

# Number and Types of Complication in Type 2 Diabetes Correlated with Outpatient Treatment Cost Using BPJS Self-Funded Scheme in Islamic Hospital Jombang

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**Abstract:** The treatment cost of type 2 diabetes outpatients with complications is estimated to exceed the cost of uncomplicated diabetes. However, Ina CBG's claim was generalised regardless of the diabetes type case (IDR 155.000/visit). This study aims to determine the correlation between the number and type of complications in type 2 diabetes patients to treatment cost and their conformity with Ina CBG's claim. The research was conducted by way of a cross-sectional study. Secondary data was taken from type 2 diabetes outpatients using a BPJS self-funded scheme in RSI Jombang from 1<sup>st</sup> January-31<sup>st</sup> December 2014 with 110 samples analysed by Kruskal Wallis, Spearman Rho and Chi Square. There was a positive and significant correlation between the number and type of complications in type 2 diabetes with the treatment cost ( $r=0.414$ ,  $p=0.001$ ;  $r=0.430$ ,  $p=0.001$ ). There was a significant difference ( $p=0.001$ ) between the average cost of diabetes without complications (IDR  $99.049 \pm 9.316$ ) with one complication (IDR  $112.722 \pm 20.468$ ) and with two complications or more (IDR  $120,711 \pm 18,512$ ). It was concluded that there was increase in the average cost of diabetes outpatients with complications in RSI Jombang but not to the point of exceeding Ina CBG's claim.

## 1 INTRODUCTION

Diabetes mellitus is a metabolic disease characterised by hyperglycemia resulting from defects in insulin secretion, insulin action, or both. The chronic hyperglycemia of diabetes is associated with the long-term damage, dysfunction, and failure of various organs, especially the eyes, kidneys, nerves, heart, and blood vessels (American Diabetes Association, 2007). Shaw et al., (2010) estimated that the world prevalence of diabetes among adults aged 20–79 years was 6.4% (285 million) in 2010, and will increase to 7.7% (439 million) by 2030. The prevalence of diabetes mellitus in productive age urban Indonesians was 4.6% (Mihardja et al., 2014).

The treatment cost of type 2 diabetes is associated with the progression of the disease and its complications (Vaivadait & Padaiga, 2014). In the previous health insurance system, PT. Askes reported that type 2 diabetes management costs more

than 22.4 million USD in 2010. The patient management of uncomplicated diabetes requires \$40 USD/patient/year and complicated patients require a higher cost of \$800 USD/patient/year (Soewondo, Ferrario & Tahapary, 2013). However, Ina CBG's (Indonesian National Social Health Insurance reimburse package) claim for type 2 diabetes outpatients was generalised regardless of the complication frequency (IDR 155.000/visit). Healthcare facilities were disallowed to charge fees to BPJS (Badan Penyelenggara Jaminan Sosial/ Indonesian National Social Health Insurance) payers. Health care facilities are not allowed to ask the fee of the patient as long they get the benefit of health care according to their human rights (Law of Ministry of Health, 2014). Outpatient treatment costs for BPJS self-funded payers should not exceed Ina CBG's claim. Some hospitals have charged additional costs to the patient under a consent for them to gain better treatment. BPJS self-funded payers who have been diagnosed with type 2

diabetes are at risk of paying more outside Ina CBG's scheme.

In Jombang Islamic Hospital, type 2 diabetes occupied the top most common diagnosis in the Outpatient Department and more than 70% patients were using the BPJS self-funded scheme. Therefore, this study aims to determine the correlation between the number and type of complications in type 2 diabetes patients with treatment cost and its conformity with Ina CBG's claim in RSI Jombang.

## 2 METHODS

This research was using retrospective study based on the data collected from medical records and treatment bills per visit from type 2 diabetes outpatients in 2014. Treatment bills included were internist specialist consultation fees, drug use costs (for seven days) and ancillary examinations (laboratory and radiology). The population was the outpatients in the Internal Medicine Clinic of Islamic Hospital Jombang using the BPJS self-funded scheme. The inclusion criteria was that they had been diagnosed with type 2 diabetes and the

exclusion criteria was uncompleted data or a patient that had been co-diagnosed with malignancy, tuberculosis, and HIV. There were 110 samples taken from the population who met the criteria.

