



Indonesia Hospital Cost Analysis: a Micro-Costing Approach

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Abstract

Efforts to develop the financing methods is needed to strengthen the Indonesia's recently implemented universal health coverage system. Hospital cost data is urgently needed to calculate the unit cost of medical services that is important to evaluate the reimbursement rate setting. The most recent approach to calculate unit cost of medical services in hospital is micro-costing approach. This study aimed to perform a unit cost calculation using micro-costing approach in Indonesia's district hospital in June-Dec 2016 from the provider perspective. The costing study followed the standard costing method and financial data were obtained through the hospital financial reports. Some financial data were directly measured since this study used bottom-up approach. This study showed that the unit cost was not relevant with the reference price set up by the government. It could be caused by different cost items and cost objects that had been employed in the study since the government tariff's did not have clear and detailed information about the source of cost calculation. Micro-costing approach was useful as a precise method to calculate unit cost, even though rigorous efforts were needed to complete the data.

Introduction

Although Indonesia has established its universal health coverage system in 2014 the system still requires strengthening efforts. One of the pivotal is to develop financing method that requires information on unit cost of hospital medical services.

Information about the unit cost of medical services will help the decision makers and hospital managers to negotiate the reimbursement rate setting, especially in low and middle-income countries (Chatterjee, Levin, & Laxminarayan, 2013; Teerawattananon et al., 2016). However, it is undeniable that information about hospital cost is limited in the developing countries (Chatterjee et al., 2013, Javid, Hadian, Ghaderi, Ghaffari, & Salehi, 2015).

To provide unit cost information, a study to calculate the cost of medical service provision, or often called cost analysis study (WHO, 2013) is needed. Cost analysis study is needed in order to provide meaningful information for policy makers and hospital managers to improve hospital service and manage resources effectively.

There are several methods to calculate the unit cost of medical services, such as average method, micro-costing method, ratio of cost to charge (RCC), and relative value unit (Schulman-Marcus, Prabhakaran, & Gaziano, 2010). The micro-costing method currently is the most accurate (Riewpaiboon, Malaroje, & Kongsawatt, 2007) despite requiring a large amount of data, which is time-consuming and costly (Cao et al., 2006; Cao et al., 2006). The

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choice of method and approach used in the calculation of unit cost will affect the result (Riewpaiboon et al., 2007).

District hospital in Indonesia is the first layer after primary health care providers to provide medical services after the establishment of a new referral system according to the Indonesia UHC system. The reference price to provide medical services in district hospital was set by the government (Kementerian Kesehatan Republik Indonesia, 2016). However, there is no study that used standard costing method to calculate the unit cost of district hospital in Indonesia.

Micro-costing method will allow detailed and precise calculation of the unit cost (Yereli, 2009). However, this method consumes a lot of time and cost due to the amount of data needed.

This study aimed to observe the unit cost of laboratory services in a district hospital using micro-costing approach from the provider's perspective to be compared with the reference price.

Methods

Economic cost analysis of medical

services was done using standard cost approach adopted from existing hospital costing manual. This study was designed as retrospective descriptive cost analysis. The study population was public district hospitals in Yogyakarta. Pratama Yogyakarta hospital (45 inpatient beds) was selected by convenience method. Resource used and service provided during June-Dec 2016 were included in the analysis. Field works for data collection was done during July 2017-January 2018. First, the study was designed to calculate the unit cost using provider perspective, and the costing template was developed using Microsoft Excel. The second step was analysing the organizational structure and classifying it as transient and absorbing cost centres. Since the bottom-up approach was used, the absorbing cost centres were all the departments that provide medical services to the patient. Third step was determining the direct cost. Capital cost was calculated using economic approach and allocated using the proportion of equipment usage as well as the material cost was calculated using the proportion of consumed material. The full time

