patients. According to data obtained from hospital the billed amount for normal labor is 539 TL which is below the cost calculated (814.66 TL) in the study. The difference is more dramatic for cesarean labor. The billed amount 618 TL is far below the cost figure calculated in the study which is 1.271.21 TL. Lastly normal labor and cesarean section unit costs that are calculated according to ABC method are compared with price lists in Communique on Healthcare Practices (Sağlık Uygulamaları Tebliği-SUT [HIN]) **Conclusion:** According to this study, it is determined that there are differences between the unit costs calculated by ABC method of normal and cesarean deliveries and repayment amounts. It is concluded that hospital is incurring losses due to underpricing of normal and cesarean labor operations below their calculated costs. Use of the ABC method in the calculation of the costs of clinical procedures will enable health institutions managers to make more accurate financial planning and financial decisions. In addition, it will increase competitiveness through higher quality service provided to patients.

**Keywords:** Hospital costs; parturition; cesarean section

**ÖZET Amaç:** Çalışmanın amacı; klinik işlem maliyetlerinin daha gerçekçi hesaplanabilmesine olanak sağlayan çağdaş maliyetleme tekniklerinden Faaliyet Tabanlı Maliyetleme (FTM) yöntemi ile sezeryan ve normal doğum birim maliyetlerinin tespit edilmesidir. **Gereç ve Yöntemler:** Samsun'da faaliyette bulunan bir kamu hastanesine ait 2014 yılı finansal ve diğer veriler alınmıştır. Çalışmada, normal ve sezeryan doğuma ait birim maliyetler FTM yöntemi ile analiz edilmiştir. Normal ve sezeryan doğum için hesaplanan birim maliyetler hastalara fatura edilen tutarlarla karşılaştırılmıştır. **Bulgular:** Normal ve sezeryan doğuma ait birim maliyetler FTM yöntemine göre hesaplanmış olup; normal doğum birim maliyetinin 814,66 TL (Türk Lirası) ve sezeryan doğum birim maliyetinin 1,274,21 TL olduğu bulunmuştur. Son olarak normal ve sezeryan doğum için maliyet tutarları hastalara fatura edilen tutarlarla karşılaştırılmıştır. Hastaneden elde edilen verilere göre normal doğum için fatura edilen tutar, hesaplanan maliyetin (814,66 TL) altında olup 539 TL'dir. Sezeryan doğumda fark daha belirgindir. 618 TL sezeryan doğum fatura tutarı, yapılan çalışmada 1,271,21 TL olarak hesaplanan tutarın oldukça altındadır. Son olarak FTM ile hesaplanan normal ve sezeryan doğum birim maliyetleri Sağlık Uygulama Tebliği (SUT) fiyat listesi ile karşılaştırılmıştır. **Sonuç:** Gerçekleştirilen bu çalışmaya göre, normal ve sezeryan doğumların FTM yöntemiyle hesaplanan birim maliyetleri ile geri ödeme tutarları arasında farklılıkların olduğu tespit edilmiştir. Normal ve sezeryan doğuma ait fatura tutarlarının hesaplanan maliyetten daha az olması hastanenin zarara uğramasına sebep olduğu söylenebilir. Klinik işlemlerin maliyetlerinin hesaplanmasında FTM yönteminin kullanılması, sağlık kurumları yöneticilerinin daha doğru bir finansal planlama yapabilmesi ve finansal karar verebilmesinde etkili olacaktır. Ayrıca, daha kaliteli hizmet sağlayarak rekabet gücünün artırılabilmesine olanak sağlayacaktır.

**Anahtar Kelimeler:** Hastane maliyetleri; normal doğum; sezeryan doğum

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The level of expenditures on health and health services which have a great importance both in social and individual perspectives is steadily increasing.<sup>1</sup> This increase in health costs has ended with amassed pressure on health service providers in rendering service to their patients in a more efficient and effective manner.<sup>2</sup> In Turkey, total health expenditures which was 8.248 million TL by the year of 2000 has increased to 140.647 million TL by the year of 2017. The ratio of total health expenditures to Gross Domestic Product (GDP) has decreased to 4.5% in 2017 from 4.9% in 2000.<sup>3</sup> This relatively significant ratio of health expenditures requires efficient usage of scarce resources that are provided to health institutions and necessitates in rendering health services with a professional management perspective which entails cost-orientation.<sup>4</sup> There is also a pursuit for management systems and reforms in other countries that would both solve problem of increasing health expenditures due to higher importance given to individual health protection and provide efficiently usage of scarce resources reserved for health services via decreasing health service costs.<sup>5</sup>

