

Unit Cost Analysis of Inpatient Services with INA-CBG's Rates using The ABC Method at Dian Harapan Jayapura Hospital in 2023

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Abstract

Rising hospital costs and the fixed-payment structure of Indonesia Case-Based Groups (INA-CBGs) require accurate cost information to maintain service quality and financial sustainability. This study aimed to calculate inpatient unit costs at Dian Harapan Hospital, Jayapura, using Activity-Based Costing (ABC), compare them with hospital and INA-CBGs tariffs, and formulate recommendations. A comparative retrospective case study design was employed using 2023 financial, administrative, medical record, and service activity data. Costs were allocated to inpatient classes based on cost drivers, while tariff suitability was assessed for the 20 most frequent diagnoses through comparative analysis and a paired-samples t-test. The ABC-based daily room rates were IDR 699,122 for VIP, IDR 549,220 for First Class, IDR 474,790 for Class 1, IDR 453,850 for Class 2, and IDR 428,199 for Class 3. Compared with ABC-based rates, hospital tariffs were higher for all classes except Class 3. Among the 20 diagnoses, INA-CBGs payments exceeded ABC-based costs for 13 diagnoses but were lower for seven diagnoses. Overall, INA-CBGs payments were 7.37% higher than ABC-based costs, with a difference of IDR 1,162,196,858. This difference was not statistically significant ($t = 0.80$; $p = 0.43$). Therefore, systematic implementation of Activity-Based Costing is recommended to improve tariff accuracy, cost control, and managerial decision-making.



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INTRODUCTION

The cost of health services continues to increase due to various factors, including government policies, population growth, demographic changes, advances in health technology, demands for improved service quality, and increasing competition among healthcare providers. One significant factor contributing to rising costs is the implementation of hospital accreditation, which requires compliance with various quality standards, as well as improvements in facilities and infrastructure that require substantial investment and directly affect operational costs. Hospitals are required to manage costs effectively to maintain a balance between investment and revenue, considering that healthcare services are not only social activities but also complex and capital-intensive

operations that must be managed professionally based on rational and efficient economic principles (Pratiwi, 2022).

Organizations operate effectively and efficiently when managed properly; therefore, reliable managers are required to oversee each department (Hariyani, 2018). Operational cost efficiency is not merely an administrative requirement but also an integral component of hospital sustainability strategies within a modern healthcare financing system that increasingly emphasizes effective and efficient resource utilization. Before the implementation of the National Health Insurance (Jaminan Kesehatan Nasional [JKN]) program in early 2014, most healthcare payment systems in Indonesia used a fee-for-service scheme, which tended not to encourage cost efficiency. Following the implementation of JKN, the payment system shifted to a diagnosis-based package scheme known as Indonesia Case-Based Groups (INA-CBGs), which establishes fixed reimbursement rates based on diagnosis groups and disease severity (Chen et al., 2023; Cook & Averett, 2020; Li et al., 2022; Qian et al., 2021; Rimler et al., 2015).

The INA-CBGs payment scheme encourages hospitals to adopt efficiency principles in service delivery because reimbursement is no longer based on actual costs but on predetermined rates according to diagnosis groups and disease severity. However, hospitals must simultaneously maintain service quality in accordance with accreditation standards despite limited resources. Inpatient services, as a major component of healthcare delivery, have complex cost characteristics, including accommodation, 24-hour medical and nursing services, pharmaceuticals, medical or surgical procedures, and the utilization of medical facilities and equipment. This complexity causes inpatient services to generally have higher costs than other types of services, making accurate unit cost calculations essential for supporting managerial decision-making and tariff policies oriented toward hospital efficiency and sustainability (Igusti et al., 2025; Luca & Paul, 2019; Rakhshan et al., 2025; Shi et al., 2023; Yang et al., 2020).

Research by Zelman et al. indicates that hospitalization represents the largest cost component in hospital expenditure structures, primarily due to variations in length of stay and the high intensity of resource utilization. The study also emphasizes that inaccurate cost calculations for these services may result in inappropriate pricing decisions and budget allocation (William N. Zelman et al., 2020). Kowalska et al. (2015) emphasized the importance of appropriate strategies in managing inpatient services, particularly regarding financing efficiency and reducing waiting times, and highlighted that traditional costing approaches often fail to represent actual service requirements in complex cases. Porter and Teisberg, through the concept of value-based healthcare, emphasized that cost-per-episode calculations are essential for evaluating service value because an inadequate understanding of actual cost structures may lead hospitals to establish inefficient tariffs (Porter & Teisberg, 2006).

