Research Paper

Analysis of Factors Affecting Medical Cost and Insurance Reimbursement Gaps in Hypertension Heart Failure Patients

Nurma Suri[1], Gracylia Kylalona[1]

[1]Departement of Pharmacy, Lampung University, Bandar Lampung, Indonesia

Abstract: Hypertension with congestive heart failure (CHF) results in high disease-related costs, placing a burden on patients, families, and healthcare facilities. Direct medical costs are known to be the highest proportion. This study aims to identify factors associated with direct medical costs in patients with hypertension and CHF and the difference in payment amounts compared to insurance reimbursements. This research uses a cross-sectional design at Hospital X in Lampung Province. The study population consists of patients diagnosed with hypertension and CHF within the period 2020-2022, with samples selected using total sampling. From 101 samples, the total direct medical cost for all cost components was IDR 908.700.216, with an average direct medical cost of IDR 8.997.032. The highest cost component was cardiac catheterization, with a total IDR of 473.081.000 and an average IDR of 36.390.846. The lowest cost component was additional medical expenses, with a total IDR 16.348.780 and an average IDR 166.824. Bivariate analysis showed a significant relationship between direct medical costs and length of hospital stay, insurance classes, and comorbid conditions. In addition, bivariate analysis showed a significant difference between direct medical costs and insurance reimbursement, with a positive discrepancy of IDR 4.437.619. This study concludes that length of stay, insurance classes, and comorbidities are significantly associated with direct medical costs. There is also a significant difference between direct medical costs and the amount of insurance reimbursement.

Keywords: Cost of Illness; Congestive Heart Failure; Direct Medical Costs; Hypertension; Insurance reimbursement

Introduction

Cardiovascular disease is a major cause of morbidity and mortality (Hessel, 2021; Lering et al., 2024). Hypertension is recognized as a risk factor for cardiovascular disease, with a prevalence ranging from 20% to 50% (Oh & Cho, 2020; WHO, 2023) The World Health Organization (WHO) reports that approximately 1.28 billion people aged 30–79 worldwide suffer from hypertension, with one-third residing in low- and middle-income countries. The absence of symptoms in the early stages of the disease leads to approximately 46% of

people with hypertension being unaware of their condition, and hypertension is often referred to as a "silent disease." This is why reducing the prevalence of hypertension has been established as a global target for non-communicable diseases from 2010 to 2030 (WHO, 2023).

In patients with chronic hypertension, structural and functional changes in the heart occur, leading to the development of congestive heart failure (CHF). Clinical trials have demonstrated a link between long-term hypertension and CHF, with a meta-analysis of 23 clinical trials finding that 28.9% of hypertensive patients developed CHF, equating to 8.5 cases per 1.000 patients (Oh & Cho, 2020). (4.6) CHF accounts for 5% of all cardiovascular cases, with hypertension contributing to 42.02% of CHF cases in Asia (Feng et al., 2024; Hessel, 2021; Lering et al., 2024). The progressive nature of hypertension leading to CHF increases the likelihood of rehospitalization and healthcare costs (Heidenreich et al., 2022; Lesyuk et al., 2018; Lutfi et al., 2023). In Asia, the prevalence of CHF reached 31.89 million cases in 2019 and is expected to continue rising yearly (Feng et al., 2024).

The Cost of Illness (COI) is one of the most fundamental pharmacoeconomic evaluations used to assess the economic burden of a disease. It encompasses various resource values that are expended or lost due to a health condition, including healthcare sector expenses (direct costs), reduced or lost patient productivity (indirect costs), and the pain and suffering experienced by patients (intangible costs) (Feng et al., 2024). Hypertension has been shown to impose a considerable financial burden, with disease-related expenses consuming a significant portion of household income. This places economic strain on patients and their families and increases financial pressure on healthcare systems (Zawudie et al., 2020). Among the components of COI, direct medical costs represent the largest share of the economic burden associated with hypertension (Zawudie et al., 2020). Several studies have identified factors influencing these costs, including length of hospital stay, presence of comorbidities, number of prescribed medications, and the patient's specific diagnosis (Dao et al., 2024; Dauphinot et al., 2021; Su et al., 2022).

