Cost of Illness Patient Covid-19

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Abstract

Introduction: According to statistics published in the worldometers database, more than 6,719,815 people in Indonesia have been infected with Covid-19 as of December 2022 and of them more than 160,612 people have died.The spread of Covid-19 has had a broad social and economic impact. From an economic perspective, the increase in the number of patients and disease complications due to the spread of the Covid-19 virus has resulted in high direct medical costs and high indirect medical costs, affecting the health system and government. Method: This research is a non-experimental analytic study with a cross-sectional study design. Data was collected retrospectively from patient medical records and claims data which consisted of details of direct medical costs during treatment to find out the cost of caring for Covid-19 patients during the period January - December 2021. Result: This study used data on 1462 COVID-19 patients who were hospitalized during the January-December 2021 period. A total of 1223 patients were declared cured while 239 patients died with the majority of the Covid-19 case category in patients treated being confirmed with mild severity. Conclusion: It is important to have sound health financing policies in place so that you can weather economic storms. Covid-19 financial analysis can be used to develop a systematic approach to making decisions and a roadmap for future risk management.

Keywords: SARS-CoV-2, Retrospective Studies, COVID-19, Cross-Sectional Studies, Government, Weather.

1. Introduction

A mysterious case of pneumonia was reported from Wuhan, Hubei Province, China in December 2019 but the source of transmission of the disease is not known with certainty (1). The samples studied showed the etiology of the new coronavirus (2) hence the name Coronavirus Disease (Covid-19) which is caused by the Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) virus. Transmission of Covid-19 through droplets causes this disease to spread quickly and infect many people (3).

People above the average age of 55.5 years (4) and have comorbid diseases such as hypertension, diabetes, and heart disease, are at higher risk of being infected with the Covid-19 virus (5,6). According to statistics published in the worldometers database, more than 6,719,815 people in Indonesia have been infected with Covid-19 as of December 2022 and of them more than 160,612 people have died.The spread of Covid-19 has had a broad social and economic impact. From an economic perspective, the increase in the number of patients and disease complications due to the spread of the Covid-19 virus has resulted in high direct medical costs and high indirect medical costs, affecting the health system and government (7). A number of studies have shown that the medical costs of Covid-19 patients are significantly higher than other infectious diseases because it requires a longer hospitalization and a higher death rate.

(8). On the other hand, the need for Covid-19 patients for special care services also affects the costs associated with caring for Covid-19 patients (9–11). Variations in the amount of medical costs for Covid-19 patients depend on the number of people infected, the severity of the disease, the average length of stay in the hospital, the average length of stay in the ICU, and other factors (12,13). Statistical data on the worldometer website shows that more than 3% of Covid-19 patients in the world are in critical condition and require special care services. The results of a study on 138 people with Covid-19 in Wuhan, China, showed that 26.1% of patients used special care services,

41.6% of patients received non-invasive ventilation and 47.2% of patients received invasive ventilation (14). In Lombardy, Italy the majority of patients treated in the ICU use invasive ventilation (15). The cost per day of hospitalization in the ICU is generally 3-4 times higher than in general wards (16). Cost of Illness (COI) analysis is an important element in the decision-making process for infectious diseases such as Covid-19, because it can evaluate the cost of a disease and can be used for planning and budgeting in making policy interventions in disease control (17). The purpose of this study was to find out the amount of treatment costs for Covid-19 patients based on a hospital perspective, to find out the cost per day of confirmed cases, suspected and probable Covid-19 patients, to find out the difference between hospital rates and INA-CBG's package rates in caring for Covid patients -19, and to find out the factors that influence the cost of treating Covid-19 patients.

2. Method

This research is a non-experimental analytic study with a cross-sectional study design. Data was collected retrospectively from patient medical records and claims data which consisted of details of direct medical costs during treatment to find out the cost of caring for Covid-19 patients during the period January - December 2021. This study was conducted from the perspective of the hospital as a health service provider, using an approach prevalence.