Various approaches have been used to calculate unit costs, including Step-Down Costing, Job Order Costing, and Activity-Based Costing (ABC). Among these approaches, the ABC method is considered more relevant for accurately capturing the complexity of hospital activities and resource consumption because it allocates costs

based on actual activities performed rather than simple linear allocation. Therefore, ABC provides a more representative approach for service organizations with high levels of operational heterogeneity, such as hospitals (Kaplan & Anderson, 2003). Bachtiar et al. (2019) found that calculating inpatient service tariffs using an activity-based costing system at ST Hospital Khadijah Pinrang enabled cost allocation based on inpatient unit activities, with each activity assigned a cost driver that generated costs. This approach produced more accurate and detailed inpatient service costs and supported improved managerial decision-making compared with traditional methods that only aggregate fixed and variable costs and divide them by the number of hospitalization days (da Silva Etges et al., 2020; da Silva Macedo, 2019; Nelson et al., 2015).

Dian Harapan Hospital, Jayapura, is a private faith-based hospital that serves as one of the referral hospitals in the Papua region. In providing healthcare services, Dian Harapan Hospital faces unique geographical and operational challenges, including limited medical personnel, high logistics costs, and inadequate infrastructure, particularly for advanced medical equipment required for complex inpatient cases. These challenges are further complicated by the national implementation of the INA-CBGs financing system, which standardizes reimbursement rates without fully accounting for regional disparities in geographical conditions and operational costs. Consequently, hospitals may experience financing gaps and implement cross-subsidization strategies among services (Malmlose & Lydersen, 2021; Testa et al., 2015).

In its operational practices, Dian Harapan Hospital has not yet implemented a systematic and comprehensive unit cost calculation method. The existing tariffs are primarily determined by comparing them with those of surrounding hospitals that have different cost structures, creating the risk of inaccurate managerial decisions, particularly in tariff determination. Dependence on external benchmarks without considering internal cost structures may result in tariffs being set below actual costs, which can reduce the hospital's ability to cover operational expenses. Therefore, comprehensive inpatient service unit cost calculations are required as a basis for evaluation, appropriate financing strategies, and service sustainability within an evolving healthcare financing system.

Based on these conditions, this study was important for accurately calculating inpatient service unit costs using the Activity-Based Costing (ABC) approach. This method was selected because it represents resource consumption based on actual activities and provides a more accurate reflection of the underlying cost structure. This study contributes by applying the ABC approach to calculate inpatient service unit costs at Dian Harapan Hospital, Jayapura, as a referral private hospital in Eastern Indonesia with distinct geographical and operational challenges. Furthermore, this study analyzed the suitability of ABC-based costs compared with INA-CBGs tariffs as a basis for financial decision-making and tariff policy formulation.

The following section presents an overview of Dian Harapan Hospital's inpatient data from 2020–2024 based on hospital tariffs and the INA-CBGs reimbursement scheme.

Table 1. Hospitalization Rates at Dian Harapan Hospital Compared to INA-CBG's Package Rates for 2020-2024

Year	Service Type	RS Fare (Rp)	INA-CBG's Package Tariff (Rp)	Number of Cases
2020	RITL	48.434.629.077	25.759.367.700	6.178
2021	RITL	52.286.454.533	24.566.694.300	5.702
2022	RITL	57.130.998.204	30.001.716.600	6.368
2023	RITL	71.008.650.025	35.170.496.800	7.239
2024	RITL	75.640.988.951	34.668.536.600	7.242

Source: RS. Dian Harapan, Jayapura

Actual data from Dian Harapan Hospital for the 2020–2024 period show an increase in the number of inpatient visits. However, this increase has not been accompanied by adequate reimbursement from the Indonesia Case-Based Groups (INA-CBGs) scheme, indicating a widening gap between the service costs incurred by Dian Harapan Hospital and the standard reimbursement rates provided by BPJS Kesehatan. This condition highlights the importance of conducting cost analysis using the Activity-Based Costing (ABC) method to enable Dian Harapan Hospital to accurately identify the primary factors contributing to increased cost burdens and develop sustainable financial strategies.

Problem Identification

The rate currently used is still the result of the calculation in 2016 with the double distribution method, which every year is only adjusted by increasing the average value using the inflation value as the basic assumption of increase, so it is necessary to recalculate the unit cost using the ABC method to find out the hospitalization rate that is really real and competitive. In addition, the component of the tariff package imposed by BPJS is not known in detail so that Dian Harapan Hospital needs to make its own calculation as the basis for financing policies to reduce costs and losses, as well as it can be used in the preparation of the Clinical Pathway as a guideline with the Doctors in Charge of Patients (DPJP).

