



COMPARISON OF MEDICAL TREATMENT COST ANALYSIS USING ACTIVITY BASED COSTING AND DOUBLE DISTRIBUTION METHOD: A SCOPING REVIEW

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ABSTRACT

Determining appropriate healthcare service tariffs is essential for hospital management to ensure financial sustainability, accessibility, and quality of care. Accurate tariff setting requires precise unit cost calculations. This study reviews and compares two widely used methods in healthcare cost analysis: Activity-Based Costing (ABC) and Double Distribution (DD). Using a scoping review guided by the PRISMA framework, literature was searched across Google Scholar, PubMed, Scopus, Web of Science, and the Cochrane Library with keywords "Activity-Based Costing," "Clinical Pathway," "Double Distribution," "Financing," and "Hospital," limited to publications from 2019 to 2024. Eleven relevant studies were identified. The findings indicate that the DD method often underestimates costs, as it does not fully account for all healthcare activities, though it is easier to implement and widely used in Indonesia. In contrast, the ABC method provides a more detailed and accurate calculation by linking costs to actual activities, offering greater transparency for decision-making, though it requires comprehensive data and resources. Four studies applied ABC integrated with Clinical Pathways (CP), showing improved cost accuracy, quality control, and efficiency through standardized care processes. Overall, ABC, particularly when combined with CP, demonstrates stronger potential in supporting hospitals to set fairer tariffs and enhance service efficiency compared to the DD method.

Keywords: activity-based costing; clinical pathway; double distribution; financing; hospital

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INTRODUCTION

Determining healthcare service tariffs is one of the key aspects of hospital management. Appropriate tariffs are essential to ensure the financial sustainability of hospitals while also guaranteeing the accessibility and quality of services for patients. In this context, the Activity-Based Costing (ABC) method has emerged as a more effective approach compared to the Double Distribution method in determining the cost and pricing of services (Niasti et al., 2019). A recent study by Usman et al. (2023) demonstrated that the implementation of the ABC method in healthcare organizations can significantly enhance cost management and operational efficiency. By understanding the costs associated with each activity, hospital management can make more informed and strategic decisions in resource management (Usman et al., 2023).

Activity-Based Costing (ABC) is one approach that can be used to determine more accurate healthcare service tariffs. The ABC method identifies various activities involved in the service process and allocates costs based on the resource consumption of each activity. This approach can provide more detailed and accurate cost information compared to the Double Distribution method, thus allowing the established tariffs to reflect the actual costs (Kinanti et al., 2022). In this study, the researchers focus on comparing the use of the Activity-Based Costing (ABC) method and the Double Distribution method in determining costs and tariffs for services in hospitals or other healthcare facilities. The purpose of this research is to provide evidence-based insights that can help

hospital management and policymakers decide which costing method is more suitable for ensuring financial sustainability, accurate tariff setting, and efficient resource allocation.

METHOD

This study employed a systematic review approach to analyze the comparison of unit costs of medical treatment procedures using the Activity-Based Costing (ABC) method and the Modified Double Distribution method. The study followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. The protocol included the research question, inclusion and exclusion criteria, search strategies, data extraction methods, data management strategies, and a data analysis plan (including considerations for meta-analysis where possible and appropriate). The research question addressed in this systematic review was: “How does the unit cost of medical treatment procedures compare between the Activity-Based Costing (ABC) method and the Double Distribution method?”

The literature search was conducted in February 2025 and limited to articles published between 2019 and 2024 using electronic databases including Google Scholar, PubMed, Scopus, Web of Science, and the Cochrane Library. A structured and well-documented search strategy was developed using MeSH terms and keywords, including (but not limited to): “Financing,” “Activity-Based Costing,” “Double Distribution,” “Clinical Pathway,” and other relevant keyword combinations. The search strategy was optimized to maximize both sensitivity and specificity. In this systematic review, the researchers applied strict inclusion and exclusion criteria to ensure that only relevant and high-quality studies were included. The inclusion criteria comprised studies related to medical services, those employing qualitative or quantitative research methods, and those published after the year 2020. The exclusion criteria included studies unrelated to medical services, research using non-empirical methods, and publications dated before 2020.

