ORIGINAL ARTICLE

Patient Characteristics Correlation with Cost of Hospitalisation in Ischemic Stroke Geriatric Patient

Korelasi Karakteristik Pasien dengan Biaya Perawatan Pasien Stroke Iskemik Geriatri

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ABSTRACT

Background
Ischemic stroke is a degenerative condition that primarily affects the elderly and has high treatment expenses. There is no data on how much it costs to treat stroke patients in Indonesia, and there are many factors that influence the cost of ischemic stroke treatment, particularly in geriatric patients.

Methods
This study was conducted from October to December 2018 using a cross-sectional technique. In this study, 53 patients who met the exclusion and inclusion criteria were employed as samples. The patient's characteristics, such as age, gender, length of stay, number of comorbidities, and drug quantities, are the independent variables in this study. The cost of treatment is the dependent variable. Data was acquired utilizing data collecting sheets from hospital information systems and medical records. The Spearman test and the eta test were conducted with 95 percent confidence to determine the correlation between patient characteristics and treatment costs, and the value of R was used to determine the strength of the correlation between variables.

Results
According to the findings, the average cost of treatment for geriatric ischemic stroke patients was Rp 5,144,083 Rp 4,423,794. The length of stay (p-value 0.05; R=0.756), the number of comorbidities (p-value 0.05; R=0.44), and the number of drugs (p-value 0.05; R=0.60) all had a significant correlation with the cost of treatment.

Conclusions
The factors that significantly affect the cost of hospitalisation for geriatric ischemic stroke patients are the length of stay, number of comorbidities, and number of drugs.

Keywords: Stroke ischemic; Geriatric; Cost

ABSTRAK

Latar Belakang

Stroke iskemik merupakan penyakit degeneratif yang dialami oleh kelompok usia lanjut dan merupakan penyakit dengan biaya perawatan yang tinggi. Di Indonesia belum ada data berapa biaya yang dikeluarkan untuk perawatan pasien stroke terutama pada pasien geriatri dan terdapat banyak faktor yang mempengaruhi biaya perawatan stroke iskemik khususnya pada pasien geriatri.

Metode

Penelitian ini menggunakan metode cross-sectional dan dilakukan pada bulan oktober – desember 2018. Jumlah sampel yang digunakan pada penelitian ini adalah 53 pasien yang memenuhi kriteria inklusi dan eksklusi. variabel terikat pada penelitian ini adalah karakteristik pasien meliputi usia, jenis kelamin, hari perawatan, jenis jaminan perawatan, jumlah komorbiditas, jumlah obat sedangkan variabel terikat pada penelitian ini adalah biaya perawatan. Data didapatkan dari sistem informasi rumah sakit dan rekam medis dan dikumpulkan dengan lembar pengumpulan data. Analisis data dilakukan untuk mengetahui korelasi antara karakteristik pasien dengan biaya perawat menggunakan uji spearman dan uji eta dengan tingkat kepercayaan 95% serta nilai kekuatan korelasi antar variabel ditentukan dengan nilai R.

Hasil

Berdasarkan hasil penelitian rata-rata biaya perawatan pasien stroke iskemik geriatri sebesar Rp 5,144,083 ± Rp 4,423,794. hari perawatan (p-value <0.05; R=0.756), jumlah komorbiditas (p-value <0.05;R=0,44) dan jumlah obat (p-value < 0.05; R = 0.60) memiliki korelasi yang signifikan meningkatkan biaya perawatan.

Kesimpulan

Semakin hari pasien dirawat dan semakin banyak jumlah obat yang digunakan berkorelasi positif dengan peningkatan biaya perawatan pasien stroke iskemik geriatri.

