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RESEARCH ARTICLE

Optimal scenario of antihypertension's cost-effectiveness in Prolanis hypertension patients: A case study of Pandeglang District, Indonesia

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Abstract

Background: Since hypertension prevalence has increased, its economic burden has also increased in all regions, including Pandeglang District in Banten Province, Indonesia. In 2014, the government launched a chronic disease management programme (Prolanis) to optimise hypertension treatment in Primary Healthcare Centres (PHCs) through the Social Health Insurance Administration Body (BPJS Kesehatan). Pharmacists' counseling is important in this as it can increase the effectiveness of hypertension treatment. **Objective:** To investigate the cost-effectiveness of pharmacists' counselling for Prolanis hypertension patients at PHCs. **Methods:** An experimental study was conducted at 16 PHCs using a purposive sampling method. The total sample included 96 Prolanis hypertension patients divided into two groups of 48 participants (an intervention and control group). Incremental cost-effectiveness ratio (ICER) was applied by comparing the cost per quality-adjusted life-year (QALY) gained in both groups. A validated EuroQol-5 Dimension-5 Level (EQ-5D-5L) questionnaire and its Indonesian value set were employed to measure patient quality of life, and the local GDP per capita threshold for cost-effectiveness was used. **Results:** Pharmacists' counseling intervention is cost-effective (ICER: IDR.2,000-28,307 per QALY-gained) within several scenarios with varying fees. Sensitivity analysis showed that the patient's utility score and the pharmacist's counseling fee were the most influential parameters impacting the ICER. **Conclusion:** Pharmacist's counseling can be considered as a promising intervention to optimise Prolanis hypertension treatments at PHCs.

Introduction

The data from the Indonesia Basic Health Research (Riskesdas) (2018) showed that hypertension increased from 25.8% to 34.1% in the province of Banten. The prevalence was reported to increase significantly from 23.0% in 2013 to 29.5% in 2018 (Kemenkes, 2013, 2018). This situation occurred in all districts in this province, including Pandeglang, which was previously designated as a disadvantaged area through Presidential Regulation Number 131 of 2015 concerning Determination of Underdeveloped Regions in 2015-2019 (Presidential Decree, 2015).

The prices of antihypertensive drugs vary significantly, and therefore the choice of drugs to prescribe becomes a

major factor in decision making. Therefore, it is necessary to conduct a cost-effectiveness analysis to make drug selection decisions that are cost-effective (Korman & Wisløff, 2018). Standard service fees for Prolanis hypertension patients have also been established by the Social Health Insurance Administration Body (BPJS) regulation No. 2 of 2015, amounting to IDR 3,000; - IDR 6,000; (Kesehatan BPJS Health Regulations No.2, 2015). Moreover, the success of hypertension therapy is also influenced by patient compliance in taking antihypertensive drugs. One indicator of patient compliance taking antihypertensive medication is blood pressure control (Jerant, Franks & Kravitz, 2011; Pérez-Escamilla *et al.*, 2015).

This study aims to determine the effectiveness of costs incurred by health facilities and also BPJS for groups of patients counselled by pharmacists compared with those only received standard of care. This is material for consideration in making better therapeutic plans related to the cost and effectiveness of hypertension therapy at the primary healthcare centre.

Nine scenarios were outlined in this paper (Table I). An alternative that is categorised as very cost-effective is scenarios 1 to 6. It describes the addition of pharmacist counselling service costs with varied nominal, starting from IDR 2,000/ counselling/ patient up to the equivalent salary following the highest district minimum wage in Banten Province, which is IDR 28,307/ counselling/ patient.

