

A Comparative Analysis of INA-CBG's Tariffs and Actual Costs among Inpatients with Type 2 Diabetes Mellitus at Bhakti Wira Tamtama Hospital

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Abstract

Type 2 diabetes mellitus is a chronic disease that requires long-term care and incurs significant healthcare costs. In Indonesia, the healthcare financing system uses the Indonesian Case-Based Group (INA-CBG) scheme as the basis for reimbursement of inpatient services. However, there are concerns that actual costs incurred by hospitals may exceed payments made through the INA-CBG scheme. This study aims to compare actual healthcare costs with INA-CBG rates for inpatients with type 2 diabetes mellitus. This study used a descriptive quantitative approach with a retrospective method based on medical records and financial reports. The results showed a significant difference between actual costs and INA-CBG's with $p = 0.000$, and an average difference of negative IDR1,946,238. Factors that influence the actual costs of type 2 diabetes mellitus patients at Bhakti Wira Tamtama Hospital are LoS, severity, and number of comorbidities.

Key words: Actual cost, INA-CBG's, healthcare financing, Type 2 diabetes mellitus

Introduction

Diabetes mellitus is a chronic, non-communicable disease characterized by elevated blood glucose levels above normal (PERKENI, 2021). Type 2 diabetes mellitus is a chronic metabolic disease characterized by elevated blood glucose levels due to reduced insulin sensitivity or insufficient insulin production. According to the International Diabetes Federation (IDF) 2025 report, more than 500 million

adults aged 20 to 79 worldwide are living with diabetes. Of these, more than 90% are type 2 diabetes mellitus cases (IDF, 2025). By 2024, approximately 20 million Indonesians aged 20-79 will have type 2 diabetes mellitus, with a prevalence of more than 10% (IDF, 2025). According to data from the Central Java Provincial Health Office, the number of diabetes mellitus sufferers in Central Java reached approximately 600,000 in 2023. In Semarang City, more than 40,000 people were recorded as having diabetes mellitus. This figure ranks first among 34 districts/cities in Central Java (Dinkes Provinsi Jawa Tengah, 2024). Diabetes mellitus contributes significantly to mortality and morbidity and requires lifelong therapy to manage the disease and prevent complications, thus imposing a significant economic burden.

Treatment of type 2 diabetes mellitus requires long-term therapy that includes the use of oral antidiabetic drugs, regular blood glucose monitoring, and patient education. This ongoing treatment has a direct impact on health care costs, which are included in the real costs (Wahyudi *et al.*, 2024). Estimated annual costs based on previous research at the Bima Regency General Hospital in 2020 showed that the cost of treating type 2 diabetes mellitus at the moderate severity level (E-4-10-II) and severe severity level (E-4-10-III) caused a deficit because the real costs exceeded the established tariffs of the Indonesia Case Based Groups (INA-CBGs) (Oktadiana, 2021).

The discrepancy between actual costs and the INA-CBG rates reflects how the real cost of caring for type 2 diabetes patients involves various important components. Patients' financial constraints, due to high medical costs, often hinder them from receiving optimal care. Meanwhile, for the healthcare system, rising prices for drugs, medical devices, and consumables require it to continue providing services without incurring excessive cost burdens. The significant cost of treatment, especially for patients with complications, can affect the suitability of the INA-CBG rates as a reference for healthcare financing. This discrepancy has the potential to lead to a shortage of funds for healthcare facilities to cover actual care costs. Evaluating the relationship between actual costs and INA-CBG rates is crucial.

Methods

This study is a non-experimental observational study with a retrospective design and a cross-sectional approach. The study was conducted at Bhakti Wira Tamtama Hospital by collecting data on inpatients participating in the National Health Insurance (JKN) with a diagnosis of Type 2 Diabetes Mellitus in the period March–December 2025. A sample that met the inclusion criteria was 100 patients. The data obtained were then processed to describe the comparison of real costs and INA-CBGs using SPSS. The initial stage included testing the normality of the data using the Kolmogorov-Smirnov method. This was then continued with the Mann-Whitney, Wilcoxon, and Kruskal Wallis tests.

