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Comparing Unit Costs, INA-CBGs, and Hospital Tariffs in Indonesia: A Literature Review

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ABSTRACT

The implementation of the National Health Insurance (JKN) program aims to provide equitable access to healthcare for all Indonesians. The JKN financing system uses a prospective payment model based on INA-CBGs tariffs. However, studies indicate discrepancies between the unit cost incurred by hospitals and the INA-CBGs tariffs, potentially causing financial losses for hospitals. This study aims to review the literature on the comparison between unit costs, INA-CBGs tariffs, and hospital tariffs, as well as analyze the Cost Recovery Rate (CRR) indicator. Seventeen studies were reviewed, covering various types of services. Findings show that most services, especially outpatient services such as hemodialysis and surgeries, have unit costs higher than INA-CBGs tariffs. This study recommends strengthening hospital efficiency strategies by calculating unit costs using the Activity-Based Costing (ABC) method integrated with clinical pathways. BPJS Kesehatan should also evaluate the INA-CBGs tariff structure to align payments with actual service costs.

1. Introduction

Universal Health Coverage (UHC) in Indonesia aims to provide equitable access to healthcare services for all Indonesian citizens without imposing financial burdens on patients. The National Health Insurance Program (JKN), managed by BPJS Kesehatan since 2014, is responsible for healthcare financing and ensuring adequate medical services are available to all levels of society. As of June 30, 2025, the BPJS Kesehatan membership data shows a coverage of 98.6%. The JKN financing system uses a prospective payment method based on the INA-CBGs (Indonesian Case-Based Groups) tariff, which sets prices for each diagnosis or medical procedure (Alrianto & Pieter, 2021; Mulyadi et al., 2025). Although JKN's primary goal is to improve access to healthcare, there is often a mismatch between the unit cost incurred by hospitals and the payment received through INA-CBGs. This mismatch has the potential to cause hospitals to incur operational losses because the costs are not aligned with the payments received (Mulyadi et al., 2025).

The discrepancy between unit costs and INA-CBGs tariffs poses a serious financial challenge for hospitals in Indonesia. Several studies show that the INA-CBGs tariffs are lower than the unit costs incurred by hospitals to provide healthcare services, making it difficult for hospitals to cover their operational costs. A study by Khoiriyati and Hafni (2023) found that the unit cost for hemodialysis services is higher than the INA-CBGs tariff, leading to financial losses for the hospital.

Cost efficiency becomes a crucial aspect of hospital management, particularly due to the limited resources available in the healthcare sector. Hospitals need to manage costs efficiently to provide quality services without burdening their financial situation. Therefore, unit cost assessment is key to evaluating the sustainability of hospital operations (Nasution et al., 2022). Calculating unit costs allows hospitals to determine in detail the expenses required for each type of healthcare service, enabling them to adjust the tariffs accordingly to match the actual costs incurred (Verdika et al., 2022). Hospitals need to evaluate their unit costs against the applied INA-CBG tariffs and develop strategies to adjust expenses to cover the differences caused by tariff discrepancies.

Although numerous studies document mismatches between hospital unit costs and INA-CBGs, the evidence remains fragmented across single services or facilities and seldom provides an integrated mapping at the

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diagnosis/procedure level. The objective of this study is to review research findings analyzing unit costs, hospital tariffs, and INA-CBGs. This study will also assess the Cost Recovery Rate (CRR) as an indicator of efficiency and financial sustainability for hospitals facing the financial challenges of the INA-CBGs system. Furthermore, this study will map the unit costs for each diagnosis and procedure against the INA-CBGs tariffs to illustrate the differences between the costs incurred by hospitals and the payments received through the JKN financing system.

2. Theory

2.1. Universal Health Coverage (UHC)

Universal Health Coverage (UHC) is a health system goal that ensures every individual has access to comprehensive services including preventive, promotive, curative, rehabilitative, and palliative care without experiencing financial hardship. UHC aims to reduce inequities in access to care, particularly among low-income and vulnerable populations. In Indonesia, UHC has been implemented since 2014 through the National Health Insurance program (Jaminan Kesehatan Nasional, JKN), administered by BPJS Kesehatan under the mandate of UU No. 24 of 2011.

