ORIGINAL ARTICLE

Cost analysis of inpatient hypertension patients at Panembahan Senopati Hospital, Bantul, Yogyakarta, Indonesia: comparison between INA-CBGs rates and hospitalized actual rate

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ABSTRACT

Hypertension as a cardiovascular disease ranks first as a disease with the highest expenditure on health insurance costs. In the financing system implemented by the Indonesian Social Security Program, hospitals as health service providers no longer break down bills based on details of services provided, but only by submitting a diagnosis code that comes out in the form of Indonesia Case-Based Groups (INA-CBGs). The INA-CBGs code for mild hypertension with a severity level of 1 is I-4-17-1. The purpose of this study was to determine the implementation of INA-CBGs rates by comparing the cost difference between the INA-CBG rates and the actual hospital rates for inpatients with hypertension code I-4-17-1 with the parameters studied in the form of gender, age, and length of stay, comorbidities, and drug usage. The analytic observational method with a cross-sectional design was used. Data were hospital financial records and patients medical record documents (inpatient hypertension patients) coded I-4-17-I with the following classes; first class, second class, and third class treatment rooms from October 2016 to July 2017 at Panembahan Senopati Hospital. Data were tested for normality with the Kolmogorov-Smirnov test. One Way ANOVA test and t-test were used to analyze the data in determining the difference in costs between the INA-CBGs rates and the actual hospital rates and in determining the factors that influenced the difference in costs. The results showed that 53 patients met the inclusion criteria. The total cost incurred by the hospital for hospitalized hypertensive patients was Rp. 140,963,105, while the total claim rate for INA-CBGs was Rp. 109,960,000. Gender, length of stay, comorbidities, and drug usage were contributed to the difference in cost, while age had no significant effect. It can be concluded that hospitals need to evaluate the implementation of INA-CBGs rates to minimize financial losses.

Key words:
hospital financial; health insurance; hospitalization cost; hypertension; direct medical costs

INTRODUCTION

Hypertension is a condition where a person experiences an increase in blood pressure above normal range, which increases morbidity and morbidity.[1,2] The prevalence of hypertension rose from 600 million in 1980 to around 1 billion in 2013.[3] World Health Organization estimates that in the world there are 11% of hypertensive patients who are not detected and 50% of them are in developing countries.[4,5]

Data from the Indonesian Ministry of Health indicates that since 2015, as much as 30% of the cost of the Social Security Organizing Agency (BPJS) has been absorbed by the treatment of chronic diseases such as diabetes, hypertension, and heart problems, with costs reaching 6.9 trillion.[6] It logically happen as these diseases affect almost one million people in Indonesia. The number of people with hypertension disease according to the Indonesian Health Research and Development Agency was 25.8% of the population of Indonesia.[7]

BPJS Health as a government health insurance is part of the Universal Health Coverage (UHC) formed to organize the National Social Security (JKN) program.[8] JKN participants until March 2017 totaled 174,653,763 million people or 67% of the total population of Indonesia.[9] JKN participants who seek treatment at a health service facility registered as a member of the BPJS will be subjected to payment using the INA-CBGs tariff system (Indonesian -Case Based Groups). [10,11] Payments made by using the INA-CBGS system either to the hospital or the payer no longer specify the bill based on the details of the services provided, but only determined by submitting an outpatient diagnosis and the Disease Related Group (DRG) code, commonly referred to as coding.[12]

Coding is very decisive in a prospective financing system that will determine the number of claim costs paid by the BPJS to the Hospital.[13,14] The diagnosis code for mild hypertension inpatient category with a severity level of 1 is I-4-17-I. Code I-4-17-I listed three different cost packages, namely for inpatients in class 1, class 2, and class 3. The cost already includes all the types of treatments starting from the patient's hospital admission until the patient is discharged from the hospital. Presidential Establishment Number 19, 2016 concerning changes to Presidential Establishment Number 12, 2013 concerning Health Insurance, regulates the difference in costs for first class, second class and third class inpatients only lies in the accommodation cost components. The first class is with 2-4 patient beds in one room, the second class with 3-5 patient beds in one room and the third class with 4-6 patient beds in one room, with the cost of drugs and other components remaining the same.[15].

