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Unit Cost Analysis of Sectio Caesarea Using Activity-Based Costing

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ABSTRACT

Determining medical service tariffs, particularly for Sectio Caesarea (SC), is a critical decision that directly affects hospital profitability. To generate accurate cost information, an appropriate accounting system is essential, one of which is the Activity-Based Costing (ABC) method. This method is considered more precise than traditional approaches because it utilizes multiple cost drivers and allocates expenses based on actual activities. This study aimed to analyze the unit cost of SC procedures at RSU Royal Prima Medan using the ABC method. Conducted between April and June 2025, the study examined a one-year sample of 72 SC patients. Costs were categorized and analyzed across three activity levels: unit-level, batch-level, and facility-level. The findings revealed a total cost of SC services amounting to IDR 1,220,572,338, with an average cost per patient of IDR 16,952,394. After applying a 15% profit margin, the recommended tariff was IDR 19,495,253 per patient—lower than the hospital's current rate of IDR 20,141,176, resulting in a difference of IDR 645,923. This discrepancy indicates that the ABC method offers a more realistic and accurate representation of actual costs, making it a valuable tool for evaluating operational efficiency and revising service tariffs. In conclusion, the application of the ABC method in determining C-section service rates enables hospitals to set tariffs that more accurately reflect resource consumption. It is recommended that hospitals adopt the ABC method comprehensively across all service units to enhance efficiency and promote cost transparency.
Keywords: activity-based costing; unit cost; sectio caesarea; cost driver; cost efficiency

INTRODUCTION

Hospitals are unique and complex organizations characterized by their specialized nature and functions, due to the involvement of various professional disciplines dedicated to delivering medical services. Consequently, the advancement of these institutions must consider a range of factors; scientific, technological, and organizational that influence their capacity to provide healthcare services.[1] Hospitals are also examples of profit-oriented entities whose primary objective is to offer medical care, health services, and patient treatment.[2] Within hospital operations, cost becomes a critical component, as pricing directly affects the institution's overall performance. It is essential for hospitals to determine the costs associated with each service unit, as this unit cost information serves as the foundation for establishing service pricing structures.[3]

One such service is the cesarean section, a surgical procedure involving incisions in the abdomen and uterus to deliver a baby.[4] A cesarean section is typically performed when medical indications necessitate delivery through an abdominal and uterine incision, while maintaining the integrity of both structures.[5] This procedure is commonly performed among women, and since 1990, the global prevalence of cesarean deliveries has steadily increased.[6] Statistical analyses indicate that 21.1% of live births worldwide are conducted via cesarean section, with regional variations ranging from 6% in Sub-Saharan Africa to 42.8% in Latin America and the Caribbean. Projections suggest that by 2030, approximately 28.5% of women globally will undergo cesarean delivery. In the United States, the current rate stands at 31%, with increases observed across high-, middle-, and low-income countries.[7,8] According to the 2017 Indonesian Demographic and Health Survey (IDHS), cesarean deliveries accounted for 17% of births in health facilities. This increase is associated with medical indications such as premature rupture of membranes, fetal malposition, preeclampsia, and a history of previous cesarean sections.[4]

The World Health Organization (WHO) estimated that in 2019, more than one-third of all births were performed via cesarean section. A WHO survey of 287 health facilities across 21 countries revealed that out of 239,144 mothers who gave birth, 74,582 (31.2%) underwent cesarean delivery. Common indications included previous cesarean history, dystocia, fetal distress, and breech presentation. The maternal mortality rate for elective cesarean sections was 2.8%, while emergency procedures had a significantly higher rate of 30%.