In the last decade, there is an increasing trend among governments and hospital managers to realize that costs of hospitals emerge as a result of various and complex activities. Hospital costs are also an integral part of price formation process which impacts the profitability of the hospital. Traditional costing methods, particularly methods that are employed in hospitals, fall short of fulfilling these managerial expectations. Under these methods cost are determined without regard to set of services provided at a fixed price. Therefore, it is vital to perform costing through accurate and effective methods.

Rapid developments in technology affect production and management processes of companies and make solid changes in them. Engagement of production systems such as computer aided, robotic and flexible production systems into production process plays an important role in this evolution.<sup>6</sup> These developments in production in recent years have increased the importance of costing techniques.<sup>7</sup> For this purpose Activity Based Costing (ABC) is introduced in order to calculate cost more accurately. ABC successfully handles cost and quality issues for manufacturing

companies and same is similarly valid for service industry and provides more accurate unit product costs in comparison to traditional costing system.<sup>8-10</sup>

## ACTIVITY BASED COSTING APPROACH

ABC is simply the process of accumulating manufacturing overhead costs in cost pools and then distribution of these costs to outputs with predetermined cost keys. Besides taking into consideration the causal relationship between cost drivers and activities according to ABC, the underlying principle is to determine which resources are consumed by activities performed in order to produce goods and services.<sup>11</sup>

While ABC system contributes to cost reduction through supply of accurate and detailed information on product costs, performance evaluation, elimination of non-value adding activities, continuous improvement strategies, on the other hand it helps company managers in strategic decision making on other issues, planning and control activities.<sup>12</sup>

ABC consists of a two-staged segregation process. If it is considered for hospitals, at the first stage hospital costs (patient admission, cardiac catheterization, EKG test, etc.) are assigned to activity pools. At the second stage costs are assigned from these cost pools to patients or periodic care units via allocation keys.<sup>13</sup>

Although design of ABC varies among companies, it generally consists of 5 steps that are listed below:

1. Determination of activities
2. Grouping of activities
3. Redistribution of manufacturing overhead costs in accordance with activities
4. Selection of appropriate cost drivers for assignment of costs to products
5. Allocation of activity costs to products.<sup>14</sup>

## COMPARISON OF TRADITIONAL COSTING AND ACTIVITY BASED COSTING

Traditional costing system is defined as a method in which one cost driver (e.g. direct labor, production volume, etc.) is used to allocate whole manufactur-

ing overhead costs. This situation may cause a distortion in distribution of aforementioned costs that constitutes a large part of product costs.<sup>15</sup> These systems usually overlook the connection between different department and functional areas and similar activities.<sup>6</sup> While direct material and direct labor costs can be straightforwardly assigned, assignment of manufacturing overhead costs which are composed of several types of costs is not that easy. Accordingly the sensitivity regarding accuracy of indirectly assigned cost information increases. Therefore it is important to select and apply the appropriate method that will be used in the allocation of costs.<sup>16</sup>

ABC is a modern costing method that enables to allocate manufacturing overhead costs more accurately and fairly in comparison to traditional costing method. The ABC is merely concentrated on providing accurate information about goods and services, processes, activities, distribution channels, customers, real cost of contracts and projects. This system assigns indirect and other supportive costs to products, product lines, departments, distribution channels and customers who demands or benefits from these resources more properly.<sup>17-19</sup>

This is not the case under traditional costing methods. If it is held for hospital, for instance, direct costs which are namely usage of operating room, laboratory test are directly billed to customers. However, accumulated costs are calculated by dividing total amount of indirect costs and manufacturing overhead costs related with hospital activities by patient-day number. Under this method, level of care that is used for calculating manufacturing overhead costs per patient is taken as operations applied or numbered of days stayed regardless of the type of patient disease or complaint.<sup>13</sup>