Referring to the explanation above, the researcher wants to identify the implementation of JKN program from the perspective of the health service provider, which is the hospital. The aim is to determine whether the number of costs incurred by the hospital for hypertensive inpatients is equal to the claim rates of INA-CBGs so that the hospital does not suffer losses. The parameters perspectives were gender, age, length of stay, comorbidities and drug usage to determine the difference in cost. In this study, the selected hospital is Panembahan Senopati Hospital, a referral hospital serving patients registered with JKN program.

To see the number of costs incurred, an analysis of the factors that can be related to the size of the cost of hospitalized hypertensive patients was conducted. Based on research conducted by Adrian, age is a factor that affects the increase in hospital care costs, while gender does not affect the additional costs of treating hypertensive patients. The study also revealed that patients with at least one

additional disease tend to have longer Length of Stay (LOS) than patients without comorbidities so this results in significantly higher treatment costs.[15] While Elsabet's research explained that education status, economic status, medicine usage, and comorbidities were significant factors affecting the high costs of inpatient hypertension patients.[16] Therefore, in this study the effect of gender, age, length of stay, comorbidities and drug usage also contributed on the costs of hospitalized hypertensive patients.

Real costs are costs incurred by hospitals for patient care, while INA-CBGs claim rates are fees paid by the Indonesian Social Security Administrative Body to health service providers. Analysis of the cost of inpatient hypertension patients against the claim rates of INA-CBGs is very much needed in the planning of health services so that hospitals can make cost savings and prevent financial losses. Hospitals that are unable to perform cost efficiency and effectiveness will suffer losses. The results of this study are expected to provide an overview of the implementation of the INA-CBGs system and determine the ability of hospitals to manage the healthcare costs of inpatient hypertension patients. In addition, this research is expected to provide an overview for policy makers in determining the cost package for hospitalized hypertensive patients and evaluate the quality of social security in Indonesia.

METHODS

Study design

This research belongs to a non-experimental analytic (observational analytic) study with a cross-sectional study design using retrospective data collection methods. The data were taken from hospital financial records and medical record document searches of hypertensive

patients' inpatient code I-4-17-I under class 1, class 2, and class 3 at Panembahan Senopati District Hospital for 10 months (October 2016- July 2017). The study received the approval code from the Ethics Research Committee no 001151/KKEP/FKG-UGM/EC/2017.

Study subjects

The sample size used in this study was all JKN participants who were diagnosed with mild hypertension and hospitalized at Panembahan Senopati Hospital in the period October 2016 to July 2017 and have met the inclusion criteria. Inclusion criteria include patients with a diagnosis at the time of discharge identified as mild hypertension with the code INA-CBGs I-4-17-I. The sample in this study were 53 patients who met the inclusion criteria.

INA-CBGs is a continuation of the Indonesia Diagnosis Related Groups (INA-DRGs) application. The INA-CBGs system is run using a grouper from the United Nations University International Institute for Global Health (UNU-IIGH). Universal Grouper means that it covers all types of patient care.

Based on the Regulation of the Minister of Health of the Republic of Indonesia No. 52 of 2016 it is known that the treatment of moderate hypertension has the INA-CBGs code I-4-17-I for the description of mild hypertension. The first letter indicates the CMG (Casemix Main Groups) for the cardiovascular system, the number 4 indicates the type of case as an inpatient non-procedure, the third number indicates the specific code for CBGs (Case Base Group), the last digit indicates the severity of the disease.

Patients who met the inclusion criteria in this study totaled 53 patients consisting of 3 treatment classes (class 1, class 2, and class 3 treatment rooms).

Materials and Research Tools

The materials used in this study were patient medical records, details of costs incurred, and details of patterns of drug use by patients during treatment to find outpatient care costs and drug use during treatment at Panembahan Senopati Hospital in the period October 2016-July 2017.

The tool used in this study was a hypertensive patient data collection sheet containing patient demographic data (medical record number, gender, age, length of illness, class of treatment) and drug use (name of drug, frequency and dose, dosage form, date of administration, duration of administration, and disease diagnosis by a doctor) and sheets to record data on direct medical costs (medicine and medical equipment costs, diagnostic support costs, medical personnel costs, accommodation costs, administrative costs, and other costs).