2.2. JKN Financing Mechanism in Indonesia

Under JKN, financing is based on INA-CBGs (Indonesian Case-Based Groups), a prospective payment system that sets tariffs for each diagnosis or medical procedure before services are delivered (Agustina et al., 2019). This approach provides cost certainty**,** reducing the unpredictability inherent in traditional payment models; limits over-billing and upcoding through predetermined tariffs; and encourages more efficient resource use**.** Despite these advantages, prospective payment faces several challenges. Standardized tariffs may not fully reflect actual costs for a given episode of care, creating potential losses when expenditures exceed reimbursement. Tariff rigidity can insufficiently account for case complexity, leading to underpayment. Moreover, the transition from retrospective to prospective payment requires substantial operational adjustments for hospitals and patients alike, including changes to administrative procedures and strict adherence to applicable regulations(Maharani et al., 2024).

2.3. Unit Cost, INA-CBGs Tariffs, Hospital Tariffs, and Cost Recovery Rate (CRR) in the Context of JKN Financing

Unit cost refers to the total cost required to produce a single unit of a specific service. The calculation of unit cost considers not only direct costs, such as the cost of medications, medical equipment, and medical personnel, but also indirect or overhead costs, which include facility maintenance, administration, and other utilities (Nadhiasari et al., 2025; Than et al., 2017). The unit cost calculation allows hospitals to understand the costs incurred in providing healthcare services, which is an essential foundation for financial and operational management. Hospital tariffs can also be set based on the unit cost, with an added profit margin.

The financing for BPJS Kesehatan participants in hospitals uses a prospective payment system based on INA-CBGs tariffs. INA-CBGs is a payment system based on specific diagnosis and procedure groups (Happy, 2018). Under this system, the payment is fixed according to the tariffs classified by the patient's diagnosis, requiring hospitals to manage operational costs efficiently to avoid deficits caused by actual costs exceeding the INA-CBGs payments.

The Cost Recovery Rate (CRR) indicator can be used to evaluate a hospital's ability to cover service costs through INA-CBGs payments. In this study, CRR is calculated by comparing revenue from INA-CBG tariffs to service costs, which are calculated using the unit cost method. The CRR formula is as follows:

$$\text{CRR} = \left(\frac{\text{Payments Received from JKN (INA-CBGs)}}{\text{Total Unit Cost}} \right) \times 100\%$$

Figure 1. CRR formula in the context of JKN financing.z

A CRR value above 100% indicates that the hospital generates a surplus or higher revenue compared to its unit cost; a CRR value of 100% indicates a break-even point. In comparison, a CRR value below 100% indicates a deficit, meaning that the INA-CBGs payment is insufficient to cover the service unit cost (Rahayu et al., 2023). The CRR indicator can be an essential tool for hospital management to evaluate financial efficiency in service operations under the JKN system.

3. Research Method

This study employed a literature review method by examining relevant scientific sources concerning hospital unit costs, INA-CBGs tariffs, and hospital tariffs in Indonesia. The literature review was selected because it provides a comprehensive understanding of unit-cost calculation methods and their comparison with INA-CBGs and hospital tariffs, as well as the implications for financial sustainability. The literature sources included journals, reference books, and official institutional reports (e.g., BPJS Kesehatan, Ministry of Health) addressing topics related to hospital costing, reimbursement, and health financing.

The process of literature collection was carried out by selecting publications published from 2020 to 2025. Literature searches were conducted using academic databases such as Google Scholar, PubMed, ScienceDirect, supplemented by institutional and healthcare repositories. The inclusion criteria consisted of literature that directly reported or analyzed unit costs and compared them with INA-CBGs and/or hospital tariffs.

4. Results

4.1 Characteristics of the Literature

A total of 17 articles were reviewed and published between 2020 and 2025. These literatures discuss unit

cost, hospital tariffs, and INA-CBG tariffs. Of the 17 literatures, 15 diagnoses or procedures are discussed, with nine studies focusing on inpatient services and eight studies focusing on outpatient services. The hospitals analysed include 1 type A hospital, 5 type B hospitals, 6 type C hospitals, and 4 type D hospitals. One study did not specify the type of hospital analyzed. Regarding hospital ownership, five hospitals are public and 10 are private, while two studies did not mention the ownership status of the hospitals.