ABC provides more useful information related with both costs and activities. More detailed information may be obtained about value adding and non-value adding activities of the company.<sup>20</sup> According to traditional costing methods, it is assumed that there is linear relationship between manufacturing overhead costs and goods produced or service capacity. However, under ABC manufacturing overhead costs are accumulated in activities that are vital for conti-

nunity of the business. Manufacturing overhead costs are allocated to products within a collective view under traditional costing methods. According to ABC these costs are accumulated in activities and assigned to both units and to various level of activities by the help of cost drivers specified for each activity.<sup>14</sup>

In addition to procedural advantages of ABC over traditional costing system, it also helps to improve financial performance measures. According to the study of McGowan, Holmes and Martin, it is found that particular hospital measures benefitted from adoption of ABC costing. It is observed that profitability and occupancy rates are positively affected from adoption of ABC. Results are dissimilar for non-profit or government hospital. Latter group experienced an increase in revenues with an accompanying increase in costs that result in stable level profitability.<sup>21</sup>

## APPLICATION OF ACTIVITY BASED COSTING IN HEALTHCARE INSTITUTIONS

Today production systems are changing fastly as a result of transformation and development in technology. Structure of accounting and cost calculation methods are also evolving in response to mentioned changes. One of the major changes occurred in manufacturing overhead costs in which a dramatic increase is observed, especially capital intense industries. As proportion of manufacturing overhead costs in total costs has been rising strikingly in healthcare sector (due to intense usage of technology), it is becoming one of the most affected sectors due to usage of technology intensely. Therefore it is important to employ ABC method, in which a more accurate cost allocation is provided, in cost allocation manufacturing costs in order to offer precise costing, performance measurement and to provide data for other analysis.<sup>22</sup>

ABC system is usually applied for manufacturing companies and it's commonly thought that it is suitable for these type of companies. However there are many examples of application of ABC in service sector. In this section literature on service sector particularly in hospitals is discussed in compliance with the subject of the study. The literature on implemen-

tation of ABC in health industry is discussed in the following paragraphs.

The following studies are outstanding among studies that analyzed ABC application in healthcare sector. Uğurtay et al. analyzed service costs in May 2010 for adult angiography department in a state hospital, namely İstanbul Mehmet Akif Ersoy Thoracic, Cardiovascular Surgery Training and Research Hospital. In this study unit service costs for adult angiography laboratory (for 15 separate processes applied on patients) are calculated employing ABC system and results are compared with Healthcare Implementation Notification (HIN) (in Turkish, (SUT) Sağlık Uygulama Tebliği) listed prices which are determined by Republic of Turkey Social Security Institution (SSI) (SGK) as a standard for every hospital. It is revealed that there are differences between cost that are calculated according to ABC and HIN listed prices. It is justified that usage of ABC costing in health institutions would directly impact profitability and effectiveness as hospital management would be able to make more precise decision using these data obtained from ABC system.<sup>23</sup>

Ergün et al., examined 44 histopathology instances that categorized into 4 distinct levels under HIN in Ankara University Medical Faculty Medical Pathology Department Pathology Laboratory for the month October 2010. Accurate costs are calculated based on duration of laboratory tests. Calculated costs are compared with HIN and Medicare price lists. It is determined that majority of costs of histopathology examinations that are at the same level of HIN pricing list are significantly different from each other. Therefore it is concluded that prices on HIN do not reflect the actual costs, Medicare system is more realistic and reflective of actual costs. Basic parameters of ABC underlie the importance of assigning levels for pathology examinations.<sup>24</sup>

Bengü and Arslan calculated unit costs for “direct graphy” and “ultrasonography examinations” which are the most common types of graphics according to ABC and traditional costing system for the radiological imaging and treatment department in a hospital that serves in many other departments. Unit costs for direct graphics and ultrasonography examinations are 13.54 TL and 13.38 TL respectively under traditional cost-

ing systems. Same costs are calculated as 18.21 TL and 11.57 TL respectively according to ABC. It is inferred that direct graphics costs are understated while ultrasonography examinations are overstated.<sup>25</sup>

Krug et al. conducted an ABC study on positron emission tomography which has an important role in cancer, neurological and cardiac treatments. It is found in the study that radiopharmaceutical costs are the major cost components in contrast to other “very expensive” medico-technical procedures in which personnel and equipment costs are dominant. Further sensitivity analysis supports the findings. It is concluded that for cost effectiveness, radiopharmaceutical costs should be aimed.<sup>26</sup>

