Journal of Social Research
P-ISSN: 2827-9832
E-ISSN: 2828-335x
http://ijsr.internationaljournallabs.com/index.php/ijsr

Cost Analysis and Determinants of Inefficiency of Hemodialysis Services

Dwi Suwondo, Evi Octavia
Universitas Widyatama Bandung, Indonesia
Email: suwondo.dwi@gmail.com, evi.octavia@widyatama.ac.id

ABSTRACT

This study aims to analyze the cost of hemodialysis services in patients with Chronic Kidney Failure (CKD) at Dr. Abdul Radjak Purwakarta Hospital using the Activity-Based Costing (ABC) approach with a bottom-up method. In addition, this study also identifies inefficiency factors through Value Stream Mapping (VSM) analysis. This study is quantitative descriptive research that aims to determine the value of independent variables, either one or more variables, without making comparisons with other variables. The results of the study showed that the cost of hemodialysis units amounted to Rp 949,048 per action, consisting of direct costs of Rp 752,513, direct resources overhead of Rp 131,498, and indirect resources overhead of Rp 65,037. The largest cost component comes from the labour-related aspect, accounting for 62.7% of the total direct costs, followed by service-related (24.2%) and non-functional unit employee costs (75.72% of indirect overhead). The efficiency of the service process reached 92%, but it was found that 8% of non-value added activities mainly occurred in the registration and final administration process. A comparison between ABC's unit cost and INA-CBG's rate shows a cost difference, with a cost recovery rate of 99%, which means hospitals have a deficit of 1% per procedure. The results of this study confirm the importance of using the ABC method in the calculation of hospital service costs as well as the integration of lean approaches to improve operational efficiency and accuracy of financial decision-making in the hemodialysis service unit.

Keywords: *Activity-Based Costing, Hemodialisis, Value Stream Mapping*

INTRODUCTION

Chronic Kidney Failure (CKD) is one of the significant global health problems. *GGK* is defined as a disorder of kidney structure or function that lasts for three months or more, characterized by a decrease in the glomerular filtration rate (*GFR*) or the presence of structural kidney damage (KDIGO, 2012). According to Amalia and Apriliani (2021), *GGK* causes progressive kidney damage, eventually requiring kidney replacement therapy such as hemodialysis or transplantation.

In Indonesia, data from the 2018 Basic Health Research (*Riskesdas*) shows that around 12.5% of the population experiences decreased kidney function, and more than 60 thousand patients undergo hemodialysis therapy routinely every year (Pernefri, 2021). This figure is expected to continue to increase along with lifestyle changes, the prevalence of hypertension and diabetes mellitus, and the increase in life expectancy.

Hemodialysis is one of the most common forms of kidney replacement therapy in Indonesia. This procedure is performed regularly, usually two to three times a week, with a duration of about four hours per session. Although effective in sustaining the patient's life, this therapy is very expensive and requires large resources. The high cost of hemodialysis is not only a burden for patients and their families, but also for hospitals and the national health financing system, especially *BPJS Kesehatan* (Ministry of Health of the Republic of Indonesia, 2022).

The main problem in the implementation of hemodialysis services in many hospitals is the gap between the actual costs incurred by hospitals and the payment rates set by *INA-CBGs*. A study by Soetedja, Nurwahyuni, and Intan (2022) revealed that the real cost of hemodialysis services often exceeds the *INA-CBGs* claim rate, especially because not all cost components such as consumable medical materials, salaries of medical personnel, equipment maintenance, and supporting examinations are adequately accommodated. As a result, hospitals experience deficits and service efficiency is hampered.

One of the root problems of this cost inefficiency lies in the conventional hospital cost calculation system. This system generally uses traditional costing methods that allocate indirect costs or Factory Overhead (*FOH*) evenly or proportionally to all service units, without taking into account the actual consumption of resources by each activity (Sujarweni, 2019). This has the potential to result in cost distortions, where service units such as Hemodialysis may be burdened with costs that do not reflect their real activities, thus affecting tariff accuracy and operational efficiency.

