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COST OF ILLNESS ANALYSIS OF EPILEPSY OUTPATIENTS USING VALPROIC ACID, PHENYTOIN, AND CARBAMAZEPINE THERAPY IN ONE OF HOSPITAL IN BANYUASIN REGENCY

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Abstract

Epilepsy is a condition of the onset of attacks in the form of abnormal, irregular brain nerve cell movements, occurring repeatedly and causing temporary motor, sensory or mental function disorders. The treatment of epilepsy has costs that must be known, including direct medical costs, indirect medical costs, and indirect costs; this study aims to determine the cost of illness of epilepsy in one hospital in banyuasin regency with retrospective costing in outpatients. The research method used in this study is a cross-sectional study using patient medical record data and cost data taken from BPJS claims data and hospital rate patterns. This study uses the BPJS perspective and societal perspective, the cost data taken from the BPJS perspective is the result of BPJS claims according to the INACBGs. Package tariff and for the social perspective the data taken is doctor consultation data, administrative costs, laboratory costs, drug costs, transportation costs, and lost productivity costs carried out by interview method for 12 months. The results of this study indicate that the cost of epilepsy outpatients from a societal perspective is Rp.3,141,414 and for BPJS perspective is Rp.2,338,567.

Keywords: cost of illness, epilepsy, outpatient settings

INTRODUCTION

Epilepsy is a condition in which attacks of abnormal, irregular, repetitive movements of brain nerve cells occur, resulting in temporary impairment of motor, sensory or mental function (Sander & Shorvon, 1996). Nearly 50 million people worldwide have epilepsy, making it one of the most common neurological diseases in the world (World Healt Organization., 2016). Epidemiologic studies in Japan have shown that the incidence of epilepsy is significantly higher in the elderly, and children compared to other age groups. However, epilepsy can occur outside of these age ranges. Epilepsy can actually affect all levels of society regardless of age, and social status. This disease has specific characteristics in each age group, including etiology, clinical manifestations, and reactions to treatment (Tanaka et al., 2013). The incidence of epilepsy is highest in developing countries because the risk of developing conditions or diseases that lead to brain injury is higher in developing countries compared to developed

countries (Megiddo et al., 2016). In Indonesia, the incidence of epilepsy is relatively high, as the prevalence ranges from 0.5% to 2%. There are at least 700,000 to 1,400,000 cases of epilepsy that occur in Indonesia, and an increase of 70,000 new cases each year. Around 40% to 50% of cases affect children (Suwarba, 2016). Generalized idiopathic epilepsy is the most frequent type of epilepsy. The incidence is about 20% to 40% of all cases of epilepsy, and begins in childhood or adolescence. In an effort to manage epilepsy, it must also consider the costs due to illness. The cost of illness associated with epilepsy is a crucial consideration in healthcare planning, and resource allocation. Cost of illness analysis is an analysis that measures the economic burden of disease on society. It is often called the burden of disease. Costs can be divided into direct, and indirect costs. Direct costs relate to the provision of medical services, such as hospital stays, doctors' fees for outpatient visits, and drug costs (including the cost of the drug itself, and any adverse events that may arise as a result of drug administration). Indirect costs are costs related to expenses, such as transportation costs, that are a direct result of illnesses. Refers to a method for estimating the minimum amount of product that can be obtained if the quality of the product is higher (Jolicoeur et al., 1992). The analysis has only one perspective of the cost of illness, and that is the market perspective. This perspective is more comprehensive because it considers both direct medical costs, and indirect medical costs, resulting in a longer analysis. One of the most important aspects of the Cost of Illness study is the focus on the healthcare system in epilepsy in Indonesia. This research paper aims to provide a comprehensive analysis of the cost of illness in epilepsy patients, drawing insights from various studies conducted in a hospital in banyuasin regency.