Problem Formulation

Based on this background, the formulation of the problem in this study is: (1) how is the unit cost of inpatient services at Dian Harapan Jayapura Hospital based on the Activity Based Costing (ABC) method; (2) how is the difference between the unit cost of ABC-based inpatient services and the applicable inpatient rates at Dian Harapan Jayapura Hospital; and (3) how is the compatibility between the unit cost of inpatient services and the INA-CBG's rate compared to that received by hospitals from BPJS Kesehatan.

Purpose and Usefulness of Research

This study aims to: (a) determine the unit cost of inpatient services at Dian Harapan Hospital using the ABC approach; (b) compare the results of the ABC calculation with the INA-CBG's rates received by hospitals; (c) compare the results of the ABC calculation with the hospitalization rates set by Dian Harapan Hospital; and (d) prepare data-based recommendations to support strategic decision-making related to rate setting and hospital

financial sustainability. This study is expected to provide an accurate picture of the actual cost compared to the INA-CBG's claim rate as the basis for managerial decision-making, assist hospital management in budget planning and cost control, provide input related to the suitability of INA-CBG's rates with the cost reality in the field, and become a reference for further research in the field of hospital costing.

METHOD

This study employed a comparative descriptive design. The unit cost of inpatient services was calculated using the Activity-Based Costing (ABC) method, and the results were compared with INA-CBGs tariffs and hospital tariffs to examine differences among the three cost components. This applied research used a retrospective case study design involving historical data from inpatient services during 2023.

The research was conducted at Dian Harapan Hospital, specifically in the inpatient service unit, using data from the 2023 service period. Dian Harapan Hospital is a type C private hospital serving outpatient and inpatient services in Jayapura City and Regency. The hospital provides five inpatient service classes: VIP Class, First Class, Class 1, Class 2, and Class 3, with a total capacity of 132 beds and supporting facilities, including laboratories, radiology, medical records, laundry, and kitchen services.

Sampling Methods and Techniques

The method used is a case study with a comparative descriptive approach and Activity Based Costing. The case study was chosen because the research was conducted in depth at one institution. The type and source of data were determined by purposive sampling technique, namely sample selection based on considerations of relevance and completeness of data. The analyzed sample of service units was sourced from the inpatient service unit, with the selection of samples aimed at obtaining a representative picture of real costs on the operational conditions of Dian Harapan Hospital, while rate comparisons were carried out on 20 inpatient diagnoses with the highest number of cases in 2023.

Variable Operations

The variables in this study consist of input variables (inpatient service activity costs), process variables (inpatient service activities and cost drivers), output variables (ABC-based inpatient service unit costs), and comparative variables (hospital hospitalization rates and INA-CBG's rates), as presented in the following table.

Table 2. Operational Research Variables

Variable	Type	Operational Definition	Indicator	Data Source
Inpatient Service Activity Fees	Input	All costs arising from inpatient service activities consumed by patients during treatment	Medical personnel, medication/BHP, room, administration, utilities, maintenance	Hospital financial statements, inpatient unit data
Inpatient Service Activities	Process	A series of service activities carried out to inpatients	Maintenance, nursing, administration, support (pharmaceutical/nutrition/laundry), use of facilities	SOP RS, observation, interview
Cost Driver	Process	Factors that trigger costs as the basis for cost allocation in the ABC method	Length of treatment days, number of patients, working hours of health workers, number of actions, number of facilities usage	Medical records, unit reports
Inpatient Service Cost Unit (ABC)	Output	The cost of the inpatient service unit is calculated based on activity consumption using the ABC method	Total activity cost, driver cost rate, cost per day of care, cost per class of care	ABC calculation results
Hospital Hospitalization Rates	Comparator	Internal rates for inpatient services set by Dian Harapan Hospital	Room rates, service rates, medical support rates	Hospital tariff documents
INA-CBG's Rates	Comparator	Inpatient service package rates set by BPJS Kesehatan based on diagnosis group and severity	Rate per diagnosis, severity, treatment class	BPJS Regulations, INA-CBG's claim data

Data Collection and Processing Techniques

Primary data was obtained through direct observation of inpatient service activities (treatment, medical procedures, use of tools, and administration) as well as interviews with hospital officers related to the process and time of activities. Secondary data was obtained from hospital administrative documents such as financial statements, resource usage lists, INA-CBG's rates, as well as patient medical records and diagnostic codes. Data processing was carried out using the Microsoft Excel application through stages: grouping of cost data (direct and indirect), identification of activities, determination of cost drivers, calculation of activity costs, calculation of inpatient unit costs, comparison with INA-CBG's rates, and presentation of data in the form of tables and graphs.