A study in Ethiopia found that direct medical costs accounted for 51% of total healthcare costs. A further study indicated that direct medical costs contributed up to 60.81% of the total costs (Zawudie et al., 2020). The annual cost of treating CHF patients is estimated to be nearly 346.17 billion US dollars, with the majority of expenses allocated to inpatient care for hypertensive CHF patients (Heidenreich et al., 2022; Lippi & Sanchis-Gomar, 2020; Tran et al., 2016).

The situation in Indonesia closely mirrors global trends (Feng et al., 2024; Irnizarifka & Arifianto, 2021; Muharram et al., 2024). The Indonesian Basic Health Research (RISKESDAS) report demonstrates fluctuations in hypertension prevalence, from 31.7% in 2007, decreasing to 25.8% in 2013, and rising again to 34.1% in 2018 (Feng et al., 2024; Irnizarifka & Arifianto, 2021; Muharram et al., 2024). The estimated prevalence of CHF is 5%, or approximately 900.90 CHF cases per 100.000 people (Feng et al., 2024; Lutfi et al., 2023; Shahim et al., 2023). A cardiovascular disease analysis in Indonesia from 2017 to 2019

revealed an increase in healthcare costs of 125.4 million US dollars, with most expenses occurring in hospital services (91% in 2019) (Feng et al., 2024; Lutfi et al., 2023; Shahim et al., 2023). A study by Hasbi et al. reported that the total cost of outpatient care for CHF at a hospital in Central Jakarta over three months amounted to IDR 13.207.307 (Feng et al., 2024; Lutfi et al., 2023; Shahim et al., 2023). Similarly, the research conducted at RSD Balung in Jember Regency found that the average economic burden for hypertension inpatients was IDR 2.650.037 per inpatient, with total direct costs surpassing indirect costs (Rosiyani et al., 2021).

The majority of hypertensive congestive heart failure (CHF) patients receive medical care through insurance, which underscores the significance of pharmacoeconomic analysis from a hospital perspective, given the high direct medical costs associated with hypertension and CHF. A study revealed a discrepancy between the actual treatment costs and INA-CBGs reimbursement rates, with a negative difference of IDR 584.792 per inpatient at RSUD Panembahan Senopati and a negative IDR 1.821.893 per inpatient at Hospital X in Kediri (Nilansari et al., 2021; Restyana et al., 2023).

This study provides one of the first detailed evaluations of the discrepancy between direct medical costs and insurance reimbursements in hypertensive CHF inpatients in Indonesia, integrating cost breakdown with comorbidity analysis, and identifies the factors influencing these costs. Furthermore, it aims to examine the discrepancy between the actual direct costs incurred by the hospital and the amount reimbursed through insurance claims. The findings of this study are expected to provide valuable insights for hospitals in reviewing their financial policies and to serve as a foundation for informed managerial decision-making and budget planning in the provision of health services.

Method

Research Plan

Using a cross-sectional design, this study was conducted at Hospital X, the main referral hospital in Lampung Province, between January and March 2024. Secondary data were retrospectively collected from patient medical records and financial treatment reports. All research procedures adhered to ethical standards, as approved by the Health Research Ethics Committee of the Faculty of Medicine, University of Lampung (Approval No. 49/UN26.18/PP.05.02.00/2024).

Research Subject

The study population comprised patients diagnosed with hypertension and comorbid CHF who were hospitalized at Hospital X in Lampung Province between 2020 and 2022. A total sampling method was employed to select participants who met the inclusion and exclusion criteria (Fauziyah, 2019). The inclusion criteria for this study were inpatients who had a primary diagnosis of hypertension and congestive heart failure within the 2020–2022 period. Patients with incomplete medical records and financial data, those who passed away, or those who were discharged at their request were excluded from the sample.

Data Analysis

Direct medical costs and insurance reimbursements were obtained from the hospital's financial reports. The data were analyzed using both univariate and bivariate statistical methods. Univariate analysis was conducted descriptively to present the total direct medical costs and their components, with the results displayed in table format. Bivariate analysis was then used to examine the relationship between direct medical costs, patient characteristics, and insurance claim reimbursements. The Mann-Whitney U test was applied for comparisons involving variables with two categories, given that the cost data were not normally distributed. The Kruskal-Wallis test was used for comparisons involving more than two categories. Additionally, the relationship between direct medical costs and insurance reimbursements was assessed using the Kolmogorov-Smirnov test. All statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS) software.

