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Analysis of Cost-Effectiveness of Single Antidiabetic Usage on Diabetes Mellitus Patients with In-Patient Complications

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ABSTRACT

Diabetes Mellitus (DM) is a chronic disease that requires lifelong medicinal interventions, especially to manage the disease and prevent further complications. Medical costs, in particular, drug costs, have increased sharply in recent decades. This trend is continuing as the population of elderly patients continues to grow due to increased drug use, the presence of new and more expensive drugs, also changing treatment patterns. We have to look for ways to make health services more efficient and economical. This research was a qualitative study using a case study design of the real costs of caring for type two DM patients with hypertension and coronary heart disease complications at Panembahan Senopati Hospital, Bantul, in 2019. Data was collected using a questionnaire and in-depth interviews. The subjects involved type 2 diabetes patients, pharmacists, internist specialists, finance, and health care workers. The average cost of single antidiabetic usage with hypertension complications is IDR 4,331,723 for coronary heart complications is IDR 4,182,353; the percentage of hypertension effectiveness is 83%. In comparison, the ACER value for hypertension of IDR 5,218,943 is more efficient than the ACER value for coronary heart disease of IDR 26,139,706. The ICER value for both hypertension and coronary heart complications was IDR 31,225,019.

ABSTRAK

Diabetes Mellitus (DM) merupakan penyakit kronis yang memerlukan intervensi pengobatan seumur hidup, terutama untuk mengelola penyakit dan mencegah komplikasi lebih lanjut. Biaya medis, khususnya, biaya obat, telah meningkat tajam dalam beberapa dekade terakhir. Tren ini terus berlanjut seiring dengan bertambahnya populasi pasien lanjut usia akibat penggunaan obat yang meningkat, adanya obat baru yang lebih mahal, serta perubahan pola pengobatan. Kita harus mencari cara agar pelayanan kesehatan lebih efisien dan ekonomis. Penelitian ini merupakan penelitian kualitatif dengan desain studi kasus biaya riil perawatan pasien DM tipe dua dengan komplikasi hipertensi dan jantung koroner di RS Panembahan Senopati Bantul tahun 2019. Pengumpulan data menggunakan kuesioner dan wawancara mendalam. Subyek melibatkan pasien diabetes tipe 2, apoteker, spesialis penyakit dalam, keuangan, dan petugas kesehatan. Rata-rata biaya pemakaian antidiabetik tunggal dengan komplikasi hipertensi adalah Rp 4.331.723 untuk komplikasi jantung koroner adalah Rp 4.182.353; persentase efektivitas hipertensi adalah 83%. Sebagai perbandingan, nilai ACER untuk hipertensi sebesar Rp5.218.943 lebih efisien dibandingkan nilai ACER untuk penyakit jantung koroner sebesar Rp26.139.706. Nilai ICER untuk komplikasi hipertensi dan jantung koroner adalah Rp31.225.019.

Kata kunci:

Diabetes Mellitus Tipe 2
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INTRODUCTION

The problem of healthcare costs (hospitals, doctors, drugs, etc.) has attracted a lot of attention since the last few years—both in the health and non-health sectors. Meanwhile, following government policy, health workers are expected to bring health services closer to the community. In responding to these challenges, efforts are needed to improve efficiency in using funds more rationally (Eristina et al., 2017) (Fitri et al., 2015). The cost of health care, especially on medicine, has risen sharply in recent decades, which is likely to continue, such as DM. Drug costs are the highest cost in the management of DM both without complication and with complications, except for DM with macrovascular complications where the highest cost is the cost of hospital care.

Diabetes is a chronic disease that occurs either when pancreas enough insulin or when the body cannot effectively use the insulin it produces. Insulin is hormone that regulates blood sugar. Hyperglycemia or raised blood sugar, is a common effect of uncontrolled diabetes and, over time, leads to serious damage to many of body's systems, especially the nerves and blood vessels (WHO, 2020) (ADA, 2012).