Table I: Scenarios

Scenario	Description
1	Current conditions (there are still no pharmacist counselling services, and there are still primary healthcare centres that do not have a Pharmacist);
2	There are pharmacist counselling services according to SK PD IAI Banten (046/SK/PD-IAI/BANTEN/IV/2019), i.e. IDR10.000/counselling/patient
3	Conditions under which Pharmacists are provided with appropriate counselling services nominal other capitation health workers, such as dentists (IDR2.000/counselling/patient.
4	Pharmacists are given a salary as is currently the case at a primary healthcare centre in Pandeglang District (3B group, years of service = 0, according to PP No.15/2019), i.e., IDR17.923/counselling/patient
5	Pharmacists are given a salary as district minimum wage in Pandeglang district (Decision of the governor of Banten No.561/Kep.320-Huk/2019 for Pandeglang District), i.e. IDR18.393/counselling/patient
6	Pharmacists are given a salary as the highest district minimum wage in Banten province (Decision of the governor of Banten No.561/Kep.320- Huk/2019 for Cilegon city), i.e. IDR28.307/counselling/patient
7	The addition of one pharmacist with a salary as it is today, which occurred at the primary healthcare centre in Pandeglang District (3B the group, years of service=0, according to PP No.15/2019), i.e. IDR17.923/counselling/patient times 2 = IDR35.847
8	The addition of one pharmacist with a salary as district minimum wage in Pandeglang District (Decision of the governor of Banten No.561/Kep.320- Huk/2019), i.e. IDR. 18.393/counselling/patient times 2= IDR36.785
9	The addition of one pharmacist with a salary as the highest district minimum wage in Banten province (Decision of the governor of Banten No.561/Kep.320-Huk/2019 for Cilegon city), i.e. IDR28.307/counselling/patient times 2= IDR56.614.

Methods

This was a case-control study design using a purposive sampling data collection method. Subjects were hypertensive Prolanis patients in 16 PHCs in 16 districts of Pandeglang. Data were obtained from medical records of patients, including antihypertensive agents based on e-catalogue, systole blood pressure, level of adherence, and quality of life of patients. Furthermore, the total number of respondents was 96 patients; 48 patients were assigned to the intervention group and divided among eight PHCs receiving drug counselling service from pharmacists, while 48 others in eight PHCs were assigned to the control group and only received general drug information from pharmacists (no counselling provided). Data collection was conducted within three months, from June to August

2019. The inclusion and exclusion criteria are described below.

Cost-effectiveness analysis was conducted using two perspectives, namely Patient and BPJS. The measured component is the cost of antihypertensive drugs used by patients and capitation rates from BPJS. Furthermore, the effectiveness of treatment is measured by a decrease in blood pressure, an increased level of adherence, and the quality of life of patients at the first, second, third, and fourth meetings. Treatment effectiveness was analysed using the Wilcoxon test or equivalent to a paired sample T-test. Meanwhile, ICER (Incremental Cost-Effectiveness Ratio) is calculated based on the ratio between the difference in cost and percentage of clinical outcomes in both groups of patients (Figure 1).

$$\begin{aligned}
 ICER &= \frac{\Delta Cost}{\Delta Effectiveness} \\
 &= \frac{\text{cost with intervention} - \text{cost without intervention}}{\text{decreased SBP with intervention} - \text{decreased SBP without intervention}}
 \end{aligned}$$

Figure 1: ICER calculation

Result

Characteristics of respondents showed that Prolanis patients of female sex dominate, reaching up to 80% of all patients. This is consistent with the study of Zhang and colleagues (2017) in China, which showed that the number of hypertensive women is higher than men. Age levels vary, and the results of studies showed that patients suffering from hypertension mostly have ages greater than 50 years, and their level of education is relatively low (\leq primary school). The overview of the characteristics can be seen in Table II.

Table II: Sociodemographic frequency distribution of hypertensive patients

Sociodemographic	Frequency	Percentage
Age		
20-35 years	0	0%
36-50 years	37	39%
> 50 years	59	61%
Gender	96	100%
Female	77	80%
Male	19	20%
Controlling	96	100%
Every 4 weeks	6	6%
Every 3 weeks	7	7%
Every 2 weeks	20	21%
Every 1 week	63	66%
Therapy	96	100%
Single	82	85%
Two combinations	14	15%
Job	96	100%
Housewife	51	53%
PNS/Entrepreneur/Farmers/ Labour /Private employees/		

Sociodemographic	Frequency	Percentage
Fisherman	43	45%
Etc	2	2%
Education	96	100%
Primary school	57	59%
Junior high school	15	16%
Senior high school	17	18%
College (D3, S1)	7	7%
Total	96	100%

Data processing researchers from the results of medical records and interviews (Yusransyah, Halimah, & Suwantika, 2020)

The treatment effectiveness was analysed using the Wilcoxon test or equivalent to paired sample t-test, and the cost of the payer perspective is the capitation rate of BPJS, including direct medical costs. In contrast, the patient perspective consists of the cost of antihypertensive drugs. Table III shows the difference between the intervention and the control groups.

