

Factors related to diabetic gangrene debridement service bills at Aisyiyah Hospital Bojonegoro in 2021

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ABSTRACT

Diabetes mellitus is a chronic disease that cannot be cured and can cause serious complications, including diabetic gangrene. This research is a retrospective non-experimental descriptive study that aims to analyze factors related to the bill for diabetic gangrene debridement services at Aisyiyah Bojonegoro Hospital in 2021. Of the 151 patients who met the criteria, it was found that most diabetic gangrene patients who underwent debridement were aged under 60 years (66.2%), with the most sex being female (53%), and the most degree being grade 1 (51.7%). With a minimum length of stay of 2 days and a maximum length of stay of 13 days. From the results of the study, it was found that the bill was more than INA-CBGs by 37 cases at degree I, 6 cases at degree II, and 24 cases at degree III. So that from a total of 151 patients treated with diabetic gangrene debridement, there were 67 cases where hospital bills were higher (deficit) than INA-CBGs. The deficit results were found in all treatment classes and all levels of severity except in class 2 degrees I and III and in class 1 degree II where a surplus was obtained compared to INA-CBGs. Based on the results of the study, it was found that P-Value <0.05 was at the level of severity, fornas compliance, length of stay and DPJP which means that there was a significant relationship between severity, fornas compliance, length of stay, and DPJP with the total real bills of diabetic gangrene debridement patients.

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INTRODUCTION

Diabetes Mellitus is one of the top ten causes of death in adults. The global prevalence of diabetes mellitus continues to triple even according to the *World Health Organization* (WHO) and the *International Diabetes Federation* (IDF) it is estimated that 578 million people (10.2% of adults aged 20-79 years) will have diabetes by 2030 and will increase to 700 million (10.9%) by 2045. From IDF data, it was found that 4 million of the number of deaths globally in 2017 were caused by diabetes mellitus and health expenditures due to diabetes mellitus were estimated at 727 billion dollars. Indonesia is ranked 7th with 10.7 million patients and is the only country in Southeast Asia to be included in the list (Saeedi *et al.*, 2019).

Patients diabetes mellitus often experience severe acute or chronic complications. One of the most frequent macrovascular complications is a case of diabetic ulcer/gangrene and is the most treated case of diabetes in the hospital. It is estimated that up to one-third of all diabetic patients will have problems with their legs. The increasingly long treatment days and expensive medical expenses are one of the problems that should receive special attention. (PERKENI, 2021). The high cost of treatment of diabetic gangrene can be a burden for patients and their families. Therefore, the Indonesian government has prepared a comprehensive health insurance called the National Health Insurance (JKN), and diabetic ulcers / gangrene are one of the diseases included in the financing of the health insurance. In the era of national health insurance, payments are included in the *Indonesia Case Bank Group* (INA-CBG s) package. This method is a payment method for health services provided based on each service activity provided to patients. The greater the number of service activities provided, the greater the costs that must be incurred (Kinanti *et al.* , 2021) .

According to data from Aisyiyah Bojonegoro Hospital, the number of diabetes mellitus patients with diabetic ulcers / gangrene who were debridement was carried out as many as 187 cases in 2020 and as many as 172 cases in 2021. There is also a difference in rates between the real rate of the hospital and the claim rate paid by BPJS in diabetic gangrene patients with debridement measures. This difference in tariffs certainly has a detrimental impact on hospitals and needs to be addressed properly by the hospital management, as a basis for improving quality and costs to be more efficient so as not to cause heavier losses for hospitals.

RESEARCH METHOD

It is a retrospective non-experimental descriptive study based on medical record data and data on the financial section of diabetic gangrene debridement inpatients in 2021 at Aisyiyah Bojonegoro Hospital. The samples in this study were all BPJS participation patients with diabetic gangrene diagnosis and underwent debridement procedures who were hospitalized in the period from January to December 2021 and met the inclusion criteria. When analyzing the data, to see whether or not there are differences in the service behavior of diabetic gangrene debridement patients, the rates of accommodation, consultation and *doctor visitation* that initially differ according to the class of care rights will be equated using class II rates, so that for the calculation of service bills on all samples in this study will use class II rates. Data analysis using univariate, bivariate, and multivariate analysis (Yasril and Subaris, 2009; Dahlan, 2015; Dr.Drs. Susanto Priyo Hastono, 2017).