Data analysis

The data obtained were then analyzed by using the Statistical Package of Social Science (SPSS) by starting the normality test which shows that all data is normally distributed. A t-test was conducted to determine differences in hospital costs and INA-CBGs claim rates. Besides that, this analysis was also used to determine parameters that influenced differences in costs, namely gender, comorbidities, and amount of the drug

administered. Meanwhile, One Way ANOVA test was used to assess the parameters of age and Length of Stay. Post Hoc Test LSD analysis with a 95% level of confidence was carried out if the One Way ANOVA test results were significant.

RESULTS

Hospital Costs for INA-CBG Rates at Panembahan Senopati Hospital

The research was conducted during the period October 2016 - July 2017. There was a total of 53 inpatients under class 1, class 2, and class 3 with cases of mild hypertension code I-4-17-I. All patients met the inclusion criteria. Hypertension patients at Panembahan Senopati Hospital showed the number of patients in class 1 was 12 patients, then class 2 patients 8 patients, and class 3 patients had the most number, 33 patients.

Analysis of medical costs and sociodemographic data were initiated by carrying out a normality test with the Kolmogorov-Smirnov test showing that the data were normally distributed (parametric) so that One Way ANOVA test and t-test were applied with a significance level of 95% ($p < 0.05$) to find out the difference in costs between the INA-CBGs rates and the actual hospital rates and to find out the factors that influence the difference in costs.

Table 1. Costs for inpatient hypertension at Panembahan Senopati Hospital

| Cost | Inpatient Class | | | | | | Total Patient Costs (Rp) | p |
| | Class 1 | | Class 2 | | Class 3 | | | |
	n	Mean (Rp) ±SD	n	Mean (Rp) ±SD	n	Mean(Rp) ±SD	n		
Rates of INA-CBGs (Rp)		2.591.600		2.221.400		1.851.200		109.960.000	0.001*
Hospital Rates (Rp)	12	3.800.403± 1957967	8	2.960.900± 2714953	33	2.171.850± 1025818	53	140.963.105	

* = p<0.05 (there are significant differences)
Rates of INA-CBGs = Claim rates determined by health insurance for one patient treatment under class 1, class 2 and class 3

Referring to Table 1, it appears that the costs incurred for inpatient hypertension patients under class 1, class 2, and class 3 exceed the INA-CBGs claim rates. The higher the class of care, higher the average cost of hospitalized hypertensive patients who are not covered by INA-CBGs claim rates. The total costs incurred by the hospital for hypertensive inpatients was Rp. 140,963,105, while the rate paid by BPJS to the hospital for the INA-CBGs claim rate was Rp.109,960,000, so the difference was Rp. 31,003,105. Statistical tests were performed to determine the difference between hospital costs and INA-CBGs rates using the t-test, resulting in a value of p=<0.05 (p = 0.001) indicating significant difference.

Parameters studied on the cost of hospitalized hypertensive patients

There are 5 parameters studied to determine the factors that can affect the cost of inpatient treatment of hypertensive patients at Panembahan Senopati Hospital. Table 2 presents data on drug costs for hospitalized hypertensive patients on the parameters studied in the form of gender, age, length of stay, comorbidities, and amount of the drug.

Table 2. Parameters studied on the cost of hospitalized hypertensive patients at Panembahan Senopati Hospital