Yereli calculated cost of cholecystotomy in general surgery clinic of a university hospital. Cost of operations that are grouped as open and laparoscopic are calculated using traditional and ABC methods. Results of the study indicated that cost of an open cholecystotomy is 146.520 TL according to traditional approach and 125.909.64 TL according to ABC. For laparoscopic cholecystotomy, results are 78.000 and 98.205.60 respectively. It is concluded that costs that are calculated employing these two different methods are different.<sup>27</sup>

Erkol ve Ağırbaş conducted a cost allocation study in Cardiovascular Department of a university hospital. Fourteen types of operations that may be named as immense and distinctive are selected as sample and their costs are calculated. Costs that are calculated using ABC method is compared with prices of Turkish Medical Association, HIN prices and Department of Cardiovascular Surgery invoice amounts. It is concluded that costs of these 14 operations are higher than three of the prices.<sup>1</sup>

## MATERIAL AND METHODS

The aim of the study is to calculate the cost of cesarean and normal labor using ABC methods that is one of the contemporary methods that provide more accurate cost allocations. Hence it is intended to set forth realistic cost figures for these two type of labors. The study was conducted in accordance with the Helsinki Declaration Principles. To conduct the study permission is taken from Samsun Turkey Public Hos-

pitals Union General Secretariat in 13.01.2015 (Number of permission slip:54103609/044).

The hospital of which data are used in the study, provides services in four major fields as children disease, women's health, surgery and gynecology. Hospital-wide accounting data obtained from accounting department and in order to get costs attributable to gynecology department cost data is distributed among these departments depending on some measures. Hospital management, fuel, security, publicity costs, stationery and some other ignorable small amounts of costs are distributed evenly. Indirect labor and related clothing costs are distributed according to numbers of employees in each department. Square meter measure is used in cost allocation of water, cleaning, heating and electricity costs. In allocation of food, laboratory services and medical waste, disposal number of patient is used. Computer related costs like data processing, internet service and software costs are distributed according to the number of computers. Finally, communication costs are distributed according to number of telephones in use. As a result of this procedure, overhead costs that are attributable to gynecology department are determined.

The next step is to calculate unit costs for normal labor and cesarean section according to ABC methods. Distribution of direct costs (i.e. direct material and direct labor) is not falling under the area of ABC. The ABC is merely dealing with distribution of overhead costs. Because direct costs are the costs that are attributable to cost objects. Therefore there is no need for allocation of direct material and labor costs.

Initial step for ABC method is identification of activities in gynecology department. Then activity cost drivers are defined for each activity and costs are assigned to activity cost pools via cost drivers. Lastly, unit costs for normal labor and cesarean section are calculated through assignment of costs accumulated in activity cost pools to cost objects.

## RESULTS

### STAGES OF APPLYING ABC

Production costs are composed of three components; direct material, direct labor and manufacturing over-

**TABLE 1:** Direct labor costs for cesarean labor and normal labor.

	Cesarean Labor	Normal Labor
Direct material (Medicine and other medical consumables)	127.45 TL	39.60 TL
Direct labor (Doctor premium)	106.83 TL	106.83 TL
Total direct costs	234.28 TL	146.43 TL

head costs. Allocation of direct material and direct labor are straight-forward as they are attributable to related outputs. Direct material costs are medicine and other medical consumables (e.g. aspiration gavage, disposable underpad, suture, spinal needle, sterilized gloves and medicine) and direct labor costs are doctor premium in our case. Doctor's premium is composed of amount that is received by the doctor for clinical procedures from revolving fund. Amounts of direct material costs vary among patients. Two sample patients are randomly chosen, one for normal labor and one for cesarean labor and their related direct material costs are taken. Direct labor cost is solely composed of doctor premium because other personnel do not take any premium per the number of labors attended. Amounts for direct material and direct labor are given in [Table 1](#).

The main problematic area in cost allocation is overhead costs. Traditionally overhead costs are distributed in proportion to activity volume which is usually taken as production volume. ABC method is designed in order to overcome shortcomings of traditional costing system that usually ends with arbitrary cost allocation. The philosophy of ABC, as discussed above, depends on segregating business process into activities and tracking manufacturing overhead costs via these activities. Therefore initial step of applying ABC is defining hospital activities for gynecology department. Then overhead costs are accumulated in these activities according to cost factors. At the final stage, costs accumulated in each activity are allocated to outputs using cost drivers which are cesarean and normal labor in our case.