RESULTS AND DISCUSSIONS

Univariate Analysis

Patient Carasteristic

The research data was taken from INA-CBGs data and medical records of inpatients in Rumah Sakit Aisyiyah Bojonegoro with a diagnosis of a gangren d iabetic and undergoing d ebridement procedures in the period January to December 2021 totaling 172 samples. Of the 172 samples that met the inclusion criteria were 151 samples.

Table 1. Univariate Analysis Based on Characteristics

Characteristic	Number (n)	Percentage (%)
Patient characteristics		
Age		
<60 years old	100	66,2
≥ 60 years	51	33,8
Gender		
Man	71	47,0
Woman	80	53,0

Characteristic	Number (n)	Percentage (%)
Education		
Not going to school	26	17,2
SD	45	29,8
JUNIOR	30	19,9
SMA	45	29,8
College	5	3,3
Work		
Work	85	56,3
Not working	66	43,7
Severity		
1st degree (I-4-15-I)	78	51,7
Degree 2 (I-4-15-II)	13	8,6
Degree 3 (I-4-15-III)	60	39,7
Characteristics of waiters		
Services based on DPJP		
A (Internal Medicine)	54	35,8
B (Internal Medicine)	18	11,9
C (Surgical)	43	28,5
D (Surgical)	36	23,8
Fornas Compliance		
Obedient	151	100
Disobedient	0	0
Length of Treatment		
Maximum	13	
At least	2	
Average	4,72	

From the data from table 1, it was found that the characteristics of the most diabetic gangrene debridement patients based on the age of the patients were under 60 years, namely 100 cases with a percentage of 66.2%, the most sex, namely women, 80 people with a percentage of 53.0%, education is elementary and high school, namely with the number of 45 cases each with a percentage of 29.8%, the severity is at degree 1, which is 78 cases with a percentage of 51.7%, DPJP, namely DPJP A (Internal Medicine) with 54 cases with a percentage of 35.8%, and fornass compliance is compliant with a percentage of 100%. The results of the study obtained the average length of treatment for patients with diabetic gangrene debridement was 4.72 days.

Utilization of Diabetic Gangrene Services with Debridement Measures Accommodation

Diabetic gangrene debridement patient accommodation during the treatment period obtained an average utilization of class III accommodation of 1.97, meaning that during patient care, class III accommodation was 1.97 times.

Consulting and Visite

The average utilization of consultations to room doctors is 0.7, meaning that during the average day of patient care, consultations to room doctors are carried out 0.7 times. This consultation is carried

out on the 1st to the 2nd day during the treatment period. Consultations with Sp.PD doctors via telephone obtained an average utilization of 0.32 carried out on the 1st to 3rd treatment day, and not all patients were consulted via telephone.

For visite, the average utilization of Sp.PD doctor *visite* is 2.23, meaning that during treatment at the hospital the patient is visited by a Sp.PD doctor 2.23 times and is carried out on the 1st to 5th day of treatment.

Action

The most actions were 3.65, meaning that during treatment the average nursing care was performed 3.65 times. Nursing care on day 1 is 1 in the sense that all patients (151 patients) are carried out nursing care on the first day of hospitalization. Nursing care is still carried out di day 1 to day 5.

Supporting Examinations

The most laboratory tests carried out during the treatment period are blood sugar checks during with an average utilization of 2.83, meaning that during the treatment period the patient is checked for blood sugar 2.83 times and is carried out on the 1st to the 5th treatment day. In the complete blood test, the average utilization was 1.21, meaning that during the patient's treatment, a complete blood test was carried out 1.21 times. On the 1st day of treatment, a complete blood test was performed 1 time meaning that out of 151 patients all were checked for complete blood. Another examination given is an antigen test with an average utilization of 0.89 and is carried out on the first day when the patient enters hospitalization. This antigen test is not contained in the KDP because the antigen/PCR test was carried out during the Covid-19 pandemic while the PPK was issued before the Covid-19 pandemic. This antigen test can increase the total hospital bill because the examination is mandatory before the debridement procedure. Meanwhile, in 2021 the antigen test is a new and relatively expensive test.