Data Quality Test

The validity and reliability test in this study was not carried out using statistical tests because the data used were not perception data or questionnaires, but secondary data in the form of official hospital documents. Data validity was determined through source validity (data obtained directly from financial units, medical record units, and inpatient units), content validity (data suitability with ABC calculation needs), and document

validity (sourced from financial statements and internal hospital documents). Data reliability is guaranteed through consistency of data recording, the use of data from the same period, and data processing processes that produce consistent values. Classical assumption tests were not carried out because this study was comparative descriptive and did not use regression or statistical inferential analysis, but focused on cost calculations and comparisons.

Hypothesis Analysis and Test Design

The stages of data analysis include: identification of inpatient service activities; grouping of direct and indirect costs (overhead); determination of cost drivers for each activity; calculation of activity cost pools using Microsoft Excel; calculation of inpatient unit costs by dividing the total cost of activities by the amount of service output; and analysis of ABC-based unit cost comparisons with INA-CBG's rates to determine the difference in costs and potential surpluses or deficits.

The main steps and formulas of ABC used in this study are as follows. First, determine the total cost of the activity, which is the sum of all resource costs for each activity. Second, determine the cost driver rate, which is the total cost of the activity divided by the total unit cost driver. Third, charge the cost to the cost object (hospitalization), which is the cost driver rate multiplied by the number of cost drivers used. Fourth, calculate the unit cost of hospitalization, which is the sum of the cost of all activities divided by the number of days of stay (length of stay/LOS). Descriptive statistical analysis is also used to describe cost and tariff data through the calculation of the mean and percentage of cost difference, namely the difference between unit cost and INA-CBG's rate divided by INA-CBG's tariff multiplied by 100%.

The research hypothesis was prepared to answer the research objective, which is to compare the unit cost of ABC-based inpatient services with the INA-CBG's rate and the rate of Dian Harapan Hospital. For comparison with INA-CBG's: H0 stated that there was no significant difference between the unit cost of hospitalization based on the ABC method and the INA-CBG's rate in 20 cases of the largest inpatient disease, while H1 stated the opposite. Hypothesis testing was carried out through comparative descriptive analysis with a paired difference test (Paired Sample t-Test), because it compared two values on the same object, with the formula $t = \bar{d} / (Sd/\sqrt{n})$, where $\bar{d}$ is the average difference between unit cost and tariff, Sd is the standard deviation difference, and n is the number of observations (hospitalized cases). If the significance value is less than 0.05, then H0 is rejected which means that there is a significant difference.

RESULTS AND DISCUSSION

Overview of Research Objects

Dian Harapan Hospital is administratively located in the Jayapura City area, located at Jalan Teruna Bhakti, Yabansai Village, Heram District, Jayapura City, Papua Province. This location is strategic because it is easily accessible by private and public vehicles, is located in a residential environment, and has relatively close access to Sentani Airport ($\pm$ 30 minutes) and the center of Abepura City ($\pm$ 15-20 minutes), making it the main

alternative for the community in obtaining health services. The vision of Dian Harapan Hospital is to present love in the form of health services for people who are in need and suffering, with the mission of making Dian Harapan Hospital an independent and quality hospital for the people of Jayapura and Papua in general.

The organizational structure of Dian Harapan Hospital consists of Directors, Deputy Directors (Medical, Nursing, General, and Finance), Head of Field, Head of Section, Head of Sub-Division, Internal Inspection Unit, as well as various committees and teams, as presented in Figure 1.

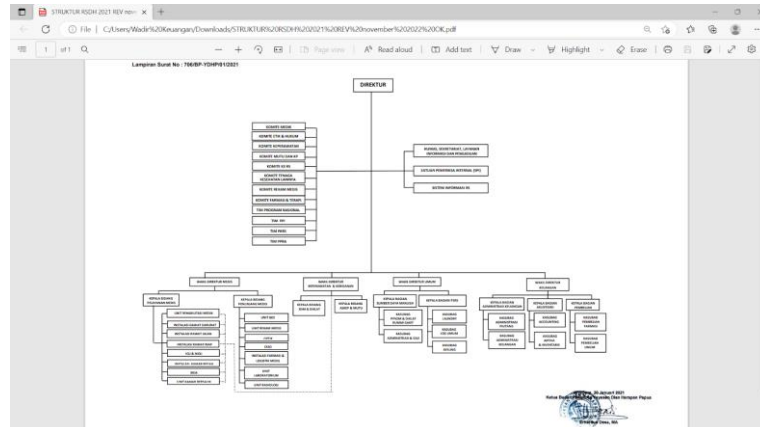


Figure 1. Organizational Structure Chart of Dian Harapan Hospital, Jayapura (Source: Data of RS. Dian Harapan, Jayapura)