Parameter	Class 1 Mean (Rp) ±SD	Class 2 Mean (Rp) ±SD	Class 3 Mean(Rp) ±SD	n	Mean(Rp) ±SD	p
Gender Male	4.098.836 ±2.620.971	4.324.096 ± 3.439.511	2.468.353 ± 1.240.798	21	3.210.038 ±2.184.256	0.009*
Female	3.728.251 ±1.460.678	1.597.704 ± 642.826	2.002.419 ± 868.346	32	2.329.356 ± 1.234.006	
Age (Year) < 45	-	1.393.806	1.730.807 ± 50.085	5	1.663.407 ± 156.829	0.389
45 – 60	3.723.545 ±2.620.971	2.470.169 ± 1.334.228	2.487.988 ± 1.185.899 ±	31	2.724.254 ± 1.337.678	
> 60	3.877.261 ± 2.436.790	4.971.275 ± 5.721.282	1.665.339 ± 482.114	17	2.834.951 ± 2.401.047	
LOS (Day) 1-5	2.763.864 ± 846.136	1.656.216 ± 560.125	1.823.331 ± 528.450	37	1.974.170 ±703.272	0.001*
6-9	3.812.018 ± 1.349.581	4.733.072	2.890.905 ± 1.382.373	12	3.274.697 ± 1.387.961	
> 10	7.410.869 ± 1.957.967	9.016.833	4.783.853	4	7.155.606 ± 1.812.828	
Comorbidity Hypertension without comorbidities	-	-	1.556.361 ± 376.245	7	1.556.361 ± 376.245	0.036*
Hypertension+ comorbidities	3.800.403	2.960.900	2.337.559 ± 1.085.515	46	2.827.577 ± 1.769.917	
Amount of the drug <2	444.712 ± 453.468	599.120 ± 569.496	794.696 ± 974.787	22	548.645 ± 614.864	0.04*
>2	574.668± 673.795	1.703.040 ± 2.540.617	1.369.625 ± 1.178.183	31	909.209 ± 1.172.730	

* = p<0.05 (there are significant differences)
LOS = Length of Stay

Referring to table 2, it appears that although the number of female patients were greater than male patients, the average cost of treating male patients is greater than female patients. Test-t results with a 95% confidence level resulted in a P-value <0.05 (p = 0.009) indicating that there was a significant difference between the costs of treating male inpatient hypertension compared with female patients.

The average cost of hospitalized hypertensive patients was analyzed for several age categories. Increasing with age, the average cost of hospitalized hypertensive patients is higher. To see the level of difference in each age category, One Way ANOVA test was performed. From the test results with a 95% confidence level, the value of P = 0.389 was obtained, which means there was no significant difference in costs incurred by the hospital based on age category.

The cost of hospitalized hypertensive patients based on the category of length of stay showed a significant result of p<0.05 (p=0.001), which means there was a significant effect difference between the cost of hospitalized hypertensive patients with a length of stay 1-5 days, 6-10 days, and> 10 days. Statistical test results with Post Hoc revealed that the length of treatment of 1-5 days was significantly different from the length of treatment of 6-9 days and the length of treatment > 10 days, however, the length of treatment of 6-9 days was not significantly different from the length of treatment > 10 days.

The number of comorbidities in hypertensive patients hospitalized at Panembahan Senopati Hospital shows a significant value with a 95% confidence level, which is p = 0.036 (<0.05). This indicates that there was a significant difference between the costs of hospitalized hypertension patients without comorbidity and hypertensive patients accompanied by comorbidity.

Table 2 shows that the majority of patients, namely 31 patients, received > 2 drug items with a higher average drug price compared to patients who received ≤ 2 drug items. Statistical t-test results with a 95% confidence level demonstrated significant results below $p<0.05$ (p = 0.04) which means there was a significant difference between the costs of hospitalized hypertensive patients using ≤2 items of drugs and those who used > 2 drugs.

Comorbid hypertension patients based on diagnoses by doctors using ICD-10 (The International Statistical Classification of Diseases and Related Health Problems-10th Revision) indicated that the most common comorbidity suffered by patients is dyslipidemia with a total of 11 cases, then the second most common comorbidity is Diabetes Mellitus type 2 (Table 3).

The pattern of drug use in hypertensive patients with the code INA-CBGs I-4-17-1 in this study showed that the antihypertensive class of Calcium Channel Blockers was most widely used, followed by the Angiotensin II Receptor Blocker group. In addition, the most widely used drug for the digestive system is the histamine H2 receptor antagonist class (Table 4).

