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DIRECT MEDICAL COST AND LENGTH OF STAY OF HYPERTENSION PATIENTS AT PRIVATE HOSPITAL IN YOGYAKARTA

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ABSTRACT

The province that ranks fourth with the highest incidence of hypertension in Indonesia is the Special Region of Yogyakarta (DIY). Hypertension therapy is carried out in a not short period, so it becomes an economic burden for people with hypertension and the government. This study aims to determine the relationship between the length of hospitalization and direct medical costs—an analytical observational research method with retrospective data collection and data from class III inpatient hypertensive medical records. The calculation of costs is viewed from a payer's perspective—descriptive and analytical data analysis to determine the relationship between the length of hospitalization and direct medical costs. The study's results of 41 patients met the criteria; 53.65% were women aged 22-59 years (53.65%). The most widely used antihypertensive drug was the combination of amlodipine + candesartan (26.82%). The average direct medical costs for hypertensive patients were IDR 7,039,515. The highest direct medical cost component is the cost of other drugs and medical equipment. The component of direct medical costs is the lowest cost of antihypertensive drugs. The average length of hospitalization for hypertensive patients is 6.14 days. There was a significant relationship (p=0.000) between the length of hospitalization and direct medical costs. The conclusion of this study is a significant relationship (p = 0.000) between the length of hospitalization and direct medical costs

Keywords: Direct medical cost; Length of stay; Hypertension

1. INTRODUCTION

Dangerous diseases in the world include hypertension, heart attacks, heart failure, stroke, and chronic kidney failure, which is cardiovascular disease, the leading risk factor for which is hypertension. In 2017, it was found that an increase in systolic blood pressure is the leading risk factor that can cause death globally. 10.4 million deaths each year are caused by hypertension (WHO, 2020). The incidence of hypertension (11.01%), which ranks fourth highest in Indonesia, is in the Special Region of Yogyakarta (Kemenkes RI, 2018). Hypertension is a disease with the highest incidence of the ten most common diseases in 2020 and the top 10 causes of death in DIY. In 2020 as many as 6,171 were recorded as new cases of inpatient hypertension (Dinkes, 2020).

Direct medical costs are the most significant cost component (60.81%) compared to non-medical costs (12.17%) and indirect costs (27%) of the total cost of hypertension (Adane et al., 2020). A study in Ethiopia also showed that the total costs for treating hypertension, indirect costs (49%), were less than direct costs (Zawudie et al., 2020). Likewise, research in Kenya, the average direct cost of US $ 304.8 is greater than the average indirect cost of US $ 171.7 of the total cost of hypertensio (Oyando et al., 2019). The cost of class 3 hospitalization for hypertensive patients at Panembahan Senopati Hospital is between IDR.899,969 to IDR.4,880,536, where the INA-CBGs rate is IDR.1,851,200 (Nilansari et al., 2021)

The cost of treating hypertensive patients with complications is US$ 78 more expensive than the cost of treating uncomplicated patients, US$ 53. The cost of hospitalization days is the most significant component (41.37%) compared to the cost of drugs (33.96%) of the total direct costs. inpatient hypertension (Nguyen et al., 2014). The component of direct medical costs for hospitalized hypertensive patients is the cost of drugs, namely 37.49% (Fadillah et al., 2021). Drug costs account for 32.95% of Poland's total direct medical costs for treating hypertension in adolescents (Paczkowska et al., 2014).

Drug costs and the number of other accompanying diseases can affect the total direct medical costs for treating hypertensive patients and other diseases (Baroroh & Fatonah, 2017). Factors significantly associated with the high cost of hypertension include the length of stay, the number of drugs used, and co-morbidities (Adane et al., 2020). The cost of inpatient days at the hospital has been identified as the main cost driver in hypertension (Nguyen et al., 2014). The number of days of hospitalization, the severity of the disease, co-morbidities, and the type of financing are some factors that significantly affect the cost of treating hypertension inpatients at Sorong Hospital (Bambungan et al., 2017). Based on the background from previous research in Vietnam and at Sorong Hospital (government hospital), it is necessary to conduct research in private hospitals to find out whether or not there is a correlation between length of stay and direct medical costs.