Results

The study initiated its data collection process with a total of 108 inpatients who met the initial inclusion criteria. The rigorous sample selection process, critical for ensuring the validity of the research, necessitated the exclusion of seven patients who unfortunately passed away during their inpatient treatment. Consequently, the final and complete sample for this study comprised 101 inpatients. This meticulous approach to sample selection, as depicted in the conceptual framework of Figure 1, ensured that all analyzed data were derived from patients who successfully completed their treatment, thereby providing a more accurate reflection of the direct medical costs associated with their care.
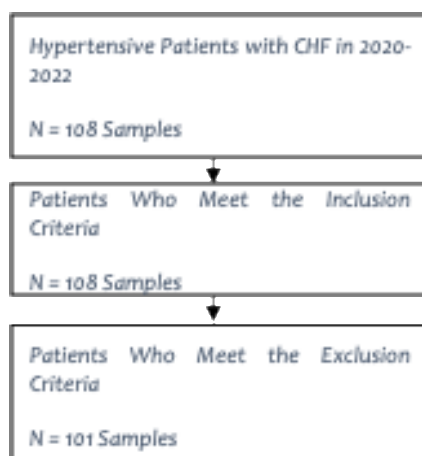

Figure 1. Sample Selection

The analysis of the total direct medical costs revealed a comprehensive breakdown of expenses incurred during the treatment of hypertension patients with chronic heart failure (CHF). The cost components considered in this study were meticulously categorized to include all relevant medical expenditures, namely medications, inpatient care, physician fees, laboratory tests, nonsurgical medical procedures, nursing services, radiodiagnostic procedures, electromedical diagnostic examinations, cardiac catheterization, and other additional medical costs.

As presented in Table 1, a detailed breakdown of these cost components was conducted. The findings from the analysis indicated that the cost component that exerted the highest financial burden on the healthcare system was cardiac catheterization. This procedure, performed on a subset of 13 patients, incurred a total expenditure of IDR 473.081.000, with a remarkably high average cost of IDR 36.390.846. The significant financial impact of this procedure is further underscored by its wide range, from a minimum of IDR 13.007.000 to a maximum of IDR 44.393.000, and a substantial standard deviation of IDR 21.003.625, highlighting considerable variability in costs.

In stark contrast, the cost component with the lowest financial burden was identified as additional medical expenses. These costs, associated with 98 patients, amounted to a total of IDR 16.348.780, with an exceptionally low average cost of IDR 166.824. This data confirms that while certain procedures like cardiac catheterization are major financial drivers, other supplementary costs are comparatively minor.

Table 1. Analysis of Direct Medical Cost Components for Hypertension Patients with CHF

Cost Components	n	Total Cost (IDR)	Average (IDR)	Median (IDR)	Min-Max (IDR)	SD (IDR)
Medicine	101	99.016.210	980.358	685.717	142.512 – 5.435.694	907.458
Inpatient Care	101	71.001.204	702.982	225.000	60.000 - 5.950.000	1.044.684
Doctor Fee	101	25.568.000	253.149	150.000	20.000 - 1.845.000	339.227
Laboratory procedures	99	85.884.743	867.523	702.500	33.000 - 3.455.459	580.351
Non-surgical medical procedures	101	68.297.146	676.209	532.000	132.000 - 2.812.850	475.547
Nursing Care	101	26.897.928	266.316	217.500	82.500 - 914.000	150.101
Radiodiagnosis	84	19.585.000	233.1545	148.500	148.500 - 2.802.500	343.501.205
Electromedical diagnostic examinations	42	23.030.991	548.357	370.000	65.000 - 985.991	249.132.630
Cardiac catheterization	13	473.081.000	36.390.846	44.393.000	13.007.000 - 44.393.000	21.003.625
Additional medical costs	98	16.348.780	166.824	95.000	45.000 - 2.957.000	350.953
Total Direct Medical Cost	101	**908.700.216**	**8.997.032**	**3.439.978**	**1.400.875-54.853.102**	**13.553.580**

The bivariate analysis, detailed in Table 2, was performed to examine the relationship between average direct medical costs and various patient characteristics. The findings provided crucial insights into the factors that influence healthcare expenditures for this patient group.