According to Hilton, activities performed in an enterprise can be classified into four subcategories. These are unit level activities, batch level activities,

product-sustaining level activities and facility level activities. Unit level activities should be done for each unit or in our case each patient. This type of activities is the activities that are most common in hospital because usually each patient is treated individually. Another level of activity, batch level activity is applied for each batch of product which is not applicable to hospitals. Product sustaining-level activities are done for a line products in order to support that product which is private section for normal labor patients in our case. Lastly facility level activities are performed in order to support entire production processes and covers whole facility.<sup>28</sup>

At the first stage activities performed in hospital are determined and they are categorized according to Hilton. According to interviews performed with personnel seven distinct activities are determined which are namely patient admittance, preparation, labor, mother care and childcare after labor, room services, private section for normal labor and general hospital expenditures. In the hospital a private section was prepared for women who prefer to give a normal labor. This private section is composed of rooms that are special and serves only one patient at a time. A high level of privacy is provided to women and this is a very encouraging initiative for normal labor. Most interestingly, no extra amount is requested from patient who gives labor in this section. Therefore this initiation is thought to be a good support for normal labor and costs related to this department are distributed among all normal labor patients rather than distributing to only patients that give labor in this department. In accordance with Hilton, this activity is a product-sustaining level activity. General hospital expenditures are facility level activity. All other five activities are product level activities.

At the second stage, manufacturing overhead costs attributable to gynecology department are accumulated in activities using cost factors. Costs accumulated in patient admittance activity are indirect labor, stationery, water, cleaning, heating, electricity, data processing, telephone, and internet and software costs. Indirect labor, water, cleaning, heating, electricity, disinfecting agents and medical device amortization and maintenance costs are the costs that are in preparation department. Costs that are incurred in

**TABLE 2:** Activities performed for cesarean labor and normal labor.

Activity	Activity Level	Accumulated Cost Amount
Patient admittance	Unit Level	50.823 TL
Preparation	Unit Level	346.892 TL
Labor	Unit Level	3.207.344 TL
Mother care-child care	Unit Level	348.073 TL
Room services	Unit Level	766.990 TL
Private section	Product-Sustaining Level	22.169 TL
General hospital expenditures	Facility Level	1.239.708 TL
<b>TOTAL (rounded amounts)</b>		<b>5.981.999 TL</b>

preparation activity are also applicable to labor activity. In addition to that communication and software costs are incurred in labor activity. Mother care and child care after labor activity consist of indirect labor, water, disinfecting agents, heating and electricity. Room services activity and private section for gynecology department activity contain indirect labor, water, heating, electricity, communication food and amortization costs. Finally, general hospital expenditures consist of indirect labor, water, cleaning, heating, electricity, clothing, fuel, promotion, landscaping, technical support, security and some other costs. In the [Table 2](#) each activity, its activity level and total amount of overhead costs accumulated in these activities are given.

The final stage is allocation of manufacturing overhead costs in activities to outputs. This allocation is performed utilizing cost drivers. Cost driver for patient admittance activity is number of patients. Both type of patients, normal labor and cesarean labor, are treated as the same under this activity. Number of normal labor is 3.624 and number of cesarean labor is 3.441 for the year of 2014. Preparation activity cost driver is time spent. According to interviews with personnel, it is determined that preparation processes for normal labor is two times longer than cesarean labor on average. Although preparation activity is more longer for normal labor, labor activity is longer and complicated for cesarean labor in comparison to normal labor. Therefore costs accumulated in this activity are distributed in proportion of 1:2 (cesarean labor: normal labor). Labor activity is more complex and time consuming for cesarean