The most widely carried out radiological examination is Ro Thorax with an average utilization of 1.01, meaning that patients are examined by Ro Thorax on average as much as 1.01 times. This examination was carried out the most on the 1st day of treatment with 1 utilization, meaning that out of 151 patients, all Ro Thorax examinations were carried out on the first day.

Medicines

The utilization of infusion fluids is the highest Nasal Saline infusion with an average utilization of 3.51, meaning that during treatment patients are given Nasal Saline infusion 3.51 times.

The highest average utilization of anti-diabetic drugs was Actrapid HM as much as 24.6, meaning that during the treatment period patients were given the anti-diabetic drug Actrapid HM as much as 24.6 times.

The utilization of antibiotic drugs obtained by the class of antibiotic oral drugs that are often used is Coamoxyclav tablets with an average utilization of 8.25, meaning that during the treatment period patients are given Coamoxyclav antibiotic tablets as much as 8.25 times. The most commonly used class of antibiotic injection drugs is Metronidazole with an average utilization of 2.42, meaning that during the treatment period patients are given Metronidazole injection antibiotics 2.42 times.

The administration of the antihypertensive drug Captopril 12.5 mg has the highest average utilization of 1.08, meaning that as long as the patient is treated, the administration of the drug Captopril 12.5 mg is 1.08 times.

The analgesic drug Ketorolac tablets have the highest average utilization of 4.16, meaning that as long as the patient is treated, the administration of the analgesic drug Ketorolac tablets is 4.16 times. The most commonly used analgetic injection drug group is Santagesic injection (Metamizole sodium) with an average utilization of 3.86, meaning that during the treatment period patients are given Santagesic injections 3.86 times. For Anesthesia, Sedacum injection has an average utilization

of 0.38, meaning that during the time the patient is treated, the administration of Sedacum injection anesthesia is 0.38 times.

The administration of the anti-pyretic drug Tamoliv injection (Paracetamol) has the highest average utilization of 0.23, meaning that as long as the patient is treated, the administration of the anti-pyretic drug Tamoliv injection is 0.23 times.

The anti-ulcer drug Omeprazole 20 mg capsules has the highest average utilization of 8.1, meaning that as long as the patient is treated, the administration of the anti-ulcer drug Omeprazole 20 mg capsules is 8.1 times. The most commonly used class of anti-ulcer injection drugs is Omeprazole 40 mg injection with an average utilization of 2.05, meaning that during the treatment period patients are given 40 mg Omeprazole injection as much as 2.05 times.

The administration of anti-emetic drugs Metoclopramide tablets has the highest average utilization of 8.17, meaning that as long as the patient is treated, the administration of anti-emetic drugs Metoclopramide tablets is 8.17 times. Meanwhile, the most commonly used anti-emetic injection drug class is Ondansetron injection 4 mg with an average utilization of 1.21, meaning that during the treatment period patients are given Ondansetron injection 4 mg as much as 1.21 times. ISDN drugs have the highest average utilization of 1.09, meaning that as long as the patient is treated, the ISDN drug is given 1.09 times. For the administration of anti-dyslipidemia drugs Avesco (Atorvastatin Calcium) tablets have an average utilization of 0.61, meaning that during the time the patient is treated, the administration of anti-dyslipidemia drugs is 0.61 times.

For ispa drugs Promedex tablets have the highest average utilization of 0.65, meaning that as long as the patient is treated, the administration of ispa drugs Promedex tablets is 0.65 times. Meanwhile, asthma drug Salbutamol tablets have an average utilization of 0.1, meaning that as long as the patient is treated, the administration of asthma drugs Salbutamol tablets is 0.1 times.