DM is divided into types 1 and 2 Diabetes, secondary Diabetes and Gestation Diabetes. Symptoms of DM include polyuria, polyphagia, and polydipsia. Treatment of DM is divided into Anti-Diabetics Injection (DM Type1) and Oral Anti-Diabetes (Type 2 DM) (American Diabetes Association, 2015) In addition, Diabetes Mellitus is a chronic disease that requires life-long therapeutic interventions, especially to manage the disease and prevent further complications. Health care costs and the burden of diabetes with chronic complications are increasing from year to year. Spending on health care will have a negative impact on economic.

Efforts to control hyperglycemia are important, but Diabetes Mellitus patient management's main goals are to reduce and prevent complications and improve patient life expectancy and quality of life (Dipiro, 2012). The current development of Pharmaco-epidemiology examines the use and effect of drugs in terms of efficacy, safety and analyses from an economic point of view. A particular study on this subject is known as Pharmaco-economics (Trisna, 2018., Tamiselvan, 2017). Cost analysis, which is a simple type to evaluate cost interventions. Cost analysis is carried out to see all costs in implementing or treatment or assessing efficacy. Prehards states that the Average Cost-Effectiveness Ratio (ACER) is the most cost-effective alternative cost. By using this ratio, one can choose the alternative that the lowest cost per outcome obtained. Cost-Effectiveness Analysis is not about reducing costs but about optimizing the cost incurred. In addition, Incremental Cost-Effectiveness Ratio (ICER) is applied to determine the additional costs and additional effectiveness of alternative therapy compared with the best treatment (Priharsi, 2015). This ratio can provide an overview of fees the other required to obtain different effects by replacing intervention A with intervention B. The ICER value is obtained from the results of dividing the cost difference between interventions by the percentage difference in effectiveness between interventions Diabetes Mellitus is one of the world's most prevalent and serious non-communicable disease (NCDS) (Afroz, 2018).

Treatment cost analysis's by estimating the total cost of disease is an effort to make health policy decisions. The result of the analysis is used as appropriate considerations, this also happens in other countries (Afroz, 2018). because of that, need to do a disease cost analysis diabetes mellitus.

Including Indonesia that estimate to occupy the fourth in the highest number of DM suffers after India, China, and the United States of America. DM suffers estimated to increase by 21.3 million people in 2030 (Wild, 2014). This disease has a high prevalence in Yogyakarta (Risikesdas, 2013., Endang et al). It related the increasing prevalence of DM and the number of DM patient's complications. Therefore, a rational evaluation of DM therapy is needed. This study aims to provide input to pharmacists, balance costs and patient outcomes that benefit both patients and the health care system, increase efficiency and mobilize the source of funds provided by the government effectively.

METHOD

This was a qualitative research using a case study design of the real costs of caring for type 2 DM patients with complications of hypertension and coronary heart disease at Panembahan Senopati Hospital, Bantul in 2019. This study describes the effectiveness of the use of antidiabetic in patients with complications of hypertension and coronary heart disease at Panembahan Senopati Hospital, Bantul.

This research also utilized secondary data from the hospital, namely patient billing data, total data on inpatient financing, and patient medical record data and was supported by in-depth interviews with the head of the pharmaceutical installation, head of finance, internal medicine specialist and the coordinator of the insurance unit at Panembahan Senopati Hospital Bantul as primary data.

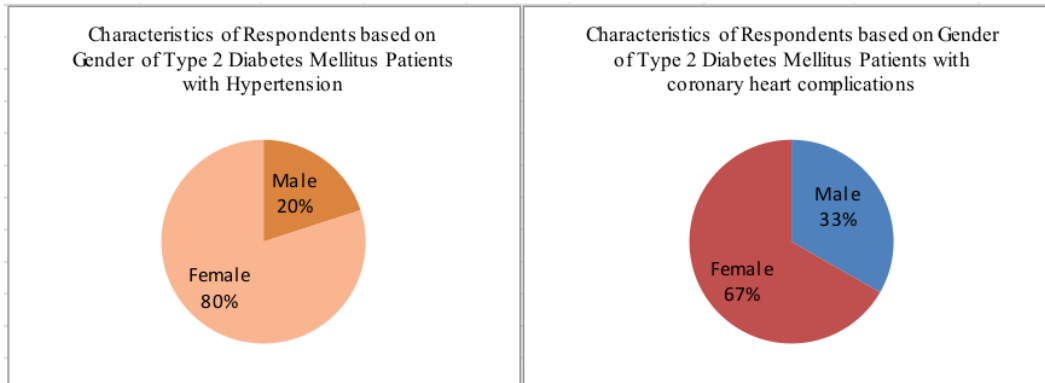
The data we collect estimate the economic burden of a disease for a given period, six months to one year. We collected medical record data for all diabetes patients enrolled in 2019, and according to our study criteria as respondents, none of our respondents were excluded while patients were receiving antidiabetic treatment. In-depth interviews use interview guidelines to obtain in-depth information.

