

Direct medical cost and utility analysis of diabetics outpatient at Karanganyar public hospital

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Abstract. Diabetes Mellitus is a high cost disease, especially in long-term complication treatment. Long-term complication treatment cost was a problem for the patient, it can affect patients quality of life stated with utility value. The purpose of this study was to determine the medical cost, utility value and leverage factors of diabetics outpatient. This study was cross sectional design, data collected from retrospective medical record of the financial and pharmacy department to obtain direct medical cost, utility value taken from EQ-5D-5L questionnaire. Data analyzed by Mann-Whitney and Kruskal-Wallis test. Results of this study were IDR 433,728.00 for the direct medical cost and pharmacy as the biggest cost. EQ-5D-5L questionnaire showed the biggest proportion on each dimension were 61% no problem on mobility dimension, 89% no problems on self-care dimension, 54% slight problems on usual activities dimension, 41% moderate problems on pain/discomfort dimension and 48% moderate problems on anxiety/depression dimension. Build upon Thailand value set, utility value was 0.833. Direct medical cost was IDR 433,728.00 with leverage factors were pattern therapy, blood glucose level and complication. Utility value was 0.833 with leverage factors were patients characteristic, therapy pattern, blood glucose level and complication.

Keywords: diabetes mellitus, direct medical costs, utility value, EQ-5D-5L

1. Introduction

Diabetes mellitus (DM) is a metabolic disorder which is marked with hyperglycemia and anomaly in carbohydrate, fat and protein [1]. DM is diseases that require a lot of therapy costs, particularly long-term costs. Long-term cost treatment is a burden to the patients of diabetes mellitus, which affects the quality of life of the patients. Patients quality of life can be seen from the utility value. Utility is the satisfaction of the patients after getting health intervention [2]. EQ-5D-5L questionnaire used on this study to measure patient's utility. EQ-5D has the advantage to measure the single comprehensive score of the unit of the value which is able to be compared among disease and used for economic evaluation [3].

2. Materials and Methods

This study was an analytic research with cross sectional design that is a research done in one time and at a time. Data taken in 2 ways, used EQ-5D-5L questionnaire and medical record of financial and pharmacy department. Data analyzed by calculating direct medical cost and utility value in conjunction with seeing relationship toward factor which may affect. Direct medical costs used in this study were:



administrative costs, medical fees, laboratory fees and drug costs and utility was patient satisfaction level after obtaining a health intervention that is measured by using EQ-5D-5L questionnaire. Questionnaire of EQ-5D-5L consists of 2 parts, the first describes a system consisting of 5 dimensions (mobility, self-care, activity, pain/discomfort, anxiety/depression). Second was the best and worst health status Visual Analogue Scale (VAS) 100 and 0 respectively. Respondents were asked to determine health status at which point and what line. An index utility with a range of 0 shows death and 1 represents perfect health. The value of index utility obtained by summing the result of the domain based on the value set of Thailand.

Accordance to hospital rules, 100 patients were used as sample by quota sampling technique. Inclusion criteria were outpatient who had undergone at Karanganyar Public Hospital for at least 3 months, outpatients who visited in January 2017 until February 2017 at Karanganyar Public Hospital, outpatients of type 2 DM both male or female >18 years, outpatient who willing to fill out the EQ-5D-5L questionnaire, complete medical record data include administrative costs, medical fees, laboratory fees and drug costs. Exclusion criteria were outpatients with mental disorders or language barriers that can disrupt the process of research. This study used hospital perspective, cost calculated was direct medical cost.

3. Results and Discussion

3.1. Direct medical cost

Result of direct medical cost components refer pharmacy as the highest component's cost (81.37%) caused by antidiabetic therapy and complication treatment which made pharmacy's cost higher than other components, shown in Table 1. The same result which medicine cost (53.27%) was the highest cost [4].

Table 1. Direct medical cost of DM outpatient at Karanganyar public hospital

Component's cost	n (IDR)	Average (IDR)	%
Pharmacy	35,294,037.00	352,940.00 ± 251,646.55	81.37
Laboratory	6,778,829.00	67,788.00 ± 60,527.19	15.63
Administration	1,200,000.00	12,000.00 ± 0	2.77
Services	100,000.00	1,000.00 ± 0	0.23
Total	43,372,866.00	433,728.00 ± 192,982.56	100

This study found average combination of insulin antidiabetic therapy pattern was IDR 1,069,185.71 which was higher than others pattern. The same result of insulin antidiabetik is bigger than the other antidiabetik, due to the price of insulin is higher than the other [5]. Insulin antidiabetic cost were 3 times greater than oral antidiabetics [6]. The result of SPSS Kruskal-Wallis Test ($p=0.000$) there was a significant relationship ($p<0.05$), therapy pattern has relation to direct medical cost, shown in Table 2.