Results and Discussion

a. Characteristics of Type 2 Diabetes Mellitus Patients at Bhakti Wira Tamtama Hospital

Table 1. Characteristics of Type 2 Diabetes Mellitus Patients at Bhakti Wira Tamtama Hospital in 2025

Karakteristik Pasien	Jumlah (n)	Persentase (%)
Gender		
Male	37	37
Female	63	63
Age (years)		
15-24	0	0
25-34	4	4
35-44	4	4
45-54	24	24
55-64	41	41
≥ 65	27	27
LoS (day)		
<4	36	36
≥4	64	64
Inpatient class		
I	11	11
II	24	24
III	65	65
Severity Level		
Mild	83	83
Moderate	17	17
Severe	0	0
Number of Comorbidities		
No Comorbidity	7	7
1 Comorbidity	45	45
2 Comorbidities	39	39
3 Comorbidities	7	7
4 Comorbidities	2	2

The majority of type 2 diabetes patients are female. These results align with research at Pertamina Bintang Amin Husada Hospital, which showed that more than 50% of type 2 diabetes mellitus sufferers are female (Hafizi *et al.*, 2024). This finding is further supported by research showing that women have up to a 2.7-fold greater risk of developing type 2 diabetes mellitus. Type 2 diabetes mellitus can be caused by hormonal factors, particularly the decline in estrogen levels during menopause, which can increase insulin resistance. Furthermore, a higher prevalence of obesity in women also contributes to an increased risk of type 2 diabetes mellitus. Other factors include a history of pregnancy, including gestational diabetes (Lestari *et al.*, 2026).

The highest prevalence of type 2 diabetes mellitus is found in the 55–64 age group. This is due to the aging process, which leads to decreased pancreatic β -cell function and increased insulin resistance. The results of this study align with previous research by Susilawati & Rahmawati (2021), which showed that older patients are more likely to suffer from type 2 diabetes mellitus than patients aged <45 years. The length of hospitalization for 36 patients was less than 4 days, and 64 patients were hospitalized for ≥ 4 days. Management of type 2 diabetes mellitus, which includes blood sugar control and pharmacological therapy, can generally be achieved within a few days, depending on the condition of complications that may arise during treatment. The results of this study are consistent with previous research that stated that more than 50% of patients received hospitalization for ≥ 4 days (Fikry & Aliya, 2019). Type 2 diabetes mellitus is a chronic disease that requires long-term costs, so patients tend to choose a more affordable treatment class, namely class 3. The results of this study are similar to the results at UNS Hospital, which found that most patients use class 3 as an inpatient class (Dyanneza *et al.*, 2024).

The dominant severity level in this study indicates that the majority of type 2 diabetes mellitus patients are in severity level I (mild), meaning they have a relatively stable clinical condition and have not experienced serious complications. Type 2 diabetes mellitus is a chronic disease that develops gradually, so many patients are still in the early stages or have not experienced any worsening of their condition during treatment. Similar findings were also found in a study by Oktadiana (2021), which found that most patients hospitalized with type 2 diabetes mellitus fell into category I (mild) severity. Inpatients with type 2 diabetes mellitus at Bhakti Wira Tamtama Hospital not only have type 2 diabetes mellitus but also have other comorbidities. This is in line with research at Sleman Regional General Hospital, which found that more than 90% of type 2 diabetes mellitus patients have comorbidities (Lembang *et al.*, 2025). Patients with type 2 diabetes mellitus often have comorbidities because long-term high blood sugar levels can cause blood vessel damage, impaired organ function, and a weakened immune system. In this study, the majority of patients had at least one comorbidity. Common comorbidities found in type 2 diabetes mellitus patients include hypertension, heart disease, kidney disorders, and infections (Aulia *et al.*, 2024).