RESULTS AND DISCUSSIONS

This study was conducted at Panembahan Senopati District Hospital Bantul. It is a type B education government hospital which is located at Jl. Dr Wahidin Sudiro Husodo, Bantul, Yogyakarta Special Region. This hospital was founded in 1953 and officially named Rumah Sakit Umum Daerah Panembahan Senopati Bantul on March 29, 2003, by Sri Sultan Hamengkubuwono IX. It is established on a land of 3.8 hectares with a building area of 21,088.11 m². This hospital has 299 beds and several supporting facilities, such as laboratory installations, radiology installations, central surgical installations, ICU/PICU, emergency department installations, etc. Based on the number of hospitalized patients in 2019, it reached as many as 23,734 patients. As a government hospital, Panembahan Senopati District Hospital Yogyakarta is most of the time an obtained limited fund from the government, where these funds cannot meet all the hospital needs to provide services to the patients. One of the most persisted efforts is how to provide effective drugs with available funds efficiently.

Table 1
Respondent Characteristic Based on Age Groups

Age Group	Number of Hypertension Patient	Percentage	Number	Percentage
17-25	0	0	0	0
26-35	0	0	0	0
36-45	1	6,6	0	0
46-55	6	40,0	2	66,6
56-65	5	33,3	0	0
>65	3	20,0	1	3,33
	15	100	3	100

**Figure 1.** Data of university graduates in several countries.**Respondent Characteristic Based on Age Groups**

Characteristics of type 2 DM patients with hypertension complications are mostly patients with an age range of 46-55 years (40%). Simultaneously, the characteristics of Type 2 DM patients with coronary heart complications are mostly suffered by patients with an age range of 46-55 years (66.6%) (table 1).

Characteristics Respondents Based on Gender

The characteristics of Diabetes Mellitus type 2 patients with hypertension complications in Panembahan Senopati District Hospital, Bantul, were mostly female patients with 12 patients (80%) compared to 3 male patients (20.0%). Whereas for type 2 Diabetes Mellitus patients with coronary heart complications at Panembahan Senopati District Hospital, Bantul, the most male patients were three patients (66.7%) while female patient was one patient (33.3%) (Figure 1).

Characteristics based on comorbidities

Characteristics based on comorbidities Diabetes Mellitus patients can experience complications at all levels of cells and all anatomic levels. The following are the characteristics of comorbidities in 18 patients (table 2).

Table 2
Types of Complications in Type 2 DM Patients.

Types of complication diseases	Number of Patient
Hypertension	15
Coronary Heart Disease	3

Characteristics Based on the length of stay

The length of hospitalization for type 2 DM patients with hypertension and coronary heart disease complications, at Panembahan Senopati District Hospital Bantul, in 2019 is seen in the table 3.

Table 3 shows the length of stay for type 2 Diabetes Mellitus patients with hypertension complications in Panembahan Senopati District Hospital Bantul in 2019 at most for six days as many as four patients (26.6%) and the longest treatment is for 14 days as many as one patient (6.6%). Whereas in type 2 Diabetes Mellitus patients with coronary heart complications, there were patients who received treatment for four days, six days and the longest for nine days.

Based on the results of an interview with one of the internist at Panembahan Senopati District Hospital, Bantul said:

"There is no minimum or maximum standard of LOS in diagnosing type DM 2 with complications, but the length of the LOS is adjusted to the patient's condition. The patient is said to be allowed to go home when the patient is in a stable condition, i.e. the blood glucose level reaches the target blood sugar at 70-200 mg/dl, and the patient's condition improves according to the desired target ..." (AY / 30 June 2020).