Table 3. Comorbidity of Inpatient Hypertension

NO.	ICD 10	Description	Number of patients
1	E 78.9	Disorder of lipoprotein metabolism, unspecified	11
2	E 11.4	Type 2 diabetes mellitus	10
3	R 42	Vertigo NOS	9
4	I 25.9	Chronic ischaemic heart disease, unspecified	8
5	R 04.0	Epistaxis Haemorrhage from nose	4
6	R51	Headache	4

NO.	ICD 10	Description	Number of patients
7	J 06.8	Other acute upper respiratory infections of multiple sites	3
8	K 30	Functional dyspepsia	3
9	R 40	Somnolence	2
10	K25.9	Gastric ulcer pylorus	1
11	N 19	Unspesific kidney failure	1
12	I 03.9	Selesis	1
13	K 11.2	Sialoadenitis	1
14	K 37.0	Unspecified appendicitis	1
15	J03.9	Acute tonsillitis, unspecified	1
16	J 81	Pulmonary oedema	1
17	K80	Cholelithiasis	1
18	E 78.0	Pure hypercholesterolaemia	1
19	K 59.0	Obs. Konstipasi kronis	1
20	R 11	Nausea and vomiting	1
21	E 87.6	Hypokalaemia	1
22	H 40.9	Glaukoma	1
23	M 10.9	Gout, unspecified	1
24	E 05	Hipertiroid	1
25	R 63.0	Anorexia	1
26	M 13.0	Polyarthritis, unspecified	1
27	N 39.9	Disorder of urinary system, unspecified	1
28	E 78.1	Pure hyperglyceridaemia	1

Table 4. Comorbidity of Inpatient Hypertension

Drug Therapy	Group	Amount	Percentage
Antihypertensive	Diuretic	30	9%
	ACE Inhibitors	18	5%
	Agiotensin II Receptor Blocker	40	12%
	Calcium Chanel Blocker	44	13%
	ß Blockers	12	4%
	Central alpha-2 agonist	9	3%
	Central alpha agonist	1	0%
Gastrointestinal	Antacids	9	3%
	Antagonist serotonin receptors	9	3%
	Antagonist receptor histamine H2	34	10%
Antibiotics	Cephalosporin	3	1%
	Penicillin	5	1%
	Quinolones	4	1%
Antidiabetic	Rapid Acting Insulin	8	2%
	Long Acting Insulin	3	1%
	Biguanide	9	3%
	Sulfonylureas	3	1%
Pain reliever	NSAIDS	11	3%
	Analgesic antipyretic	15	4%
	Corticosteroids	6	2%
	Benzodiazepines	7	2%

Drug Therapy	Group	Amount	Percentage
Cardiovascular	Vasolidator	12	4%
	Antiplatelet	8	2%
	Xantahunine Oxidase Inhibitors	7	2%
	Anti- Fibrinolytic	4	1%
Other	Antihistamine	5	1%
	Vitamin	12	4%
	Statins	6	2%
	hypoallergenic	7	2%

DISCUSSION

Hospital Costs for INA-CBG Rates at Panembahan Senopati Hospital

Hypertension is a degenerative disease that has the highest incidence at Panembahan Senopati Bantul District General Hospital. The same thing happened in hospitals in the United States, 37% of patients undergoing hospitalization had a diagnosis of hypertension.[17] It is estimated that the prevalence of hypertension will continue to increase by more than 9%, or an additional 27 million people, from 2010 to 2030.[18]

Data from the Ministry of Health of the Republic of Indonesia states that since 2015, as much as 30% of the costs for the Social Security Administration Agency (BPJS) have been absorbed by the treatment of chronic diseases with a cost of up to 6.9 trillion [19]. Hypertension is a chronic disease where the cost of treating patients is covered by the Health Social Security Administration in Indonesia with the existence of the National Health Insurance program. The National Health Insurance System (JKN) imposes health service rates by determining the INA-CBGS rates. The diagnosis code included in the INA-CBGs package rates for the description of hospitalization for mild hypertension with severity level 1 (without complications or comorbidities) is I-4-17-I. The results of this study compare the difference in costs between the costs of INA-CBG claims and the actual rates of hospitalized hypertensive patients. Data were obtained from 53 inpatients class 1,

class 2, and class 3 with cases of mild hypertension code I-4-17-I at Panemban Senopati Hospital. All patients met the inclusion criteria. Hypertension patients at Panembahan Senopati Hospital showed the number of patients in class 1 was 12 patients, then class 2 patients 8 patients, and class 3 patients had the highest number, namely 33 patients.