4.2 Analysis of Unit Cost Against INA-CBGs

The analysis results show that the majority of studies report unit costs higher than the INA-CBGs tariffs. Of the 20-unit cost calculations reviewed, 11 studies indicate that the unit cost is higher than the INA-CBGs tariff, which potentially leads to underpayment risks for hospitals (Astuti, 2020; Ridwan et al., 2024). These findings suggest that hospitals bear costs that are not fully compensated by the INA-CBGs tariff system.

Eight studies show that the unit cost is below the INA-CBGs tariff, indicating that hospitals still generate a profit margin. Research by Astuti (2020) shows varying results based on the class of care, where the unit cost for core needle biopsy is higher than the INA-CBGs tariff in classes 3 and 2, but lower in classes 1 and VIP. Adjusting tariffs based on service classes directly impacts the financial margin of hospitals. Ridwan et al (2024) concluded that an increase in service class is generally followed by a positive gap between the INA-CBGs tariff and unit cost, resulting in a larger margin.

This discrepancy highlights the need to evaluate the INA-CBGs tariff structure to better reflect healthcare facilities' actual costs. The misalignment of these tariffs can disrupt hospitals' financial sustainability, especially if not accompanied by effective cost control strategies and operational efficiency improvements.

4.3 Analysis of Unit Cost Against Hospital Tariffs

Most studies comparing unit costs with internal hospital tariffs found that the unit cost was below the established tariff. Twelve studies showed a Cost Recovery Rate (CRR) greater than one, indicating that hospitals are able to generate sufficient revenue to cover service costs and create a surplus (Khoiriyati & Hafni, 2023; Mulyadi et al., 2025). This suggests that the internal tariff setting has adequately accounted for the cost structure.

However, four studies revealed that the unit cost was higher than the hospital tariff (Table 4.1). These four studies were conducted on outpatient services, both in private and public hospitals (Fibionisa et al., 2023; Rhegy Seno Pratama et al., 2025). Factors influencing this discrepancy include outdated tariffs, the absence of a tariff-setting program in hospitals, and the use of regional regulations (PERDA) for tariff setting, which do not reflect all hospital costs (Fibionisa et al., 2023; Khoiriyati & Hafni, 2023; Mulyadi et al., 2025). This misalignment highlights the challenges in tariff setting for outpatient services, which may lead to deficits if not properly evaluated and adjusted.

In the studies reviewed, INA-CBGs' tariffs are generally lower than the tariffs applied by hospitals. This discrepancy can reduce hospital revenue and calls for cost-efficiency strategies and adaptive internal tariff policies. Hospitals need to strengthen financial governance to reduce dependence on fixed tariffs from third parties and maintain service sustainability.

4.4 Analysis of CRR Unit Cost Against INA-CBGs Tariffs Based on Diagnosis or Procedure in Outpatient Services

The analysis of the Cost Recovery Rate (CRR), which compares unit cost to INA-CBGs tariffs in outpatient services, shows that most diagnoses and procedures have a CRR below one (Table 4.2). This indicates that hospitals are experiencing financing deficits for these services. The CRR values found include hypertension at 0.78; simple odontectomy at 0.68; echocardiography at 0.39; and the lowest being post-operative wound care for caesarean section at 0.29 (Table 4.2).

The most studied outpatient procedure in this research is hemodialysis for patients with chronic kidney disease. Three studies showed that the unit cost for hemodialysis is lower than the INA-CBGs tariff, with a CRR <1, indicating potential losses for the hospital in providing these services (Fibionisa et al., 2023; Khoiriyati & Hafni, 2023; Verdika et al., 2022). The most significant cost in hemodialysis services comes from direct costs, particularly BMHP *(Bahan Medis Habis Pakai)* and AMHP *(Alat Medis Habis Pakai),* which account for 67.33% of total costs (, (Khoiriyati & Hafni, 2023). Verdika et al. (2022) also stated that BMHP costs in a partnership operational scheme (KSO) are the most significant component of direct costs. Overhead costs also contribute to the discrepancy between unit costs and INA-CBGs tariffs, with the most significant proportion coming from human resources (HR) costs (Fibionisa et al., 2023; Khoiriyati & Hafni, 2023; Verdika et al., 2022). One factor contributing to high HR costs, according to Fibionisa et al. (2023) is the number of employees exceeding the calculated staffing needs. Fibionisa et al. (2023) also recommended using dialyzer reuse to reduce hemodialysis service costs. The low unit cost compared to the INA-CBGs tariff makes it essential for hospitals to implement quality control and cost management (KMKB) to ensure cost efficiency without reducing the quality of hospital services.