b. Distribution of Patient Therapy

Table 2. Type 2 Diabetes Mellitus Therapy for Type 2 Diabetes Mellitus Patients Hospitalized at Bhakti Wira Tamtama Hospital in 2025

Drug Class	Drug Name / Regimen	(n)	Percentage (%)
Monotherapy			
Biguanid	Metformin	13	30,95
Sulfonilurea	Glikuidon	11	26,19
	Glimepirid	8	19,05
	Glikazid	5	11,90
<i>Rapid acting insulin</i>	Insulin Aspart	1	2,38
	Insulin Lispro	1	2,38

	Human insulin	1	2,38
<i>Inhibitor alfa-glukosidase</i>	Akarbose	1	2,38
<i>Long acting insulin</i>	Insulin Glargine	1	2,38
Total		42	100
Dual Combination Therapy			
Sulfonilurea + Biguanid	Glikazid + Metformin	19	50,00
	Glimepirid + Metformin	3	8,11
Sulfonilurea + Sulfonilurea	Glikazid+ Glimepirid	3	8,11
	Glikazid+ Glikuidon	1	2,70
Sulfonilurea + <i>Rapid acting insulin</i>	Glimepirid + Human Insulin	2	5,41
	Glikazid + Insulin Aspart	1	2,70
	Glikazid + Human Insulin	1	2,70
Sulfonilurea + DPP-4 Inhibitor	Glikazid + Sitagliptin	2	5,41
Rapid Acting Insulin + Rapid Acting Insulin	Human Insulin + Insulin Glargine	1	2,70
Sulfonilurea + Premixed insulin	Glikazid + Insulin lispro premiks 50/50	1	2,70
Biguanid + <i>Inhibitor alfa-glukosidase</i>	Metformin + Akarbose	1	2,70
Sulfonilurea + <i>Long-acting insulin</i>	Glikuidon + Insulin Glargine	1	2,70
Sulfonilurea + Thiazolidinedione	Glikazid + Pioglitazone	1	2,70
Total		37	100,00
Triple Combination Therapy			
Sulfonilurea + <i>Rapid-acting Insulin</i> + Biguanid	Glikazid + Human Insulin + Metformin +	4	26,67
	Glimepirid + Human Insulin + Metformin	1	6,67
	Glikazid + Insulin Lispro + Metformin	1	6,67
Sulfonilurea + <i>Long Acting Insulin</i> + Biguanid +	Glimepiride + Insulin Glargine + Metformin	1	6,67
	Glikazid + Insulin Glargine + Metformin	2	13,33
Sulfonilurea + Sulfonilurea + <i>Inhibitor Alfa-Glukosidase</i>	Glikuidon + Glikazid Akarbose +	2	13,33
	Glimepiride + Glikuidon + Akarbose	1	6,67
Sulfonilurea + <i>Rapid-acting insulin</i> + <i>Rapid-acting Insulin</i>	Glimepirid + Insulin Aspart + Insulin Glargine +	1	6,67
<i>Rapid-Acting Insulin</i> + <i>Rapid-Acting Insulin</i> + <i>Premixed Insulin</i>	Insulin Glargine + Insulin Lispro + Insulin Lispro Premiks	1	6,67