The total cost of one hospitalization for each class of care between class 1, class 2, and class 3 inpatients showed different results. This research resulted that the costs incurred by hypertensive patients in inpatient class 1, class 2, and class 3 exceed the INA-CBGs claim rates. The higher the class of care, the greater the average cost of hospitalized hypertensive patients who are not in accordance with the INA-CBGs claim rates. The total cost incurred by the hospital for hospitalized hypertensive patients is Rp. 140,963,105, while the rate paid by BPJS to hospitals for INA-CBGs claim rates is IDR 109,960,000, so the difference between these two amounts is IDR. 31003105. The results of the statistical test resulted that there was a significant difference between the cost of claiming INA-CBGs and the actual rate of hospitalized hypertensive patients.

Hospitals as health service providers can suffer losses if the costs incurred by hospitals for treating hypertensive inpatients were greater than the costs of reimbursing INA-CBGs claims. The Medical Panel Survey Data (MEPS) shows that hypertension is the most expensive of all cardiovascular diseases, with an estimated direct cost of $ 69.9 billion in 2010.[19] Direct medical costs and

non-medical components of hypertension costs were 61.81% and 12.17%, respectively. Hospitals that had a surplus in the BPJS Health era were those hospitals that were able to implement cost efficiency and effectiveness practices. These hospitals were able to build good health management, good coding quality, good claim quality and did not commit fraud.[21] Conversely, if a hospital experiences a deficit, it will have an impact on patient health services, namely a decrease in the quality of health services, both from the aspect of health workers or human resources, the health facility management system, health equipment support, as well as the provision of medicines or pharmaceuticals.

Hospitals need to conduct an evaluation related to the costs incurred by the hospital for the treatment of hypertensive inpatients higher than the claims of INA-CBGs rates by looking for factors causing financial losses.

To find out the factors that can influence the difference in the cost of treating inpatient hypertension cases against INA-CBG rates, this study analyzed several factors including patient characteristics (including age and sex), length of time of treatment, comorbidities, and medicine usage.

The gender factor against the cost of hospitalized hypertension patients

There were more female patients in this study than male patients. Research in Ethiopia and the United States also found that female inpatients with hypertension were more dominant than males.[16,20] Hypertension is common in the United States with a current prevalence of an estimated 37% for men and 40% for women.[21,22]

The results of this study show that the number of female patients is greater than that of males, but the average cost of treating male patients is greater than that of female patients. Therefore, the statistical test results show that there is a significant difference between the treatment costs of male inpatients with hypertension compared to female patients.

The high hospital costs in male patients can occur because in this study the length of treatment for male patients was longer than that for female patients. Male patients had LOS of 5.3 days, while female patients had 4.8 days. Higher hospital costs for male patients can also occur because in this study male patients suffer more comorbidities than female patients. Gender has an important influence on blood pressure regulation because there is a possibility that sex hormones may affect the angiotensin-renin system. In general, blood pressure in men is higher than in women.[23,24]

The age factor against the cost of hospitalized hypertension patients

The age classification used by the Indonesian Ministry of Health in 2009 is 18-45 years as an early adult category, 46-65 years as a late adult category, and> 65 years as an old age category.[25,26] Table 3 shows that hypertension is most commonly suffered by patients aged 45-65 years, 31 patients.

The prevalence of hypertension increases with age.[27] The majority of 62.2% of hypertensive patients aged 45-65 years. Sidhu noted that the highest prevalence of hypertensive patients is at the age of ≥ 60 years, followed by the age of 50-59 years.[28,29]

High hypertension in line with increasing age is caused by changes in the structure of large blood vessels. As a result, the lumen becomes narrower and the blood vessel walls become stiff, leading to an increase in systolic blood pressure.[30,31] The prevalence of hypertension is estimated to decrease at the age of ≥ 75 years because

the number of patients seeking treatment at Panembahan Senopati Hospital at that age is small.