Drugs used for Type 2 Diabetes Mellitus patients with Hypertension and Coronary Heart Complications Receiving Inpatient Treatment at Panembahan Senopati District Hospital, Bantul Yogyakarta, 2019.

The description of the use of diabetes drugs in Type 2 Diabetes Mellitus patients with complications of

hypertension and coronary heart disease who are receiving inpatient therapy at Panembahan Senopati Bantul Hospital in 2019 as follows in table 4.

5 Table 5 shows that the most frequently used therapy for type 2 Diabetes Mellitus patients with hypertension complications in 15 patients is Novomik® Flexpen 3 ml for two patients (13.33%), Novorapid® Flexpen 3 ml + Levemir® Flexpen 3 ml + Glimepirid for two patients (13.33%), and Novorapid® Flexpen 3 ml + Levemir® Flexpen 3 ml + Metformin 500 mg for two patients (13.33%). The following are types of diabetes drugs with coronary heart complications.

7 Analysis of Direct Medical Costs of Type 2 Diabetes Mellitus Patients with Complications

Cost analysis for Diabetes Mellitus patients consists of several cost components: antidiabetic costs, comorbidities costs, administrative costs, nursing services, medical equipment accommodation costs, laboratory costs and other supporting examination costs. The following are component costs for treating type 2 Diabetes Mellitus patients with complications of hypertension and coronary heart disease in 2019 (table 6).

Table 3
Distribution of type 2 DM patients with hypertension and coronary heart complication based on the length of stay

Length of Stay (LoS)	Number of patients	Percentage (%)	Number of Coronary Heart Diseases	Percentage (%)
3	1	6,6		0
4	3	20	1	33,3
5	1	6,6		0
6	4	26,6	1	33,3
7	1	6,6		0
8	2	13,3		0
9	1	6,6	1	33,3
10				0
11	1	6,6		0
12				0
13				0
14	1	6,6		0
Total	15	100	3	100

Table 4
Drugs used for Type 2 Diabetes Mellitus patients with Hypertension and Coronary Heart Complications Receiving Inpatient Treatment

Drugs Classification	Types of Diabetes Drugs	Total patients	Percentage (%)
Insulin Analog Mix	Novomik® Flexpen 3 ml	2	13,33
Suldonilurea	Gliquidon	1	6,66
Rapid Acting Insulin (Insulin Aspart) + Long-Acting Insulin + Biguanid	Novorapid® Flexpen 3 ml + Levemir® Flexpen 3 ml + Metformin 500 mg	2	13,33
Rapid Acting Insulin (Insulin Aspart)	Novorapid® Flexpen 3 ml	1	6,66
Biguanid	Metformin 500 mg	1	6,66
Long-Acting Insulin + Biguanid	Levemir® Flexpen 3 ml + Diamicron® 30 mg	1	6,66
Insulin Analog Mixed	Humalogmix® 25 kwikpen	1	6,66
Rapid Acting Insulin (Insulin Aspart) +Sulfonylurea+Biguanid	Novorapid® Flexpen 3 ml + Glimepirid 3 mg + Metformin 500 mg	1	6,66
Insulin Glargine	Lantus® 100 IU+ Glimepirid 1 mg	1	6,66
Rapid Acting Insulin (Insulin Aspart) + Insulin Analog Mixed	Novorapid® Flexpen 3 ml + Novomik® Flexpen 3 ml	1	6,66
(Insulin Aspart) +	Novorapid® Flexpen 3 ml + Levemir® Flexpen 3 ml+	2	13,33

Table 5
Diabetes Drugs with coronary heart complications

Drugs Classification	Types of Diabetes Drugs	Number of patients	Percentage (%)
Rapid Acting Insulin (Insulin Aspart)	Novorapid® Flexpen 3 ml	2	66,67
Rapid Acting Insulin (Insulin Aspart) + Biguanid	Novorapid® Flexpen 3 ml + Metformin 500 mg	1	33,3