RESEARCH METHODOLOGY

This research is an observational study that uses a cross-sectional approach with data collection in a specific period. The sampling technique used is non-probability sampling in the form of consecutive selection. The population in this study was all patients with outpatient valproic acid, phenytoin, and carbamazepine therapy for BPJS participants at the Rivai Abdullah General Hospital. The research sample is a population that meets the following inclusion criteria:

1. Patients aged 18 years, and over
2. BPJS participant patients
3. Patients who are willing to be research respondents

The location of this research is in Rivai Abdullah General Hospital Banyuasin. The study was carried out from April 2024 to Mei 2024. This research was ethically compliant with the ethics number published by the Health Research Ethics Commission Rivai Abdullah General Hospital with No 018/EC/TEPK/2024. The variables in this study are direct medical costs, including registration fees, laboratory fees, costs for doctor examinations, costs for drugs obtained from health centers, and costs for purchasing drugs themselves. Transportation costs are an example of direct non-medical costs. In addition, there are indirect costs such as lost patient income, and lost patient companion income.

Validity test

The validity test used is content validity, which is to see whether the contents of the interview guide suit the variables you want to know. In this study, interview questions were derived from a literature review conducted by researchers, who then had experts with one pharmacist hospital, and one outpatient polyclinic test their validity.

Data analysis

After processing the data, they will be analyzed using Microsoft Excel. Based on the following calculations:

COI = (Direct medical costs × frequency of treatment in one year) + (Direct non-medical costs × frequency of treatment in one year) + (Indirect costs × frequency of treatment in one year) ..... (1)

The estimated total cost of treating type epilepsy patients BPJS outpatients with valproic acid, phenytoin, and carbamazepine therapy in one year is obtained.

RESULT AND DISCUSSION

Patient demographic data

Most of the patients were female 13 (54.2%) (Table 1). In general, the prevalence of epilepsy is slightly higher in men than in women in many populations. However, given that the prevalence rate can be influenced by various factors such as access to healthcare, diagnostic practices, and genetic or environmental risk factors, the actual prevalence in women would require referencing up-to-date studies or health databases specific to the population in question.

Table 1. Demographic data of epilepsy patients with alproic acid, phenytoin, carbamazepine therapy outpatients BPJS participants

Demographic Data	Number of Respondents (%)
Sex	
Male	11 (45.8%)
Female	13 (54.2%)
Ages	
18-25 years	8 (33.3%)
26-35 years	3 (12.5 %)
36-45 years	1 (4.2 %)
56-65 years	10 (41.2%)
> 65 years	2 (8.4%)
Education	
Elementary school	12 (50%)
Junior high school	2 (8.4%)
High school	9 (37.5%)
College	1 (4.2%)
Occupations	
Student	3 (12.5%)
Civil servant	1 (4.2%)
Employee	11 (45.8)
Unemployed	9 (37.5%)

Demographic Data	Number of Respondents (%)
Income	
Rp, 500,000.00 – Rp, 1000,000.00	9 (37.5%)
Rp, 1000,000.00 – Rp, 2000,000.00	3 (12.5%)
> Rp, 2000,000.00	12 (50%)
BPJS Participant	
PBI	3 (12.5%)
Independent Class 1	4 (16.6%)
Independent Class 2	3 (12.5%)
Independent Class 3	14 (58.3%)

*PBI : Penerima Bantuan Iuran

The highest number of patients was in the age range of 56-65 years with ten patients (41.2%). The incidence of epilepsy is higher in the elderly population compared to younger adults. This is partly because the risk of developing epilepsy increases with age due to age-related changes in the brain, and an increased likelihood of having health conditions that can lead to epilepsy(Gao et al., 2015). Common causes of new-onset epilepsy in the elderly include strokes, brain tumors, Alzheimer's disease, and other neurodegenerative conditions (Tanaka et al., 2013). Trauma and infections can also lead to epilepsy. A previous study in the city of Banda Aceh, showed that female patients had a higher prevalence than male patients when compared to male patients, with a prevalence of 59.3%. Meanwhile, based on age, also found that the highest age of patients with epilepsy was in the age range of 21-30 with 87 patients (Lestari, 2022). Research conducted by Priyoherianto, 2021 showed that the results obtained showed that most epilepsy patients were male patients while based on age most were patients with an age range of 43-55 years (Priyoherianto, 2021).

Direct Medical Costs

In this study, direct medical costs include laboratory costs, registration fees, doctor examination fees, and drug costs obtained as well as the results of direct media costing costs attached in table 2.