Sulfonilurea + DPP-4 Inhibitor + <i>Rapid-Acting Insulin</i>	Glikazid + Sitagliptin + Sansulin rapid	1	6,67
Total		15	100
Quadruple Combination Therapy			
Biguanid + Sulfonilurea + <i>Long Acting Insulin</i> + <i>Rapid-Acting Insulin</i>	Metformin + Glikazid + Insulin Glargine + Human Insulin	2	33,33
Biguanid + Sulfonilurea + Inhibitor Alfa-Glukosidase + <i>Rapid-Acting Insulin</i>	Metformin + Glikazid+ Akarbose + Human Insulin	1	16,67
Biguanid + Sulfonilurea + Thiazolidinedione + <i>Rapid-Acting Insulin</i>	Metformin + Glikazid+ Pioglitazone + Human insulin	1	16,67
Biguanid + <i>Long Acting Insulin</i> + <i>Rapid-Acting Insulin</i> + Thiazolidinedione	Metformin + Insulin Glargine + Human Insulin + Pioglitazone	1	16,67
Biguanid + Sulfonilurea + <i>Long Acting Insulin</i> + DPP-4 Inhibitor	Metformin + Glikazid + Insulin Glargine + Sitagliptin	1	16,67
Total		6	100,00

Based on the single antidiabetic drug class prescribed to patients, these include biguanides, sulfonylureas, alpha-glucosidase inhibitors, rapid-acting insulin, and long-acting insulin. Single antidiabetic therapy involves the use of a single antidiabetic drug to control blood sugar levels in patients. In single therapy, the most commonly prescribed drug is metformin, accounting for 30.95%. Metformin is a biguanide drug and is the first-line treatment for diabetes mellitus. Metformin's mechanism of action is to lower blood sugar levels by inhibiting glucose production in the liver and increasing insulin sensitivity. Metformin is considered a monotherapy option due to its relatively good effectiveness, low hypoglycemic side effects, and relatively affordable price (PERKENI, 2021).

The most common combination of four types of type 2 diabetes mellitus drugs in this study was long-acting insulin + rapid-acting insulin + biguanide + sulfonylurea, with a percentage of 33.33%. This four-drug combination consisted of caprisulin log g dispopen + human insulin + metformin + glikazide. Insulin glargine, a long-acting insulin, is used to control fasting blood sugar, while sansulin rapid is used to control postprandial blood sugar. Metformin is still administered because it can increase insulin sensitivity. Meanwhile, glikazide works by increasing endogenous insulin secretion. These combinations have different mechanisms of action, resulting in a more rapid blood sugar-lowering effect (Rukminingsih & Nova, 2021). The combination of four antidiabetic therapies in type 2 diabetes mellitus patients at Bhakti Wira Tamtama Hospital is carried out when glycemic control has not been achieved with previous therapy because the patient has a more complex diabetes condition and is accompanied by comorbidities.

c. Components of Real Costs in Patients with Type 2 Diabetes Mellitus

Table 3. Real Cost Components of Inpatient Treatment for Type 2 Diabetes Mellitus Patients at Bhakti Wira Tamtama Hospital in 2025

Cost Components	Range (IDR)	Mean (IDR)	Persentase (%)
Administrative Cost (IDR)	110.000-260.000	117.500	0,90
Physician Cost (IDR)	75.000-1.038.000	128.940	0,98
Nursing Care Cost (IDR)	300.000-4.340.000	850.800	6,49
Laboratory Cost (IDR)	149.000-3.774.000	1.045.380	7,98
Supporting Examination Cost (IDR)	0-3.600.000	332.196	2,54
Surgical Procedure Cost (IDR)	0-11.824.000	7.665.800	58,52
Radiology Cost (IDR)	0-2.430.000	631.148	4,82
Accommodation Cost (IDR)	600.000-5.350.000	1.704.000	13,01
Drug and Medical Supply Costs (IDR)	297-291.526	51.137	0,39
- Type 2 Diabetes Medication Cost (IDR)	86.084-1.472.282	451.828	3,45
- Other Medication Costs (IDR)	26.587-1.205.803	121.632	0,93
- Medical Supply Costs (IDR)			
Total (IDR)	1.346.968	1.190.942	100,00

Based on the research results, the real cost component with the highest average cost is surgical procedures, followed by accommodation and laboratory costs. The high cost of surgical procedures is due to the greater use of resources compared to other medical procedures, such as the use of operating rooms, specialized medical equipment, and the involvement of healthcare personnel during the procedure. Furthermore, patients with type 2 diabetes undergoing surgery generally require more intensive monitoring and treatment to prevent complications during treatment, which increases the total cost of care.