Table 6
Components of Direct Medical Costs in Type 2 DM Patients with Hypertension Complications

Cost Component	Total Cost (IDR)	Average Cost (IDR)
Diabetes medication costs	2.766.914	197.637
Drug complication costs	13.234.421	882.295
Doctor's Examination Fee	4.694.500	276.147
Acomodation costs	8.106.000	476.824
Diagnostic costs	19.129.000	1.125.235
Nursing Service-Fee	12.743.500	749.618
Medical Device Costs	23.876.190	1.404.482
Total Costs	68.549.190	

The component of direct medical costs for Type 2 DM patients with hypertension complications in 2019 is the largest cost of consumable medical devices of IDR 23,876,190 with an average expenditure for each patient of IDR 1,404,482 and the lowest cost is the cost of Diabetes Mellitus drugs of IDR 2,766,914 with an average cost per patient of IDR 197,637 (table 7).

Table 7
Components of Direct Medical Costs in Type 2 DM Patients with Complications of Coronary Heart

Cost Component	Total Cost (IDR)	Average Cost (IDR)
Diabetes Medication costs	401.850	133.950
Drug Complication costs	3.123.928	1.041.309
Doctor's Examination Fee	1.057.500	352.500
Accommodation costs	892.000	297.333
Diagnostic costs	3.960.000	1.320.000
Nursing Service-Fee	2.036.500	678.833
Medical Device Costs	4.750.700	1.538.566
Total Costs	12.696.700	

The component of direct medical costs for Type 2 DM patients with coronary heart complications in 2019 was the highest cost of consumable medical devices of IDR 4,750,700 with an average expenditure for each patient is of IDR 401,850 with an average cost per patient of IDR 133,950 (table 8).

The number of cases is 15 patients for type 2 Diabetes Mellitus patients with hypertension and 3 patients for type 2 Diabetes Mellitus patients with coronary heart disease.

Table 8
Medical cost for Type 2 DM Patients with Hypertension and Coronary Heart Disease

Cost	Medical costs for Type 2 DM Patients with Hypertension Complications	Health Care Costs for Type 2 DM Patients with Hypertension Complications
Total hospital rates	IDR 64.975.854	IDR 12.547.060

Table 9
Average Medical Cost for Type 2 DM Patients with Complications for Each Diagnosis compared to INA-CBG's Costs

Costs	Average In-patient Costs (IDR)
DM with Hypertension	4.331.723
DM with Heart Failure (CHF)	4.182.353

According to table 9, the total cost of care for type 2 DM patients with hypertension complications is IDR 64,975,854. While the total cost of care for type 2 DM patients with coronary heart complications is IDR 12,547,060 for Type 2 DM patients with hypertension complications is IDR 4,331,723 and the average cost of caring for Type 2 DM patients with coronary heart complications is IDR 4,182,353.

Analysis of Cost Effectiveness

The results of a cost-effectiveness analysis related to the use of a single antibiotic in patients with hypertension complications as follows:

Table 10.
Percentage of Effectiveness of Using Type 2 Anti-Diabetes with Complications

Descriptions	Percentage of Effectiveness
Hypertension	83%
Coronary heart diseases	16%

Table 11
Acer's Calculations for Single Antidiabetic Use in Complicated Patients at Panembahan Senopati Hospital in 2019.

ACER / pasien	Description
Hypertantion	4.331.723,6 / 0,85 = 5.218.943
Coronary Heart	4.182.353 / 0,16 = 26.139.706

Table 12
Calculation of ICER in cases of single use of antidiabetic with hypertension and coronary heart complications

ICER Calculations for Hypertension & Coronary Heart Cases
$26.139.706 - 5.218.943 : (0,16) - (0,83) = 31.225.019$

The calculation of the percentage of effectiveness associated with the use of single antidiabetics in patients with hypertension complications is by 83% and for coronary heart disease is by 16 per cent. The calculation for Acer obtained by patients with hypertension complications is of IDR 5,218,943 and Acer for coronary heart is of IDR 26,139,706 (table 12).