These criteria were applied uniformly across all databases. However, despite uniform application, several challenges arose in maintaining consistency throughout the selection process. First, the heterogeneity of study designs and methods sometimes made it difficult to determine if all studies strictly met the inclusion criteria. Second, interpretation of the inclusion and exclusion criteria could vary among researchers, potentially causing inconsistencies during selection. Third, human error during the selection process could result in studies that did not meet the criteria being mistakenly included in the review. To address these challenges, a clearly defined and structured research protocol was developed, detailing the inclusion and exclusion criteria. The research team worked collaboratively to ensure that all members understood and consistently applied these criteria. Additionally, a multi-stage selection process was employed, in which studies were screened based on their titles, abstracts, and full texts. A final review was conducted to verify that all selected studies met the inclusion criteria. Despite these challenges, the researchers believe that the measures taken to ensure consistency during the selection process have enhanced the reliability and validity of the systematic review findings.

The inclusion criteria specified that only studies related to medical services, employing either qualitative or quantitative research methods, and published after 2020 were considered relevant for this review. Conversely, studies that did not focus on medical services, those using non-empirical methods, or those published before 2020 were excluded from the analysis. Researchers independently selected studies based on their titles and abstracts. Any disagreements were resolved through discussion or consultation with other researchers. Studies that met the inclusion criteria at this stage were then evaluated based on their full texts. The study selection process was documented using a PRISMA flow diagram. Researchers independently extracted data from the selected studies using a validated data extraction form. The extracted data included study characteristics (study design, sample size, population, year of publication), participant characteristics, methods used, and outcomes (sensitivity, specificity, positive predictive value, negative predictive value, and

accuracy). Any disagreements were resolved through discussion or consultation with other researchers.

This systematic review included studies with various designs. To assess the risk of bias in interventional studies, the researchers used the Cochrane Risk of Bias Tool, which evaluates seven domains of bias: randomization allocation, blinding, incomplete data, group similarity, outcome measurement methods, consistency of intervention, and consistency of control. However, the Cochrane tool is specifically designed for interventional studies. To assess the risk of bias in observational studies, such as cohort and case-control studies, the researchers used the Newcastle-Ottawa Scale. This scale assesses three domains: group selection, group comparability, and data collection. Since the Newcastle-Ottawa Scale was originally intended for observational studies, the researchers adapted it for interventional studies by adding assessment criteria for randomization allocation and blinding, which are two important domains in evaluating bias in interventional research.

Data were analyzed narratively, with descriptions of the findings from each included study. Heterogeneity among studies was explored and explained. If appropriate and feasible, a meta-analysis was conducted using suitable methods to address heterogeneity. Sensitivity analysis was performed to assess the impact of studies with a high risk of bias on the overall results. The results of the systematic review are presented in a structured narrative form, supported by tables and figures summarizing the characteristics of the studies, diagnostic outcomes, and risk of bias assessments. A PRISMA flow diagram illustrates the study selection process.

RESULT

Based on the search results using the predetermined keywords and inclusion criteria, a total of 107 articles were found. After screening the titles, 107 articles were identified as having relevant titles. Further filtering resulted in 18 articles that met the criteria. Upon closer examination, 7 duplicate or identical articles were found, leaving 11 articles to be used and reviewed in this study.