ICER calculation results for all situations showed that the cost incurred by payers and patients is higher in the intervention group than in control. However, there is an exemption in scenario 1, because it is a base case where the pharmacist does not get counselling fees at all. The effectiveness measured were systolic blood pressure, compliance, and utility score (QALY's). The intervention group that received counselling from the pharmacist showed higher values than the control. Therefore, the total average decrease in systole blood pressure, the average increase in patient adherence to taking antihypertensive drugs, and the difference in utility values for patients that received counselling from pharmacists showed higher values.

Table III: Cost and effectiveness parameters for various analysis scenarios

Pharmacoeconomy scenarios	Σ Cost(Payer)	Σ Cost(Patient)	Σ ↓SBP	Σ ↑Adherence	Σ ↑QALY
Scenario 1 (Base Case)	IDR	IDR	mmHg	Score	Score
Intervention group	1,152,000	777,500	305	48.33	2.4125
Control group	1,152,000	694,840	196.33	36.33	1.0575
Scenario 2 (Counselling Fees = IDR 10,000)	IDR	IDR	mmHg	Score	Score
Intervention group	3,072,000	2,697,500	305	48.33	2.4125
Control group	1,152,000	694,840	196.33	36.33	1.0575
Scenario 3 (Counselling Fees = IDR 2,000)	IDR	IDR	mmHg	Score	Score
Intervention group	1.536.000	1.161.500	305	48.33	2.4125
Control group	1.152.000	694.840	196.33	36.33	1.0575
Scenario 4 (Pharmacist's salary = IDR 2,688,500)	IDR	IDR	mmHg	Score	Score
Intervention group	4.593.216	4.218.716	305	48.33	2.4125
Control group	1.152.000	694.840	196.33	36.33	1.0575
Scenario 5 (Pharmacist's salary = IDR 2,758,909)	IDR	IDR	mmHg	Score	Score
Intervention group	4.683.456	4.308.956	305	48.33	2.4125
Control group	1.152.000	694.840	196.33	36.33	1.0575

Pharmacoeconomy scenarios	ΣCost(Payer)	ΣCost(Patient)	ΣΔSBP	ΣΔAdherence	ΣΔQALY
Scenario 6 (Pharmacist's salary = IDR 4,246,081)	IDR	IDR	mmHg	Score	Score
Intervention group	6.586.944	6.212.444	305	48.33	2.4125
Control group	1.152.000	694.840	196.33	36.33	1.0575
Scenario 7 (salary 2 Pharmacists = IDR 5,377,000)	IDR	IDR	mmHg	Score	Score
Intervention group	8.034.624	7.660.124	305	48.33	2.4125
Control group	1.152.000	694.840	196.33	36.33	1.0575
Scenario 8 (salary 2 Pharmacists = IDR 5,517,818)	IDR	IDR	mmHg	Score	Score
Intervention group	8.214.720	7.840.220	305	48.33	2.4125
Control group	1.152.000	694.840	196.33	36.33	1.0575
Scenario 9 (salary 2 Pharmacists = IDR 8,942,163)	IDR	IDR	mmHg	Score	Score
Intervention group	12.021.888	11.647.388	305	48.33	2.4125
Control group	1.152.000	694.840	196.33	36.33	1.0575

An alternative position is shown in Table IV, where the intervention group towards the control is in the quadrant with higher costs and effectiveness. This is

where ICER calculations play a role in analysing the ability of payers to pay for better efficacy.