The integration of advanced technologies and specialized expertise contributes to the high operational costs incurred by hospitals, which in turn influences the pricing of medical services.[9] In determining service rates or formulating budgetary allocations, unit cost calculations are essential. These calculations help ensure that actual expenditures required to produce a service are accurately captured, while also serving broader objectives such as evaluating budget efficiency.[10] Setting appropriate rates for cesarean section services is a strategic decision with direct implications for hospital profitability. The deployment of specialized personnel and medical technologies increases operational costs, thereby affecting the pricing of cesarean procedures. To manage these costs effectively, hospitals require a robust accounting framework, particularly one that enables precise cost calculation for service activities. Traditionally, hospitals have relied on conventional cost structures, which allocate costs based on direct and indirect expenditures associated with service delivery.[11]

According to Ministry of Health Regulation No. 85 of 2015 concerning the National Hospital Tariff Pattern, hospital tariffs must be guided by principles of mutual cooperation and fairness, prioritizing the needs of low-income communities over profit motives. Tariffs are to be calculated based on unit costs, while considering the economic capacity of the population, rates at other local hospitals, and cross-subsidy policies.[12]

Scientific advancements have led to the development of a more refined pricing framework known as Activity-Based Costing (ABC), which addresses distortions inherent in traditional cost accounting systems. The ABC method significantly enhances decision-making by allocating costs to products based on actual activities and cost drivers, making it more accurate than conventional approaches.[9,11,13] The primary distinction between traditional cost accounting and ABC lies in the number and specificity of cost drivers used.[14] In hospital settings, implementing ABC requires careful consideration of multiple factors, as it provides more precise cost information by directly linking expenses to the medical activities that consume resources.[15] As a result, ABC enables hospitals to estimate expenditures more accurately, improve operational efficiency, and minimize resource waste.

ABC posits that cost aggregation arises from the activities associated with service delivery, allowing healthcare institutions to identify areas where pricing interventions are necessary to maintain profitability.[16] The ABC method is proposed as an enhancement to traditional costing, offering more accurate cost analysis through the estimation of two key parameters: (i) the cost of resource input units and (ii) the time and quantity of resources required to perform specific activities.[17]

The ABC methodology employs a greater number of cost drivers than traditional accounting systems. It is widely supported as a reliable method for determining hospital service rates, as it uses activity-based cost drivers to allocate expenses to specific services and procedures.[18] Based on this background, the researcher is motivated to conduct a study, therefore, this study aims to analyze the unit cost of cesarean section services using the Activity-Based Costing (ABC) method at Royal Prima General Hospital in Medan, in order to provide more accurate cost information that can support efficient pricing decisions and improve financial transparency in hospital service delivery.

METHODS

This research was a quantitative descriptive study with a cost analysis approach using the Activity-Based Costing (ABC) method at Royal Prima General Hospital in Medan. This design was chosen because the research was conducted in a specific period so that it could describe the actual cost of services. The research sample consisted of 72 cesarean section procedures, while the research objects included all service activities related to the calculation of direct and indirect costs. The types of data used were primary data in the form of hospital cost reports, organizational structures, and supporting documents, and secondary data in the form of relevant literature, journals, and previous studies.

Data collection was carried out through observation, documentation, and literature study. The research instruments consisted of observation sheets, cost recap lists, and other supporting tools. The research procedure was carried out in three stages, namely preparation (problem identification, literature study, observation, and research permission), implementation (collection of cost data and service activities), and data processing (unit cost analysis using the ABC method). Data analysis was conducted descriptively in a quantitative manner through the calculation of unit costs (without statistical inferential tests). The stages included activity identification, determination of direct and indirect costs, cost allocation to activities, and calculation of total costs per unit. The results of the unit cost calculation were then compared with the official hospital rates to obtain an overview of the cost efficiency of cesarean section services.

In conducting this study, the researcher adhered strictly to the ethical principles of health research. All procedures were carried out with respect for the rights, safety, and confidentiality of participants. Informed consent was obtained from all respondents prior to data collection, and their identities were kept anonymous throughout the research process. The study design, data handling, and reporting were conducted in accordance with ethical standards set by relevant institutional and national guidelines, ensuring that the research upheld integrity, transparency, and accountability in every stage of its implementation.