The most profitable outpatient procedure in this literature review is medical rehabilitation for Low Back Pain (LBP), with a CRR of 1.31. The hospital has effectively implemented clinical pathways (CP), focusing on cost efficiency, which is the key factor in successfully controlling costs for this program. This strategy proved effective with a profit margin of 24% from BPJS-funded LBP rehabilitation services (Ahmadah et al., 2024).

4.5 Analysis of CRR Unit Cost Against INA-CBGs Tariffs Based on Diagnosis or Procedure in Inpatient Services

Most literature on inpatient services focuses on procedures in obstetrics and gynecology (Table 4.3). Three studies analyzing unit cost calculations for caesarean section (SC) procedures show varying results. Two studies conducted by Sugianto et al. (2024) and Ridwan et al. (2024) report CRR values below one, indicating that hospitals are at risk of incurring losses in the implementation of these procedures

Table 4.1 List of Studies with Unit Cost Higher Than Hospital Tariffs

No	Author(s) (Year)	Unit Cost	Hospital Tariff	Findings
1	Fibionisa et al. (2023)	IDR 927,555	IDR 800,000	- Hospital tariff lower than unit cost and INA-CBG tariff. - Tariff not optimized as the last tariff evaluation was in 2013, requiring tariff reassessment.
2	Pratama et al. (2025)	IDR 1,087,623	IDR 700,000	- Unit cost significantly higher than tariff, requiring a review of financing strategy and resource efficiency due to the discrepancy of IDR 387,623.
3	Khoiriyati & Hafni (2023)	IDR 1,091,641	IDR 1,040,000	- Hospital faces under costing and risks operational losses in hemodialysis services. - Negative discrepancy between hospital tariff and unit cost due to lack of tariff-setting program.
4	Mulyadi et al. (2025)	IDR 689,150	IDR 255,000	- Hospital tariff setting using regional regulations (PERDA) results in inadequate tariffs that do not reflect all costs.

Table 4.2 List of Studies Comparing Unit Cost Against INA-CBGs Tariff or CRR in Outpatient Services

No	Author(s) (Year)	Diagnosis/Procedure	CRR	Findings
1	Fibionisa et al. (2023)	Chronic Kidney Disease / Hemodialysis	0.95	- Unit cost higher than INA-CBGs tariff. - The largest cost is staff expenses, with the number of staff exceeding calculated staffing needs. - The hospital requires KMKB to be cost-efficient without compromising service quality. - Reuse of dialyzer is recommended to reduce hemodialysis costs.
2	Ahmadah et al. (2024)	Medical Rehabilitation for Low Back Pain (LBP)	1.31	- Implementation of Clinical Pathway (CP) is crucial for achieving a 24% profit margin in BPJS-funded LBP rehabilitation services.
3	Fuad et al. (2021)	Hypertension	0.78	- The largest variable cost is direct costs, particularly medication. The second-largest cost is medical services fees. - The largest fixed cost is depreciation on building investments.
4	Verdika et al. (2022)	Chronic Kidney Disease / Hemodialysis	0.93	- The largest cost is direct costs for BMHP in KSO. - The largest overhead costs are labor-related (HR costs) in hemodialysis services.
5	Pratama et al. (2025)	Echocardiography	0.39	- Unit cost significantly higher than INA-CBGs tariff.
6	Khoiriyati & Hafni (2023)	Chronic Kidney Disease / Hemodialysis	0.86	- The largest expenditure is on BMHP-AMHP, accounting for 67.33%. - The discrepancy between unit cost and INA-CBGs tariff is due to the largest overhead costs being HR costs.
7	Mulyadi et al. (2025)	Post-Caesarean Wound Care	0.29	- A negative discrepancy between INA-CBGs tariff and unit cost indicates that the hospital risks losses if it relies solely on INA-CBGs payments.
8	Dewi et al. (2021)	Simple Odontectomy	0.68	- A negative discrepancy between INA-CBGs tariff and unit cost indicates the risk of underpayment by BPJS. - Efficiency can be achieved in radiology and control components, but not in the main procedure.