This study shows that the average cost of hospitalized hypertensive patients for 3 age categories, namely <45 years, 45-65 years and > 65 years. As age increased, the average hospitalization costs for hypertensive patients also increased. The age parameter in this study did not show a significant difference in hospital costs based on age category.

The Length of Stay (LOS) factor against the cost of hospitalized hypertension patients

In this study, the average LOS calculation for hospitalized hypertension patients was 5.0 days. These results are the same as the average LOS calculation in hypertensive patients according to the Hospital Episode Statistics, Department of Health, England which is 5.1 days.[32] The average length of stay is 4.2 days which will cost an inpatient fee of $18.50.[30]

The length of stay in this study was divided into 3 categories, namely 1-5 days, 6-9 days, and >10 days. The test results showed that the duration of treatment affected the cost of using drugs per day in hospitalized hypertensive patients. The longer the patient's stay in the hospital, the greater the costs spent. Research conducted at a hospital in Shanghai, China suggests LOS control to help improve the effectiveness of diagnosis and treatment that can effectively control the costs of hospitalized patients to some extent.[33]

The comorbid factor against the cost of hospitalized hypertension patients

Research was conducted by comparing the costs of hospitalized hypertension patients with code I-4-17-I, namely hospitalization of individuals with mild hypertension at severity 1 (without complications or comorbidities), according to which description the patients classified under this code are hypertensive patients in

the absence of complications or concomitant diseases. But the results of research conducted on 53 patients with code I-4-17-I revealed that as many as 46 patients had concomitant diseases.

Research conducted in India and Canada shows that 58.6% of inpatient hypertensive patients have concomitant diseases that require a variety of treatments and healthcare procedures, thereby increasing the cost of hospitalization. Patients who had comorbidities significantly increased their service costs by $ 83.63 compared to patients without comorbidities who only spent ETB $ 60.92.[16]

Research conducted at hospitals in Zimbabwe has shown that the presence of two comorbidities was associated with higher hospitalization costs. Comorbidity will make patients undergo multidrug treatment so that the cost of using drugs is higher.[34]

The accuracy of the Management Information System in entering the I10 code greatly influences hospital management. Errors in putting the code can result in the hospital experiencing financial losses if the code entered is higher. However, it can also benefit the hospital if the code entered is higher than the patient's illness, which can be a fraudulent activity in the hospital.

The results of this study showed that the costs incurred by the hospital for hypertensive patients with code I-4-17-I exceed the INA-CBGs rates. This could be due to hypertension patient code I-4-17-I, related to the description of mild hypertension inpatients with severity 1 without complications or comorbidities, but as many as 46 patients accompanied by comorbidities. The more severe comorbidities from hypertension will result in more medical treatment costs for the treatment of these comorbidities than the treatment of hypertension alone. Besides, the presence of comorbidities can affect the length of time a patient is treated with

hypertension, so the longer the treatment time the more costs incurred. People who live with such chronic conditions can experience increased treatment costs.[35]

The most common comorbidity in this study was dyslipidemia. Dyslipidemia with the highest comorbidities can occur in hypertensive patients because hypertension is a multifactorial disease. In general, the causes of hypertension are age, gender, behavior and physical activity, high blood cholesterol levels and diabetes mellitus. In addition, other risk factors for hypertension are race, history of hypertension in the family, alcohol consumption and history of smoking, fat, sugar and obesity. Lipids play an important role in influencing the incidence of hypertension, an increase in blood lipid profile levels is very closely related to the development of atherosclerosis, especially at the age of 30-40 years. When the total cholesterol levels in the blood reach 260 mg/dl, the incidence of atherosclerosis will increase 3-5 times. In addition, epidemiological, laboratory and clinical studies conducted by the Framing Heart Study (FH) and the Multiple Risk Factor Intervention Trial (MRFIT) have proven that impaired lipid metabolism is a central factor in the occurrence of atherosclerosis. Based on its geographical distribution, it can also affect the distribution of hypertension [39].