The administration of the anti-inflammatory drug Dexamethasone injection has the highest average utilization of 0.27, meaning that as long as the patient is treated, the administration of the anti-inflammatory drug Dexamethasone injection is 0.27 times. The administration of the anti-diuretic drug Furosemide injection has an average utilization of 1.42, meaning that during the time the patient is treated, the administration of the injection drug Furosemide is 1.42 times.

For vasodilator drugs Cilostazol tablets have an average utilization of 0.56, meaning that as long as the patient is treated, the administration of the drug Cilostazol tablets is 0.56 times. For the anti-platelet drug Platogrix (Clopidogrel) tablets have an average utilization of 0.79, meaning that as long as the patient is treated, the administration of the drug Platogrix tablets is 0.79 times. Meanwhile, the anti-coagulant drug Simarc (Warfarin) tablets have an average utilization of 0.03, meaning that as long as the patient is treated, the administration of the drug Simarc tablets is 0.03 times.

Multivitamin Megabal capsules have an average utilization of 2.38, meaning that during the time the patient is treated, the administration of Megabal capsules is given vitamins 2.38 times. Octenic ointment has an average utilization of 0.32, meaning that as long as the patient is treated, the octenic ointment is given 0.32 times.

BMHP and Medical Devices

The highest BMHP was Alcohol swab with an average utilization of 8.59, meaning that during the time the patient was treated the use of swab alcohol was 8.59 times. And the highest medical device is a 10 cc syringe with an average utilization of 18.42, meaning that as long as the patient is treated, the use of a 10 cc syringe is 18.42 times.

Bivariate Analysis

Table 2. Characteristics of Respondents with Total Diabetic Gangrene Debridement Paisein Bills

Characteristics of Respondents	Total Patient Rill Bill				Total	P-Value
	Low cost		High cost			
	F	%	f	%		
Age						
< 60 years	43	50.6 %	42	49.4 %	85	0.775
≥ 60 years	32	48.5 %	34	51.5 %	66	
Gender						
Man	35	49.3 %	36	50.7 %	71	0.939
Woman	41	51.3 %	39	48.8 %	80	
Education						
No School	12	46.2 %	14	53.8 %	26	0.063
SD	25	55.6 %	20	44.4 %	45	
JUNIOR	17	56.7 %	13	43.3 %	30	
SMA	17	37.8 %	28	62.2 %	45	
College	5	100 %	0	0 %	5	
Work						
Work	44	51.8 %	41	48.2 %	85	0.689
Not Working	32	48.5 %	34	51.5 %	66	

Based on table 2, it was found that age, gender, education, and occupation were not related to the total diabetic gangrene debridement patient bill. From the analysis of the study above, it was found that there was no statistically significant relationship between the age variable and the total bill of diabetic gangrene debridement inpatients. This is in accordance with the research of Oktadiana (2021) and Kinanti *et al* (2021) that there is no meaningful relationship between age and diabetes mellitus inpatient bills and diabetic gangrene (Oktadiana, 2021; Kinanti *et al*, 2021). From the analysis of the study above, it was found that there was no statistically significant relationship between the sex variables and the total bill of diabetic gangrene debridement inpatients. This is in accordance with the research of Oktadiana (2021) and Kinanti *et al* (2021) that there is no meaningful relationship between sex and diabetes mellitus inpatients and diabetic gangrene (Oktadiana, 2021; Kinanti *et al*, 2021). From the results of the data analysis above, it also shows that there is no statistically significant relationship between education and employment variables to the total bill of diabetic gangrene debridement inpatients. This is contrary to data from the IDF, where from the data it is found that the education and work of patients greatly affect the severity of diabetic gangrene, causing longer hospital stays and causing an increase in medical costs (International Diabetes Federation., 2019).