DISCUSSIONS

Respondent Characteristic

The characteristics respondents described in this discussion section include: respondent characteristic based on age groups, characteristics based on comorbidities, and Characteristics Based on the length of stay. The results of the data obtained by patients with age ranging from 46 years and over were the most significant number for type 2 Diabetes Mellitus patients with hypertension complication, mostly in the age range of 46-55 years with a total of 6 patients (40.0%). Whereas Diabetes Mellitus patients with the most coronary heart complications in the age range 56 - 56 years with a total of 2 patients (66.6%) This is following the research conducted by Wicaksono that patient in the age category > 45 years are more at risk of developing Diabetes Mellitus compared to the age category for less than 45 years. The patients with age > 45 years are proven to have nine times the risk of developing

type 2 Diabetes Mellitus than someone at risk <45 years (Wicaksono, 2011). DM type 2 on old age group occurs due to factors environmental and philological (Leroith, 2018). In addition, age affects the risk of developing diabetes, especially at more than 45 years old. A healthy lifestyle such as dietary food, physical activity, and stress management is prevention efforts to reduce DM's risk.

The characteristic respondents based on gender showed that the Diabetes Mellitus type 2 patients with hypertension complications in Panembahan Senopati District Hospital, Bantul, were mostly female patients with 12 patients (80%) compared to 3 male patients (20.0%). Meanwhile, for type 2 Diabetes Mellitus patients with coronary heart complications at Panembahan Senopati District Hospital, Bantul, the most male patients were three patients (66.7%) while female patient was one patient (33.3%). This result is also like the research conducted by Al Kayyis which states that Diabetes Mellitus patients are dominated by women compared to men, 63.6% and 36.4% respectively (Al-kayyis, 2017). Women have the potential to develop Diabetes Mellitus because of the opportunity to experience an increase in body mass index due to hormonal factors so that the distribution of fat is easily accumulated, and they are at risk of developing DM (Dolongseda, 2017). In contrast to the research conducted by Zahrawardani et al shows that the most coronary heart patients experienced by male patients with 88 patients (68.80%), but statistically there is no significant relationship between sex and type 2 Diabetes Mellitus patients with coronary heart complications (Zahrawardani, 2013). Another research suggested that females show life expectancy is higher, so it is getting much prevalence in the number of advanced women with type 2 diabetes ²².

The characteristic respondent's related comorbidities: the data shows that type 2 DM patients have the most complications of hypertension, with 15 patients and three patients with coronary heart complications. Diabetes Mellitus patients can be with the number of complications, the most secondary diagnoses are hypertension in 15 patients (83.3%) and CHF for three patients out of 18 patients suffering from DM type 2 with complications. Everyone with DM is at risk of developing chronic complications, especially those of whom have been exposed to DM for 5-10 years. However, the most vulnerable patients have a history of hypertension, uncontrolled sugar levels, and kidney damage. The DM patients often have high cholesterol levels due to high LDL levels and triglycerides in the blood and low HDL cholesterol levels. The research conducted by Chaktaborby and Mandal explore that the severity/complications vary depending on the patient's severity and timing of suffering from Diabetes Mellitus. In 5-15 years, most patients experience difficulties, both macrovascular and microvascular, resulting in many complications (Leslie, 2013). DM patients also have a risk of cardio-sebbravasuler such as stroke, hypertension, and heart attack which much higher than the average population. Therefore, people with diabetes need to be treated to avoid complications resulting in decreasing life expectancy (Chakraborty, 2013).

This is related to lipid disorders associated with insulin resistance called thermogenic dyslipidemia. Mokolomba et. al. also states the factor causing hypertension to be the highest comorbid disease in Diabetes Mellitus patients is the insulin hormone which functions to regulate blood sugar levels, causes a disturbance in insulin production resulting in an increase in blood sugar levels (hyperglycemia), and causes an increase in blood pressure (hypertension) (Muthoharoh, 2020) (Mokolomban, 2018). In a study conducted by the American Heart Association (AHA), Diabetes Mellitus is the

cause of coronary heart disease (CHF) in the age group <45 years. CHF occurs when the coronary arteries become narrowed, so that blood flow to the heart muscle is blocked due to cholesterol buildup in the coronary arteries (AHA, 2018).