The second most common comorbidity in this study was Type 2 Diabetes Mellitus. This can occur because high blood sugar will stick to the blood vessel walls. After that, an oxidation process occurs in which blood sugar reacts with proteins from the blood vessel walls which give rise to advanced glycosylated end products (AGEs). These AGEs damage the inner walls of the blood vessels, and attract saturated fat or cholesterol to the walls of the blood vessels, causing an inflammatory reaction to occur. White blood cells (leukocytes) and blood clotting cells (thrombocytes) as well as other materials join together to form a plaque clot, which makes the walls of blood vessels hard, stiff and eventually a blockage occurs resulting in changes in blood pressure [40].

The medicine use factor against the cost of hospitalized hypertension patients

Medicine is an important component of health management. Medicine costs constitutes 40% -50% of the operational costs of healthcare in Indonesia and continue to show an increase every year.[36] The act of prescribing patterns can have a major impact on health expenditure.[37] The more the number of drugs consumed by patients, the greater the costs incurred.[38] WHO provides a standard indicating that the average number of drug items used per prescription sheet is categorized as good if there are at most 2 recipes (R /) for one diagnosis.[38,39]

The number of drugs in this study was grouped into 2 categories, namely group I with the number of drug items or R / ≤2 in 1-time prescription and group II with the number of drug items or R /> 2 in 1-time prescription. The results of this study found that 37% of the costs of hypertensive inpatients at Panembahan Senopati Hospital were spent on drug costs.

Patients get > 2 items of drugs because of the presence of comorbidities or comorbidities suffered by the patient. The pattern of drug use in this study showed that the majority (13%) used antihypertensive drugs of the Calcium Channel Blocker class. CCB class drugs such as amlodipine, nifedipine and nicardipine is widely used as first-line antihypertensive therapy because it is considered beneficial in terms of drug pharmacokinetics (one time daily dose) and proven efficient in controlling hypertension and as angina pectoris prophylaxis. The use of CCB can be associated with the demographic characteristics of a country

with hypertension sufferers aged over 50 years. Apart from the CCB group, antihypertensive drugs that are also widely used are the Agiotensin II Receptor Blocker (ARB) group [45].

The use of ARBs can be well tolerated as single therapy and in combination with other antihypertensive drugs because they can increase adherence to therapy and have become a mainstay in the treatment of stage 1 and 2 hypertension. The mechanism of action of Angiotensin receptor blockers (ARBs) is to inhibit the activity of angiotensin II on its receptors, making it more beneficial compared to other classes because it does not produce the side effect of dry cough. The pattern of drug use in this study also shows the use of other drugs besides antihypertensives based on the patient's comorbidities [46].

Hypertensive patients who have comorbidities will undergo multidrug treatment resulting in non-compliance with medication, especially for patients with high out-of-pocket costs.[20] Whereas research on 10,000 patients in Saudi Arabia explains that patients who regularly take hypertension drugs have generally lower costs than patients who do not routinely take antihypertensive drugs. This can occur because patients who routinely consume antihypertensive drugs will be more likely to avoid comorbidities or comorbidities.[40]

Evaluation of the hospital as a healthcare provider needs to be done to control costs associated with inpatient services, namely by ensuring that the care provided by the hospital to inpatients is indeed necessary and appropriate.

An evaluation of the hospital's coding officer is also needed so that the code entered matches the care and diagnosis of the patient. The coding process is very influential on the rates of patient care claims, where the rates to be received by patients are determined by the code rates entered by the coding officer.

RECOMMENDATIONS

There is a cost difference between the cost of INA-CBGs Rate and the actual hospitalized rate for inpatient hypertension patients at Panembahan Senopati General Hospital. The costs incurred by the hospital for hospitalized hypertensive patients are greater than the INA-CBGs claim rates. Parameters in this study such as gender, length of stay, comorbidities, and drug use affected differences in costs, while age did not affect differences in costs. The results of this study are useful for hospitals to evaluate cost control strategies for hospitalized hypertensive patients so that the hospital does not suffer financial losses. In addition, the results of this study can be an overview of policymakers in determining the cost package for hospitalized hypertensive patients and seeing the quality of social security in Indonesia.

ACKNOWLEDGEMENTS

ETHICS APPROVAL

The study received the approval code from the Ethics Research Committee no.001151/KKEP/FKG-UGM/EC/2017.

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