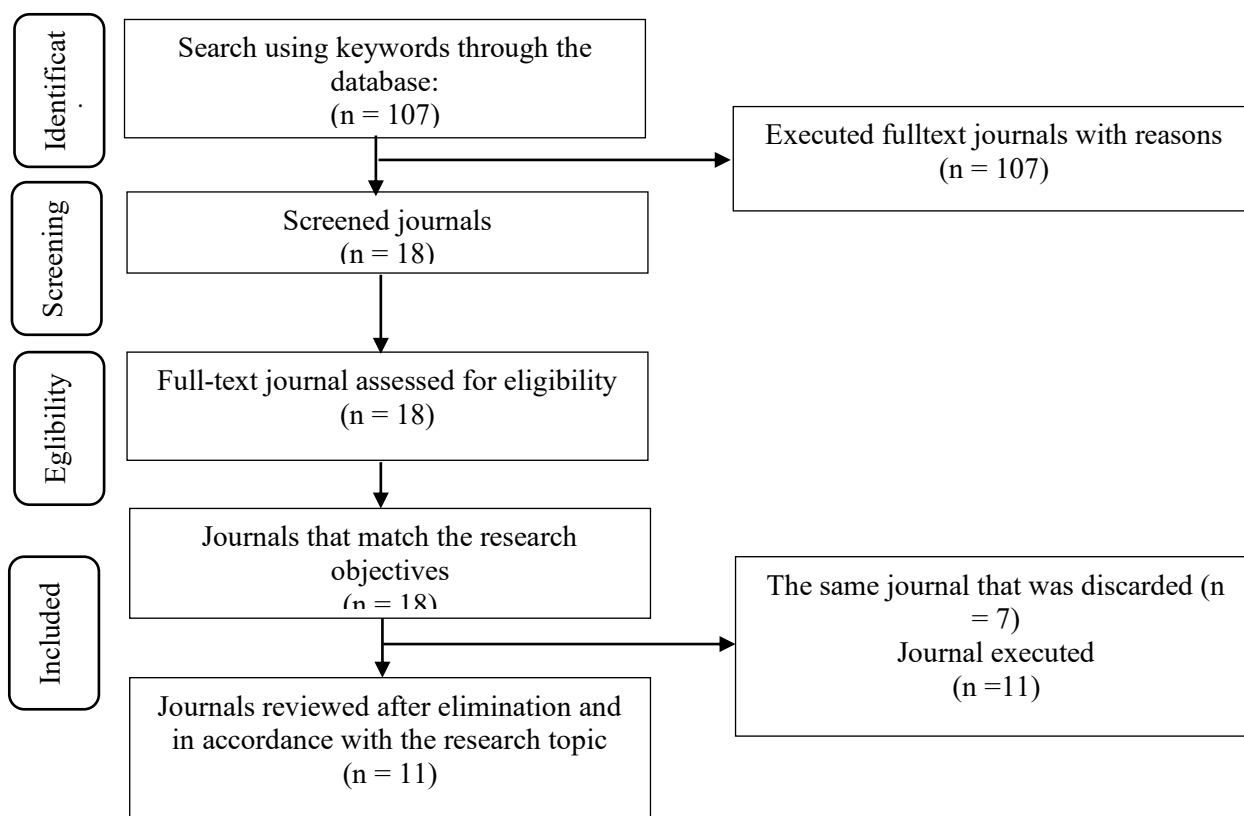


Figure 1. Diagram Alir Tinjauan Literatur Sistematis

Table 1.
Summary of Journals Comparing Unit Cost Analysis of Medical Treatment Using the Activity-Based Costing (ABC) Method and the Double Distribution Method