Table 3. Service Characteristics with Total Rill Bills of Diabetic Gangrene Debridement Patients

Service Characteristics	Total Patient Rill Bill				Total	P-Value
	Low cost		High cost			
	F	%	f	%		
Severity						
Degree I	53	67.9 %	25	32.1 %	78	0.000
Degree II	3	23.1 %	10	76.9 %	13	
Degree III	20	33.3 %	40	66.7 %	60	
Fornas Compliance						
Obedient	76	50.3 %	75	49.7 %	151	0,000
Disobedient	0	0 %	0	0 %	0	

Service Characteristics	Total Patient Rill Bill				Total	P-Value
	Low cost		High cost			
	F	%	f	%		
Rawat Class						
Grade 1	26	66.7 %	13	33.3 %	39	0.088
Grade 2	20	71.4 %	8	28.6 %	28	
Grade 3	43	51.2 %	41	48.8 %	84	
Length of Treatment						
Under LOS	70	70.0 %	30	30.0 %	100	0.000
Above LOS	6	11.8 %	45	88.2 %	51	
Main DPJP						
A	24	44.4 %	30	55.6 %	54	0.000
B	9	50.0 %	9	50.0 %	18	
C	21	48.8 %	22	51.2 %	43	
D	22	61.1 %	14	38.9 %	36	

Based on table 3, it was found that the severity, length of care, national compliance, and DPJP were related to the total diabetic gangrene debridement patient bill.

The results of the above analysis show that there is a statistically significant relationship between severity and the total bill of inpatients with diabetic gangrene debridement. These results are in accordance with the research of Kinanti *et al* (2021) where severity is one of the factors that affect the cost of treatment for diabetes mellitus patients with diabetic gangrene (Kinanti *et al.*, 2021). Based on the data above, it was found that the most common DPJP treating diabetic gangrene debridement patients was DPJP A (Internal Medicine) with a percentage of 35.8% and DPJP showed statistically significant results between the DPJP variable and the total bill of diabetes mellitus inpatients with diabetic gangrene performed debridement procedures. The role of DPJP in patient clinical management largely determines the cost of treatment, so hospitals should establish appropriate clinical practice guidelines. This clinical practice guide becomes a clinical *pathway* so that services provided to patients are in accordance with medical service standards, nursing care standards, and other evidence-based health service standards (Adisasmito, 2008). From the results of the data analysis, there was also a statistically significant relationship between the variable length of days of treatment and the total bill of diabetic gangrene inpatients with debridement. This is not in accordance with the research conducted by Oktadiana *et al*, where in his study most of the inpatients with diabetes mellitus with diabetic gangrene spent an average of 1-3 days of hospitalization. The difference in the length of treatment days can be caused by the presence or absence of comorbidities, the severity of the disease, and the type of diabetic gangrene of diabetic patients treated (Isma, 2021).

Multivariate Analysis

Table 4. Multivariate Analysis

No	Variable	B	Value P-Value	Exp(β)	95 % CI	R ²
1	Severity	0.512	0,017	1.669	1.669-1.095	0.426
2	Rawat Class	-0.790	0,002	0,454	0,277-0.745	
3	Length of Treatment	2.573	0,000	13.108	5.008-34.313	
	<i>constant</i>	0,123				

The variable that most dominantly affects the total patient bill is the length of treatment which has an Exp (β) value of 13,108 meaning that the longer the patient is treated, it will cause

13,108 times (CI: 5,008-34,313) to increase the total real bill of diabetic gangrene debridement patients.

Factors Related to Diabetic Gangrene Debridement Service Bills

The purpose of this study was to determine the factors related to the real bills of patients with diabetic gangrene with debridement measures at Aisyiyah Bojonegoro Hospital in 2021. From the results of the analysis, it was found that the severity, compliance of forms, length of treatment, and DPJP were variables that were significantly related to the bill of Diabetic Gangrene patients with Debridement ($P\text{-Value} < 0.05$).

In accordance with research conducted by Hayul et al, which showed that the variables of length of treatment, class of treatment and severity affect the real cost of hospitals in inpatients with diabetes mellitus (Hayul *et al*, 2020). According to Fakni and Viviyanti, 2013 that the factors that affect hospital financing are the form and nature of the organization, ownership status, hospital class, service system, power, facilities and infrastructure, type and number of service activities (Fakhni Armen, 2013).