To answer these challenges, the Activity-Based Costing (*ABC*) approach has become very relevant. *ABC* is a cost calculation method that allocates costs based on the activity consumed by the product or service. By tracing costs through activities, this method provides a more accurate picture of resource consumption and allows the identification of activities that generate waste (Kaplan & Cooper, 1998). Research by Margina and Prena (2024) shows that there is a significant difference in the total cost between re-use and single-use hemodialysis services. In addition, this study also compared the rate of *INA-CBGs* with the unit cost *ABC* method, showing a significant difference between the two.

In addition to being able to improve the cost allocation system, the application of *ABC* can also be integrated with modern operational management principles such as the Lean Hospital approach, which focuses on reducing non-value added activities and improving process efficiency (Womack & Jones, 2003). Purba et al. (2023) in their research show that the integration of Lean and *ABC* can result in a more transparent cost management system and support data-driven decision-making.

In the context of Dr. Abdul Radjak Purwakarta Hospital, which is currently still using a conventional cost calculation system, there is a great opportunity to conduct a deeper analysis of the efficiency of Hemodialysis services through the *ABC* approach. The hospital faces similar challenges as other hospitals, namely limitations in allocating *FOH* costs appropriately, which has an impact on rate inaccuracies and waste of resources.

Based on this description, the main focus of this study is to analyze the cost of hemodialysis services using the Activity-Based Costing approach, as well as identify the factors that cause inefficiency, especially related to the allocation of indirect costs (*FOH*). This research aims to provide an accurate picture of the actual cost structure of hemodialysis services and serves as a foundation for hospital management in developing efficiency strategies and data-driven decision-making. The results of the research are expected to be a reference for other hospitals facing similar challenges in their efforts towards a more efficient and sustainable health service system. Some of the problems identified include inaccuracies in the unit cost of hemodialysis services due to the absence of proper methods, the efficiency of the financing system and cost management that is still suboptimal, and the inadequate overhead

cost tracing system. In addition, the absence of proper allocation methods, such as Activity-Based Costing, makes it difficult for management to identify sources of inefficiencies and design effective cost control strategies, thereby increasing the capacity requirements of hemodialysis units.

Based on the background of the problem that has been described, the formulation of the problem in this study is: first, how to analyze the cost of hemodialysis services in patients with chronic kidney failure in hospitals using the Activity Based Costing (*ABC*) approach with the "Bottom-Up" method? Second, how to identify the determinants of inefficiency of hemodialysis services in patients with chronic kidney failure in hospitals through Value Stream Mapping (*VSM*) calculations?

The purpose of this study is to analyze the cost of hemodialysis services in patients with chronic kidney failure in hospitals with an Activity Based Costing (*ABC*) approach using the "Bottom-Up" method. In addition, this study aims to identify the determinants of inefficiency of hemodialysis services in patients with chronic kidney failure in hospitals through the calculation of Value Stream Mapping (*VSM*). The results of the study are expected to provide theoretical benefits by adding scientific disciplines related to the analysis of costs and determinants of inefficiency of hemodialysis services in hospitals, as well as practical benefits, namely providing input to the hospital and becoming a reference for future research that raises a similar theme.

RESEARCH METHODS

Types of Research

This study is a quantitative descriptive research that aims to determine the value of independent variables, either one or more variables, without making comparisons with other variables. Quantitative research methods are based on the philosophy of positivism and are used to research a specific population or sample by collecting data using quantitative or statistical research instruments and data analysis. In this context, the descriptive research is focused on analyzing unit costs and identifying factors of cost inefficiency of hemodialysis services in patients with chronic kidney failure (*CKD*) based on the Activity Based Costing (*ABC*) approach.

Data Collection Techniques

In this study, the author uses three data collection techniques according to Kriyantono, namely interviews, observations, and documentation methods. Interviews are conducted with key informants such as the President Director and Head of the One Day Care Unit (*ODC*) to obtain in-depth data on service procedures and financial documentation. Observations are carried out by direct observation of activities and services in the hospital, while documentation studies refer to records of events that have passed. For analysis, the cost of hemodialysis services will be calculated using the *ABC* approach with the "Bottom-Up" method, starting with searching medical records to identify service activities, conducting interviews with hemodialysis unit officers, and collecting and grouping cost data by relevant categories, including investment, maintenance, operational, direct, and indirect costs. Furthermore, the

cost driver will be determined and the calculation of the activity fee rate, as well as the determination of the cost of hemodialysis services per patient to calculate the total service cost.