Table IV: Alternative positions between the intervention group and control

Cost/effectivity	Cost <	Cost =	Cost >
Effectivity <			
Effectivity =			
Effectivity >			Intervention of control

ICER calculation is carried out by dividing the total cost difference by that of effectiveness for each scenario in each perspective. Table V shows ICER scores for intervention from control from two perspectives. Scenario 1 showed that the ICER result in patients is smaller than the payer perspective. This is due to the lack of additional costs for pharmacist counselling. Subsequently, Scenarios 2 to 9 showed that the ICER on the payer perspective is smaller than that of the patients. This is because the payer perspective is more cost-effective despite the addition of Counselling Fees in each Scenario. To get the same effectiveness value, patients should pay more than the BPJS, which means that they will get a better result with the addition of the pharmacist's counselling fees incurred.

Based on recommendations from the Commission on Macroeconomics and Health, the threshold for a country/region is less than three times the Gross Domestic Product (GDP). The detail is very cost-effective when ICER / QALY is smaller than 1 GDP and when ICER is between 1-3 GDP, but not cost-effective when ICER is more than 3 GDP. The alternative that is categorised as very cost-effective is Scenario 1 through

6, and it includes the addition of Pharmacist counselling services costs, which vary in nominal value, starting from IDR 2,000/counselling/patient to the equivalent salary following the highest district minimum wage in Banten Province, which is IDR 28,307/ counselling/patient. Scenarios 7, 8, and 9 are classified as cost-effective alternatives with the addition of one pharmacist in the primary healthcare centre and a salary according to the district minimum wage. It is still included as a cost-effective choice for decision-makers to obtain better results in terms of the effectiveness of the management of antihypertensive therapy in the primary healthcare centre of Pandeglang District.

A sensitivity test was also conducted by reducing and adding 25% to each cost and effectiveness parameter. The results of the addition and subtraction are included in the ICER calculation. The one-way sensitivity analysis methods are displayed using a tornado diagram with parameters that have the most dominant impact placed at the top, as shown in Figure 2. The sensitivity test results showed the order from the longest to the shortest range, i.e. longest is the utility score and counselling fees.

Table V: ICER scores for intervention from control from two perspectives

Scenario	ΔCost/ ΔSBP (IDR)	ΔCost/ ΔAdherence (IDR)	ΔCost/ ΔQALY's (IDR)	Category (Ratio)
Scenario 1				
Payer	10,600.90	96,000	850,184.50	Highly cost-effective
Patient	760.65	6,888.33	61,003.69	
Scenario 2				
Payer	17,668.17	160,000	1,416,974.17	Highly cost-effective
Patient	18,428.82	166,888.33	1,477,977.86	
Scenario 3				
Payer	3,533.63	32,000.00	283,394.83	Highly cost-effective
Patient	4,294.29	38,888.33	344,398.52	
Scenario 4				
Payer	31,666.66	286,768.00	2,539,642.80	Highly cost-effective
Patient	32,427.31	293,656.33	2,600,646.49	
Scenario 5				
Payer	32,497.06	294,288.00	2,606,240.59	Highly cost-effective
Patient	33,257.72	301,176.33	2,667,244.28	
Scenario 6				
Payer	50,013.29	452,912.00	4,011,028.78	Highly cost-effective
Patient	50,773.94	459,800.33	4,072,032.47	
Scenario 7				
Payer	63,335.09	573,552.00	5,079,427.31	Cost-effective
Patient	64,095.74	580,440.33	5,140,431.00	
Scenario 8				
Payer	64,992.36	588,560.00	5,212,339.48	Cost-effective
Patient	65,753.01	595,448.33	5,273,343.17	
Scenario 9				
Payer	100,026.58	905,824.00	8,022,057.56	Cost-effective
Patient	100,787.23	912,712.33	8,083,061.25	

Notes: Cost/QALYs < 1 PDB (Highly Cost Effective); Cost/QALYs = 1-3 PDB (Cost Effective); Cost/QALYs > 3 PDB (Not Cost Effective)