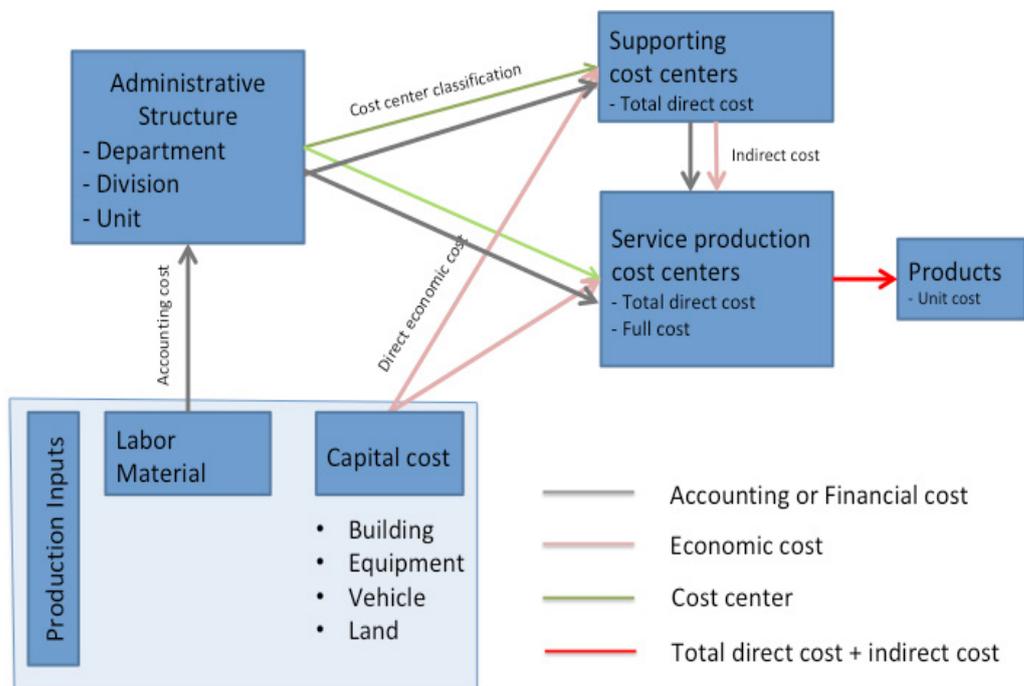


Fig. 1. Standard cost calculation concept and the cost flow

equivalent system was employed to allocate the proportion of time spent for each cost centre. Labor cost was allocated using the proportion of time spent for the professional to do each service. The total direct cost was allocated to indirect cost using the simultaneous equation method by using mathematical formula in Excel as the fourth step. In the fifth step, the full cost of absorbing cost centers were calculated. The last step, the unit cost of services was calculated using micro-costing method. Due to the time limitation of the research, micro-costing approach employed only for laboratory services. All cost were based on Indonesian Rupiah in 2016. Unit cost of the laboratory services were calculated using micro-costing approach, analysed and compared with the reference price using descriptive statistics.

Results and Discussion

There were 20 hospital departments in Pratama Yogyakarta Hospital that was classified into 10 transient cost centres and 12 absorbing cost centres as shown in Table 1. The special case was inpatient department that classified as 3 absorbing cost centres because in Pratama Yogyakarta Hospital the inpatient department was categorized into 3 sub-departments, inpatient for pediatric, adult and maternal perinatal.

There were 55 lab services at Pratama Yogyakarta Hospital. Full cost of each absorbing cost center was obtained from the calculation. The full cost of lab is IDR 1,917,262,098, which obtained from IDR 2,164,689 total direct cost and IDR 1,649,164,339 indirect or shared cost. From the calculation, the unit cost of each

Table 1. Hospital Departments that was Classified Into Transient Cost Centre (T) and Absorbing Cost Centre (A)

Cost center	Code
Administration	T1
Planning	T2
Finance	T3
Maintenance	T4
Supply	T5
Sanitation (Waste Management)	T6
Laundry	T7
CSSD	T8
Catering	T9
Medical Record	T10
Pharmacy	A1
Laboratory	A2
Radiology	A3
ER	A4
CSI	A5
HCU	A6
Mortuary	A7
Dentistry	A8
OPD	A9
IPD Pediatric	A10
IPD Adult	A11
IPD Maternal and Perinatal	A12

Table 2. Unit Cost Result From Micro-Costing Method and Reference Price and the Percent Difference