RESULTS

Stages in Activity-Based Costing (ABC) Calculation for Cesarean Section Procedures

The table grouping the costs of Caesarean section procedures at Royal Prima General Hospital in Medan was compiled using the Activity Based Costing (ABC) approach, which classifies costs into three categories activity level, namely unit level, batch level, and facility level. At the unit level, costs include the use of disposable surgical instruments, medication per patient, and doctors' and nurses' working hours. The batch level includes sterilization and operating room preparation activities, administrative documentation, and the procurement and distribution of surgical instruments. Meanwhile, the facility level consists of building and facility maintenance as well as hospital management and administration. This grouping provides a detailed overview of the cost structure so that unit cost calculations become more accurate and can support data-based managerial decision making (Table 1).

Table 1. Cost classification based on activity level in cesarean section procedures at Royal Prima General Hospital, Medan

Activity level	Examples of activities	Cost type
Unit level	Use of disposable surgical instruments	Cost of consumables
	Administration of medication per patient Medication costs	Medication costs
	Hours worked by doctors and nurses per operation	Labor costs
Batch level	Sterilization and preparation of operating rooms	Labor costs
	Patient batch administrative documentation	Administrative costs
	Procurement and distribution of surgical instruments	Equipment procurement costs
Fasility level	Building and facility maintenance	Overhead costs
	Hospital management and administration	Labor costs

Identifying Cost Drivers

Table 2. Identification of cost drivers

Activity level	Cost driver
Unit Level	Use of disposable surgical instruments
	Administration of medication per patient
	Physician and nurse salaries
Batch Level	Sterilization and preparation of operating rooms
	Batch patient administrative documentation
	Procurement and distribution of surgical instruments
Fasililty level	Building and facility maintenance
	Hospital management and administration

Cost drivers for Caesarean sections at Royal Prima General Hospital in Medan are grouped into three activity levels, namely unit level (disposable surgical instruments, medication per patient, medical staff salaries), batch level (operating room sterilization, batch administration, surgical instrument procurement), and facility level (facility maintenance and hospital management). Identifying these cost drivers provides a more accurate picture of the sources of cost consumption in unit cost calculations.

Determining Unit Cost Drivers

Tabel 3. Determining *Unit Cost Driver*

Type of fee	Cost driver	Estimated number (72 patients)
Medical equipment – building a postpartum	Number of inpatients	72
Medical devices – emergency room	Number of ER visits	72
Medical devices – central surgery	Number of operations	72
Medicine – building a postpartum	Number of prescriptions per inpatient	108
Medication – emergency room	Number of prescriptions per ER visit	72
Medicine – central surgery	Number of surgery patients	72
Doctor's honorary visit – building a postpartum	Patient's hospitalization days	216
Doctor's honorarium visit – emergency room	Number of ER patient visits	72
Nursing actions – postpartum building a	Hours of care per patient	300
Nurse actions – emergency room	Number of procedures per ER visit	108
Laboratory – emergency room	Number of lab tests	72
Medical gases – central surgery	Number of operations	72
Surgical procedures – central surgery	Number of operations	72
Recovery room – central surgery	Number of surgery patients	72
Operating room rental – central surgery	Operating room hours	108
Sterilization of medical devices – central surgery	Number of sterilization sets of surgical instruments	72
Outpatient consultation fee – emergency room	Number of consultation visits	72
Medical equipment rental rates – building a Puerperium	Days of hospitalization	216
Medical equipment rental rates – central surgery	Number of surgical procedures	72
Inpatient room rates – building a postpartum	Days of hospitalization	216
Building depreciation cost	Number of months	12
Equipment depreciation expense	Number of months	12
Machine depreciation cost	Number of months	12
Administration fee – building a puerperium	Number of days of hospitalization	216

In the Activity-Based Costing (ABC) approach, each type of cost is linked to a cost driver that reflects the main trigger for the cost. Medical equipment is charged according to the location of service (72 inpatients in Building A Puerperium, 72 emergency room visits, and 72 surgeries in Central Surgery). Medicine costs follow the number of prescriptions (108 prescriptions in Puerperium, 72 prescriptions in the ER and Central Surgery). Doctor visit fees are based on 216 inpatient days in Puerperium and 72 ER visits, while nursing procedures are based on 300 hours of care in Puerperium and 108 procedures in the ER. Laboratory tests in the ED were calculated 72 times, while medical gases, surgical procedures, recovery rooms, and operating room rentals in the Central Surgery Department each followed 72 surgeries and 108 hours of use.