Table 2. Therapy pattern and direct medical cost

Therapy Pattern	n	Average (IDR)	P
Single oral antidiabetic	29	183,665.69 ± 77,087.94	0.000
Combination oral antidiabetic	27	425,267.96 ± 103,454.91	
Single insulin antidiabetic	17	400,397.94 ± 132,543.02	
Combination insulin antidiabetic	7	1,069,185.71 ± 53,551.40	
Oral insulin antidiabetic	20	613,663.05 ± 147,855.44	

Table 3 shown average of uncontrollable blood glucose level cost was IDR 533,236.48 higher than controllable blood glucose level cost. The result of Mann-Whitney test ($p=0.000$) there was significantly difference of utility value ($p<0.05$), hence concluded glucose level influence to direct medical cost. Controllable blood glucose level use single antidiabetic therapy pattern while uncontrollable blood glucose level use combination antidiabetic therapy pattern [7, 8].

Table 3. Blood glucose level and direct medical cost

Blood Glucose Level	N	Average (IDR)	<i>p</i>
Controlable	46	316,915.13 ± 170,766.20	0.000
Uncontrolable	54	533,236.48 ± 274,449.14	

Average complication cost was IDR 553,083.59 which higher than non complication cost, shown in Table 4. Result of SPSS Mann Whitney Test ($p=0.001$) there was a significant relationship ($p<0.05$). The complication which is occurred has an impact to the cost [6].

Table 4. Complications and direct medical cost

Complications	n	Average (IDR)	<i>p</i>
Complication	32	553,083.59 ± 270,353.55	0.001
Non Complications	68	377,561.63 ± 229,552.30	

3.2. Utility

This study used EQ-5D-5L questionnaire. Questionnaire consists of 2 parts. The first part describes the patient's condition consisting of 5 dimensions of mobility, self-care usual activities, pain/discomfort and anxiety/depression. Second part were Visual Analogue Scale to find out the health status of today, patient was required to cross the scale between 0 to 100.

Description

EQ-5D-5L questionnaire used to measure health status of DM outpatient at Karanganyar. The results obtained from diabetic outpatients in Karanganyar Public Hospital who do not have a serious problem, shown in Table 5. 61% no problem on mobility dimension, 89% no problems on self-care dimension, 54% slight problems on usual activities dimension, 41% moderate problems on pain/discomfort dimension and 48% moderate problems on anxiety/depression dimension. Were no extreme issues on mobility dimension 21.2%, self care 2.8%, usual activities 17.3%, pain/discomfort 35.7% and anxiety/depression 19.7% [2].

Table 5. Health status of DM outpatient at Karanganyar Public Hospital

EQ-5D-5L Profiles	No Problem	Slight Problems	Moderat problems	Severe problems	Extreme problems
Mobility	61 %	34 %	5 %	-	-
Self care	89 %	11 %	-	-	-
Usual activities	39 %	54 %	7 %	-	-
Pain/Discomfort	18 %	37 %	41 %	4 %	-
Anxiety/Depression	17 %	35 %	48 %	-	-

VAS

VAS Measurement was aimed to see description of DM outpatients health status in Karanganyar public hospital, patients being asked to cross the scale from 0 to 100 on the questionnaire. A value of 0 indicates poor patient health, and a value of 100 indicates a healthy patient, resulted average of DM outpatients health status in Karanganyar public hospital was 80.1, it means DM outpatients in Karanganyar Public Hospital included on healthy category, while average VAS score was 74.3 [2].

Utility Index

Assessment of utility value based on Thailand value set, resulted average DM outpatient utility value was 0.833 while average utility value was 0.870 [2].

Table 6 shown DM outpatient's characteristic on this study were male patients are better average utility value (0.853) than female, same result with male utility value (0.826) better than female [9].