First, the analysis of gender revealed no statistically significant difference in the average direct medical costs between male and female patients (p-value = 0.729). Out of the 101 samples, 51 (50.5%) were female, and 50 (49.5%) were male. While the total cost for male patients (IDR 538.693.137) was higher than for female patients (IDR 370.007.079), the average cost per male patient (IDR 10.562.611) was also slightly higher than for female patients (IDR 7.400.142). However, this difference was not found to be statistically significant, indicating that gender does not serve as a significant predictor of direct medical costs in this population.

Second, the analysis based on patient age (p-value = 0.678) also showed no statistically significant differences in average direct medical costs. While the costs varied across age groups—with the highest average cost of IDR 10.356.390 found in the 56-65 year-old group and the lowest average cost of IDR 3.134.482 in the 25-35 year-old group—

these variations were not statistically significant. This suggests that the average cost of treatment for hypertension with CHF does not significantly depend on the age of the patient.

Third, a highly significant finding was observed in the analysis of length of stay (p-value < 0.001). The data clearly demonstrates a strong relationship between the duration of hospitalization and direct medical costs. Patients with a shorter stay (less than 5 days, n=77) had a total direct medical cost of IDR 606.413.433, with an average of IDR 7.875.499. In contrast, patients who stayed for 5 days or longer (n=24) incurred a total cost of IDR 302.286.783, with a much higher average cost of IDR 12.595.283. This significant difference highlights that extended hospital stays are a major driver of increased healthcare costs for this patient population.

Table 2. Bivariate Analysis of Differences in Average Direct Medical Costs by Patient Characteristics

Subjects	Subject		Direct Medical Cost					P Value
	n	(%)	Total (IDR)	Average (IDR)	Median (IDR)	Min – Max (IDR)	SD (IDR)	
Gender								
Female	51	50.5	370.007.079	7.400.142	3.349.389	1.661.987 - 49.826.133	11.130.913	0.729
Male	50	49.5	538.693.137	10.562.611	3.439.978	1.400.875 - 54.853.102	15.521.909	
Aged (Years)								
25-35	4	1	12.537.928	3.134.482	2.517.837	2.224.217 – 5.278.038	1.448.991	0.678
36-45	7	9.9	37.747.815	5.392.545	2.402.969	2.060.565– 14.416.716	4.650.352	
46-55	25	25.7	249.735.527	9.989.421	4.323.397	1.598.756 – 48.970.179	14.874.540	
56-65	45	44.6	466.037.543	10.356.390	3.488.256	1.427.718 – 54.853.102	15.868.249	
>65	20	19	142.641.403	7.132.070	3.298.239	1.400.875 – 37.832.987	8.702.192	
Length of Stay								
<5 days	77	77.2	606.413.433	7.875.499	2.973.076	1.400.875 – 54.853.102	13.053.337	<0.001*
5 days	24	22.8	302.286.783	12.595.283	6.430.226	2.224.217 – 49.826.133	14.762.984	
Payments								
Out of Pocket	1	1	2.978.917	2.978.917	2.978.917	2.978.917 – 2.978.917	0	0.784
Insurance (BPJS)	100	99	905.721.299	9.057.213	3.448.589	1.400.875 – 54.853.102	13.608.291	
Insurances Classes								
VIP	5	5	62.231.350	12.446.270	13.839.935	1.400.875 – 18.968.380	6.591.360	<0.001*
Class 1	25	24.8	403.803.386	16.152.135	5.817.553	2.789.633 – 54.853.102	18.719.464	
Class 2	8	7.9	122.866.074	15.358.259	5.527.269	2.709.026 – 47.334.527	19.777.187	
Class 3	63	62.4	319.799.406	5.076.181	2.778.977	1.427.718 – 49.069.985	8.440.083	
Diagnosis								
No comorbidities	41	40.6	174.238.159	4.249.711	2.833.692	1.427.718 – 37.832.987	5.740.564	<0.001*
Comorbidities	60	59.4	734.462.057	12.241.034	5.195.098	1.400.875 – 54.853.102	16.206.485	