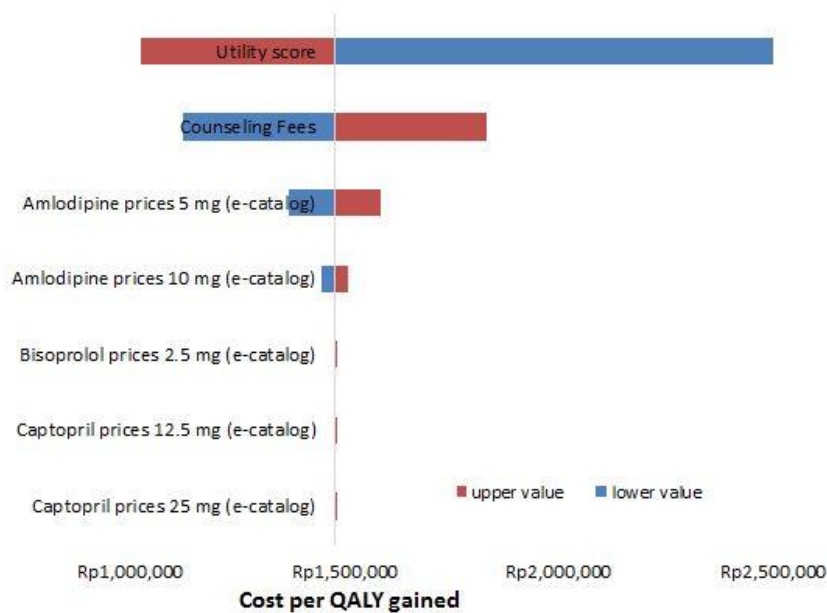


Figure 2: Tornado diagram - sensitivity test

Discussion

Generally, the cost-effectiveness of hypertension treatment for the intervention group (who are given counselling by trained pharmacists) is better than control (not getting counselling from pharmacists). This

result is consistent with the study conducted by Maxwell and colleagues (2013), related to a comparison between Pharmaceutical Care (PC). It prioritises patient care in the management of degenerative diseases with Usual Care (UC), which is a treatment with a minimal role of pharmacists as health

workers. The results showed that PCs have lower therapeutic costs than UC, and pharmacists play an essential role in the PC. They improve the quality of life of patients through therapies that are more cost-effective in terms of pharmacoeconomics, especially for the management of degenerative diseases (Adibe, Aguwa, & Ukwe, 2013).

Yusransyah and colleagues (2020) also conducted another study where pharmacist counselling can influence the physical and mental state of hypertensive Prolanis patients. The quality of life of patients given counselling by pharmacists is better than those without counselling (Yusransyah, Halimah, & Suwantika, 2020).

In a tornado diagram (Figure 1), the highest parameters and the longest range are the most influential factors. Meanwhile, utility scores and counselling fees are the most significant on ICER scores, and both are related. The utility score and the patient's compliance are directly proportional. The patient's SBP is more controlled since the patient will not be included in the Prolanis category again and can eliminate counselling fees. Besides, the utility score and counselling fees are inversely related to the ICER value.

The results should provide recommendations to policymakers that the role of pharmacists is a cost-effective activity. This is because the addition of counselling fees can provide significant results in reducing systolic blood pressure, increasing patient compliance taking antihypertensive drugs, increasing the index of utility, and increase in the health status of Prolanis hypertension patients at the primary healthcare centre. These can be used as a reference and steps to improve the Prolanis programme at the primary healthcare centre to route the counselling intervention programme, provide optimal health, and improve the quality of life of patients. The limitations are the relatively small total number of samples due to the duties and responsibilities of pharmacists that are not only focused on clinical pharmacy services. The number of primary healthcare centres studied is only 16 of the 36 centres in the Pandeglang District. This is because not all pharmacists in the primary healthcare centre have received counselling training.

Conclusion

Pharmacist counselling to hypertensive Prolanis patients at the primary healthcare centre in Pandeglang District is a cost-effective intervention programme. The results showed that the provision of drug counselling had a significant effect on increasing adherence to Prolanis hypertension patients, decreasing blood pressure, and improving the quality of

life of the intervention group. Furthermore, Scenarios 1 through 6 are included in highly cost-effective choices, while 7 and 9 are cost-effective alternatives. For scenario 1 (base case) Cost / QALY of IDR.850,184.5 (perspective payer) and IDR.61,003.69 (patient perspective). The most influential factors on ICER scores are the patient's utility score (QALY) and pharmacist counselling fees.

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Conflicts of interest

There are no conflicts of interest.

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