Sterilization of medical equipment followed the number of surgeries (72 sets), outpatient consultation fees were 72 visits, and medical equipment rentals were based on 216 inpatient days in Puerperium and 72 surgical procedures in Central Surgery. Inpatient room costs were calculated from 216 days, while depreciation of buildings, equipment, and machinery was based on 12 months of operation. The administrative costs for Building A Puerperium are also calculated based on 216 inpatient days. With the establishment of cost drivers like this, the allocation of costs for each activity becomes more accurate and the unit cost calculation results better reflect the actual use of resources.

Determination of Caesarean Section Procedure Rates using the Activity Based Costing (ABC) Method

Table 4 explains the results of determining the cost of cesarean section procedures at Royal Prima General Hospital in Medan using the Activity-Based Costing method. The research results show that at the unit level, activities such as the use of disposable surgical instruments, medication administration per patient, and doctors' and nurses' salaries are calculated based on the number of patients, prescriptions, or direct procedures performed on patients. The costs for medical equipment in Building A Puerperium, the Emergency Room, and the Central Surgery Unit amounted to Rp 20,373,605, Rp 4,291,550, and Rp 172,229,325, respectively. Furthermore, medication costs from the three service locations (Building A Maternity Ward, Emergency Room, and Central

Surgery) generated a total of IDR 65,315,702. The largest component at this level was the salaries of doctors and nurses, with a total cost of IDR 374,400,000 for 72 patients.

Table 4. Caesarean section procedure rates at Royal Prima Medan Hospital Based on the Activity Based Costing (ABC) method

Activity level	Activity	Type of fee	Rates	Cost driver	Amount
Unit level	Use of disposable surgical instruments	Medical equipment - building a postpartum	282,967	72	20,373,605
		Medical devices - emergency room	59,605	72	4,291,550
		Medical devices - central surgery	2,392,074	72	172,229,325
	Drug administration per patient	Medicine - building a postpartum	337,592	72	24,306,588
		Medication - emergency room	8,949	72	644,337
		Medicine - central surgery	560,622	72	40,364,777
	Doctors and nurses' salaries	Doctors and nurses' salaries	5,200,000	72	374,400,000
Batch level	Sterilization and preparation of the operating room	Awareness recovery room - central surgery	330,000	72	23,760,000
		Operating room rental - central surgery	1,200,000	72	86,400,000
		Sterilization of medical devices - central surgery	650,000	72	46,800,000
	Patient batch administration documentation	Outpatient consultation fee - emergency room	150,000	72	10,800,000
	Procurement and distribution of surgical equipment	Medical equipment rental rates - building a puerperium	107,300	216	23,176,800
		Medical equipment rental rates - central surgery	189,200	72	13,622,400
Facility level	Building and facility maintenance	Inpatient room rates - building a postpartum	1,652,506	216	356,941,212
		Building depreciation cost	94,875	12	1,138,500
		Equipment depreciation expense	189,750	12	2,277,000
		Machine depreciation cost	237,187	12	2,846,244
	Hospital management and administration	Administration fee - building a puerperium	75,000	216	16,200,000
Total cost of caesarean section procedure					1,220,572,338
Number of patients					72
Total cost of caesarean section					16,952,394
Profit percentage				15%	2,542,859
Caesarean section procedure rates at royal prima medan hospital using activity based costing (abc)					19,495,253

At the batch level, activities including medical equipment sterilization, operating room usage, and recovery room usage are collectively applied to patient groups rather than individuals. The costs for sterilization and operating room preparation consist of a Recovery Room of IDR 23,760,000, Operating Room Rental of IDR 86,400,000, and Medical Equipment Sterilization of IDR 46,800,000. Patient administrative documentation activities through Outpatient Consultation Fees add IDR 10,800,000. Meanwhile, the procurement and distribution of surgical equipment, such as Medical Equipment Rental Rates in the Puerperium Building and Central Surgery, add costs of IDR 23,176,800 and IDR 13,622,400, respectively.