RESULTS OF RESEARCH AND DISCUSSION

Calculation of the Total Cost of the Hemodialysis Service Process

Identify Activity

Based on the SOP of the Hemodialysis unit of Dr Abdul radjak Purwakarta Hospital, an activity center can be determined as stated in table 1.

Table 1. *Activity center* unit Hemodialisa RS Dr Abdul Radjak

Activity Center	*First Stage Cost Driver*	*Second stage Cost Driver*
Patient registration on schedule	Time (minutes)	Number of Activities
Weight check	Time (minutes)	Number of Activities
Anamnesis and examination of vital signs	Time (minutes)	Number of Activities
Physical examination and evaluation of patients	Time (minutes)	Number of Activities
Rinsing the machine with disinfectant liquid	Time (minutes)	Number of Activities
Attaching a hose to the infusion	Time (minutes)	Number of Activities
Connecting a dialysis to a dialysis	Time (minutes)	Number of Activities
Performing vascular access to patients	Time (minutes)	Number of Activities
Programming the HD tool (for 4 hours)	Time (minutes)	Number of Activities
Remove the appliance and switch off the machine	Time (minutes)	Number of Activities
Patients go home	Time (minutes)	Number of Activities

After knowing the existing activities. Then it can be identified the costs that arise from the consumption of resources when carrying out these activities. From the table *activity centers* above. It can be broadly grouped into 4 activities, namely patient registration. Examination of the patient's weight. anamnesis. vital signs examination. physical examination and evaluation of patients as well as the HD process starting from rinsing the machine. Install an infusion hose. connecting the dialysate to the dialysis. vascular access. program the HD machine. remove the appliance and switch off the machine.

a. Patient registration activities as scheduled
   Costs arising from patient registration activities according to this schedule include costs in the registration unit, the cost component is included in the cost category *indirect resources overhead* which includes the basic components of the basic salary. Allowances. overtime and other expenses incurred for employees in non-functional units
b. Weight check
   This weight check is carried out by the Hemodialysis unit nurse The cost charged in this activity is in the form of salary received by the Hemodialysis unit nurse. The cost component is included in the cost category *direct resources overhead* HD units i.e. *labour related*.
c. Anamnesis and examination of vital signs
   Fees charged on anamnesis activities. vital signs examination. Physical examination and patient evaluation are in the form of medical services received by the general practitioner who performs Hemodialysis. medical services visit internal medicine specialists and

medical services consultant doctors of hypertension kidney as the person in charge of the Hemodialysis unit of Dr. Abdul Radjak Purwakarta Hospital. The cost component is included in the cost category *direct resources overhead* HD units i.e. *labour related*.

d. Hemodialysis process (Rinsing the machine with disinfectant liquid and water in the circulation of the machine. installing a hose on the infusion. connecting the dialysate to the dialyser. performing vascular access. programming the Hemodialysis machine. removing the device and turning off the machine)

The costs charged in the Hemodialysis process activities are in the form of the use of consumable medical materials. Hemodialysis unit nurse services and electricity costs. The cost of consumable medical materials will be included in the cost *direct tracing. equipment related* (office equipment costs include inventory and depreciation of such equipment in the Hemodialysis unit).*service related (*Electricity.air cost. phone.hygiene in the Hemodialysis unit)while other costs will be included in the category *biaya direct resources overhead* .

Resource Classification Hemodialysis Unit

The resources in the HD unit are divided into 4 groups, namely:

a. Labour related

Human resources in the hemodialysis unit in 2024 there are 1 general practitioner who performs Hemodialysis, 14 Hemodialysis nurses, 1 internal medicine specialist, and 1 consultant doctor for Renal Hypertension who is the supervision in the Hemodialysis Unit. *Labour related* is the cost of employees such as salaries, overtime, allowances, incentives, official travel costs, training costs, food expenses incurred by the Hemodialysis unit for the benefit of the human resources.