Kata Kunci: Stroke; Iskemik; Geriatri; Biaya; Tulungagung

INTRODUCTION

Research about stroke in Southeast Asia, East Asia, and South Asia shows the incidence of stroke varies from 67 to 422 stroke incidents per 100,000 population every year.[1] Meanwhile, in Indonesia based on the results of RISKESDAS in 2018, the prevalence of stroke is most prevalent in East Kalimantan, Yogyakarta Special Region, and North Sulawesi, while the national prevalence is 10.9‰ and when viewed by age group, the highest prevalence of stroke in the age group >65 years (95.5‰).[2] Stroke is divided into 2 types, hemorrhagic stroke and ischemic stroke. Ischemic stroke is the most common type of stroke that is experienced at 88% when compared to the type of hemorrhagic stroke which is 12%.[3]

Stroke patients generally experience several manageable and unmanageable risk factors. Unmanageable risk factors include age, gender, race, and family history. Factors that can be manageable include cardiovascular disease, diabetes mellitus, smoking, obesity, dyslipidemia, and lack of physical activity.[3] Controlling controllable risk factors is a strategy that can be used to decrease the number of incident strokes.

The treatment of stroke patients is costly. Geriatric patients who are treated generally have multiple comorbidities, with increasing comorbidities will increase the number of drugs used and in the end will increase the cost that must be used to treat the patient or the health insurer.[4,5] In the United States, it costs approximately $36,6 – 72,7 billion (± Rp439-872 trillion) per year to treat stroke patients. In addition to direct medical costs, stroke patients also require indirect medical

costs of \$33.7 billion.[6] Stroke patients generally experience sequelae from the stroke experienced so they require physiotherapy in Ontario Canada the budget for stroke programs is \$445,000 per year.[7] Research conducted in Korea the cost of treating ischemic stroke patients is 6.7 million KRW (\$6146).[8] Another study in Brazil showed that the average cost of treating 196 ischemic stroke patients was \$5,020 and the average per day of care was \$256.[9] A study in North Sumatra showed that treating 130 stroke patients cost Rp. 1,305,844,880 and an average of Rp. 10,044,960.[10] A 2021 study in Canada showed that women had 3% lower treatment costs than men in patients undergoing outpatient care and rehabilitation but higher long-term care and home care costs than men.[11] Age, days of care, and type of stroke are patient characteristics that cause an increase in the cost of care.[12]

Research conducted by Firmansyah showed that there were factors that significantly influenced the cost of care for ischemic stroke patients including length of stay, number of comorbidities, and treatment class.[13] Another research showed that patient characteristics that statistically affect differences in treatment costs include age, length of stay, type of care, and number of comorbidities.[14] With the background that has been described, the researcher is interested in the correlation between the characteristics and treatment costs of geriatric ischemic stroke patients. The novelty of this study is that the research sample is geriatric patients who are the age group most prone to suffering an ischemic stroke and the analysis I used was an analysis to see the correlation or relationship between patient characteristics and treatment costs and factors affecting cost of hospitalization. So, knowing the correlation between patient characteristics and treatment costs can be used to optimize therapy without having to sacrifice the health insurer.

METHODS

The method that was used in this study was cross-sectional observational. Data collection was carried out retrospectively. The samples in this study were all patients who were admitted from October to December 2018 who met the inclusion and exclusion criteria.

The inclusion criteria are patients age ≥60 years, diagnosed with ischemic stroke while the exclusion criteria are the presence of incomplete data which includes age, gender, drugs, comorbidities, days of treatment, costs, and type of care insurance; the patient died before the data was taken.

Patient characteristics in this study include age, gender, drugs used, comorbidities, length of stay, and type of care insurance, this data is an independent variable. The dependent variable is the total cost that must be incurred by the health insurer. Data were collected from hospital information systems and medical records which were collected on data collection sheets.

Data analysis was performed descriptively, namely gender, age, days of treatment, number of comorbidities, number of drugs, and total cost of care. Data normality was analyzed using Kolmogorov-Smirnov analysis. The correlation of age, length of stay, number of comorbidities, and number of drugs used with the cost of treatment was analyzed using Spearman Rho analysis. Gender and type of treatment guarantee with treatment costs were analyzed using eta analysis with a 95% confidence level. The strength of the correlation was determined by the R-value.[15]

RESULTS

This study involved 53 patients who met the inclusion and exclusion criteria. Patient characteristics included gender, age, length of stay, type of care insurance, number of comorbidities, number of medications, and total cost of care. Patient characteristics can be seen in Table 1 which consists of 30 male patients (57%) and 23 female patients (43%). So it can be interpreted that stroke is experienced more by men than women, this is in line with a systematic review showing that the prevalence of stroke mostly affects men compared to women, this is also the same as research from RISKESDAS that stroke is mostly suffered by men.[2]