In providing health services, Dian Harapan Hospital provides five classes of inpatient services with different facilities in each class. The VIP class consists of 10 rooms (4x7 m area) occupied by 1 patient with complete facilities including air conditioning, TV, refrigerator, and ensuite bathroom. First Class consists of 14 rooms (4x6 m area) for 1 patient with similar facilities. Class 1 consists of 42 rooms (4x6 m area) for 2 patients per room. Class 2 consists of 16 rooms (5x7 m area) for 3 patients per room with basic facilities. Class 3 consists of 35 rooms (8x5 m area) for 6 patients per room with basic facilities. So far, Dian Harapan Hospital calculates the inpatient room rate by adding fixed costs, semi-variable costs, and variable costs to the total cost, then dividing the number of days of hospitalization, with additional considerations in the form of a survey of competitor hospital prices and the socio-economic conditions of the surrounding community.

Table 3. Inpatient Service Rates at Dian Harapan Hospital, Jayapura

Class Type	Rate/Day (Rp)
VIP Class	1.100.000
First Class	850.000
Class 1	600.000
Class 2	500.000
Class 3	400.000

Source: RS. Dian Harapan, Jayapura

Supporting Data for Unit Cost Calculation

The determination of hospitalization rates using the Activity Based Costing (ABC) method requires a number of supporting data, including data on the number of inpatients and the length of days of treatment in a year, data on the area of inpatient rooms per class, data on electricity usage per class, and data on meal costs per class during 2023.

Table 4. Data on the Number of Patients and Length of Hospitalization at Dian Harapan Hospital in 2023

Classes	Copyright © 2019 Copyright © 20	Jml. Patient	Treatment Day
VIP Class	10	382	1.411
First Class	14	960	3.424
Class 1	42	4.062	13.665
Class 2	16	1.862	5.857
Class 3	35	3.540	11.230
Total	117	10.806	35.587

Source: RS. Dian Harapan, Jayapura

Table 5. Data on Hospitalization Area per Class of Dian Harapan Hospital in 2023

Class Type	Room Area (m ²)	Number of Rooms	Total Floor Area (m ²)
VIP Class	35	10	350
First Class	24	14	336
Class 1	24	42	1.008
Class 2	35	16	560
Class 3	40	35	1.400

Source: RS. Dian Harapan, Jayapura

Table 6. Electricity Usage Data per Class of Dian Harapan Hospital in 2023

Class Type	Power (KWH/day)	Treatment Day/Year	Consumption/Year (KWH)
VIP Class	28,605	1.411	40.362
First Class	23,022	3.424	78.827
Class 1	27,57	13.665	376.771
Class 2	24,98	5.857	46.308
Class 3	39,94	11.230	448.526

Source: RS. Dian Harapan, Jayapura

Table 7. Meal Rates per Class of Dian Harapan Hospital in 2023

Class Type	Consumption Cost (Rp)
VIP Class	100.000
First Class	85.000
Class 1	75.000
Class 2	60.000
Class 3	50.000

Source: RS. Dian Harapan, Jayapura

Unit Cost Calculation with Activity Based Costing Method

The calculation of ABC in this study was carried out through three main stages, namely the identification of cost activities, the calculation of inpatient room rates using ABC, and the comparison of ABC results rates with the rates that have been set by the hospital.

The first stage is to identify the set of activities associated with costs, which are divided into direct costs (care activities, cleaning activities, patient nutrition activities, and laundry activities) and indirect costs (electricity costs, water costs, facility depreciation, building depreciation, and administrative costs).

Table 8. Classification of Costs for Each Activity of Dian Harapan Hospital in 2023

Activity Elements/Types	Amount (Rp)
Maintenance Activities	5.541.599.915
Electricity	881.528.433
Water	126.942.967
Patient Nutrition Activity	2.644.882.465
Cleaning Activities	423.750.830
Administration	1.403.355.000
Laundry Activities	207.983.074
Facility Depreciation	729.274.073
Building Depreciation	1.294.026.629
Total	13.253.343.385

The next stage is to classify activity costs based on the ABC hierarchy, namely unit activity level (costs that increase/decrease in line with the number of units produced, such as treatment, patient nutrition, electricity, and water), batch level activity (administrative costs), and facility sustaining activity (cleaning costs, laundry, building shrinkage, and facility shrinkage).

Table 9. Classification of Activity Costs Based on ABC Hierarchy

Yes	Activity Type	ABC Hierarchy
1	Maintenance Activities	Unit Level Activity
2	Patient Nutrition Activity	Unit Level Activity
3	Electricity Costs	Unit Level Activity
4	Water Cost	Unit Level Activity
5	Administration Fees	Batch Level Activity
6	Cleaning Activities	Facility Level Activity
7	Laundry Activities	Facility Level Activity
8	Facility Depreciation	Facility Level Activity
9	Building Depreciation	Facility Level Activity

Each activity is then identified with its cost driver as the basis for calculating the rate per unit, as presented in the following table.