Title, Author, Year	Objective	Sample	Method	Results
Comparison of Inpatient Service Tariffs Using Traditional Costing and Activity-Based Costing Methods (R.I et al., 2019).	To understand the application of activity-based costing (ABC) in setting inpatient service rates at Hospital XXX, Jambi.	2018 data from a private hospital in Jambi	Quantitative descriptive with a case study design	ABC gave lower rates for VIP, Class I, and II, but higher for Class III. ABC Rates: VIP: Rp 670,435 Class I: Rp 431,491 Class II: Rp 373,275 Class III: Rp 331,508 Pros: Reflects actual resource usage, avoids cross-subsidization, offers transparent and fair data. Cons: Complex, needs complete activity data, trained personnel, and might not always yield lower rates.
Cost Analysis of Inpatient Services Using ABC: A Case Study (Niasti et al., 2019).	To calculate unit costs for inpatient services at RSIA-CA using ABC.	Inpatient activity data for 2020 from RSIA-CA	Descriptive case study	Rates for SVIP, VIP, Class I, and NICU match ABC results, with over 30% profit margin. Class II and III rates are below cost. Examples: SVIP rate: Rp 1,000,000 vs. ABC: Rp 564,532 → large profit Class II rate: Rp 300,000 vs. ABC: Rp 448,891 → potential loss. Pros: Reveals mismatches, supports financial evaluation, helps planning. Cons: Doesn't always lower costs, needs detailed data, unclear CP integration.
ABC Tariff Comparison for Inpatient Services at Ujoh Bilang Community Health Center (Lasah et al., 2024).	Analyze inpatient tariff comparisons at Ujoh Bilang CHC using ABC for 2023.	2023 financial and service data from Ujoh Bilang CHC	Field research	Official 2018 rates don't reflect real costs. ABC gives more accurate rates based on actual activities. Pros: More realistic and transparent, supports rate adjustments. Cons: Final tariff not disclosed; needs complete data, which may be lacking in remote centers.
Implementation of Unit Cost Calculation Using ABC in the Eye Polyclinic (Novianti et al., 2025).	Compare eye polyclinic service tariffs using ABC at Hospital X.	Financial and service data from Hospital X's eye clinic	Qualitative case study	ABC rate for refraction by specialist: Rp 103,903 vs. conventional: Rp 86,400 (higher). Incision: Rp 98,818 vs. conventional: Rp 307,200 (much lower). Pros: Fairer rates based on complexity and resource use. Cons: More complex, could result in higher tariffs for some services.
ABC-Based Tariff Calculation for VIP Inpatient Rooms at Intan Medika Hospital (Indonesia et al., 2024).	Compare VIP inpatient room tariffs using ABC vs. traditional method.	VIP inpatient unit, Intan Medika Lamongan Hospital	Descriptive quantitative	ABC rate: Rp 160,499 vs. hospital rate: Rp 266,000. ABC can attract more patients and improve occupancy. Pros: Competitive, realistic, aids efficiency and marketing. Cons: Requires detailed data; study only covered VIP class.
Cost Analysis of Hemodialysis Sessions Using ABC and Traditional Costing (Turgut et al., 2024).	Determine cost of hemodialysis sessions using ABC vs. traditional costing.	University hospital hemodialysis unit in Turkey	Descriptive cross-sectional	Traditional: \$49.54 ABC: \$41.16 → ABC is more efficient. Pros: Accurate, supports financial control. Cons: Complex, needs detailed data and good systems.
Cost Analysis for Pathology Clinic Services at RSK	Determine unit cost per service in the pathology	Pathology clinic at RSK hospital	Modified step-down or DD method	Blood test: Rp 46,566 Blood bag test: Rp 406,220 Rates are competitive. Pros: Easier implementation,

Title, Author, Year	Objective	Sample	Method	Results
Hospital, Central Java. (Suryawati & Nandini, 2024).	clinic using modified Double Distribution (DD) method.			supports quality and cost control. Cons: Less detailed than ABC, not optimal for waste analysis. Only pathology services assessed.
ABC Cost Analysis for Cardiac Outpatient Services Using Clinical Pathways (Tanjung & Akbar Santana, 2022).	Calculate unit cost of cardiac outpatient care using ABC and Clinical Pathways.	RSUD dr. Slamet Garut, 2021	Clinical Pathway	Total cost: Rp 1,672,986 EKG: Rp 680,234 ECHO: Rp 537,348 Treadmill: Rp 455,404 Pros: Standardized, helps cost and quality control. Cons: Needs complete data, limited to cardiology.
Financial Performance Analysis Using DD and ABC at Kandou Hospital (Pessak et al., 2022).	Analyze financial performance using DD and ABC at the Cardiovascular and Brain Center.	RSUP Dr. R.D. Kandou Manado	Case study	DD underestimates costs compared to ABC. Hospital risks loss; a 16.07% tariff increase suggested using ABC data. Pros: ABC provides realistic view, promotes efficiency. Cons: ABC is complex, DD is easier but less accurate.
Cost Efficiency in Non-Hemorrhagic Stroke Treatment (Paryono et al., 2022).	Analyze actual cost of treating JKN patients with non-hemorrhagic stroke using ABC.	Inpatients with stroke, 2023	Descriptive quantitative	ABC cost = Rp 3,146,184 Hospital tariff = Rp 5,762,965 INA-CBGs tariff = Rp 4,036,200 → Surplus. Pros: Identifies inefficiencies, supports rate review. Cons: Requires strict CP, data systems may be lacking.
ABC Cost Analysis for Uncomplicated Caesarean (ERACS) at RS XY Pati (Purnaningrum & Suryawati, 2024).	Compare unit costs of conventional vs. ERACS C-sections using ABC.	Class III patients at RS XY Pati	Field research with qualitative design	ABC cost for ERACS C-section = Rp 6,298,800 INA-CBGs tariff = Rp 5,130,200 Loss per patient = Rp 1,168,600 Pros: Accurate, reflects real cost, aids financial planning. Cons: Needs complete data, only focuses on Class III.