Conversely, the cost components with the lowest average costs were administrative costs and physician fees. The low administrative costs indicate that these components do not require significant clinical resources compared to other cost components. The inpatient administrative cost at Bhakti Wira Tamtama Hospital is IDR 110,000, and the outpatient registration fee is IDR 100,000. The range of administrative costs in this study was IDR 110,000–IDR 260,000, with an average of IDR 117,500. Administrative costs only cover recording and managing hospital services, making them lower than other cost components. This is consistent with research at Dr. Moewardi Hospital in Surakarta, which found administrative costs to be the lowest real cost component (Youpita *et al.*, 2025).

Table 4. Classification of Drug Costs for Type 2 Diabetes Mellitus Patients Inpatients at Bhakti Wira Tamtama Hospital in 2025

Drug Class	Drug Name / Regimen	(n)	Percentage (%)	Average Drug Price (IDR)
Monotherapy				
Biguanid	Metformin	13	30,95	2.912
Sulfonilurea	Glikuidon	11	26,19	1.521
	Glimepirid	8	19,05	14.909
	Glikazid	5	11,90	24.912
<i>Rapid acting insulin</i>	Insulin Aspart	1	2,38	6.300
	Insulin Lispro	1	2,38	95.326
	Human insulin	1	2,38	91.365
<i>Inhibitor alfa-glukosidase</i>	Akarbose	1	2,38	95.389
<i>Long acting insulin</i>	Insulin Glargine	1	2,38	88.799
Total		42	100	420.596
Dual Combination Therapy				
Sulfonilurea + Biguanid	Glikazid + Metformin	19	50,00	23.740
Biguanid	Glimepirid + Metformin	3	8,11	10.497
Sulfonilurea + Sulfonilurea	Glikazid+ Glimepirid	3	8,11	103.669
	Glikazid+ Glikuidon	1	2,70	96.929
Sulfonilurea + <i>Rapid acting insulin</i>	Glimepirid + Human Insulin	2	5,41	24.480
	Glikazid + Insulin Aspart	1	2,70	14.066
	Glikazid + Human Insulin	1	2,70	110.300
Sulfonilurea + DPP-4 Inhibitor	Glikazid + Sitagliptin	2	5,41	28.260
Rapid Acting Insulin + Rapid Acting Insulin	Human Insulin + Insulin Glargine	1	2,70	182.532
Sulfonilurea + Premixed insulin	Glikazid + Insulin lispro premiks 50/50	1	2,70	125.858
Biguanid + <i>Inhibitor alfa-glukosidase</i>	Metformin + Akarbose	1	2,70	4.000
Sulfonilurea + <i>Long-acting insulin</i>	Glikuidon + Insulin Glargine	1	2,70	121.143
Sulfonilurea + Thiazolidinedione	Glikazid + Pioglitazone	1	2,70	77.445
Total		37	100,00	1.038.563
Triple Combination Therapy				
Sulfonilurea + <i>Rapid-acting Insulin</i> + Biguanid	Glikazid + Human Insulin + Metformin + Glimepirid + Human Insulin + Metformin	4	26,67	117.985
		1	6,67	100.256