**TABLE 3:** Cost driver for activities and amounts allocated per labor type.

Activity	Cost Driver	Cesarean Labor (per labor)	Normal Labor (per labor)
Patient admittance	No. of patient	7.19 TL	7.19 TL
Preparation	Time spent	32.45 TL	69.90 TL
Labor	Time spent- Complexity	610.57 TL	305.29 TL
Mother care- childcare	No. of patient	49.27 TL	49.27 TL
Room service	No. of days stayed	164.98 TL	54.99 TL
Private section	No. of patients	N/A	6.12 TL
General hospital ex.	No. of patients	175.47 TL	175.47 TL
<b>TOTAL</b>		<b>1.039.93 TL</b>	<b>668.23 TL</b>

labor. Accordingly the ratio of distribution is 2:1 (cesarean labor: normal labor). Mother care and child care activity is another activity in which number of patients is used as the cost driver. Cost driver for room services activity is number of days stayed. While cesarean labor patients stay 3 days on average, normal labor patients spent only one night in the hospital. As private section activity a product level activity and is only available for normal labor patient, it is only distributed among them. This activity is not applicable to cesarean labor patients. Lastly general hospital expenditures are distributed according to number of the patients. Each activity, its cost drivers and allocated amounts of overhead costs per patient are given in [Table 3](#).

As discussed above, two patients are randomly selected for analysis; one for cesarean labor and one for normal labor. Direct cost of normal labor patients consist of medicine, medical consumables and doctor's premium. They were given in [Table 1](#). Indirect costs are allocated according to ABC and they are calculated on [Table 3](#). The combination of these two tables is given in [Table 4](#) which gives the total cost of cesarean labor and normal labor calculated according to ABC.

Normal labor and cesarean section unit costs that are calculated according to ABC method are compared with HIN price lists in [Table 5](#).

It is determined that calculated unit costs differ from amounts on price lists.

## DISCUSSION

In the study, unit costs for a cesarean and a normal labor patient are calculated. The method selected for

**TABLE 4:** Total cost of cesarean labor and normal labor calculated according to ABC.

	Cesarean Labor	Normal Labor
Direct cost	234.28 TL	146.43 TL
Indirect cost	1.039.93 TL	668.23 TL
Total cost	1.274.21 TL	814.66 TL

ABC: Activity Based Costing.

**TABLE 5:** A comparison of normal and caesarean birth of unit costs with the HIN price.

	Unit cost calculated by ABC method	HIN price
Normal labor	814.66 TL	674.54 TL
Cesarean labor	1.274.21 TL	758.85 TL

HIN: Healthcare Implementation Notification, ABC: Activity Based Costing.

calculation is ABC due its advantages over traditional costing method. Currently the hospital does not have a system applicable to cost calculation. Therefore it is not possible to compare cost amounts calculate in the study with a cost amount given by the hospital.

However it is commonly known and generally accepted that cost figures are basic determinant of prices. Prices are formed adding a margin on cost number. In this case we have collected billed amounts to patient for each type of patient and it is possible to compare cost figures with these prices in order to understand if patients are under- or overpriced.

Billed amounts of these patients according to the documents taken from the hospital were 618 TL for cesarean patient and 539 TL for normal labor patient. When compared for cost amount calculated 1.274.21 TL and 814.66 TL for cesarean and normal labor pa-

tients respectively, it can be easily seen that both labor types are highly underpriced and the difference is more dramatic for cesarean labor. The cost of cesarean labor is 206.18% higher than its price and the cost of normal labor is 151.14% higher than its price.

Tarcan et al. calculated actual and standard costs for cesarean section. According to the study, actual costs for cesarean section were found for small, medium and big operations as 240 TL, 288 TL and 515 TL correspondingly. Standard cost for the same procedure is calculated as 734.92 TL.<sup>29</sup> According to another study by Tarcan and Tekin actual and standard costs for tube baby are calculated as 1.617,087 TL and standard cost as 1.617.74 TL.<sup>30</sup> There are some studies that analyzed cost allocation according to ABC for normal and cesarean labor. Öker calculated cost of normal labor and cesarean labor as 371,31 TL and 642.76 TL respectively.<sup>14</sup> According to the results of another study that calculated cost of cesarean labor under ABC method conducted by Keskin and Billerlioğlu, cost of this type of labor is 1.606.5 TL.<sup>31</sup> Hence it may be derived that cost of cesarean labor is higher than normal labor and it is reasonable to set higher prices for this type of labors. However it is important to set sound prices that are calculated over accurate cost figures.