No	Test	Unit Cost	Reference Price	% Difference
1	ABO Blood Group	91,761	10,000	818%
2	ABO+Rh Blood Group	160,258	13,500	1087%
3	Albumin	182,581	25,000	630%
4	Amphetamine	182,581	35,000	422%
5	Antal Eritrocyte	366,088	8,000	4476%
6	Antal Leukocyte	321,298	8,000	3916%
7	Antal Trombocyte	456,293	8,600	5206%
8	Anti HBsAg	261,246	37,000	606%
9	Anti HCN	182,581	49,500	269%
10	Bleeding Time	182,581	9,600	1802%
11	BTA Sputum	607,274	20,000	2936%
12	Clotting Time	273,871	9,600	2753%
13	Cocaine	182,581	35,000	422%
14	Complete Blood Test	273,871	40,900	570%
15	Creatinin	322,800	20,000	1514%
16	DGNI (Gram Coloring)	182,581	20,000	813%
17	Direct Bilirubin	182,581	20,000	813%
18	Erythrocyte Sedimentation Rate	409,434	8,000	5018%
19	Globulin	182,581	25,000	630%
20	Glucose	296,519	15,500	1813%
21	Haematocrit	370,879	8,000	4536%
22	Haemoglobin	199,455	8,000	2393%
23	HAV	182,581	81,440	124%
24	HBsAG	245,513	37,000	564%
25	HDL	670,576	20,000	3253%
26	HIV	509,619	120,000	325%
27	IgG dan IgM Dengue	182,581	130,000	40%
28	Indirect Bilirubin	182,581	20,000	813%
29	LDL	806,698	65,500	1132%
30	Leptospira	182,581	35,000	422%
31	Leucocyte Differential Count	182,581	10,000	1726%

Table 2. (Continue)

No	Test	Unit Cost	Reference Price	% Difference
32	Malaria	449,866	20,000	2149%
33	Marijuana	182,581	35,000	422%
34	NS1Ag	182,581	25,000	630%
35	Opiate/Morphine	182,581	35,000	422%
36	Peripheral Blood Morphology	182,581	69,000	165%
37	Pregnancy Test	105,157	8,000	1214%
38	Protein	157,747	8,000	1872%
39	Reduction	157,747	8,000	1872%
40	Reticulocyte	182,581	8,600	2023%
41	Rh Blood Group	91,526	7,500	1120%
42	Routine Blood Test	573,074	50,000	1046%
43	Routine Faeces	242,389	15,000	1516%
44	Routine Urine (Chemistry and Sediment)	322,512	20,000	1513%
45	Urethral Secretion	182,581	20,000	813%
46	Vaginal Secretion	182,581	35,000	422%
47	SGOT	377,361	20,000	1787%
48	SGPT	355,149	20,000	1676%
49	Total Bilirubin	182,581	20,000	813%
50	Total Cholesterol	420,231	18,000	2235%
51	Total Protein	182,581	25,000	630%
52	Triglyceride	517,177	18,000	2773%
53	Tubex Tifoid	273,871	145,500	88%
54	Urea	358,733	20,000	1694%
55	Uric Acid	417,684	25,000	1571%

laboratory services was shown in Table 2. The unit cost of each laboratory services varied from IDR 91,526-IDR 806,698. The lowest was ABO blood group test and the highest was low-density lipid (LDL) test.

The result from unit cost calculation was compared to the one set by Yogyakarta government. The laboratory service costs were higher than the reference price. The percentage of the price gap varied between 40%-52.6%. The lowest was IgG and IgM test, and the highest was antal thrombocyte test.

Micro-costing approach was used to calculate the unit cost of services, due to its detailed and precise result. However, in order to use this method, a large data is needed. This

is very challenging due to Indonesia's situation, where the database may not provide the primary data needed.

In this study, some efforts had been done to gather the primary and even secondary data to complete the calculation. To gather such a large data set some interviews to the hospital staff and manual measurement were done. Data of material consumed, time spent in labor, and time usage of the equipment were gathered from each service's standard operating procedure and direct measurement, while the output of each service (in this case, the number of patient that received the service was used) were gathered from the hospital database and laboratory logbook. A good communication

and cooperation amongst internal staffs were needed. Knowledge about the importance of cost analysis study for the hospital would improve cooperation from the staffs.