The number of complications was grouped into three categories; type 2 diabetes without complications, diabetes with at least one complication and diabetes with two complications or more. The types of complications were grouped into four categories. Type 2 diabetes without complication, microvascular complications, macrovascular complications, and both complications. The treatment cost was classified into three categories: low (<IDR 100.000), moderate (IDR100.000-120.000) and high (>IDR 120.000).

Statistical data analysis was performed using statistic software. Spearman's test was used to evaluate the correlation between the number of complications in type 2 diabetes with treatment cost ( $p=0.05$ ) while the difference was analysed by Kruskal Wallis and Mann-Whitney ( $p=0.05$ ). Chi Square and Contingency Coefficient was used to evaluate the correlation between the type of complications in type 2 diabetes with the treatment cost.

Table 1: Sample characteristic distribution (n=110)

Characteristic	n	%
Gender		
Male	42	38,2
Female	68	61,8
Age (years)		
<40	4	3,64
41-45	10	9,09
46-50	15	13,64
51-55	21	19,09
56-60	29	26,36
61-65	15	13,64
66-70	11	10
>70	5	4,54
Number of Complication		
Without complication	17	15,45
One complication	59	53,65
Two complications or more	34	30,9
Type of Complication		
Without complication	17	15,45
Microvascular	44	40
Macrovascular	28	25,45
Microvascular & Macrovascular	21	19,1
Treatment Cost per Visit (IDR)		
<100.000	29	26,36
100.000-120.000	52	47,28
>120.000	29	26,36

### 3 RESULTS

A total of 110 samples were included in the analysis. The demographic profile of the patients has been shown in Table 1. There was a greater proportion of women diagnosed with type 2 diabetes (61.8% women vs. 38.2% men). Most of the patients were 56-60 years old (26.36%) and 51-55 years old (19,09%). In total, 53.65% of patients with type 2 diabetes had at least one complication, with 40% having microvascular only and 25,45% having macrovascular only complications. Despite having the complications, all of the treatment costs did not exceed Ina CBG’s claim (<IDR 155.000).

#### 3.1 Number of Complications Correlated with Treatment Cost

The average treatment cost per patient increased gradually with the number of complications from IDR 99.049 ± 9.316 in patients without complications to IDR 112.722 ± 20.468 in patients with one complication and IDR 120.711 ± 18.512 in patients with more than one complication. There was a positive and significant correlation between the number of complications in type 2 diabetes with the treatment cost (r=0.414, p=0.001) and there was also a significant difference between the average cost of diabetes without complications, with one complication and with two complications or more (p=0.001).

Table 2: Average treatment cost per patient per visit with number of complications

No	Number of Complication	Mean
1	Without Complication	99.049 ± 9.316 <sup>a</sup>
2	One Complication	112.722 ± 20.468 <sup>b</sup>
3	Two Complications or more	120.711 ± 18.512 <sup>c</sup>

Different notation shows significance difference \*p<0.05

#### 3.2 Type of Complication Correlated with Treatment Cost

There was a positive and significant correlation between the type of complications in type 2 diabetes with treatment cost (r=0.430, p=0.001). Patients with both microvascular and macrovascular complications had higher costs (IDR 124.449 ± 21.133) compared to those with either microvascular (IDR 115.828 ± 22.057) or macrovascular (IDR 108.747 ± 12.430) complications, and also within type 2 diabetes without complications (IDR 99.049 ± 9.316).

Table 3: Average treatment cost per patient per visit with the type of complication

No	Type of Complication	Mean
1	Without Complication	99.049 ± 9.316
2	Microvascular Complications	115.828 ± 22.057
3	Macrovascular Complications	108.747 ± 12.430
4	Microvascular and Macrovascular Complications	124.449 ± 21.133

\*p<0.05

### 4 DISCUSSION

This was the first study conducted in RSI Jombang that analysed type 2 diabetes complications and its correlation with treatment cost. Most of the patients in RSI Jombang were BPJS payers and the payment scheme for BPJS reimbursement package used in Ina CBG’s claim. Ina CBG’s claim for type 2 diabetes outpatient was generalised regardless of the complications (IDR 155.000/visit). Thus, it is important to know the correlation between the number and type of complication in type 2 diabetes with treatment cost so that it can be managed efficiently.

