

Analysis of Unit Cost on Routine Hematology Examination with Activity-Based Costing Method at Hermina Yogya Hospital

Ainal Fadly¹, Firman Pribadi², Mariska Urhmila³

^{1, 2, 3}*Master of Hospital Management, Universitas Muhammadiyah Yogyakarta, Indonesia*
E-mail: ainalfadly.23@gmail.com

Background: *Analysis of unit cost is needed to calculate the cost of each unit in departments to determine the cost of various services in hospital. Hospital is an institution that provides healthcare service comprehensively in various departments, one of them being the laboratory unit. Routine hematology examination is one of most frequently enquired test by physician, which in turn raises the cost spent by hospital. We would like to find the unit cost of routine hematology examination with Activity-based Costing (ABC) method, and to compare the result with the real cost that the hospital applies.*

Materials and Methods: *This is a qualitative study with a case study design. Data were obtained from interviews, observations, documents and medical records. Analysis of the cost was conducted with ABC method, and then be compared with the real cost that the hospital applies.*

Results: *The unit cost of routine hematology examination using ABC method is Rp. 90.147, while the real cost is Rp. 83.756. The difference is Rp. 6.391.*

Conclusion: *The unit cost based on ABC method is higher than the real cost applied by the hospital. The ABC method gives more accurate cost because of the overhead costing is charged into each activity related to the routine hematology examination. This should be a concern to the hospital, giving them insight about cost containment process, which in turn may yield more profit.*

INTRODUCTION

Hospital is a healthcare facility that provides comprehensive service: inpatient care, outpatient care, and emergency care (UU no. 24, 2009). Hospital focuses on providing curative and rehabilitative service, though also promotes health towards individual or society.

One of the service is laboratory unit, which is important in helping the physician in diagnosing patients. There are 2 types of laboratory, the clinical and public health. Clinical laboratory focuses on supporting curative and rehabilitative process, while public health laboratory helps on preventive.¹ In pre-JKN era, laboratory unit was considered as revenue center due to most of the services were *fee-for-service*. Now after the JKN was implemented, it is considered as cost center due to INA-CBGs system.

Unit cost analysis is a process of calculating cost of variety of services. It can be done by calculating all costs on the unit/cost pool/department and allocating it to the product.² There are variety of methods in unit cost analysis, one of them being the *Activity-based costing* (ABC) method.

Routine hematology examination is one of the most enquired laboratory workup at the private hospital. This may result on higher cost spent by the hospital. Based on this condition, there is an emergent need to analyze the cost of this examination in an effort of containing the cost expenditure.

MATERIALS AND METHODS

This is a qualitative study with case study design. The purpose of this study is to describe

unit cost in relation to routine hematology examination in Hermina Yogya. The subject of study was department of funds, head of laboratory unit and the analysts, and administrative employee. The object was all activities involving routine hematology examination.

The first step is by observing the process of routine hematology examination. Next we gathered the information from the operational procedural standard and looking for the information related to the price and various costs of laboratory tests, especially the hematology exam. We also conducted interviews with related people (the head of laboratory and funding division). Finally we analyzed all the obtained data in an effort to find the unit cost of routine hematology test by using the ABC method.

The steps of conducting unit cost analysis using ABC method are as follows³:

1. Identifying the activities related to the unit
2. Categorizing the indirect and direct costs and driver of each cost
3. Finding the direct and indirect cost
4. Finding the activities based on operational procedural standard
5. Assigning the indirect costs onto each activity
6. Summing the indirect and direct costs

After finding the unit cost, we compared it with the real cost of the current price applied.

RESULTS

Profile of laboratory unit

Hermina Yogya Hospital has a building of 8.220 m², with a 55 m² laboratory unit which provides various kind of tests. One of them is routine hematology examination, utilizing a *hematology analyzer* machine. Total number of all examination in previous year (2017) was 53.076, while the number of routine hematology tests alone was 6.074.

Analysis of Unit Cost based on Activity-Based Costing

As have been explained in previous part, we found that the direct cost related to the routine hematology test are as explained in the table below:

Table 1: Direct cost of routine hematology test

No.	Resources	Costs (Rp.)
1	Needle FLASHBACK 22G	4.300
2	Tube EDTA 2ml BD 367841	2.000
3	Alcohol Swab	500
4	Haematology Analysing Machine Rental Fee	10.500
5	Disposables	1.500
6	Fee of Clinical Pathologist	15.000
7	Wright (reagent)	3.000
	Total	36.800

Table 2: Activity center and the duration

No	Activity	Time	Time
1	Receiving the examination inquiry paper	Number of activity	1 minute
2	Preparing the sample obtaining tools	Number of exam	2 minutes
3	Preparing the patient	Number of exam	2 minutes
4	Obtaining the sample	Number of exam	2 minutes
5	Processing the sample	Number of exam	5 minutes
6	Documenting and expertizing the result	Number of exam	2 minutes
7	Giving feedback to patient	Number of activity	1 minute
total			15 minutes

Table 3: Indirect resource costs of Hermina Yogya Hospital

Resource	Cost (Rp)
Labor related	
Employment	11.163.493.160
Equipment related	
Depreciation of medical and nonmedical equipments	1.482.485.162
Maintenance of medical and nonmedical equipments	54.287.392
Space related	
Depreciation of building	1.974.157.926
Building maintenance, sanitary	1.720.149.220
Service related	
Costs of electricity, water, gas, papers	934.394.392
Total	17.328.967.252

The result from interview can be seen in Table 2, in which we have divided the process of producing unit into 7 activities, and the duration also can be seen above. It needs to be mentioned that the activities are all based on the operational procedural standard of routine hematology examination.