Table 2. Salary Cost of Hemodialysis Unit in 2024

Yes	Information	Salary (Rp)	Total (Rp)
1	Hemodialysis Nurse	1.076.271.714	1.076.271.714
Total			1.076.271.714

Source : RS. Abdul Radjak Purwakarta

In table 2. above, you can see the cost of the Hemodialysis unit expenditure in 2024 for the cost of Hemodialysis unit employees. This cost will be used to calculate the cost of *direct resources overhead* or direct charge of the Hemodialysis unit.

b. Equipment related

In the Hemodialysis unit, which includes *equipment related* , namely medical equipment (Sphygmometerdigital.EKG.SyringePump.Stetoscope.Infrared thermometer. Troely action. Lifepak Crplus defibrillator. Mobile suction. Battery Check. Hemodialysis machines) and non-medical devices (medical equipment. Le.ari filing Sliding.Scales.Tables Ns.Medicine Cabinet.Refrigerator. 32" LED TV. AC Daikin. Pansonic air conditioner. Wheelchair.Futura Chair.Oxygen Tube+Regulator.Computer. Patient Desk & Patient Chair). *Equipment related* is the depreciation cost of medical and non-medical equipment. maintenance and repair of equipment. In this study, inventory depreciation follows the standard of Dr. Abdul Radjak Hospital, which is 4 years, for Hemodialysis, the depreciation cost is not

calculated in the calculation of unit cost because it is owned by a third party with KSO. The hospital is obliged to purchase consumable medical materials from third parties.

Table 3. Cost *Equipment Related* Hemodialysis Unit in 2024

Yes	Information	Sum	Purchase Price (Rp)	Amount (Rp)	Cost (Rp)
1	Tensimeter Digital	4	450.000	1.800.000	450.000
2	EKG	1	13.000.000	13.000.000	3.250.000
3	Syringe Pump	2	12.162.162	24.324.324	6.081.081
4	Stethoscope	4	1.925.000	7.700.000	1.925.000
5	Infrared Thermometer	2	260.000	520.000	130.000
6	Action Trolley	3	1.300.000	3.900.000	975.000
7	Defibrillator Lifepak Crplus	1	14.000.000	14.000.000	3.500.000
8	Suction Mobile	1	1.980.000	1.980.000	495.000
9	Battery Check	1	500.000	500.000	125.000
Total Depreciation of Medical Devices				**67.724.324**	**16.931.081**
1	Medical Cabinet	1	2.700.000	2.700.000	675.000
2	Lemari Filling Sliding	1	1.900.000	1.900.000	475.000
3	Scales	1	135.000	135.000	33.750
4	NS Desk	1	1.800.000	1.800.000	450.000
5	Medicine Cabinet	1	2.700.000	2.700.000	675.000
6	Refrigerator	1	2.800.000	2.800.000	700.000
7	Tv Led 32"	6	2.800.000	16.800.000	4.200.000
8	Ac Daikin 2 HP	3	8.047.500	24.142.500	6.035.625
9	Ac Panasonic 2Pk R32	4	7.000.000	28.000.000	7.000.000
10	Wheelchair	1	1.200.000	1.200.000	300.000
11	Futura Chair	19	380.000	7.220.000	1.805.000

Yes	Information	Sum	Purchase Price (Rp)	Amount (Rp)	Cost (Rp)
12	Oxygen Cylinder + Regulator	5	1.050.000	5.250.000	1.312.500
13	Lenovo Computer	1	7.220.000	7.220.000	1.805.000
14	Matras	16	1.100.000	17.600.000	4.400.000
15	Patient Desk	16	330.000	5.280.000	1.320.000
16	Patient Bed	16	4.180.000	66.880.000	16.720.000
Total Depreciation of Non-Medical Devices				**191.627.500**	**47.906.875**
Total Depreciation of Medical & Non-Medical Devices				**259.351.824**	**64.837.956**

Source : RS. Dr Abdul Radjak Purwakarta (reprocessed)

c. Space related

In this category, it includes the cost of maintenance and depreciation of the building from the Hemodialysis unit. The area of the Hemodialysis building is 211.68 M^2 with a depreciation value of 20 years.