At the facility level, activities that include building and facility maintenance and hospital administration management generate relatively large costs. The Inpatient Room Rates in Building A Puerperium, calculated from the number of inpatient days (216 days), contributed IDR 356,941,212, making it one of the highest components at this level. Depreciation costs for buildings, equipment, and machinery totaled Rp 6,261,744. Meanwhile, administrative costs for Building A Puerperium amounted to Rp 16,200,000.

Overall, the total cost of Caesarean section procedures for 72 patients was Rp 1,220,572,338. Dividing the total cost by the number of patients, the unit cost was Rp 16,952,394 per patient. Then, adding a profit margin of 15% of the total cost (Rp 2,542,859), the final rate for one Caesarean section procedure is Rp 19,495,253.

Difference Between Actual Rates and Activity-Based Costing (ABC) Rates for Cesarean Section Procedures

Based on the cost analysis results, there is a comparison between the actual Sectio Caesarea procedure fee set by Royal Prima General Hospital Medan and the fee calculated using the Activity Based Costing (ABC) method. The actual fee currently applied by the hospital is IDR 20,141,176 per procedure. Meanwhile, the calculation using the ABC method shows that the rate that should be charged based on the actual activities used by patients is Rp 19,495,253.

From this comparison, there is a difference of Rp 645,923, where the actual hospital rates are higher than the results calculated using the ABC method. This difference shows that the ABC method is able to identify and allocate costs more accurately based on the actual use of resources in each activity. Thus, the use of the ABC method can be a more accurate reference in determining rates, and can assist hospitals in making strategic decisions related to cost efficiency and medical service pricing.

Table 5. Difference between actual rates and ABC Rates for Cesarean Section Procedures at Royal Prima General Hospital in Medan

Action	Actual rates	Activity Based Costing (ABC)	Difference
Caesarean section procedure at Royal Prima Hospital Medan	Rp. 20,141,176	Rp. 19,495,253	Rp. 645,923

DISCUSSION

The Magnitude of Unit Costs in Cesarean Section Services Using the Activity Based Costing (ABC)

In this study, an analysis of the unit cost of Cesarean section (CS) services at Royal Prima General Hospital in Medan was conducted using the Activity Based Costing (ABC) method. CS operations have become popular among pregnant women who choose Cesarean sections because they do not experience pain or minimize pain, so many want to see a doctor to perform a CS. The ABC method was chosen because it provides a more accurate estimation of costs by allocating each expense based on the actual activities involved in the medical service process. Unlike conventional costing methods, which distribute costs evenly or proportionally without considering the actual activity load, ABC captures real resource consumption.

Based on the data and calculations carried out on 72 SC patients, the total cost required for all service Based on data from 72 CS patients, the total cost of services using the ABC approach amounted to IDR 1,220,572,338. The average unit cost was IDR 16,952,394 per procedure. After adding a 15% profit margin, the recommended rate was IDR 19,495,253 per patient. Costs were grouped into three levels of activity: unit, batch, and facility. At the unit level, direct costs such as medical equipment, drug administration, and medical personnel salaries were calculated, with personnel salaries being the largest component (IDR 374,400,000). At the batch level, collective costs included medical equipment sterilization, operating room use, and outpatient consultation. At the facility level, fixed costs such as building depreciation, equipment, machinery, and administrative expenses were included, with inpatient room charges being the highest component (IDR 356,941,212).

When compared with the hospital's current actual rate of IDR 20,141,176, the ABC-based rate was lower by IDR 645,923. This discrepancy may be due to administrative mark-ups, efficiency in resource utilization, or tariff-setting policies to cover indirect costs. Although the difference is relatively small, it demonstrates that ABC can provide a more transparent and realistic cost representation, helping hospital management make more informed decisions in setting service tariffs. Overall, these findings show that the ABC method is a useful tool to measure and evaluate cost efficiency in healthcare services. It also encourages hospitals to optimize resource allocation, identify cost-intensive activities, and determine tariffs based on actual service use rather than broad estimates. The method's characteristics, accuracy in cost analysis and provision of non-financial insights; make it valuable for improving operational performance and reducing inefficiency.