Based on Table 1, the age of the most treated patients was 60-69 years old as many as 24 patients (45.28%). Based on the results of RISKESDAS 2018, stroke patients are mostly aged more than 65 - 74 years, namely 45.3‰ and more than 75 years at 50.2‰, the same thing is also shown by a study conducted by Firmansyah in 2016 the result is that patients with an age of more than 70 years have the most strokes, which is 44 patients.[13]

Table 1. Patients Characteristic

	Categories	Numbers	Percentages
Gender	Male	30	57.00%
	Female	23	43.00%
Age (Years)	60-69	24	45.28%
	70-79	22	41.51%
	80-89	5	9.43%
	90-99	2	3.77%
Length of Stay (days)	3-5	26	49.06%
	6-8	18	33.96%
	9-11	6	11.32%
	12-14	3	5.66%
Type of care insurance	Askes	1	1.56%
	BPJS	23	35.94%
	JAMKESDA	5	7.81%
	KIS	10	15.63%
	General patient	14	21.88%
Numbers of Comorbidities	0	11	20.75%
	1	26	49.06%
	2	11	20.75%
	3	5	9.43%
Number of Medicine	1-5	4	7.55%
	6-10	31	58.49%
	11-15	12	22.64%
	16-20	4	7.55%
	21-25	0	0.00%
	26-30	0	0.00%
	31-35	2	3.77%
Total Costs (Rupiah)	1.000.000 - 4.999.999	38	71.70%
	5.000.000 - 9.999.999	10	18.87%
	10.000.000 - 14.999.999	3	5.66%
	> 15.000.000	2	3.77%

Most patients were hospitalized for 3-5 days totaling 26 patients (49.06%). Some studies showed that the average ischemic stroke patient who was treated needed treatment days

between 5-10 days of treatment.[13,14,16] Many factors affect the days of care for stroke patients in hospitals, some of which are the type of stroke where hemorrhagic stroke patients, the presence of infection, atrial fibrillation, smoking history and not getting physiotherapy, and the high number of CCI (Carlson Comorbidity Index) require longer hospitalization days.[17,18]

The type of care insurance most widely used by patients based on Table 2 is BPJS as many as 23 patients (35.94%), general as many as 14 patients (21.88%), and KIS as many as 10 patients (15.63%). With the implementation of national health insurance, more and more patients are participating in treatment using BPJS.

The number of comorbidities based on Table 1 most experienced by patients was 1 comorbidity as many as 26 patients (49.06%), patients who did not have comorbidities, and 2 comorbidities each as many as 11 patients (20.75%). a study showed that stroke patients had 1 comorbidity with the most number.[13] The most prescribed number of drugs based on Table 1 is 6-10 types of drugs as many as 31 patients (58.49%). Drug costs are 9.8% of all treatment costs in stroke patients.[9]

Based on Table 1, the number of patients treated required treatment costs of Rp 1,000,000.00 - Rp 4,999,999.00 as many as 38 patients (71.70%), while 15 patients (18.87%) required costs ≥ Rp 5,000,000.00. The total cost of treating 53 patients is Rp 272,636,386 with an average treatment cost of Rp 5,144,083 ± Rp 4,423,794. The results of this study are almost the same as the results of research conducted by Hadning where the average cost of patient care is RP 3,271,208.00 for treatment care less than 8.5 days while for treatment more than 8.5 days it is Rp 4,921,042.00.[19] Firmansyah's research showed that the average cost of treating ischemic stroke patients was Rp 10,184,691.00, this happened because Firmansyah's research was conducted in a private hospital.[13]

The results of the normality test using Kolmogorov-Smirnov analysis of all patient characteristics get a p-value <0.05 so that it can be concluded that the data is not normally distributed so that Spearman Rho analysis is used to analyze the correlation between age, days of care, number of comorbidities and the number of drugs used with the total cost of care. Meanwhile, for the analysis of gender and type of care insurance using eta analysis.

The results of the analysis can be seen in Table 2, the results show that the day of treatment, the number of comorbidities, and the number of drugs have a significant correlation in increasing the cost of care for geriatric ischemic stroke patients. while for the analysis of the correlation between gender and type of insurance with the total cost of care using ETA analysis which can be seen in Table 3, the results of Type of care insurance and gender are not significantly correlated with the cost of care for geriatric ischemic stroke patients.