Difference between Total Diabetic Gangrene Debridement Bills and INA-CBGs

From the results of this study, it was found that the difference between the total real bills of diabetic gangrene debridement patients and the INA-CBGs rate based on Permenkes Number 64 of 2016 in Regional 1 of private hospitals type C. Class 3 degrees of severity I tariffs on real bills of Rp.5,027,526 while the INA-CBGs tariff of Rp.4,389,900 obtained a difference of Rp.637,626. Class 3 degrees severity II tariff on real bills was Rp.6,458,548 while the INA-CBGs tariff was Rp.5,972,200 obtained a difference of Rp.486,348. Class 3 tariff of severity III on real bills of Rp.7,464,729 while the INA-CBGs tariff of Rp.7,166,600 obtained a difference of Rp.298,129.

For class 2 degrees of severity I tariffs on real bills of Rp.5,034,822 while INA-CBGs tariffs of Rp.5,267,900 get a difference of minus Rp.233,078. Class 2 degrees severity II tariffs on real bills of Rp.8,294,390 while INA-CBGs tariffs of Rp.7,166,600 get a difference of Rp.1,127,790. Class 2 degrees severity III tariffs on real bills of Rp.5,848,905 while INA-CBGs rates of Rp.8,600,000 get a difference of minus Rp.2,751,095.

For class 1 tariff of severity I on real bills of Rp.6,224,569 while the INA-CBGs tariff of Rp.6,145,900 is obtained a difference of Rp.78,669. Class 1 tariff of severity II on real bills of Rp.7,365,642 while INA-CBGs tariff of Rp.8,361,100 is obtained a difference of minus Rp.995,458. Class 1 tariff of severity III on real bills of Rp.12,000,935 while INA-CBGs tariff of Rp.10,033,300 is obtained a difference of Rp.1,967,635.

From the research data, it was found that the bill was more than INA-CBGs of 37 cases in degree I, 6 cases in degree II, and 24 cases in degree III. So that out of the 151 patients treated with diabetic gangrene debridement, 67 cases were obtained where hospital bills were higher than INA-CBGs.

From the above results, it can be concluded that the total real bill of diabetic gangrene debridement patients obtained higher cost results (deficit) than INA-CBGs in all classes of care and all severity except in class 2 degrees I and III and in class 1 degree II where lower cost results (surplus) were obtained than INA-CBGs. Where the total real bill of inpatients debridement of the lowest diabetic gangrene is Rp.5,034,822 at the 2 degree I class rate and the highest rate at Rp.12,000,935 at the 1 degree III class tariff.

The difference in rates in hospitals can be addressed by cross-subsidizing patients with severity and class of care who have a difference in positive values. Usually the cost is subsidized from the medical department which is small in carrying out the procedure of action. The average medical procedure that suffers a lot of losses is surgical procedures, where the INA-CBGs rate cannot be sufficient to cover the real costs of hospitals. The significant difference in costs between hospital real rates and INA-CBGs rates is likely due to the standardization of medical services that have not

been fully applied to inpatient services and also the treatment and treatment procedures provided by each doctor are different and have not been effectively and efficiently controlled because hospitals do not yet have a *clinical pathway*. and unit cost for diabetic gangrene debridement. Without clear standards it will be difficult to predict and control costs

CONCLUSION

After seeing the results of the discussion of patient characteristics, service utilization, and statistical variable relationships, several conclusions were obtained is the characteristics of diabetic gangrene debridement patients at Aisyiyah Bojonegoro Hospital were found to be more under the age of 60 years, female, with the highest severity being degree 1. The average length of days of hospitalization of diabetic gangrene debridement patients during the hospital treatment period was 4.72 days. With a minimum length of treatment of 2 days and a maximum length of treatment of 13 days. There are deficits and surpluses from the hospital's real ta gihan to INA-CBGs in patients with diabetic gangrene debridement during the hospital treatment period. Deficit outcomes were found in all classes of care and all severity except in grades 2 degrees I and III and in class 1 degree II where surplus results were obtained compared to INA-CBGs. Factors related to the bill of patients with diabetic gangrene debridement include severity, national compliance, length of care, and DPJP.

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