The treatment cost of type 2 diabetes is associated with the progression of the disease and its complications (Vaivadait & Padaiga, 2014). This study found that there was a positive and moderate correlation between the number of type 2 diabetes complications and the average cost per visit (r=0.414, p=0.001). Therefore, it can be concluded that increase number of complications related with higher average cost per visit. A study in India also found that the total costs for patients without complications reached INR 4.493 (USD 92.15) compared to INR 14.691.75 (USD 301.32) for patients with complications (Yesudian, et al., 2014). Therefore, it is important for patients and hospitals to maintain blood sugar levels in type 2 diabetes patients to reduce the risk of them developing complications so then the treatment cost can be lowered.

A previous study in Singapore proved that microvascular and macrovascular complications tend to increase the cost of care (Shuyu, et al., 2015). Another study by Dimitrova et al., (2015) showed increase of diabetes management cost for microvascular complication by 23% and macrovascular complication by 31%. Similar result was found in this study. It was confirmed that there was a positive and moderate correlation between the type of complications in type 2 diabetes with the

average cost per visit ( $r=0.430$ ,  $p=0.001$ ). There were significant cost increases in relation to both microvascular (IDR  $115.828 \pm 22.057$ ) and macrovascular complications (IDR  $108.747 \pm 12.430$ ) compared with no complications (IDR  $99.049 \pm 9.316$ ). Highest cost was found in type 2 diabetes with both microvascular and macrovascular complications (IDR  $124.449 \pm 21.133$ ). Result of this study confirmed the previous study results that patients with both microvascular and macrovascular complications had a higher cost than patients without both complications (Henrikson, et al., 2000). Previous study in Indonesia also showed that microvascular and/or macrovascular complication increased the treatment cost up to 130% compared with non-complicated diabetes (Andayani *et al.*, 2010).

On average, annually treatment cost for diabetic patient with microvascular complication cost \$1900 more than non-complicated diabetes while macrovascular cost \$3900 more (Nichols et al., 2008). Thus, type 2 diabetes complications impact on treatment cost should be considered by hospitals to provide appropriate treatment and prevention for both microvascular and macrovascular complications. Prevention and early treatment can save the diabetes treatment cost up to \$6836 annually (Palmer *et al.*, 2004).

In addition, there was a significant difference between the average treatment cost of type 2 diabetes with microvascular and macrovascular complications. The average treatment cost was higher in type 2 diabetes with microvascular complications. Contrary to the study in the US whereas macrovascular complications were the major component of type 2 diabetes costs compared to microvascular complications (Caro, Ward & O'Brien., 2002). This may be due to the hospitalisation costs were included in the previous study because macrovascular disease-related hospitalisations were more common in patients with type 2 diabetes related to unregulated diabetes (Dimitrova, et al., 2015). Moreover, the direct cost for hospitalisation purposes (inpatient care) for type 2 diabetes was the largest expenditure (Vaivadait & Padaiga, 2014). Whereas in this research, no hospitalisation cost was included.

BPJS self-funded payers have the possibility of illegally charged with additional fees outside the Ina CBG package ranged from IDR 4.000-2.000.000 (Gultom, 2015). In this study, the highest average cost per visit was found in type 2 diabetes patients with two or more complications (IDR  $120.711 \pm 18.512$ ), and also in relation to both microvascular

and macrovascular complications (IDR  $124.449 \pm 21.133$ ). Neither exceeded the outpatient reimburse package from Ina CBG's claim (IDR 155.000). This suggests that despite the increase in the average cost per visit for type 2 diabetes outpatients with complications, Ina CBG's package can still be adequate in RSI Jombang. This study confirmed that the BPJS outpatient reimburse package for type 2 diabetes with complications has covered the total costs spent by RSI Jombang. Therefore, additional fees are unnecessary (not needed) for now. This because the hospital already has good policies and efficient procedures (medical examination and drug selection) to give appropriate treatment. Therefore, as long as the hospital can practice these good management process, no additional fees should be needed. This achievement is important since in 2019, all hospital in Indonesia should participate in BPJS scheme (Mboi, 2015). In return, this will improve hospital efficiency for BPJS treatments.

## 5 CONCLUSIONS

This study concluded that there was a positive and significant correlation between the number of complications in type 2 diabetes with the average treatment cost of the patients (BPJS self-funded payers) in the Internal Medicine Clinic of RSI Jombang. The hospital must strive to improve treatment efficiency in order to control treatment costs. This study also found that the BPJS outpatient reimburse package was sufficient enough to cover type 2 diabetes and its complications treatment in RSI Jombang, regardless that the average cost was increased.

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