Mann-Whitney statistic test result of gender $p=0.034$ there was significant difference on utility value ($p<0.05$), it may concluded that gender influential about the value of utility. DM outpatient who ages >60 has lowest utility value (0.795) than younger patient. Statistical results test $p=0.001$ there was significant difference of utility value ($p<0.05$) hence concluded age can influence utility value. The life quality decreased along with aging [10]. Lowest utility value of education level was patient who has low education level (0.800). Statistical results test $p=0.001$ there was significant difference of utility value ($p<0.05$) hence concluded education influential about the value of utility. Same result with were higher level education has better quality of life [11]. Average utility value of DM outpatients who were unemployed was 0.825. The result of statistical test ($p=0.151$) there was no significant difference of utility value ($p>0.05$) may be concluded that job has no relation to utility. Same result with there were no significant affect between job and DM outpatient utility value however unemployed outpatient doesn't mean has no tough daily activity, for the example housewife does several tough activity such as sweeping, mopping, washing, and cooking [12]. Average utility value of DM outpatient who has length of DM disease more than 5 years was 0.793 it was lower than patient who has suffering less than 5 years. Statistical test results $p=0.000$ there was a significant difference ($p<0.05$) period of sickness may affect utility value. Patient who has been suffer for so long and having high blood glucose has big possibility to have a nerve damage or neuropathy type 2 diabetics.

Table 6. DM outpatient's characteristic and utility value

Characteristic	n	Average	P
Gender			
Male	56	0.853 ± 0.092	0.034
Female	44	0.807 ± 0.108	
Age			
18-40 years old	13	0.893 ± 0.065	0.001
41-60 years old	41	0.856 ± 0.100	
>60 years old	46	0.795 ± 0.102	
Education level			0.001
Low (Elementary School)	50	0.800 ± 0.107	0.001
Medium (Senior High School)	29	0.841 ± 0.080	
High (University)	21	0.900 ± 0.081	
Job Status			0.151
Employed	24	0.858 ± 0.083	0.151
Unemployed	76	0.825 ± 0.106	
Length of DM disease			0.000
<5 years	47	0.878 ± 0.080	0.000
>5 years	53	0.793 ± 0.103	

Note :

Mann-Whitney Test

Kruskal-Wallis Test

Result of therapy pattern and utility value for single oral antidiabetic therapy was 0.855 means higher quality of life where metformin as single antidiabetic used, same result from Dinaryanti's study declared that quality of life in diabetic outpatients who use metformin were better than other antidiabetic because metformin is the most effective achieving fasting blood sugar and post prandial levels [5]. Result of Kruskal-Wallis test ($p=0.004$) has significant relation ($p<0.05$) it may be concluded therapeutic pattern has influence with utility, shown in Table 7.

Table 7. Therapy pattern and utility value

Therapy Pattern	n	Average	P
Single oral antidiabetic	29	0.885 ± 0.086	0.004
Combination oral antidiabetic	27	0.820 ± 0.094	
Single insulin antidiabetic	17	0.848 ± 0.090	
Combination insulin antidiabetic	7	0.783 ± 0.138	
Oral insulin antidiabetic	20	0.779 ± 0.098	

Table 8 shown average utility value of uncontrollable blood glucose level was 0.802 lower than controllable glucose level, result of Mann-Whitney test ($p=0.002$) there was significantly difference of utility value ($p<0.05$), hence concluded glucose level influence to utility. Utility value of DM patient who has controllable blood glucose level was higher than uncontrollable patient [13].

Table 8. Blood glucose level and utility value

Blood Glucose Level	n	Average	p
Controllable	46	0.869 ± 0.080	0.002
Uncontrollable	54	0.802 ± 0.108	

Table 9 shown average utility value of DM outpatient with complication was 0.754 while patient without complication achieve greater result, Mann-Whitney test result $p=0.000$ there was significantly difference of utility value ($p<0.05$), hence concluded complication effect to utility value same with who has significant correlation between complication to patient's quality of life [14]. Prospective clinical test results from the United Kingdom Prospective Diabetic Study and Diabetic Control and Complication Trial have proven that improving blood glucose control may reduce the complications of retinopathy, nephropathy, neuropathy and cardiovascular disease in diabetes mellitus [15].

Table 9. Compications and utility value

Complications	n	Average	p
Complication	32	0.754 ± 0.094	0.000
Non complication	68	0.870 ± 0.083	

Study limitations

Limitation of study with cross sectional design has a weakness may not know the patient's medical history and the effects of antidiabetic use, patients quantity based on variable therapy pattern, unproportional complications and amount of samples in this study is limited due to policy of the hospital regarding patient data.

4. Conclusion

Average direct medical cost of DM outpatient at Karanganyar Public Hospital was IDR 433,728.00. Biggest component cost was pharmacy. Therapy pattern, blood glucose level and complication has significant correlation to direct medical cost. Average DM outpatient utility value was 0.833. DM outpatient's characteristic, therapy pattern, blood glucose level and complication has significant impact to utility value.

Hospital need to consider the analysis of the medicine therapy cost in determining the medicine therapy which will be given to the patients and hospital need to maintain and improve the service quality and gave education to DM outpatients in order to maintain and increasing the utility.

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