Table 4.3 List of Studies Comparing Unit Cost Against INA-CBGs Tariffs or CRR in Inpatient Services

No	Author(s) (Year)	Diagnosis/Procedure	Class	CRR	Findings
1	Astuti, I. Y. (2020)	Core Needle Biopsy (CNB)	3	0.91	- CRR increases with higher class. - The largest indirect cost is staff expenses.
			2	0.98	
			1	1.06	
			VIP	1.30	
		Radio Frequency Ablation (RFA)	3	1.37	
			2	1.38	
			1	1.40	
			VIP	1.46	

No	Author(s) (Year)	Diagnosis/Procedure	Class	CRR	Findings
2	Basya, F. A., et al. (2023)	Normal Delivery Sectio Caesarea (SC)		1.01 1.61	- Significant difference between INA-CBGs tariff and hospital tariff. - SC is more profitable than normal delivery.
3	Saripantung, J. S., et al. (2025)	Bronchopneumonia		0.94	- Unit cost higher than INA-CBGs tariff (negative discrepancy of IDR 298,236 or -6.2%). - Most class 3 and JKN patients have unit costs higher than INA-CBGs tariffs.
4	Firdaus, Y., et al. (2024)	Normal Delivery Curettage		0.99 1.06	- INA-CBGs payment does not meet the hospital's margin target of 30%.
5	Mubarok, C., et al. (2024)	Non-Haemorrhagic Stroke		1.28	- Clinical pathways are essential for improving cost efficiency and service quality. - Optimization of overhead cost recording is necessary for better accuracy.
6	Sugianto, S., et al. (2024)	Sectio Caesarea (SC)		0.96	- One reason for high unit costs is that healthy newborns receiving essential neonatal services are paid as a package without special resource needs. - LOS efficiency can be achieved by switching to ERACS, reducing linen, EMR, and medical services.
7	Nadhiasari, A., et al. (2025)	Chronic Heart Failure		1.11	- The hospital is efficient in treating heart failure patients, but further analysis is needed to optimize costs and revenue.
8	Nasution, M. A. S., et al. (2022)	Lithotripsy for Urinary Bladder Stones		1.47	- The largest cost is urologist and anaesthesiologist fees. - Adherence to clinical pathways and proper medication use significantly affect cost efficiency and quality of service in lithotripsy for BPJS class III patients.
9	Ridwan, D. D., et al. (2024)	Sectio Caesarea (SC)	3 2 1	0.55 0.61 0.67	- Class III shows the largest tariff discrepancy between hospital tariff and INA-CBGs tariff. - CRR increases with higher class. - Operational efficiency or redefining the JKN service package is necessary.

Sugianto et al. (2024) associated the high unit cost with the policy of BPJS Kesehatan through Regulation Number 03 of 2018, which stipulates that maternity services and healthy newborn care are reimbursed as a single package without taking into account the need for specific resources. Another factor is the cost for obstetricians, anesthesiologists, pediatricians, and midwives, which accounted for 41% of the total cost, whereas it should only account for 34% of the total INA-CBGs tariff. Sugianto et al. (2024) also suggest that length of stay (LOS) efficiency could be achieved by adopting the enhanced recovery after caesarean section (ERACS) method, which can reduce linen, electronic medical records (EMR), and medical services used. In contrast, a study by Basya et al. (2023) found a CRR above one, indicating a positive margin. This study used an Activity-Based Costing (ABC) approach based on clinical pathways (CP), demonstrating that operational efficiency can be achieved despite a significant difference between unit costs and hospital tariffs based on statistical tests.

Normal delivery procedures showed a CRR close to one. Basya et al. (2023) reported a CRR of 1.01, while Firdaus et al. (2024) reported a CRR of 0.99, indicating that revenue nearly matches the costs incurred. Curettage procedures in Firdaus et al. (2024) had a CRR of 1.06, reflecting a positive margin, albeit low, under 10%. However, on September 6, 2024, based on a recommendation from the Mojokerto branch of the KMKB team (No. 1775/VII-10/0924), curettage procedures without complications or comorbid factors were recommended to be claimed as outpatient services. This recommendation presents a challenge for hospitals in efficiently managing curettage procedures.