		Glikazid + Insulin Lispro + Metformin	1	6,67	109.665
Sulfonilurea + <i>Long Acting Insulin</i>	+	Glimepiride + Insulin Glargine + Metformin	1	6,67	93.757
Biguanid +		Glikazid + Insulin Glargine + Metformin	2	13,33	112.336
Sulfonilurea +		Glikuidon + Glikazid	2	13,33	34.531
Sulfonilurea + <i>Inhibitor Alfa-Glukosidase</i>	+	Akarbose +			
		Glimepiride + Glikuidon + Akarbose	1	6,67	30.900
Sulfonilurea + <i>Rapid-acting insulin + Rapid-acting Insulin</i>		Glimepirid + Insulin Aspart + Insulin Glargine +	1	6,67	183.694
<i>Rapid-Acting Insulin + Rapid-Acting Insulin + Premixed Insulin</i>		Insulin Glargine + Insulin Lispro + Insulin Lispro Premiks	1	6,67	291.526
Sulfonilurea + DPP-4 Inhibitor + <i>Rapid-Acting Insulin</i>		Glikazid + Sitagliptin + Sansulin rapid	1	6,67	163.789
Total			15	100	1.382.491
Quadruple Combination Therapy					
Biguanid +		Metformin + Glikazid +	2	33,33	204.428
Sulfonilurea + <i>Long Acting Insulin + Rapid-Acting Insulin</i>		Insulin Glargine + Human Insulin			
Biguanid +		Metformin + Glikazid +	1	16,67	111.097
Sulfonilurea +		Akarbose + Human Insulin			
<i>Inhibitor Alfa-Glukosidase + Rapid-Acting Insulin</i>					
Biguanid +		Metformin + Glikazid +	1	16,67	174.593
Sulfonilurea +		Pioglitazone + Human			
Thiazolidinedione + <i>Rapid-Acting Insulin</i>		insulin			
Biguanid + <i>Long Acting Insulin + Rapid-Acting Insulin + Thiazolidinedione</i>		Metformin + Insulin Glargine + Human Insulin + Pioglitazone	1	16,67	225.083
Biguanid +		Metformin + Glikazid +	1	16,67	131.303
Sulfonilurea + <i>Long Acting Insulin + DPP-4 Inhibitor</i>		Insulin Glargine + Sitagliptin			
Total			6	100,00	846.504

The cost of type 2 diabetes mellitus medication is the cost incurred for the use of medication in type 2 diabetes mellitus patients during treatment in the hospital (Baroroh et al., 2016). The average cost of type 2 diabetes mellitus medication per patient is IDR52,528 with the lowest total cost of IDR297,

namely the patient received 3 glimepiride 1mg medications and the highest IDR291,526 because the patient received 3 types of type 2 diabetes mellitus medications which are insulin. The cheapest price of type 2 diabetes mellitus medication at Bhakti Wira Tamtama Hospital given to type 2 diabetes mellitus patients is glimepiride 1mg at a price of IDR99 and the most expensive drug is IDR113,018, namely insulin lispro premix with the brand name humalog mix.

The difference in average prices between 3-drug and 4-drug combination therapy can be influenced by the types of medications used. Although the number of medications in a 3-drug combination is fewer, the resulting average cost is higher because the therapy is dominated by the use of insulin, which is relatively more expensive than oral antidiabetic drugs. Therefore, the cost of therapy is influenced not only by the number of medications in the combination but also by the type and price of each medication used. The difference in prices between generic and branded drugs can affect the total cost of therapy, with branded drugs generally being more expensive than generics even though they contain the same active ingredient (Kustriyani et al., 2024).

d. Comparative Analysis of Actual Costs and INA-CBG's Tariffs for Type 2 Diabetes Mellitus Patients at Bhakti Wira Tamtama Hospital

Number of Patients	INA-CBG's Tariff		Real Cost		Mean Difference	p-value
	Range	Mean	Range	Mean		
100	1.308.200- 6.795.400	3.391.144	2.008.800- 15.739.500	5.337.382	-1.946.238	0,00