Table 4. Cost *Space relate* Hemodialysis Unit in 2024

Yes	Information	Purchase Price (Rp)	Cost (Rp)
1	Building Area 211.68 M2	3.190.515.428	159.525.771
Total			**159.525.771**

Source : RS. Dr Abdul Radjak Purwakarta

d. Service Relate

The cost *of Service Relate* Hemodialysis unit includes the cost of cleaning. electricity. water. procurement of medical and non-medical equipment. stationery and household appliances.

Table 5. Electricity Cost of Hemodialysis Units in 2024

Yes	Item name (Pcs) [a]	Sum (watt) [b]	Daya	Duration (jam) [c]	Total Power (Kwh) [d]	Tariff/kwh (Rp) [and]	Daily Fee (Rp) [f]	Monthly Fees (Rp) [g]	Annual Fee (Rp)[h]
1	Lamp	10	9	18	2	1.433	2.322	58.047	696.560
2	Messiah HD	19	600	18	205	1.433	294.103	7.352.573	88.230.870
3	Refrigerator	1	115	24	3	1.433	3.956	98.894	1.186.731
4	AC	7	220	18	28	1.433	39.730	993.242	11.918.907
5	Television	6	130	18	14	1.433	20.123	503.071	6.036.849
6	Computer	1	150	18	3	1.433	3.870	96.744	1.160.933

Yes	Item name (Pcs) [a]	Sum (watt) [b]	Daya	Duration (jam) [c]	Total Power (Kwh) [d]	Tariff/kwh (Rp) [and]	Daily Fee (Rp) [f]	Monthly Fees (Rp) [g]	Annual Fee (Rp)[h]
	Total							**9.102.571**	**109.230.849**
	Information								
	d = a*b*c								
	f = d*e								
	g = i*25 days unless refrigerator multiplied by 30 days								
	Source : RS.Dr Abdul Radjak Purwakarta (reprocessed)								

Table 6. Cost *service relate* Hemodialysis in 2024

Yes	Information	Cost (Rp)
1	Electricity Costs	109.230.849
2	Water Cost	5.666.257
3	Cleaning Fee	35.618.975
4	Office stationery cost	29.988.618
5	Laundry and Linen Costs	28.775.400
6	Maintenance Costs	3.476.402
Total		**212.756.501**
Source : RS.Dr Abdul Radjak Purwakarta		

Identify Direct *Tracing Costs*

Direct fees or *Direct Tracing* HD action includes doctor's services and consumable medical materials.

Table 7. *Direct Cost* Hemodialysis in 2024

Yes	Medical Consumables	Price	Unit	Sum	Total
1	Registration	10.000	Activity	1	10.000
2	General Practitioner Consultation	20.000	Activity	1	20.000
3	Internal Medicine Specialist Consultation	36.750	Activity	1	29.400
4	Consultation of a Hypertensive Kidney Subspecialist	14.700	Activity	1	14.700
5	Service Services	5.000	Activity	1	5.000
6	Inviclot inj	15.972	Ml	1.5	23.958
7	Nacl 500ml generic	9.480	Flash	3	28.441
8	Blood line	103.455	Pcs	1	103.455
9	Fistula 1 ¼	16.335	Pcs	2	32.670
10	Hd pack	39.325	Pack	1	39.325
11	Dialysis Powder A	96.800	Pack	1	96.800
12	Dialysis Powder B	84.700	Pack	1.5	127.050

Yes	Medical Consumables	Price	Unit	Sum	Total
13	Masker Disabled	504	Pcs	1	504
14	Mecobalamin iv	10.648	Light bulb	1	10.648
15	O2	1.694	A little	15	25.410
16	Cairan renalin 50 cc	526	M	50	26.318
17	Hepagusan inj/heparinol 5000 iu/ml	21.199	Ml	1	21.199
18	Patient Feeding	16.146	Activity	1	16.146
19	Hemodialisa Set	30.000	Pack	1	30.000
20	Nasal Cannul	4.500	Pcs	1	4.500
21	Hemapo 3000 iu/1 ml inj	39.639	Ml	1	39.639
22	Routine blood	40.000	Pack	1	40.000
Total					**752.513**