## CONCLUSION

Cost is one of the most important considerations of a company. For profitability and good financial performance, cost should be correctly managed. Initial step for cost management is measurement of cost and then the company may attempt to find appropriate ways to control these calculated cost. Traditionally unit costs are calculated by allocating manufacturing cost basing on volume (e.g. production volume, machinery hours, labour hours etc.) However ultimately it has been understood that traditional costing system may provide misleading cost figures. Consequently various cost allocation models emerged and one of the models is ABC. Advantages of ABC over traditional costing systems are discussed above in depth. In addition, superiority for cost allocation, ABC offers valuable tools for cost control which is an integral part of cost management.

In the light of these facts, this study is conducted in order to apply ABC in a hospital. One of the limitations of this study is its area of research. Because ABC studies are being mainly applied in manufacturing companies. Therefore this study contributes to ABC literature with an application in service industry.

Our study is conducted from hospital in Samsun for the year of 2014 particularly for gynecology department. In application of ABC system usually determination of activity levels are omitted. In this study, apart from majority of the studies, activity levels are also specified while determining activities performed during cesarean and normal labor. In our case product level, facility level and most attracting attention product sustaining level activities are found. Product sustaining level activity is performed under private section service provided solely to normal labor patients in order to promote this type of labor. In other words, this activity is only performed in order to support one line of product which is normal labor in our study, in accordance with the usage of this level activity.

If distribution of labor types in Turkey is compared with distribution of labor types in developed countries, it is eventually seen that there is tendency in Turkey towards cesarean labor in contrast to developed countries. According to labor data for the year 2014, 46% of labor is normal, 52% is cesarean and remaining 2% is intervened labor.<sup>32</sup> According to labor data for the year of 2013, 27.6 of 100 labors are cesarean in OECD countries while it reaches 50.4 cesarean labor for Turkey. It can be seen that ratio of cesarean labor in Turkey is pretty more than OECD countries.<sup>33</sup> Hence there is a need for promotion of normal labor in Turkey and the hospital analyzed in this study exhibits as good practice in encouraging and comforting normal labor patients.

The hospital analyzed in the study does not have cost numbers calculated for cesarean and normal labor patient. Therefore we do not have a chance to compare cost figures found as a result of study with a benchmark number. Instead, calculated cost numbers are compared with matching prices billed to patients. It is found that prices are below the cost figures ob-



tained and the difference is more dramatic for cesarean labor. This result indicates that the hospital is incurring a loss due to cesarean and normal labor patient.

As indicated below, ABC costing system is a magnificent tool for cost control. Activities determined for cost calculation is also used for minimizing costly activities or eliminating some non-value adding activities. In our case it is not possible to eliminate any of the activities. For cost minimization each activity is analyzed and it is observed that most costly activity is labor activity as expected. Another relatively costly activity is general hospital expenditures. This activity is not as vital as the other activities but its ratio is significant. Hence hospital management may concentrate on expenses in this activity in order to gain cost effectiveness.

Lastly it should be noted that ABC system involves some intrinsic disadvantages especially due to information gathering. During our study occasionally we had difficulty in obtaining data hence, as indicated within the study, for some instances approximations are made. However level of approximation does not endanger the reliability of the study.

Employing ABC method in cost allocation would result in calculation of accurate cost figures. Therefore managers may have the chance to make sound financial planning and increase competitiveness through enhanced service quality. Additionally using ABC they can evaluate efficiency accurately

and non-value adding activities may be cut or totally eliminated.

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### Conflict of Interest

*No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.*

### Authorship Contributions

**Idea/Concept:** Mehpare Karahan Gökmen; **Design:** Mehpare Karahan Gökmen; **Control/Supervision:** Elif Dikmetaş Yardan; **Data Collection and/or Processing:** Birgül Yabana Kiremit, Mehpare Karahan Gökmen; **Analysis and/or Interpretation:** Mehpare Karahan Gökmen; **Literature Review:** Birgül Yabana Kiremit, Mehpare Karahan Gökmen; **Writing the Article:** Birgül Yabana Kiremit, Mehpare Karahan Gökmen; **Critical Review:** Elif Dikmetaş Yardan; **References and Fundings:** Mehpare Karahan Gökmen, Birgül Yabana Kiremit, Elif Dikmetaş Yardan; **Materials:** Mehpare Karahan Gökmen, Birgül Yabana Kiremit, Elif Dikmetaş Yardan.

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