Table 2. Results of statistical analysis with Spearman Rho

	Correlation between age and total cost	Correlation between Length of stay and total cost	Correlation between numbers of comorbidities and total cost	Correlation between numbers of medicine and total cost
Correlation Coefficient (r)	0.23	0.76	0.44	0.60
Sig. (2-tailed)	0.100	**0.000**	**0.001**	**0.000**

Table 3. Result of statistic analysis with eta

	Correlation between gender and total cost	Correlation between Type of care insurance and total cost
Correlation Coefficient (r)	0.322	0.082
Sig.	0.253	0.558

DISCUSSION

The correlation of length of stay with cost was statistically correlated with an increase in the total cost of care as the p-value was <0.05 and the strength of the correlation was strong with an R-value of 0.76 (0.60 - 0.79). A study in Brazil found that the longer a person's treatment in the hospital significantly contributed to an increase in the cost of treatment, 1 week of treatment for ischemic stroke patients costs $1,194 and treatment for more than 2 weeks costs $5,231.[9] Research conducted by Firmansyah in 2015 also mentioned the same thing from 4 groups of treatment duration there was a difference between treatment costs between groups.[13] Another study also found that the longer the duration of patient hospitalization, the higher the cost of treatment in the hospital, the group of patients treated for 0-7 days costs 13,988 CNY (Chinese yuan), which is much different from patients treated for > 28 days which costs 217,999 CNY (Chinese yuan).[12] The longer the patient is treated is associated with an increase in treatment costs because treatment costs also increase such as room costs, drug costs, doctor fees, and other costs.

The number of comorbidities also has a statistical correlation with an increase in the total cost of treatment because based on the results of the Spearman rho analysis has a p-value <0.05 and the strength of the correlation is moderate R-value 0.44 (0.40 - 0.59). The results of research on 4 groups of comorbidities of stroke patients who were treated had significant cost differences.[13] Research conducted in 2015 also showed the same thing: there were differences in the cost of treating ischemic stroke patients with the number of comorbidities.[14] The number of comorbidities also affects the cost of treatment. A study in China found that patients treated without comorbidities up to 2 comorbidities cost 41,220 CNY (Chinese yuan) while patients treated with 8-10 comorbidities cost 137,389 CNY (Chinese yuan).[12] The greater the number of comorbidities the cost required to treat all those comorbidities will also increase.

The number of drugs has a statistical correlation with an increase in the total cost of treatment because based on the results of the Spearman Rho analysis has a p-value <0.05 and the strength of the correlation is moderate 0.60 (0.40 - 0.59). The higher number of drugs can result in increased costs required for patient treatment.[20] reducing the number of unnecessary drugs can significantly reduce patient care costs.[21] Reducing the number of drugs used must be considerate of the patient's condition, in a study conducted by Unutmaz using the STOPP / START criteria can reduce treatment costs by up to $ 12,8 (Rp 179,000) per month.[22] The higher the

number of drugs used, the higher the cost that must be paid by the health insurer for the patient's medical costs.

CONCLUSION

The results of this study concluded that the average cost of treating geriatric ischemic stroke patients was Rp 5,140,083 (five million one hundred forty-four thousand eighty-three rupiah) and days of treatment, the number of comorbidities and the number of drugs had a correlation significantly increasing the cost of treating geriatric ischemic stroke patients. The longer the patient is hospitalized, the greater the number of comorbidities, and the more drugs used, the higher the cost of treating geriatric ischemic stroke patients. This research can be applied to all types of hospitals that work with BPJS because the majority of subjects in this study came from BPJS patients, even if it is applied to sal patients from BPJS patients, even if it is applied to patients without insurance, some readjustments are needed.

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AUTHORS CONTRIBUTION

DPN: Study concept and design, data collection, analysis and interpretation of results, preparation of manuscripts and corresponding author; MA: analysis and interpretation of results, preparation of manuscripts

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CONFLICT OF INTEREST

The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analyses, or interpretation of data; in the writing of the manuscript, or in the decision to publish the results.

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