2. METHOD

This study used an observational analytic research method with retrospective data collection taken from patient medical record data and billing sheets of inpatient hypertension patients at private hospitals in Yogyakarta for the period January-March 2021. Cost calculations are viewed from a payer's perspective (BPJS). This research was carried out after obtaining Ethical Clearance (EC) from the Hospital Research Ethics Committee Team with Number: 0073/SRIP/KEP-PKU/II/2021.

The sample used was patients with complicated and uncomplicated hypertension (ICD: I10) hospitalized in the hospital for January-March 2021 who met the inclusion requirements. Inclusion criteria include patients with the type of BPJS financing, patients with treatment class III, hospitalized hypertensive patients with and without complications, and patients aged (≥18 years). Exclusion criteria included: patients who did not complete therapy or died, patients with incomplete, missing, and illegible medical records, and patients who moved classes during the hospitalization period. The sampling technique used in this research is non-probability sampling with purposive sampling.

The results of the study were analyzed descriptively by describing patient characteristics, drug use, direct medical costs, and length of stay of hypertensive patients at the hospital. Then proceed with analytical data analysis with Spearman's rho correlation test to determine the relationship between the length of stay and direct medical costs.

3. RESULTS AND DISCUSSION

The study's results involving 41 patients based on a purposive sampling technique, namely patients with complicated and uncomplicated hypertension (ICD: I10) hospitalized at the hospital for the period January-March 2021 who met the inclusion criteria, can be included as research subjects. The demographic characteristics of the research subjects, which include gender, age, and diagnosis, are in **Table 1**.

The study's results more female hypertension patients than male patients, with an age range of 22-59 years and more than those aged 60 years and over. Thus, it is the same as previous studies, if the incidence of hypertension in men is less than in women, there is a significant relationship between the use of contraceptive pills and the incidence of hypertension in women aged 15-49 years with a PR value of 1.4 (95% CI: 1.31 - 1.45) after controlling for age and BMI

Demographic characteristics of research subjects (Pangaribuan & Lolong, 2015). The results of the study based on the age of the study subjects were different from previous studies, which showed the incidence of hypertension was 2.61 times at the age of more than 59 years compared to the age of fewer than 59 years (Amanda & Martini, 2018). Based on the diagnosis, most (51.22%) were uncomplicated hypertension, with the most complications (12.19%) being strokes as well as the most common comorbidities (12.19%) being anemia. Hypertension here is one of the factors that cause a stroke. This study is in line with previous research, which stated that gender, age, education level, history of hypertension, blood cholesterol levels, obesity, coronary heart disease, smoking habits, consuming foods high in salt, and lack of physical activity are factors that can cause heart disease strokes (Utama & Nainggolan, 2022).

Table 1. Demographic characteristics of research subjects

Demographic characteristics		n (%)
Gender	Woman	22 (53.65)
	Man	19 (46.34)
Age	*Adult* (22-59)	22 (53.65)
	Geriatrics (≥60)	19 (46.34)
Diagnosis	Hypertension	21(51.22)
	Hypertension+Complication	
	Hypertension+ Strokes	5(12.19)
	Hypertension + DM	4(9.75)
	Hypertension +Comorbidities	
	Hypertension + Hypokalemia	3(7.31)
	Hypertension + Hypoosmolarity	1(2.43)
	Hypertension + Anemia	5(12.19)
	Hypertension + Urinaria	1(2.43)
	Hypertension + Acute Respiratory Distress Syndrome (ARDS)	1(2.43)

3.1. Antihypertensive Used Research Subjects

In this study, an analysis was also carried out regarding the classes and types of antihypertensive drugs given during the hospital stay. **Table 2** shows some of the antihypertensives used by the research subjects.