Source : R.Dr Abdul Radjak Purwakarta

Identify Overhead Costs

Table 8. Number of Patients at Dr Abdul Radjak Hospital in 2024

	Number of Patients
Outpatient	160.100
Hospitalization	21.662
Surgical Unit	5.308
Hemodialisa	13.049
Medical Support	175.825
Total	**375.944**

Overhead costs in hemodialysis services consist of indirect resources overhead and direct resources overhead which are calculated based on the proportion of time of the service unit. Indirect resources overhead costs include employee costs, equipment depreciation, building maintenance, and other service costs, which totals IDR 15,399,131,219. Meanwhile, the total direct resources overhead cost of the hemodialysis unit is IDR 1,715,922,337. When charged to each patient, the indirect resources overhead cost per patient is IDR 65,037, and the direct resources overhead cost is IDR 131,498, bringing the total cost per patient to IDR 196,535. From the calculation results, the unit cost for the hemodialysis unit is IDR 949,048, which shows a deficit compared to the INA-CBG's tariff of IDR 941,600, with a cost recovery rate (CRR) of 99%.

Analysis of the Cost Component of Hemodialysis Services

The analysis of the cost of hemodialysis services shows that the cost of direct resources overhead consists of several main components: first, labor-related costs reach Rp 1,076,271,714 (62.7%); second, equipment related costs of IDR 64,837,956 (1.5%); third, space-related costs, which include building depreciation, reached Rp 159,525,771 (13.7%); and fourth, serviced related costs which include electricity and maintenance amounting to IDR 415,286,896 (24.2%). For indirect resources overhead, labor-related costs reached IDR 583,021,377 (75.72%), equipment-related costs amounted to IDR 24,747,737 (8.38%), space-

related costs that included depreciation of non-functional buildings amounted to IDR 13,580,189 (4.6%), and serviced related costs amounted to IDR 91,115,370 (11.83%).

Total Cost Analysis

Based on the results of the calculation, the total cost of Hemodialysis services is Rp.2,485,878,898. This cost consists of *direct resources* of Rp.1,715,922,337 (80%) and indirect *resources* of Rp.769,956,561 (20%).from the results of the calculation of the largest employee salary cost. The amount of this cost can still be reduced by re-evaluating the effective manpower pattern.

Cost Analysis of Hemodialysis Service Unit

Calculation of unit cost by dividing the total cost *direct resources* Rp. 1,715,922,337 and *indirect resources* IDR 769,956,561 divided by the number of patients for 1 year 13,049 and added the cost of consumable medical materials per patient IDR 752,513 so that the unit cost per hemodialysis patient is IDR 949,048

Cost *Recovery Rate* Analysis Hemodialysis

The results of the study show that the *Cost Recovery Rate* of hemodialysis services in 2024 is 99%. *The Cost Recovery Rate* that is still below 100% means that only 99% of the cost is covered by revenue. The remaining 1% is borne by the hospital.

Analysis of Inefficiencies

In the context of a financing system based on INA-CBGs tariffs and BPJS Kesehatan packages, hospitals are required to be able to manage Hemodialysis units effectively without reducing the quality of services. Based on the calculation results, the proportion of cost components is obtained as follows: *Direct Resources Overhead* labor related *costs* Rp.1,076,271,714 (62.7%). *Equipment related* Rp.64,837,956(1.5%). *space related* Rp 159,525,771 (13.7%) *Service related* Rp 415,286,896 (24.2%) while *for Indirect Resources Overhead* Labor related *costs* Rp 583,021,377 (75.72%). Equipment related Rp.61,869,342 (8.04%). *space related* Rp 33,950,472 (4.41%). *service related* Rp91,115,370 (11.83%).there is still room for improvement for inefficiencies in activities and services.in addition to efforts to reduce operational costs, other efforts after the *value stream mapping* is made show that around 8% of the time in the service process is a waste of time

Application of *the Activity Base Costing* (ABC) Method

The results showed that the application of the ABC method in calculating the cost of hemodialysis services resulted in a unit cost of Rp 949,048 per action. The ABC method allows cost allocation based on the actual activities consumed by the service. Thus resulting in more accurate calculations compared to traditional methods. This is in line with Quesado and Silva (2021) stating that the ABC method is able to improve cost transparency and the accuracy of managerial decision-making information. Further, this method divides activities into several cost drivers in two stages, namely time cost triggers and the number of activities. The results of cost allocation show the highest proportion in *labour related* (62.7%) which is in line with the findings of R Farderi harahap (2021) that the cost of human resources is the largest component in the hospital service system