Fourth, the analysis of payment methods revealed that the vast majority of patients (99%. n=100) utilized insurance (BPJS), with only one patient (1%) using out-of-pocket payment. The bivariate analysis (p-value = 0.784) found no significant difference in direct medical costs based on the payment method. The total and average costs for insurance users were IDR 905.721.299 and IDR 9.057.213. respectively, while the single out-of-pocket patient incurred a cost of IDR 2.978.917. This finding indicates that for this study's sample, the method of payment did not significantly influence the total cost of care.

Fifth, a statistically significant difference was found when analyzing direct medical costs based on insurance classes (p-value < 0.001). Patients in the VIP and Class 1 insurance categories had the highest average direct medical costs, with VIP patients (n=5) averaging IDR 12.446.270 and Class 1 patients (n=25) averaging IDR 16.152.135. In contrast, Class 3 patients (n=63), who constituted the largest group, had a much lower average cost of IDR 5.076.181. This finding indicates that the type of insurance class a patient holds is a highly significant factor influencing their total direct medical costs, likely reflecting differences in services, room types, or physician access.

Finally, the presence of comorbidities was also a statistically significant factor in determining direct medical costs (p-value < 0.001). Of the 101 samples, 60 patients (59.4%) had at least one comorbid condition. The average cost for patients with comorbidities was substantially higher (IDR 12.241.034) compared to patients with no comorbidities (IDR 4.249.711). This significant difference underscores the substantial financial burden associated with treating complex cases involving multiple health conditions.

Table 3. Analysis of Comorbid Diagnoses on Direct Medical Costs

Comorbidities	n	%	Average (IDR)	SD (IDR)	Median (IDR)	Min-Max (IDR)
Type 2 Diabetes Mellitus	12	20	5.812.916	3.894.436	4.997.821	1.400.875 – 13.839.935
Transmural Myocardial Infarction	10	16.7	31.267.780	23.384.910	47.323.361	2.709.026 - 54.853.102
Non-specific Pneumonia	9	15	3.971.986	2.446.938	3.051.055	1.661.987 –9.096.135
Unstable angina	8	13.3	18.972.885	19.626.333	14.909.554	2.041.726 - 49.826.133
Atrial fibrillation and flutter	6	10	12.287.528	18.065.962	4.885.365	3.457.200 - 49.069.985
Anemia	4	6.7	6.123.334	3.151.113	6.013.062	2.778.977 - 9.688.236
Cerebral infarction	2	3.3	3.534.198	1.478.470	3.534.199	2.488.762 - 4.579.635
Type 2 Diabetes Mellitus and Bronchitis	1	1.7	5.817.553	0	5.817.553	5.817.553 – 5.817.553
Type 2 Diabetes Mellitus and Hyperuricemia	1	1.7	2.224.217	0	2.224.217	2.224.217 – 2.224.217
Hypokalemia and Mitral Insufficiency	1	1.7	2.031.572	0	2.031.572	2.031.572 – 2.031.572
Hyperplasia of the prostate	1	1.7	2.704.792	0	2.704.792	2.704.792 – 2.704.792
Cellulitis	1	1.7	15.107.866	0	15.107.866	15.107.866 - 15.107.866
Chronic kidney disease	1	1.7	7.383.662	0	7.383.662	7.383.662 – 7.383.662
Hyperlipidemia	1	1.7	2.127.341	0	2.127.341	2.127.341 – 2.127.341
Dyspepsia	1	1.7	2.846.030	0	2.846.030	2.846.030 - 2.846.030
Hyponatremia	1	1.7	18.968.380	0	18.968.380	18.968.380 - 18.968.380

In a more detailed analysis of the comorbidities, as presented in Table 3, the most prevalent condition was type 2 diabetes mellitus, affecting 12 patients, which accounted for 20% of the comorbidity group. However, the highest average direct medical costs were not associated with the most prevalent condition but with transmural myocardial infarction. Patients with this comorbidity (n=10) had an extremely high average direct medical cost of IDR 31.267.780. with a significant standard deviation of IDR 23.384.910. highlighting the substantial and variable costs of treating this severe condition. Other prevalent comorbidities included non-specific pneumonia (n=9) with an average cost of IDR 3.971.986, and unstable angina (n=8) with an average cost of IDR 18.972.885. This detailed breakdown provides a nuanced view of how specific comorbidities contribute to the overall direct medical costs.