The length of stay of hospitalization for Diabetes Mellitus type 2 patients with complications at Panembahan Senopati District Hospital was calculated from when the patient was admitted to the hospital (MRS) until the patient was discharged from the hospital. The length of stay for patients varies depending on the disease's characteristics and severity and the availability of adequate hospital facilities and infrastructure. Patients were declared to be discharged from the hospital can be grouped into three: patients recovered, patients died or patients referred to higher health facilities. However, in this study, samples were taken from patients who were recovered and declared home by doctors. The average DM patients were treated for more than three days. The length of day of stay directly affected the cost-effectiveness of hospital treatment.

Cost Effectiveness

The calculation of the percentage of effectiveness associated with the use of single antidiabetics in patients with hypertension complications by 83% and for coronary heart disease by 16 per cent. The calculation for Acer is obtained by patients with hypertension complications of IDR 5,218,943 and Acer for coronary heart IDR 26,139,706. This result is relevant with the study conducted by Priharsi A, the lowest cost of oral antidiabetic is the biguanide group with an ACER value of IDR 1,426.72 and an ICER of IDR 10,454.89, while the highest price of oral antidiabetic is the sulfonylurea group with ACER and ICER values of IDR 15,193.2 (Majid, 2012). Another study shows the lowest CER (cost effectiveness ratio) value for insulin therapy produced by a combination of novomix-Lantus is 76,375, and the lowest CER value for oral antidiabetic therapy is metformin, i.e. 2.171. The lowest ICER value for insulin therapy is produced by novomix-lantus combination, i.e. 40,861 and the lowest ICER value for treatment (Triani, 2016).

The results of a cost-effectiveness analysis related to the use of a single antibiotic in patients with hypertension complications (table 13, 14, 15) indicates that the drugs used for hypertension therapy are more effective than those of anti-diabetes for coronary heart disease. Meanwhile, ICER for type 2 diabetes patients with hypertension and heart complications was 31,225,019. Oral antidiabetic produced by metformin is 2.171. Based on cost efficiency, therapy with the lowest ACER and ICER values for insulin therapy is novomix-Lantus, and the oral antidiabetic is metformin. Likewise, research by Triani W shows results of the lowest CER value (cost-effectiveness ratio) for insulin therapy was produced by a combination of novomix-Lantus, i.e. 76,375 and a CER value. The lowest for oral antidiabetic therapy produced by metformin is 2.171. The lowest ICER value for insulin therapy was produced by the novomix-Lantus combination, namely 40,861 and the lowest ICER value for treatment. Oral antidiabetic produced by metformin is 2.171. Based on cost efficiency, therapy with the lowest CER and ICER values for insulin therapy is novomix-lantus, and the oral antidiabetic is metformin. Research by Pramestingtyas explores that out of 38 patients with type 2 Diabetes Mellitus, 12 patients (31.58%) were males and 26 patients (68.42%) were females (Pramestingtyas, 2014).

CONCLUSION AND RECOMMENDATION

Based on the results of this study, the total average cost of using type 2 antidiabetics with complications with hypertension is IDR 64,975,854 for 15 patients; the total average cost of using type 2 antidiabetic with complications with coronary heart disease is IDR 12,547,060 for three patients. The percentage of effectiveness of using type 2 antidiabetics with complications with hypertension is 83%. The percentage of effectiveness of using type 2 antidiabetic type 2 complications of coronary heart disease is 16%. ACER value for hypertension of IDR 5,218,943 is more efficient compared to Acer's value for the coronary heart disease of IDR 26,139,706. The ICER value for both hypertension and coronary heart complications is IDR 31,225,019.

Improve compliance related to the use of clinical pathways, especially for diabetic patients with complications. Hospital management in collaboration with the pharmacy and the medical committees compiles a drug formulary that is used as a reference for internist SMF related to single antidiabetics. Recalculate the real cost for single anti-diabetes therapy in patients with type 2 diabetes patients with hypertension complications. So, recalculate the real cost for single anti-diabetes therapy in type 2 diabetes patients with coronary heart complications.

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