Table 10. Activity Data and Cost Drivers

Yes	Activities	Cost Driver
1	Cleaning Activities	Room Size
2	Maintenance Activities	Number of Days of Hospitalization
3	Patient Nutrition Activity	Number of Days of Hospitalization
4	Laundry Activities	Number of Days of Hospitalization
5	Electrical Activity	KWH
6	Water Activity	Number of Days of Hospitalization
7	Building Depreciation Activity	Wide
8	Facility Depreciation Activity	Number of Days of Hospitalization
9	Administrative Activities	Number of Days of Hospitalization

Once the cost driver is determined, the next stage is to calculate the rate per unit by dividing the total cost of the activity by the total cost of the associated driver, as presented in the following table.

Table 11. Determination of Activity Costs Per Unit

Activities	Drive	Quantity (a)	Total Cost (b), Rp	Cost/Unit (c=b:a), Rp
1. Unit Level				
A. Electricity Consumption				
VIP Class	Jml KWH	48.922		
First Class	Jml KWH	78.827		
Class 1	Jml KWH	294.781		
Class 2	Jml KWH	76.024		
Class 3	Jml KWH	111.626		
Total Electricity Consumption		610.181	881.528.433	1.445
B. Water Use				
VIP Class-3	Jml day rwt	1.411 / 3.424 / 13.665 / 5.857 / 11.230		
Total Water Usage		35.587	126.942.967	3.567
C. Nutritional Activities				
Total Nutritional Activity		35.587	2.644.882.465	74.322
D. Patient Care				
Total Patient Care		35.587	5.541.599.915	155.720
2. Batch Level				
E. Administration Fees				
Total Administration Fee		35.587	1.403.355.000	39.434
3. Facility-Sustaining Activity				
F. Cleaning Fee				
Total Cleaning Costs		3.654	423.750.830	115.969
G. Laundry Fee				
Total Laundry Costs		35.587	207.983.074	5.844

Activities	Drive	Quantity (a)	Total Cost (b), Rp	Cost/Unit (c=b:a), Rp
H. Building Depreciation Costs				
Total Building Depreciation		3.654	1.294.026.629	354.140
I. Facility Depreciation Costs				
Total Facility Depreciation		35.587	729.274.073	20.493
OVERALL TOTALS			13.253.343.385	770.934

Note: the breakdown rows per class on each cost component (VIP, Major, Class 1, 2, and 3) have been summarized; the total value of each component is the result of the sum of the entire class.

The final stage is to allocate the cost to the product (inpatient room) with the formula: Overhead Cost (BOP) charged = Rate per unit cost driver × cost driver used. The results of the calculation of cost charges for each room class are presented in the following tables.

Table 12. VIP Class Inpatient Room Rates Using ABC Method

Yes	Cost Component	Cost/Unit (Rp)	Drive	Total Cost (Rp)
1	Cleaning activities	115.969	350	40.589.160
2	Nurse activities	155.720	1.411	219.720.614
3	Patient's nutritional activity	74.322	1.411	104.867.765
4	Laundry activities	5.844	1.411	8.246.385
5	Electrical activity	1.445	48.922	70.677.891
6	Water activity	3.567	1.411	5.033.201
7	Building shrinkage	354.140	350	123.948.911
8	Facility depreciation	20.493	1.411	28.915.214
9	Administrative activities	39.434	1.411	55.642.058

Number of days of treatment (HR): 1,411. Room HP: IDR 466,082. Mark-up (±): IDR 233,041. ABC result room rate: IDR 699,122.

Table 13. First Class Inpatient Room Rates Using ABC Method

Yes	Cost Component	Cost/Unit (Rp)	Drive	Total Cost (Rp)
1	Cleaning activities	115.969	336	38.965.594
2	Nurse activities	155.720	3.424	533.184.537
3	Patient's nutritional activity	74.322	3.424	254.477.128
4	Laundry activities	5.844	3.424	20.011.073
5	Electrical activity	1.445	78.827	113.881.841
6	Water activity	3.567	3.424	12.213.806
7	Building shrinkage	354.140	336	118.990.954
8	Facility depreciation	20.493	3.424	70.167.039
9	Administrative activities	39.434	3.424	135.023.675

Number of days of treatment (HR): 3,424. Room HP: IDR 378,772. Mark-up ($\pm$): IDR 170,447. ABC result room rate: IDR 549,220.