Table 4. Analysis of Direct Medical Costs and Insurance Reimbursement

Cost	Average (IDR)	Median (IDR)	Min-Max (IDR)	SD (IDR)	p Value
Direct Medical Cost	8.997.031	3.439.978	1.400.875 - 54.853.102	13.553.580	<0.001*
Insurance reimbursement	13.434.650	5.680.100	3.502.700 - 81.890.000	19.938.284	

Finally, the study examined the relationship between direct medical costs and the actual reimbursement received from insurance providers, a critical aspect of healthcare financial management. As shown in Table 4, a bivariate analysis was conducted to compare total direct medical costs with the insurance claim payments received by the hospital. The results revealed a statistically significant difference (p-value < 0.001) between the two variables. The average direct medical cost was IDR 8.997.031, whereas the average insurance reimbursement was IDR 13.434.650. This yielded a remarkable positive gap of IDR 4.437.619, indicating that the actual treatment costs for hospitalized hypertensive patients with CHF were consistently lower than the amount reimbursed by insurance. This finding is of significant importance to hospital management and healthcare policy, as it suggests that the current insurance reimbursement model may provide a financial surplus for the hospital when treating this specific patient group.

Discussion

In this study, the total direct medical costs for hospitalized hypertensive patients with congestive heart failure (CHF) amounted to IDR 908.700.216, with an average cost of IDR 8.997.032 per inpatient. The analysis demonstrated that direct medical costs were significantly associated with length of stay, insurance class, and comorbidities. Moreover, the findings revealed a positive discrepancy between the actual direct medical costs and the amount reimbursed by insurance, indicating a positive gap between incurred expenses and reimbursement coverage.

A comparison with previous studies reveals a significant difference in direct medical costs. For example, a study conducted at RSU Sebelas Maret reported an average inpatient direct medical cost of IDR 1.719.163 (Kurniawansyah et al., 2023). In contrast, the average cost identified in the present study is approximately five times higher, indicating substantial variations. One key factor contributing to this discrepancy is hospital classification, which significantly influences the cost of medical services. The hospital in the current study is a Type A referral hospital, equipped with more advanced facilities and specialized services. In contrast, RSU Sebelas Maret is classified as a Type C hospital, which typically provides more basic care. This difference in service complexity and resource availability likely accounts for the lower costs reported in the previous study.

In this study, cardiac catheterization (cath lab) was identified as the most expensive component of medical costs. Some patients with cardiovascular comorbidities required cardiac catheterization as part of their care. This procedure is essential for diagnosing and treating coronary artery disease, assessing right and left heart hemodynamics, evaluating left ventricular function, diagnosing and treating arrhythmias, assessing pericardial and

myocardial disease, and managing heart failure (Manda & Baradhi, 2023). In contrast, the lowest cost component in this study was ancillary medical expenses. Some patients did not require certain ancillary medical tests, resulting in lower ancillary costs. These costs typically included emergency room visits and additional procedures such as blood transfusions.

Patients with hypertension and CHF in this study also underwent various laboratory tests to support treatment and detect comorbidities. These tests included microscopic urine analysis, albumin excretion measurement, blood urea nitrogen (BUN) and serum creatinine levels, serum sodium, potassium, and calcium levels, thyroid stimulating hormone (TSH) testing, hematocrit levels, fasting blood glucose levels, and lipid profiles (total cholesterol, HDL, LDL, and triglycerides).

The concept of sex differences refers to the biological differences between men and women that are influenced by sex chromosomes, autosomal gene expression, sex hormones, and their effects on organ systems. In addition, genetic factors interact with environmental influences, diet, lifestyle, stress, and differences in attitudes toward treatment and prevention between men and women (Fazzini et al., 2024; Kandou et al., 2016). While the overall risk of CHF is similar in both sexes, men are more susceptible to heart failure with reduced ejection fraction (HFrEF). At the same time, women are more susceptible to heart failure with preserved ejection fraction (HFpEF) (Fazzini et al., 2024; Lam et al., 2019).