The highest CRR found in the literature is for lithotripsy procedures, with a value of 1.47, as reported by Nasution et al. (2022). The largest cost in this procedure comes from the urologist and anesthesiologist fees. Adherence to clinical pathways and the use of medications according to formularies are key factors influencing cost efficiency and service quality. Another procedure with a high CRR is Radio Frequency Ablation (RFA), which has a CRR ranging from 1.37 to 1.46 depending on the level of care (Astuti, 2020). Inpatient procedures for non-hemorrhagic stroke also show good profitability, with a CRR of 1.28, indicating a profit margin above 25% (Mubarok Mubarok et al., 2024).

Other procedures show varying results depending on the level of care. For instance, core needle biopsy has a CRR between 0.91 and 1.30, where class 1 and VIP show a positive margin (Astuti, 2020). Procedures for chronic heart failure have a CRR of 1.11 (Nadhiasari et al., 2025), while bronchopneumonia shows a CRR of 0.94, indicating that the hospital incurs losses for this service (Saripantung et al., 2025).

4.6 Managerial Implications and Policy

In facing the financing challenges under the National Health Insurance (JKN) scheme, hospitals need to strengthen their internal cost calculation systems using the Activity-Based Costing (ABC) approach. This approach is considered more accurate than traditional methods, particularly in hospitals that offer various types of services. Operational efficiency must be a priority, especially in managing length of stay (LOS), human resource allocation, overhead cost control, and optimizing the use of BMHP (Bahan Medis Habis Pakai). A study by Iroth, Dwidayati, and Firmansyah (2016) at RS Bethesda Yogyakarta demonstrated that the implementation of a clinical pathway for acute ischemic stroke patients significantly reduced treatment costs, from IDR 10,659,617 to IDR 8,212,656.

The government needs to consider revising INA-CBGs tariffs to better reflect actual costs, as hospitals require substantial overhead costs, particularly for human resources, due to the high complexity of services. The integration of costing systems with service quality is also crucial. This can be achieved through the implementation of clinical pathways, which include quality control and cost management elements. Research by Rumbold (2010) supports this approach, showing that clinical pathways enhance cost efficiency and service quality, reduce variability in care processes, and improve compliance with medical protocols, ultimately contributing to cost control and improved healthcare service quality.

4.7 Research Limitations

The existing research has several key limitations that affect the comparison between unit costs, hospital tariffs, and INA-CBGs. Variations in the methods used to calculate unit costs and different cost drivers are factors influencing the accuracy of the results. Differences in the use of Activity-Based Costing (ABC) and Time-Driven ABC in various studies may impact the accuracy of unit cost calculations, leading to inconsistencies in the findings (Nasution et al., 2022; Susanti Sugianto et al., 2024). Furthermore, limited data on hospital type and ownership restricts the understanding of external factors that could influence unit costs and hospital tariffs. The researchers' accuracy in reporting this data significantly affects the validity of the analysis and makes the comparison less comprehensive (Firdaus & Ramadhan, 2024; Khoiriyati & Hafni, 2023).

Longitudinal research that tracks changes in unit costs and hospital tariffs over time would be more effective in illustrating the impact of tariff policies and operational efficiency on hospital performance in the long term. Long-term studies would also provide a clearer picture of how adjustments to INA-CBG tariffs or other policies affect hospital financial performance year by year (Susanti Sugianto et al., 2024). The accuracy of data collection in longitudinal studies is also a crucial factor that will impact the validity of the research results (Nasution et al., 2022).

5. Discussion and conclusion

The results of this literature review indicate that the majority of hospital services have unit costs higher than INA-CBGs tariffs, which poses a risk of financial losses. This discrepancy is reinforced by CRR analysis (<1), particularly in outpatient services such as hemodialysis and minor surgical procedures. However, some procedures, such as medical rehabilitation and lithotripsy, show CRRs >1, reflecting cost efficiency. This efficiency is generally achieved through calculating unit costs using the Activity-Based Costing (ABC) method integrated with clinical pathways. Therefore, hospitals need to strengthen their internal efficiency strategies includes minimizing unnecessary treatments and the overuse of medical consumables (BMHP), and re-evaluating indirect costs and staffing requirements so that overhead and personnel expenses do not place additional financial strain on the organization, while the government needs to evaluate the INA-CBGs tariff structure to reflect the actual service costs better.

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