Table 14. Class 1 Inpatient Room Rates Using ABC Method

Yes	Cost Component	Cost/Unit (Rp)	Drive	Total Cost (Rp)
1	Cleaning activities	115.969	1.008	116.896.781
2	Nurse activities	155.720	13.665	2.127.910.834
3	Patient's nutritional activity	74.322	13.665	1.015.604.543
4	Laundry activities	5.844	13.665	79.863.116
5	Electrical activity	1.445	294.781	425.870.660
6	Water activity	3.567	13.665	48.744.644
7	Building shrinkage	354.140	1.008	356.972.863
8	Facility depreciation	20.493	13.665	280.032.883
9	Administrative activities	39.434	13.665	538.872.231

Number of days of treatment (HR): 13,665. Room HPP: IDR 365,223. Mark-up ($\pm$): IDR 109,567. ABC result room rate: IDR 474,790.

Table 15. Class 2 Inpatient Room Rates Using ABC Method

Yes	Cost Component	Cost/Unit (Rp)	Drive	Total Cost (Rp)
1	Cleaning activities	115.969	560	64.942.656
2	Nurse activities	155.720	5.857	912.050.769
3	Patient's nutritional activity	74.322	5.857	435.301.559
4	Laundry activities	5.844	5.857	34.230.389
5	Electrical activity	1.445	76.024	109.831.671
6	Water activity	3.567	5.857	20.892.600
7	Building shrinkage	354.140	560	198.318.257
8	Facility depreciation	20.493	5.857	120.025.803
9	Administrative activities	39.434	5.857	230.967.776

Number of days of treatment (HR): 5,857. Room HP: IDR 363,080. Mark-up ($\pm$): IDR 90,770. ABC result room rate: IDR 453,850.

Table 16. Class 3 Inpatient Room Rates Using ABC Method

Yes	Cost Component	Cost/Unit (Rp)	Drive	Total Cost (Rp)
1	Cleaning activities	115.969	1.400	162.356.640
2	Nurse activities	155.720	11.230	1.748.733.162
3	Patient's nutritional activity	74.322	11.230	834.631.469
4	Laundry activities	5.844	11.230	65.632.111
5	Electrical activity	1.445	111.626	161.266.371
6	Water activity	3.567	11.230	40.058.716
7	Building shrinkage	354.140	1.400	495.795.643
8	Facility depreciation	20.493	11.230	230.133.134
9	Administrative activities	39.434	11.230	442.849.261

Number of days of treatment (HR): 11,230. Room HP: IDR 372,347. Mark-up ($\pm$): IDR 37,235. ABC result room rate: IDR 409,582

Based on the calculation of the cost of inpatient rooms using the ABC method compared to the rate that has been applied by the hospital, there is a significant difference in rates: VIP Class is IDR 400,878, First Class is IDR 400,780, Class 1 is IDR 125,210, Class 2 is IDR 46,150, and Class 3 is minus IDR 28,199. The minus value in Class 3 means that if the hospital sets a margin of 10%, then there is a difference of IDR 28,199, even though nominally Dian Harapan Hospital still gets a profit that is smaller than the expected 10% margin.

Table 17. Difference in Room Rates Using ABC and Rates That Have Been Determined by the Hospital

Room Type	RS Fare (Rp)	ABC Fare (Rp)	Price Difference (Rp)
VIP Class	1.100.000	699.122	400.878
First Class	950.000	549.220	400.780
Class 1	600.000	474.790	125.210
Class 2	500.000	453.850	46.150
Class 3	400.000	428.199	-28.199

This difference in rates is due to the fact that in the traditional method, the cost of each product is only charged to one cost driver and the hospital does not add a mark-up to the room rate, while the ABC method uses more than one cost driver in charging costs so that it is able to distribute activity costs to each room more accurately according to the level of activity utilization by each room.

Comparison of ABC Unit Cost with INA-CBG's Rates in the Top 20 Diagnoses

To analyze the suitability of tariffs, a simulation of ABC-based unit cost calculation was carried out on 20 inpatient diagnoses with the highest number of cases in BPJS patients at Dian Harapan Hospital for the January-December 2023 period, as presented in the following table.

Based on these 20 diagnoses, a comparison was made between the rates of Dian Harapan Hospital (conventional), the rates of INA-CBG's, and the rates of the calculation of the ABC method, as presented in the following table.

Furthermore, a comparison of INA-CBG's tariff with ABC tariff per diagnosis was carried out using the formula: % Difference = ((INA-CBG's Tariff - ABC Tariff) / INA-CBG's Tariff) × 100%, with positive results showing that INA-CBG's tariff is higher than ABC.