In hospital financial management, analyzing the unit cost of medical care procedures plays a vital role. The Activity-Based Costing (ABC) method and the Double Distribution (DD) method are two popular approaches used to calculate unit costs. Research findings presented in the table show that ABC and DD offer different approaches in determining the unit cost of medical care procedures.

DISCUSSION

Activity-Based Costing (ABC) Method

The ABC method is a more comprehensive accounting approach compared to traditional methods. It allocates costs based on the activities performed in the patient care process, taking into account all involved activities, including the use of resources such as medical personnel, medications, and equipment. ABC is superior in providing a more accurate and detailed cost overview because it allocates costs based on the specific activities carried out in the patient care process. It considers all activities involved, including the use of resources such as medical staff, pharmaceuticals, and equipment.

A study conducted by Zifi et al. found that ABC resulted in higher tariffs for Class III services compared to the rates set by Hospital XXX in Jambi. This indicates that ABC may account for costs overlooked by traditional methods, which generally sum all fixed, variable, and semi-variable costs and then divide them by the total number of inpatient days. This traditional method assumes that all costs are directly proportional to the number of inpatient days, thereby ignoring specific activities involved in inpatient services, especially for certain patient classes (MP Zifi, ZA Renaldo, 2020). Research by Asmadi et al. also found that unit cost calculations using the ABC method do not always result in lower costs, but the ABC method is more accurate than traditional methods. This

finding highlights that ABC allocates costs more precisely, even though it does not always yield lower costs (Fikri & Rossieta, 2024).

Another study by Novianti Dharma et al. showed that ABC produced lower service rates than conventional methods. This indicates that ABC is more efficient and reflects more accurate resource utilization, making it a solid basis for tariff revisions to ensure fairness and transparency in hospital services (Novianti et al., 2025). However, despite its advantages, the ABC method also has limitations, one of which is complexity. Implementing ABC requires a more detailed and complex recording system and demands investments in information systems and staff training (Lasah et al., 2024).

Double Distribution (DD) Method

The Double Distribution method is a two-step cost allocation process—from one support unit to other support units, and then to production unit. In the first stage, the original costs from a specific support unit are distributed to other support units and production units. As a result, some costs from support units have been distributed to production units, but some remain in the support units—these are the costs they received from other support units (Hani, 2019). These remaining costs are then distributed to the production units in the second stage, ensuring no costs remain in the support units. Because this cost distribution occurs twice, it is referred to as the Double Distribution method (Hani, 2019).

The advantage of this method is that it distributes costs not only to production units but also among support units, establishing a functional reciprocal relationship between them. This method has been commonly chosen for cost analysis in community health centers and hospitals in Indonesia (Hani, 2019). It is simpler in its calculations because it does not consider detailed activity-based data (Pessak et al., 2022). Moreover, it is easier to apply compared to ABC, although it may be less accurate as it does not take into account all the activities involved in patient care.