Table 2. Direct Medical Costs of Epilepsy Patients with valproic acid, phenytoin, carbamazepine therapy outpatients BPJS participants

Cost component	Cost Range Within 1 Year (IDR)	Average per Patient (IDR)	INACBGs (Indonesian Case Base Groups)	Average INACBGs (Indonesian Case Base Groups)
Registration	165,000- 180,000	177,391		
Laboratory	0 - 1,320,000	57,391		
Doctor's Examination	1,210,000- 1,320,000	1,300,870		
Drugs obtained from the Hospital	178,740 - 3,288,960	1,373,262	1,717,100 - 3,260,400	2,238,578
Self-bought medicine	0 - 156,800	56,500		
Medical Direct Cost Total Range	1,553,740-4,950,760	2,965,414		

The results of costing from a hospital perspective obtained the total cost of direct medical costs are Rp.1,553,740- Rp. 4,950,760 while the average direct medical cost per epilepsy patient is 2,965,414 while the results of the BPJS perspective using the INACBGs

Package tariff obtained the results of direct medical costs are Rp.1,717,100 - Rp. 3,260,400 while the average cost of epilepsy patients based on the BPJS perspective is 2,238,578 per patient. Previous research in the setting of the USA showed that the direct medical cost of epilepsy patients was $ 15,414 (Cramer et al., 2014). while from research by Andri et al, 2021 in epilepsy patients who were hospitalized, patients using valproic acid had direct medical costs of Rp.5,668,385 while patients using phenytoin had direct medical costs of Rp.3,722,275 (Priyoherianto, 2021).

Indirect cost

In this study, indirect costs include lost patient income, and lost patient companion income, while the results of the indirect cost analysis are as follows (Table. 3)

Table 3. Indirect costs of epilepsy patients with valproic acid, phenytoin, carbamazepine therapy outpatients BPJS participants

Cost Component	Cost Range Within 1 Year (IDR)	Average Per Patient (IDR)
Lost Patients Income	50,000-112,500	75,000
Lost Patients Companion Income	75,000-100,000	45,000
Total Indirect Cost Range	125,000-212,500	120,000

Based on this study, the cost of lost income for epilepsy patients is around Rp.50,000-Rp. 112,500 with an average per patient of Rp.75,000 while the cost of lost income for patient caregivers is around Rp.75,000-Rp.100,000 with an average of Rp.45,000 per patient caregiver while the average result of indirect costs is Rp.125,000- Rp.212,500 with an average of Rp.120,000 per patient. The median indirect cost was US$276.72 per year per patient, with patients', and caregivers' loss of productivity as the major component. In addition, the differences in early retirement, caregiver's costs, and loss due to under-productivity were significant across the prognostic groups (Gao et al., 2015)

Non-medical direct cost

In this study, non-medical direct costs include the cost of patient transportation to the hospital, while the results are described in Table 4.

Table 4. Indirect costs of epilepsy patients with valproic acid, phenytoin, carbamazepine therapy outpatients BPJS participants

Total Non-Medical Direct Cost Range	Cost Range Within 1 Year (IDR)	Average Range Per Patient (IDR)
Transportation	12,000-250,000	56,000

In this study, it was found that the average range of non-medical direct costs per patient in 1 year based on the frequency of patient visits in table 4 was Rp.12,000 - 250,000. The variation in costs on transportation costs is due to the transportation carried out by respondents to visit the Rivai Abdullah General Hospital Banyuasin using various vehicles including motorbikes, private cars, and bicycles. The median cost for transportation was US$19.25 annually, and there was a significant difference across the prognostic groups (p =

0.020). Patients in the drug-resistant epilepsy group (median, US$29.83) spent more on transportation than the other three groups (median, US$17.32, 15.40, and 15.72, respectively) (Gao et al., 2015).

Total cost of illness

In this study, the cost of illness was obtained from the total direct medical costs, indirect medical costs, and indirect costs of epilepsy patients who were treated at one hospital in Indonesia, the results of the total cost of illness are described in Table 5.