There are 13 diagnoses with INA-CBG's rates higher than ABC, with the largest differences in cases of N40 (63.9%), O34.2 (61.8%), P03.4 (51.7%), E11.9 (41.6%), and E11.5 (36.4%). On the other hand, there are 7 diagnoses with INA-CBG's rates lower than ABCs that have the potential to harm hospitals, namely A91 (-57.0%), A09.9 (-30.3%), D64.9 (-27.5%), O80.9 (-24.9%), J18.0 (-13.1%), H11.0 (-5.4%), and J06.9 (-4.3%). In aggregate, the INA-CBG's rate is still 7.37% higher than the ABC-based fee (a total difference of IDR 1,162,196,858), so that the total payment with the INA-CBG's package claim mechanism does not harm Dian Harapan Hospital. However, in 7 diagnoses with lower INA-CBG's payment than ABC, management attention is needed through measures to reduce high costs, for example by monitoring the length of treatment (LOS) and excessive use of drugs/consumables.

Paired Sample t-Test Test Results

A differential test was performed on the difference (d) between the INA-CBG's tariff and the ABC rate at 20 diagnoses (n=20). The total difference (Σd) was IDR 1,162,196,858 with an average difference ($\bar{d}$) of IDR 58,109,843, which means that the

average INA-CBG's rate was IDR 58,109,843 higher than the ABC per diagnosis. The standard deviation difference (Sd) obtained from the calculation of the deviation of each diagnosis was IDR 325,339,626 (rounded to IDR 325,400,000), indicating a considerable variation in the difference between diagnoses.

The value of t is obtained through the formula $t = \bar{d} / (Sd/\sqrt{n})$. With $\sqrt{20} = 4.472$, then $Sd/\sqrt{n} = Rp325,400,000 / 4,472 = Rp72,750,000$, so that t calculation = $Rp58,109,843 / Rp72,750,000 = 0.80$. With the degree of freedom (df) = $n-1 = 19$, the t -value of the table ($\alpha=0.05$, bidirectional) ≈ 2.093 . Because t is calculated ($0.80 < t$ table (2.093)), H_0 is accepted (not rejected), with a significance value (p -value) ≈ 0.43 ($p > 0.05$). These results show that there is no statistically significant difference between the INA-CBG's tariff and the ABC-based unit cost, although on average the INA-CBG's tariff is higher by Rp58,109,843, the difference is not statistically significant due to the considerable variation between diagnoses (high standard deviation).

These results are consistent with the findings of Bachtiar et al. (2019) who show that the ABC method is able to present more accurate and detailed inpatient service costs than traditional methods, because it charges fees based on more than one cost driver. These findings are also in line with the view of Kaplan and Anderson (2003) that ABC is more representative for service organizations with high heterogeneity such as hospitals, as well as the view of Porter and Teisberg (2006) regarding the importance of accurate cost-per-episode calculation of care as a basis for evaluating value-based healthcare and hospital financial sustainability, especially for hospitals in areas with unique operational cost characteristics such as Dian Harapan Hospital, Jayapura.

CONCLUSION

This study found differences in inpatient room rates between the results of the Activity-Based Costing (ABC) calculations and the rates applied by Dian Harapan Hospital across all classes (VIP, First Class, Class 1, Class 2, and Class 3). The most notable difference was observed in Class III, where the existing tariff was lower than the ABC-based calculation, indicating the need for tariff adjustments. The ABC method also generated cost estimates that were lower than hospital tariffs but higher than INA-CBGs tariffs in most cases, suggesting that INA-CBGs reimbursement rates may not fully reflect actual costs and could potentially create financial challenges for hospitals in high-volume diagnoses and cases involving longer lengths of stay.

Overall, among the 20 most frequent diagnoses, INA-CBGs tariffs were 7.37% higher than ABC-based unit costs, with a difference of IDR 1,162,196,858. The results of the paired-samples t -test ($t = 0.80$; $p = 0.43 > 0.05$) indicated that there was no statistically significant difference between ABC-based unit costs and INA-CBGs tariffs, although substantial variations existed among diagnoses. Based on these findings, Dian Harapan Hospital management is recommended to implement the ABC method systematically to provide more accurate and accountable cost information compared with the previous general costing approach. The hospital should also establish more realistic and competitive inpatient room tariffs based on ABC calculations to support service

quality improvement, prepare separate monthly budgets for water and electricity consumption between inpatient units and other operational activities to improve cost control and transparency, and consider tariff adjustments, particularly reductions in VIP Class, First Class, and Class 1 rates that are considered relatively high, while maintaining reasonable mark-ups to ensure operational continuity and sustainable service quality.

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