Overhead costs are based on direct and indirect resources. They can be grouped into 4 category of cost: *labor related, equipment related, space related, and service related*. Labor related cost includes the fee of employment, transportation fee, uniform, etc. Equipment related cost includes the depreciation and maintenance of the equipment. Space related cost includes the depreciation and maintenance of the building, sanitary, and housekeeping. Service related cost includes the bills of electricity, telephone, water, gas, etc.

Indirect resources overhead can be found by assigning the resources that aren't directly related to the unit production. The basis of the assignment may be proportion of the unit production in relation with the income and cost. In this case, it was the annual cost indirectly

related to the laboratory test that was spent by the hospital. It was then multiplied by the proportion that is found by comparing the incomes and costs.

From the tables above, we found that proportionally the indirect cost of supporting unit are Rp 9.860.182.366, while the total income of the laboratory unit was Rp 3.304.685.720. We were informed that the total income of hematology routine examination Rp 662.066.000, which is 3,02% of the total income of the supporting unit. The number was then multiplied with the proportional total cost of the supporting unit which equals Rp 238.379.244. It is then divided by the number of routine hematology examination in year, which equals Rp 39.246 for each test.

Direct resource cost is the cost of resources that indirectly related with the unit production but is used within the activity. With every activity, these resources would be spent, and we could analyze them accordingly.

Table 4: Proportion of income, compared to indirect cost

Unit	Income	Proportion	Indirect cost (Proporsive)
Inpatient (Wards, ICU)	8.580.707.572	22,3 %	3.864.359.697
Outpatient (Clinic, ER)	3.604.480.648	9,4%	1.628.922.922
Operating Theatre	4.008.279.112	10,4%	1.802.212.594
Delivery Room	421.251.520	1%	173.289.673
Supporting units (Radiology, Laboratory)	21.892.379.404	56,9 %	9.860.182.366
total	38.507.098.256	100%	17.328.967.252

Table 5: Direct resource cost of routine hematology examination

Resource	Total Cost Entire lab tests (Rp)	Total Cost RH test only (Rp)
Labor related		
Laboratory employee fee	283.847.148	32.483.374
Equipment related		
Depreciation of equipment	323.204.561	36.987.424
Space related		
Depreciation of building		13.209.085
Service related		
Paper, electricity, telephone, water	25.936.003	2.968.108
total		85.647.991

As seen in the Table 5, the total cost of direct resources are Rp 85.647.991, which is then divided by the number of routine hematology examination in a year (6.074), resulting in Rp 14.101.

In Table 6, we add both indirect and direct costs to find the overhead cost. The next step is assigning the overhead costs into each activities in routine hematology examination, based on the operational procedural standard.⁴ The process can be seen in Table 7.

Table 6: Overhead cost of routine hematology examination

NO	Type of costs	Cost (Rp)
1	Indirect resources	Rp 39.246,00
2	Direct resources	Rp 14.101,00
	total	Rp 53.347,00

Table 7: Assigning overhead cost into each activities

No	Activity	Cost (Rp)
1	Receiving the examination inquiry paper	Rp 3.557,00
2	Preparing the sample obtaining tools	Rp 7.113,00
3	Preparing the patient	Rp 7.113,00
4	Obtaining the sample	Rp 7.113,00
5	Processing the sample	Rp 17.781,00
6	Documenting and expertizing the result	Rp 7.113,00
7	Giving feedback to patient	Rp 3.557,00
	total	Rp 53.347,00

Table 8: Unit cost of routine hematology examination using ABC model

No	Type of cost	Cost (Rp)
1	Direct cost	Rp 36.800,00
2	Overhead	Rp 53.347,00
	total	Rp 90.147,00

After we found the overhead cost of routine hematology examination, the direct cost was then added, to bring the unit cost of this product. The unit cost, as seen above, is Rp 90.147. The next step is comparing the unit cost of ABC model with the real cost of current price that the hospital is using now.

Table 9: Current price of routine hematology examination and its real cost

No	Type of cost	Cost (Rp)
1	Real cost	Rp 83.756,00
2	Profit margin (30%)	Rp 53.347,00
	total	Rp 109.000,00

Table 10: Comparison between real cost of current price with unit cost (ABC model)

Real cost	Unit cost ABC model	Difference
Rp 83.756,00	Rp 90.147,00	Rp 6.391,00

DISCUSSION

There is Rp. 6.391 difference between the actual costs of current price of routine hematology examination with the unit cost of ABC model. This shows that the test might be underpriced.

Hermina Yogya Hospital, is a hospital that are owned by Hermina Hospital Group (HHG), who has based their price on the guidelines provided by HHG. This means that the cost analysis was done by the group. Meanwhile it is very possible that the analysis done by the hospitals under HHG may result differently from each other. From the interview that we've conducted, HHG stated that up until this point, unit costs aren't routinely documented, and that might affect the price that came up, making them inaccurate.

From the analysis done in this hospital, it is known that the labor-related resources took a great contribution to the cost value, as seen also in another study.⁵ It can also be seen that the service-related resources didn't have detailed information of each resource (i.e. how much the power is

needed to operate a single test, how many telephone usage in a month for laboratory unit).

With ABC model, a more detailed categorization of resources and their costs can be obtained,⁶ therefore yielding a better and accurate representation of the unit production cost.^{7,8} Private hospitals are generally profit oriented, thus making the accurate analysis of unit costs very important.⁹

CONCLUSION

The ABC model unit cost of routine hematology examination in Hermina Yogya Hospital is Rp 90.147, which is higher than the real cost which is Rp. 83.756. Although ABC model is more accurate, hospitals ought to provide detailed information on the resources and their costs to give benefit on determining the price.

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