The Activity Based Costing (ABC) method is a method of calculation based on activities. The ABC method has specific characteristics, namely the ability to analyze accurate costs and provide non-financial information to improve performance and efficiency. In addition, this method is able to reduce the inefficient use of resources.[7] Based on Minister of Health Regulation No. 85 of 2015 concerning the National Hospital Tariff Pattern, which states that hospital tariffs must take into account the principles of mutual cooperation and fairness by prioritizing the interests of low-income communities, as well as not prioritizing profit. It is also stated that hospital tariffs are calculated based on unit costs, taking into account the economic capacity of the community, other local hospitals, and cross-subsidy policies. This, the unit cost of Cesarean section services calculated using the ABC method at Royal Prima General Hospital in Medan provides a strong and objective basis for setting fair and efficient tariffs, as well as increasing transparency and accountability in the hospital financing system.

The Difference in Costs for Cesarean Section Services Using the Activity-Based Costing (ABC) Method Compared to the Costs Currently Applied

This study compared the costs of CS services calculated with the ABC method to the actual hospital tariffs currently applied at Royal Prima General Hospital Medan. The total cost for 72 patients was IDR 1,220,572,338, resulting in an average unit cost of IDR 16,952,394. After including a 15% profit margin, the recommended tariff was IDR 19,495,253, whereas the hospital's current tariff was IDR 20,141,176. Thus, the hospital rate exceeded the ABC-based rate by IDR 645,923 per patient.

This difference can be explained from several perspectives. First, the ABC method allocates costs strictly according to actual activities, such as use of medical equipment, medication, staff working hours, operating room use, and administrative services providing a transparent reflection of resource consumption. Second, hospital tariffs may include additional considerations not fully captured by ABC, such as reserves for medical risks, inefficiencies, or profit mark-ups. Hospitals may also determine tariffs through aggregated internal policies or agreements with insurance providers rather than detailed activity-based analysis. Although the discrepancy is not large in nominal terms, the results show that ABC provides a more objective and measurable cost picture. This has important implications for evaluating hospital efficiency, reviewing tariffs, and supporting performance-based budgeting.

The findings of this study are consistent with research conducted by[19] which analyzed uncomplicated caesarean sections using the ERACS method at XY Hospital in Pati and revealed differences between ABC-based and traditional tariff calculations. Similarly, ABC identified cost components not fully covered by INA-CBGs tariffs, highlighting the risk of underfunding hospital expenditures. Conversely, the results differ from research conducted by[20] which reported that ABC-based calculations (IDR 689,150) were higher than both hospital tariffs (IDR 255,000) and INA-CBGs rates (IDR 202,600). This shows that outcomes may vary depending on hospital policies, efficiency levels, and resource allocation. According to[21] ABC is a method of determining product costs where overhead costs are allocated based on activities carried out in relation to the production process. This difference reflects the need for hospitals to reevaluate and reconsider the applicable tariff structure so that it is more in line with the reality of resource utilization and can provide benefits for the sustainability of quality and efficient services.

These variations emphasize the need for hospitals to reassess and reconsider their tariff structures to ensure alignment with actual resource utilization. Ultimately, the application of the ABC method in calculating CS costs at Royal Prima General Hospital Medan revealed a difference of IDR 645,923 compared to actual hospital rates, underscoring the importance of transparency, cost efficiency, and sustainable healthcare financing.

CONCLUSION

This study concludes that applying the Activity-Based Costing (ABC) method in calculating Caesarean Section service costs provides a more accurate and transparent reflection of actual resource use compared to conventional approaches. The findings highlight the potential for improving hospital efficiency and revising tariff policies. ABC offers valuable support for decision-makers in designing fair, sustainable, and quality-oriented healthcare pricing strategies.

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