The unit cost result of each laboratory services varied because it depended on the quantity of resources consumed and the quantity of the output. The higher the resources consumed to provide a service, the higher the cost would be. However, the higher the quantity of the output, the lower the cost would be.

The unit cost calculation was set up to be provider prospective because it aimed to evaluate the reimbursement rate setting, which was under the regulation of local government. Since there is no guidance to calculate the unit cost of services in Indonesia, the cost calculation followed the standard unit cost method as mentioned in WHO guidance and other hospital cost manual, which included capital, material and labor cost.

The costing template was developed using Microsoft Excel because Microsoft Excel is popular in Indonesia and easy to manage, even some functions that used in developing the template needs a special training, since it employs some advanced calculation. Microsoft Excel can provide a precise data and suitable for developing hospital costing template as mentioned in another study about reimbursement-rate setting of hospital pharmaceutical services in Thailand (Riewpaiboon & Kumluang, 2011).

Hospital departments were categorized into transient and absorbing cost centres because in order to allocate the cost. Since the bottom-up approach was used, every department that could obtain revenue from patients was categorized into absorbing cost centre. Hospital departments that support other departments was categorized into transient cost centre.

When compared to the reference price, there was a variable difference between unit costs of laboratory services, ranging from 40-52.6 %, which indicated that the existing reference price was not relevant with the actual cost. This might happen because the reference price set by the government did not consider all cost objects, while the micro-costing method did. Micro-costing method calculated the unit

cost by including the capital, material, and labor cost that were able to be traced in order to check the calculation, while the reference price might be calculated by including only material cost, since public hospitals tend to neglect its capital and labor cost.

Another factor that affected unit cost is the output. The higher the output, the lower the unit cost would be. Pratama Yogyakarta Hospital is a new district hospital built in 2016 that was developed from a public health centre (Puskesmas). During the period of financial data collection, the output or number of the tests received by patients was very low. Since the indirect cost were distributed equally to each output, low number on the lab test caused high indirect cost, which would increase unit cost. The difference might not be this high if only the direct cost was calculated to determine the unit cost. The indirect cost calculation might be useful for private hospitals since they have to be very careful to calculate the unit cost to obtain revenue from patients. Hospitals can use the referral system to increase output by promoting the hospital to the public health centres nearby. It is a real challenge for the hospital to provide excellent service and increase efficiency while minimizing cost (Younis, Jabr, Plante, & Forgione, 2013).

Different method and approach used to calculate the unit cost will affect the result (Riewpaiboon et al., 2007). Recently, capital cost is calculated using economic approach. Inflation adjustment factor is employed to the calculation, since it should not be neglected. However, in Indonesia government's financial system the inflation adjustment factor is not employed in the cost calculation. However, in this study, the cost calculation employed was standard costing method while it might not be the case for the reference price. There was no clear information about the cost object and cost items that employed in the reference price that was set by the government of Yogyakarta City through Yogyakarta Major Decree number 18 in 2016.

The reference price was set while considering the average price of laboratory services in some hospitals in Yogyakarta; it was not calculated using the standard costing method to estimate the unit cost of each service.

In addition, according to the budgeting system, public hospitals received financial support from the government, hence the price may not reflect the actual cost. However, this study aimed to obtain new insights in hospital unit cost calculation. Another method that possible to do and easier to complete the data is ratio cost to charge (RCC) method. There should be a study to compare the unit cost result using different methods to give a comparable result so the government and health care providers can choose the most suitable method to calculate the unit cost of medical services. There must be a clear guidance to calculate the unit cost based on the standard costing method and agreed by both health care providers and the government.

Conclusions

The micro-costing method could be considered as a method to calculate the unit cost of medical services in Indonesian hospitals. However, the unit cost depends on the quantity of resources consumed and the quantity of outputs. Numerous data was required to calculate the unit cost, which is labor-intensive. Good communication and awareness amongst hospital staffs had been a significant support to the study.

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