Table 2. Antihypertensive used research subjects

Drug amount	Hypertension drug class	Types of hypertension drugs	n(%)	Average Cost (IDR)
1	CCB	Amlodipin	3(7.31)	13,333
	ACE-I	Captopril	1(2.43)	2,741
	ARB	Candesartan	5(12.19)	87,257
	ACE-I	Ramipiril	1(2.43)	10,400
2	CCB + ARB	Amlodipin+candesartan	11(26.82)	99,202
	CCB + ACE-I	Amlodipin+ramipril	2(4.87)	22,810
	CCB + Diuretic	Amlodipin+furosemide	2(4.87)	22,516
	CCB + Beta Blocker	Amlodipin+bisoprolol	1(2.43)	18,828
	CCB + ACE-I	Amlodipin+captopril	2(4.87)	6,493
	Beta Blocker + ARB	Bisoprolol+candesartan	1(2.43)	104,600
	ARB + Diuretic	Candesartan+furosemide	1(2.43)	117,500
3	CCB + ARB + Beta bloker	Amodipin+candesartan+bisoprolol	5(12.19)	192,988
	CCB + Diuretic+ ACE-I	Amlodipin+furosemid+ramipril	2(4.87)	66,700
	CCB + ARB + Diuretic	Amlodipin+candesartan+furosemid	1(2.43)	148,607
	CCB + ACE-I + ACE-I	Amlodipin+captopril+ramipril	1(2.43)	4,230
	CCB+ Beta Blocker +ACE-I	Amlodipin+bisoprolol+ramipril	1(2.43)	10,830
	ACE- I + ARB + Diuretic	Captopril+candesartan+furosemide	1(2.43)	172,464

Table 2 shows that the most common antihypertensive is candesartan (12.19%) which belongs to the ARB group and acts directly as an inhibitor on selective angiotensin receptors (Katzung BG, 2014). While the most used combination drugs were 2 CCB + ARB, namely

amlodipine + candesartan (26.82%), this study is in line with research at the Panembahan Senopati Hospital; the most widely used drug combinations are ARB and CCB class drugs (Nilansari et al., 2020). More patients get 2 drugs than 1 drug or 3 drugs (Putri & Satriyasa, 2019). ARB class antihypertensives that work directly as inhibitors of more selective angiotensin receptors, combined with CCBs with a mechanism of action of inhibiting calcium influx in arterial smooth muscle resulting in vasodilation and reducing peripheral resistance (Katzung BG, 2014).

The results showed that the highest average cost of antihypertensive drugs was in patients who received 3 antihypertensive drugs, class CCB + ARB + Beta blockers, namely Amodipine + candesartan + bisoprolol. Likewise, the results of a study in the United States showed that the use of several antihypertensive drugs doubled the costs compared to the use of a single antihypertensive drug. In addition, it is also known that antihypertensive drugs in the ARB class are antihypertensive drugs with the highest cost (Park et al., 2020)

3.2. Direct Medical Costs of Hospitalized Hypertensive Patients

Direct medical costs are costs incurred for patients during the treatment period. Antihypertensive costs, costs for other drugs and medical devices, fees for services and facilities, costs for diagnostics, and fees for examination services are some of the direct medical costs in this study. **Table 3** shows the amount of direct medical costs resulting from the study.

Table 3. Direct medical costs of hospitalized hypertensive patients

Cost type	Cost average (Mean)	Percentage (%)
Antihypertensive Cost	80,001	1.13
Cost of other drugs + medical devices	3,306,709	46.97
Service and Facility Fees	2,220,159	31.53
Diagnostic Fee	715,195	10.16
Inspection Service Fee	719,402	10.21
Total cost	**7,039,515**	

Direct medical costs in **Table 3** show an average total cost of IDR 7,039,515. The results of this study, the amount of direct medical costs is greater than the cost of Illness study of inpatients with hypertension at Balung Hospital, Jember Regency, with an average total direct cost incurred by inpatients with hypertension of IDR 2,171,919 and a cost range of IDR 1,030,999 -IDR 3,699,700 (Rosiyani et al., 2021). Likewise the study of class 3 inpatient costs at Panembahan Senopati Regional General Hospital for hypertensive patients between IDR 899,969 to IDR 4,8880,536, with an average of IDR 2,171,850 (Nilansari et al., 2021).

The cost of other drugs and medical equipment is the most significant component (46.97%) of the total direct medical costs. The cost of other drugs and lakes is higher because patients need to be given other drugs to reduce the symptoms or complaints experienced by patients. Patients with complications and co-morbidities need additional drugs to treat the disease. As we know, based on the demographic characteristics of the respondents, the most complications (12.19%) were strokes. So, it requires the cost of other drugs as additional drugs to treat stroke at a cost higher than the cost of antihypertensive drugs. The percentage of the cost of other drugs and medical devices from the study showed that it was more significant than the direct medical costs of treating hypertension in adolescents in Poland, where drug costs required 32.95% of the total direct medical cost (Paczkowska et al., 2014).