Table 5. Total Cost of Illness Pasien Epilepsy with valproic acid, phenytoin, carbamazepine therapy outpatients BPJS participants

Cost Component	Cost Range Within 1 Year (IDR)	Average Per Patient (IDR)
Medical Direct Cost	1,533,740-4,950,760	2,965,414
Non-Medical Direct Costs	125,000-212,500	120,000
Indirect Cost	12,000-250,000	56,000
Total Range Cost of Illness	1,670,740 - 5,423,260	3,141,414

In this study, the ratio of the cost of illness per person for one year was calculated, the total cost of illness for epilepsy patients who were treated on the street was around Rp.1,670,740 - Rp.5,423,260 with an average total cost of Rp.3,141,414 while based on studies conducted from One hundred one cost-of-illness studies were included in the direct health care cost database, 74 from North America or Western Europe. Thirteen studies were used in the indirect cost database, eight from North America or Western Europe. The average annual cost per person with epilepsy in 2019 ranged from $204 in low-income countries to $11,432 in high-income countries based on this highly skewed database. The total cost of epilepsy, applying per person costs to the estimated 52,51 million people in the world with epilepsy, and adjusting for the treatment gap, was $119,27 billion (Begly et al, 2022).

CONCLUSIONS

The cost of illness analysis obtained the results of the total cost of epilepsy disease in outpatient hospitals is Rp.3,141,414, these results come from the analysis of direct medical costs, indirect medical costs, and indirect costs of epilepsy patients. Meanwhile, according to the BPJS perspective, the total cost of outpatient epilepsy is around Rp. 1,717,100 - Rp. 3,260,400 with an average cost of 2,238,578 per epilepsy patient.

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REFERENCE

Begley, C., Wagner, R. G., Abraham, A., Beghi, E., Newton, C., Kwon, C. S., Labiner, D., & Winkler, A. S., 2022. The global cost of epilepsy: a systematic review and extrapolation. *Epilepsia*, *63*(4), 892-903.

Cramer, J. A., Wang, Z. J., Chang, E., Powers, A., Copher, R., Cherepanov, D., & Broder, M. S., 2014. Healthcare utilization and costs in adults with stable and uncontrolled epilepsy. *Epilepsy & behavior*, *31*, 356-362.

Gao, L., Xia, L., Pan, S.-Q., Xiong, T., and Li, S.-C., 2015. Burden of epilepsy: a prevalence-based cost of illness study of direct, indirect and intangible costs for epilepsy. *Epilepsy research*, *110*, 146-156.

Jolicoeur, L. M., Jones-Grizzle, A. J., and Boyer, J. G., 1992. Guidelines for performing a pharmacoeconomic analysis. *American journal of hospital pharmacy*, *49*(7), 1741-1747.

Lestari, N. D., 2022. Prevalence of Epilepsy in Dr. Zainoel Abidin Hospital Banda Aceh. *Jurnal Kedokteran Syiah Kuala*, ISSN: 1412-1026.

Megiddo, I., Colson, A., Chisholm, D., Dua, T., Nandi, A., and Laxminarayan, R., 2016. Health and economic benefits of public financing of epilepsy treatment in India: An agent-based simulation model. *Epilepsia*, *57*(3), 464-474.

Priyoherianto, A., 2021. Cost-Effectiveness Analysis Biaya Pengobatan Epilepsi Jenis Grand Mal Dengan Beberapa Obat Anti Epilepsi Di Rawat Inap Rsud Sidoarjo. *Afamedis*, *2*(2), 55-62.

Sander, J., and Shorvon, S. D., 1996. Epidemiology of the epilepsies. *Journal of neurology, neurosurgery, and psychiatry*, *61*(5), 433.

Suwarba, I. G. N. M., 2016. Insidens dan karakteristik klinis epilepsi pada anak. *Sari Pediatri*, *13*(2), 123-128.

Tanaka, A., Akamatsu, N., Shouzaki, T., Toyota, T., Yamano, M., Nakagawa, M., and Tsuji, S., 2013. Clinical characteristics and treatment responses in new-onset epilepsy in the elderly. *Seizure*, *22*(9), 772-775.

World Health Organization., 2020, *Global Actions on Epilepsy and other neurological disorders.* Available at: https://www.who.int/health-topics/epilepsy#tab=tab_1