This study found that most patients were aged over 56 years, accounting for approximately 63.6% of the sample. This finding aligns with existing literature, which indicates that congestive heart failure (CHF) predominantly affects older adults, with the average age ranging from 58 to 81.6 years. There is a strong correlation between aging and the development of CHF, as increased age is associated with arterial wall thickening and collagen accumulation in the muscular layers, leading to vascular narrowing and stiffness (Kumalasari et al., 2019; Lesyuk et al., 2018). Their clinical condition influences the length of a patient's hospital stay. For elderly patients, achieving target blood pressure levels before discharge is particularly important (DiPiro et al., 2020).

The highest average cost was observed in patients hospitalized for more than five days, amounting to IDR 12.789.762, with a p-value of <0.001. This finding is consistent with other studies showing a direct correlation between the length of hospital stay and medical costs, confirming that longer hospital stays result in higher healthcare costs (Baroroh & Maghfiroh, 2023; Tandah et al., 2023). Several factors influence the length of hospital stay, including demographic characteristics and clinical conditions (Istiqomah et al., 2022).

A significant difference in direct medical costs was also observed between insurance classes. According to Anida et al., insurance classes and total costs strongly correlate (p = 0.025), indicating that higher classes correspond to higher medical costs (Anida et al., 2022). However, in this study, the average cost for Class 1 inpatients was higher than for VIP patients. Possible explanations for this discrepancy include differences in

comorbidities, length of stay, medical procedures, and medication use, all contributing to the overall cost of care. In addition, there are plans to remove these classes from the health insurance system.

Furthermore, there was a significant discrepancy in direct medical costs between patients with and without comorbidities. Comorbidities significantly increase healthcare costs, as managing multiple conditions complicates treatment and increases economic burden, including medication costs, medical procedures, and inpatient care. Patients with comorbidities also tend to require more medications and supportive care (Istiqomah et al., 2022; Restyana et al., 2023).

Diabetes mellitus in hypertensive patients with CHF has been shown to impair glucose absorption by altering insulin and glucose delivery to skeletal muscle (Mandasari et al., 2022). Additionally, cardiovascular comorbidities were common among study participants, as hypertension contributes to blood vessel thickening and hardening, leading to arterial narrowing and reduced blood flow (Pawening & Haqi, 2021). Hypertension can also directly damage the coronary artery walls, increasing the risk of coronary atherosclerosis, which may result in angina pectoris, coronary insufficiency, and myocardial infarction—conditions more frequently observed in hypertensive patients (Poznyak et al., 2022).

The results of this study contrast with research conducted at RSUD Panembahan Senopati and a hospital in Kediri, which found a negative discrepancy between direct medical costs and insurance claim payments. The discrepancies were negative IDR 30.993.94 and negative IDR 196.764.400, respectively. However, studies reported a positive discrepancy where the INA-CBGs tariff exceeded direct medical costs by IDR 117.648.518 and other positive differences, respectively (Oktadiana et al., 2019; Tandah et al., 2023).

The higher direct medical costs incurred by hospitals compared to insurance payments can be attributed to comorbidities, severity of illness, and length of hospital stay (Istiqomah et al., 2022). If this situation persists, it may lead to budget deficits within hospital services. However, several factors should be considered when direct medical costs exceed insurance payments. Errors in disease coding and the lack of a standardized clinical pathway can lead to variations in treatment selection, potentially resulting in lower insurance reimbursements than actual hospital expenditures (Munawaroh & Sulistiadi, 2019; Nilansari et al., 2021; Puspitasari & Retno Kusumawati, 2017).

Conclusion

The present study has concluded that the length of hospitalization, inpatient classification, and comorbid conditions are significantly associated with direct medical costs. Furthermore, a substantial discrepancy between direct medical expenditures and insurance claim reimbursements was identified, exhibiting a favorable variance of IDR 4.437.619.

Acknowledgement

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