The DD method is easier to understand and implement, particularly for hospitals that do not have comprehensive recording systems. It also requires lower investment compared to the ABC method. However, it lacks accuracy in determining unit costs because it does not consider every activity involved in the care process. Furthermore, it does not provide detailed information about the activities carried out, making it less useful for effective analysis and decision-making. Based on empirical evidence and comparative analysis, the ABC method proves to be more effective in providing accurate and detailed information on medical care costs. It enables hospitals to set fairer and more efficient service prices and identify areas for efficiency improvement. While the Double Distribution method is easier to implement, it lacks accuracy and does not offer sufficient detail regarding the costs associated with each activity.

In contrast to both methods described above, research by Suryawati & Nandini found that the Double Distribution method can also have a positive impact on quality control and better overall control—however, the Double Distribution method referenced in this study is a modified version. The study also emphasized shifting the focus in healthcare services from volume and efficiency to patient-centered approaches (Suryawati & Nandini, 2024). Suryawati and Nandini used a modified Double Distribution or "step-down" method to calculate the unit cost of pathology clinic services at "RSK" Hospital. This method shows potential to be effective in both quality and cost control. The concepts of Quality Control and Cost Control can be explained as follows:

1. Quality Control is a series of processes and actions designed to ensure that healthcare services meet certain standards, including compliance with medical protocols, competency of healthcare personnel, and patient satisfaction.
2. Cost Control is a managerial approach in healthcare aimed at managing expenditures while maintaining the quality of services (Wahidah & Yusuf, 2022).

Implementing Quality and Cost Control in healthcare involves performance evaluation, resource optimization, and continuous quality improvement. One example is the standardization of services, such as the use of a drug formulary, to control costs and maintain service quality. Thus, based on Suryawati & Nandini's research, it can be concluded that the modified Double Distribution method has potential as an effective tool to produce more accurate cost data compared to the traditional DD method. It is also easier to implement than the ABC method, which requires more extensive data and resources.

From the above data, it can be observed that there is a tendency for the unit cost calculated using the ABC method to be higher than that calculated using the DD method. This is supported by research from Pessak et al., which showed that medical procedure cost calculations using the DD method tend to be under-costed compared to the ABC method. This is because the ABC method takes into account a wider range of activities and associated costs, resulting in a more comprehensive and accurate cost estimation.

It is also important to note that out of the nine studies presented, not all were based on the use of Clinical Pathway (CP). Only four studies—by Asmadi, Rahmawati, Akbar, Hidayaturrahmi (2023), Tanjung & Junior (2022), Mubarok et al. (2024), and Purnaningrum et al. (2024)—used ABC based on Clinical Pathway to analyze unit costs for outpatient services with heart disease diagnoses. Ideally, the ABC method should be based on clinical pathways, because ABC integrated with CP can effectively demonstrate both quality and cost control in healthcare settings. This method provides more accurate cost information and helps identify sources of inefficiency in the care process. CP also helps optimize care delivery by standardizing procedures, identifying sources of waste, and improving efficiency (Tanjung, R., & Junior, A. S. (2022). However, implementing the ABC method requires complete and reliable data, as well as adequate funding and robust financial accounting. This is because the ABC method demands more data and resources to identify and track all activities associated with healthcare services.

CONCLUSION

This scoping review demonstrates that the Activity-Based Costing (ABC) method tends to produce higher unit costs compared to the Double Distribution (DD) method. This is due to ABC's more detailed approach in calculating costs based on actual activities occurring within the healthcare service process. In contrast, the DD method often results in undercosting, as it does not account for all service activities. Although DD is simpler and easier to apply in healthcare facilities with limited data, ABC is superior in terms of accuracy and supports decision-making based on real cost data. Furthermore, the integration of the ABC method with Clinical Pathways (CP) has been shown to strengthen quality control and cost efficiency, although its implementation requires a well-prepared information system and adequate resources. Therefore, for more accurate and fair pricing—particularly in inpatient and outpatient services based on clinical standards—the ABC method, especially when integrated with CP, is recommended. However, the DD method (particularly its modified version) remains relevant for use in contexts with limited information systems, with a continued emphasis on gradually improving cost accuracy.

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