Cost and Efficiency Component Analysis

Value *stream mapping* (VSM) analysis shows that the efficiency of the hemodialysis service process is at 92% as a *value added* activity. With 8% of the time considered as waste

(non value added).these findings support the theory of TLAPA et al. (2020) and Lam et al. (2020) which states that *Value stream mapping* (VSM) is effective in identifying activities that do not provide added value and can be used as a basis for process improvement. Two activities that are classified *as non-value added*, namely the registration process and the final administration, show the potential for efficiency in time and resource management by redesigning or digitizing the two processes. Efficiency can be improved and overhead costs can be reduced. In particular, employee costs (*labour related*) which reached IDR 1,076,271,714 or 62.7% of the total *direct resources overhead of* service-related *components* which include electricity, water, sanitation, office stationery, laundry, and maintenance are also quite high. namely IDR 415,286,896 or 24.2%. This indicates that the non-medical support aspect still accounts for a significant burden in the unit's operations. In the context of the theory of Ostadi et al. (2019). This shows the importance of efficient management of hospital utilities and logistics so as not to add to the burden that is not directly related to clinical actions. Meanwhile. *Equipment related* such as depreciation of medical and non-medical devices only contributed Rp 64,837,956 or 1.5%. and *space related*, namely building depreciation reaching Rp 159,525,771 or 13.7%. This is in accordance with the operational cooperation system (KSO) implemented by the hospital with the HD machine provider. where the main tool (HD machine) is not charged a depreciation fee to the hospital. But. Such a model leaves potential risks of dependency and limited control in the long-term investment aspect. as criticized by Lam et al. (2020) in a study of healthcare partnerships.

In the *indirect resources overhead component*, the largest proportion was also found in the cost of non-functional unit employees of IDR 583,021,377 or 75.72%, followed by *service related* (11.83%). *equipment related* (8.38%). and *space related* (4.6%). These findings emphasize that even non-functional units do not directly interact with patients. financing for human resources and facilities still makes a major contribution to the total cost of service units.

Comparison of ABC Fees and INA-CBG's rates

Based on the results of the research, the ABC unit cost is IDR 949,048. slightly higher than the INA-CBG's tariff of IDR 941,600. This difference results in a Cost Recovery Rate (CRR) of 99%. which means that the hospital has a deficit of 1% per service action. This supports the opinion of Zahraee et al. (2020) that the mismatch of INA-CBG's rates with the actual cost of hospitals can trigger financial imbalances, especially for high-intensity and high-tech units such as Hemodialysis. In the context of package-based financing such as INA-CBG's. Hospitals are not paid based on the real cost inputs used. rather, it is based on a fixed rate that has been set for each type of service or diagnosis. This often leads to inequality. Especially if the hospital has a unique cost structure. such as high labor components or outside vendor involvement (e.g. HD machines with KSO). Lam et al. (2020) highlight that this kind of fixed-rate system can weaken the flexibility of hospitals in adaptively regulating cost allocation. Further. According to Quesado and Silva (2021), the difference between the actual rate and the rate paid can cause hospitals to face double pressure: in terms of operational efficiency. and in terms of demands to maintain the quality of service. When the actual cost is not fully compensated. Hospitals face a dilemma between efficiency and quality, especially in units such as hemodialysis which rely heavily on human resource expertise. special medical devices. and regular supervision of specialist doctors. In the long run. The mismatch between unit cost and

INA-CBG's tariff can pose a risk of deficit accumulation, especially if the volume of patients continues to increase. This is in line with the findings of Hani (2019) who stated that one of the main challenges in hospital financial management is to develop an efficiency strategy without sacrificing quality, especially in a package-based flat rate system such as INA-CBG's.