3.3. Length of Stay

Length of stay is the number of days from when the patient is admitted to being treated until he is discharged. Length of stay can be used to describe the efficiency of medical services in a hospital. The data on the return condition of hypertensive patients includes information that the patient returns home in good condition and has been allowed to go home by the hospital doctor

responsible for these patients. The length of hospitalization of hypertensive patients in the study can be seen in **Table 4**.

Table 4. Length of stay in hypertensive patients

Length of stay (Days)	Number of patients	Percentage (100%)
1-2	4	9.75
3-4	12	29.26
5-6	11	26.82
7-8	7	17.07
>9	7	17.07

Based on **Table 4** shows that the length of patient care is one day of hospitalization at the lower limit and more than nine days at the upper limit. Patients with a length of stay of 3-4 days were 12 the most compared to another length of stay. This is because the characteristics and severity of each hypertensive patient and the general conditions experienced by these patients are different, so treatment takes longer. The study's results showed that the average length of stay was 6.14 day.

The results of this study included length of stay in the moderate category if categorized based on previous studies, which stated that the length of stay of patients was obtained by calculating the difference between the date of admission and the date of discharge from the hospital. The patient's length of stay is categorized as short if the patient is treated for 1-3 days, moderate for 4-7 days, and long ≥7 days (Sulistiyono & Kurniawan, 2018).

One of the successes of therapy can be measured based on the length of stay. The shorter the length of stay, the more effective and efficient it can be said; on the other hand, the more extended the patient's stay becomes less effective and efficient (Amiman et al., 2016). Hypertensive patients accompanied by complications of other diseases can increase the length of stay even more than seven days of hospitalization. Hypertensive patients undergoing inpatient services have varying lengths of stay. The length of stay is influenced by several factors, including patient demographic characteristics, clinical conditions, medical procedures, patient care in the room, and hospital administration issues (Peacock et al., 2011).

3.4. Long Hospitalization Relationship with Direct Medical Costs

The relationship between the length of stay and direct medical costs was carried out using a correlation test which aims to determine the level of closeness of the relationship between variables expressed by the correlation coefficient (r). The relationship between the independent and dependent variables can be positive or negative, with a correlation coefficient between variables ranging from -1 to 1. Positive and negative signs indicate the direction of the relationship between the two (Sugiyono, 2012). **Table 5** shows the results of the relationship analysis from this study.

Table 5. Relationship between length of stay and direct medical costs

Average Length of stay (Days)	Average Direct Medical Expenses (IDR)	*P value, Rho value*
6.14	7,039,515	0.000 0.548

Table 5 shows a significant relationship, 0.000 <0.05, between the length of stay and direct medical costs, meaning that the longer the patient is hospitalized, the more costs the patient incurs. The correlation value is 0.548, indicating a correlation value between 0.41 to 0.60, so this value indicates a moderate relationship between the length of stay and direct medical costs. In the results of another study, length of stay was significantly related (p=0.010) to direct medical costs. The more severe the condition of a patient, the longer the day of hospitalization experienced. Some of the increasing numbers of complications can also affect the severity of the disease, which results

in several medical actions that must be carried out and the total costs that must be incurred (Oktadiana et al., 2019). Likewise, other studies have shown that length of stay is a significant factor associated with the high cost of hypertensioni (Adane et al., 2020). The limitation of this study is that the researchers did not classify direct medical costs for the same length of stay. In this study, researchers also did not control the patient's condition during therapy at the hospital, which may have an effect on the effectiveness of therapy, which also has a relationship with the patient's length of stay.

4. CONCLUSION

The conclusion of this study is that the average direct medical costs for hospitalized hypertensive patients are IDR 7,039,515, the average length of hospitalization for hypertensive patients is 6.14 days, and there is a significant correlation (p=0.000) between the length of stay and direct medical costs. With the results of this study, it is hoped that it can be used as a consideration for the treatment of inpatients with hypertension in order to minimize direct medical costs and length of stay while still prioritizing the effectiveness of treatment.

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6. CONFLICT OF INTEREST

The author states that there is no conflict of interest in this research.

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