There is a difference between the established INA-CBG rates and the actual costs incurred by the hospital. The results of the study indicate a difference between the actual hospital costs and the INA-CBG rates for inpatients with type 2 diabetes mellitus at Bhakti Wira Tamtama Hospital. This discrepancy is evident from the negative difference in the cost comparison results, so that the hospital has the potential to experience losses due to the high costs incurred for patient services. The largest negative difference between the INA-CBG rates and the actual costs is IDR 12,645,804. The smallest negative difference from the rate comparison is IDR 35,800. These results are in line with previous research at Hospital X in Surakarta in 2023 which stated that the real costs of type 2 diabetes mellitus patients are greater than the INA-CBG rates with the largest difference being IDR 179,035,583 (Youpita *et al.*, 2025). The positive difference between the INA-CBG's rate and the largest hospital's real costs is IDR929,400. The positive difference between the real costs and the INA-CBG's rate indicates that the claim rate received by the hospital is greater than the real cost of patient services, so the hospital obtains a financing surplus and service financing is considered quite efficient for the hospital.

The results of the study indicate that H_a is accepted and H_o is rejected with a significance of p-value 0.00. This indicates a significant difference between the real costs and the INA-CBGs rates. This condition indicates that the real costs incurred by the hospital do not match the established INA-CBG's rates. The results obtained in this study are in line with research at Denpasar City Hospital which stated that there is a significant difference between real costs and INA-CBGs rates with a p-value <0.05 (Suardiani and Muliadana., 2026). The INA-CBG's rates as a national financing standard according to the results of this study have not fully accommodated the real costs incurred by hospitals.

e. Analysis of Factors Associated with the Total Real Cost of Type 2 Diabetes Mellitus Patients

Patient Characteristics	<i>p-value</i>	Interpretasi
LoS	0,000	Significant
Inpatient Class	0,308	Not Significant
Severity Level	0,021	Significant
Number of Comorbidities	0,046	Significant

Based on the table above, the first factor influencing real costs is the LoS. The Mann-Whitney test showed a significant result with a p-value of 0.000. This indicates that the longer a patient is hospitalized, the greater the total real costs incurred. This study's findings are similar to previous research that LoS affects real costs (Oktadiana, 2021). The effect of LoS on real costs occurs because a longer duration of treatment increases the use of hospital resources, both in the form of pharmacological therapy and other medical services.

Based on statistical analysis using the Kruskal Wallis test, the p-value of treatment class and total real costs was 0.308, indicating no significant difference. This means that treatment classes I, II, and III did not affect the total real costs of type 2 diabetes mellitus patients. The insignificant effect of treatment class on total real costs was due to the uneven number of patient samples in each treatment class, resulting in disproportionate data distribution between groups. This study's findings align with previous studies that found that treatment class did not affect real costs (Dyanneza *et al.*, 2024).

The Mann-Whitney test showed a significant difference in patient severity with a p-value of 0.046, indicating that severity affects the total real costs incurred by the hospital. The more severe the patient's severity, the more intensive the healthcare services required. This will significantly impact the total real costs incurred by the hospital. The findings of this study align with previous research that found that severity affects total real costs (Youpita *et al.*, 2025).

The analysis of the number of comorbidities against total real costs using the Kruskal Wallis test showed significant results. This indicates that the more comorbidities a patient suffers, the greater the total real costs. The number of comorbidities affects the total real costs because the more comorbidities a patient has, the more complex the clinical condition will be. This complexity leads to increased use of drugs,

supporting examinations and other medical procedures, so that the total cost of health services incurred by the hospital becomes higher. Research by Dyanneza et al. (2024) also showed that complications were significantly associated with direct medical costs in type 2 diabetes mellitus patients ($p\text{-value} = 0.000$), which indicates that the presence of comorbidities or complications contributes to increased patient care costs.

Conclusion

Based on the research results, there is a difference between the actual costs and the INA-CBGs rates for inpatients with type 2 diabetes mellitus (DM), so the hospital covers the costs for patients who experience the difference. LoS, severity, and number of comorbidities are factors that influence the actual costs, while the class of care does not show a significant effect. This research contributes to the development of pharmacoeconomic studies related to the evaluation of the costs of services for patients with type 2 diabetes mellitus and can be used as a consideration in evaluating the INA-CBGs payment system and managing healthcare costs in hospitals.

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