CONCLUSION

The results of the study concluded that the application of the Activity-Based Costing (*ABC*) method with a "Bottom-Up" approach to hemodialysis services showed a service unit cost of Rp 949,048 per action, consisting of direct costs of Rp 752,513, indirect resources overhead costs of Rp 65,037, and direct resources overhead costs of Rp 131,498. The largest cost came from the labor-related component, reaching Rp 1,076,271,714 or 62.7% of total direct resources overhead. In addition, service-related components and non-functional unit employee costs also contributed significant costs, with Rp 415,286,896 or 24.2% and Rp 583,021,377 or 75.72% of total indirect overhead, respectively, indicating that there is room for efficiency improvement. With the *INA-CBGs* rate of Rp 941,600, there is a negative difference that results in a cost recovery rate of 99%, meaning that hospitals experience a deficit of 1% for each service. In addition, through the Value Stream Mapping (*VSM*) approach, the efficiency of the hemodialysis service process was identified to reach 92%, with 8% of the time in the process classified as non-value added activities. The two main activities that cause inefficiencies are the waiting time for patient registration and the time for the final process of administration and filing.

BIBLIOGRAPHY

Amalia, R., & Apriliani, E. (2021). *Nursing care for clients with disorders of the urinary system*. CV. Widina Bhakti Persada.

Hani, T. M. (2019). *Calculation of unit cost (UC) and preparation of hospital rates using the Double Distribution (DD) method*. Deepublish.

Kaplan, R. S., & Cooper, R. (1998). *Cost & effect: Using integrated cost systems to drive profitability and performance*. Harvard Business School Press.

KDIGO. (2012). KDIGO 2012 clinical practice guideline for the evaluation and management of chronic kidney disease. *Kidney International Supplements*, 3(1), 1-150.

Lam, H., Kwan, R., Tuthill, M., & Haghighi, M. (2020). Unitwain: A cost-effective solution for lean gross imaging. *Journal of Pathology Informatics*, 11(1), 31.

Margina, A., & Prena, G. D. (2024). *Cost analysis comparison between reuse and single-use hemodialysis services using activity-based costing method*. [Journal name not specified in original].

Ministry of Health of the Republic of Indonesia. (2022). *Indonesia's health profile in 2021*. Ministry of Health of the Republic of Indonesia.

Ostadi, B., Daloie, R. M., & Sepehri, M. M. (2019). A combined modelling of fuzzy logic and time-driven activity-based costing (TDABC) for hospital services costing under uncertainty. *Journal of Biomedical Informatics*, 89, 11-28.

Pernefri. (2021). *Indonesian HD data registry book 2020*. Indonesian Nephrology Association.

Purba, S. S., Kusuma, P. N., Nurani, F. S., & Iswanto, A. H. (2023). The application of lean hospital to analyze waste in minimizing outpatient waiting time: Literature review. *An-Najat*, 2(2). https://doi.org/10.59841/an-najat.v2i2.1141

Quesado, P., & Silva, R. (2021). Activity-based costing (ABC) and its implication for open innovation. *Journal of Open Innovation: Technology, Market, and Complexity*, 7(1), 41.

Harahap, R. F. (2021). *Implementation of activity-based costing system in determining inpatient service rates*. *Journal of Muara Economics and Business*, 5(1), 36-48.

Soetedja, I., Nurwahyuni, A., & Intan, A. (2022). INA-CBG's tariff gap to the actual cost of hemodialysis: A case study on regional general hospitals. *Journal of Indonesian Hospital Administration*, 8(3), 142-150.

Sujarweni, V. W. (2019). *Activity-based costing method for hospitals*. Pustaka Baru Press.

TLAPA, D., Zepeda-Lugo, C. A., Tortorella, G. L., Baez-Lopez, Y. A., Limon-Romero, J., Alvarado-Iniesta, A., & Rodriguez-Borbon, M. I. (2020). Effects of lean healthcare on patient flow: A systematic review. *Value in Health*, 23(2), 260-273.

Womack, J. P., & Jones, D. T. (2003). *Lean thinking: Banish waste and create wealth in your corporation*. Simon and Schuster.

Zahraee, S. M., Tolooie, A., Abrishami, S. J., Shiwakoti, N., & Stasinopoulos, P. (2020). Lean manufacturing analysis of a heater industry based on value stream mapping and computer simulation. *Procedia Manufacturing*, 51, 1379-1386.