The subjects used were the entire population of Covid-19 patients who met the study inclusion criteria. The inclusion criteria for research subjects were all Covid-19 patients with complete medical record data and financing, while the exclusion criteria included Covid-19 patients who died during treatment and incomplete patient data, both medical record data and details of direct medical costs that were lost or can not be read.

The independent variables in this study included age, gender, length of stay, severity, category of Covid-19 cases and number of comorbidities. While the dependent variable is the direct medical costs of Covid-19 patients.

Data analysis was carried out through descriptive analysis to describe the patient's socio-demographic data while the patient was hospitalized. The cost of illness analysis for Covid-19 is carried out by calculating the average direct medical costs using a top-down approach. The difference between the cost of illness and the INACBGs rate is obtained by testing the average of a single sample against a reference with the assumption that the data is normally distributed. The difference between the real cost of Covid-19 patients and the INA-CBGs rate is obtained if the p-value <0.05, it can be concluded that there is a significant difference between the two variables measured, but if the p-value is > 0.05, it can be concluded that there is no difference meaning between the two variables measured. Linear regression multivariate correlation analysis to determine the relationship between age, gender, length of stay, severity, category of Covid-19 cases and number of comorbidities to the total cost of illness in Covid-19 patients.

3. Results and Discussion

This study used data on 1462 COVID-19 patients who were hospitalized during the January-December 2021 period. A total of 1223 patients were declared cured while 239 patients died with the majority of the Covid-19 case category in patients treated being confirmed with mild severity. Among the patients who recovered, 658 patients had co-morbidities, such as pneumonia, diabetes mellitus, essential hypertension, heart disease and other co-morbidities with an average length of stay of 7 days. The average length of stay for COVID-19 patients without comorbidities is 6 days, while the average length of stay for COVID-19 patients who have comorbidities is 8 days. The status of patients discharged from the hospital was 84% in a living condition and 16% in a dead condition. Patients who died mainly in the age range of 41-65 years, elderly patients with comorbidities, and patients who had multiple comorbidities. (Table I).

Table 1. Characteristics of Covid-19 Patients

Patient Demographics	Total (n=1223)	Procentage
Comorbid		
Patients without comorbidities	565	46,2%
Patients with Comorbids	658	53,8%

Gender		
Male	609	49,8%
Female	614	50,2%
Age		
0-12 Years (Children)	67	5,5%
13-22 Years (Teenager)	61	5.0%
23-40 Years (Early youth)	277	22,6%
41-65 Years (Late adulthood)	642	52,5%
> 65 Tahun (Elderly)	176	14,4%
Category Case Covid-19		
Probable	10	0,82%
Suspect	313	25,59%
Confirmation	900	73,59%
Severity		
Light	848	69,34%
Medium	200	16,35%
Weight	175	14,31%
Hospital discharge status		
Live	1223	84%
Dead	239	16%

Based on the Terminology of the Covid-19 Case in accordance with the Decree of the Minister of Health of the Republic of Indonesia Number HK.01.07-MENKES-413-2020 concerning Guidelines for the Prevention and Control of Covid-19 in Indonesia, the categories of Covid-19 cases are divided into 3 namely Probable, Suspect and Confirmation. A suspected case is a person who has one of the following criteria: a) a person with an acute respiratory infection (ARI) and in the last 14 days before the onset of symptoms had a history of traveling or living in a country/region of Indonesia reporting local transmission, b) a person with one of the symptoms/signs of ARI and in the last 14 days before symptoms appeared had a history of contact with confirmed/probable Covid-19 cases, c) People with severe ARI/severe pneumonia requiring hospitalization and no other causes based on the clinical picture convincing. The second category is a probable case which is a suspected case with Severe ARI/ARDS/death with a convincing clinical picture of Covid-19 and no RT-PCR laboratory test results. The third category is confirmed, which is someone who has tested positive for the Covid-19 virus as proven by RT-PCR laboratory tests. The cost per day in each case can be seen in the following table.

Table 2. Cost Per Day Based on Covid-19 Case Category

No	Covid-19 Case Category	Total Cost Per Day	Total Hospital Claims Based on INA CBG's Rates
1	Probable	Rp162.500.000	Rp122.263.000
2	Suspect	Rp8.746.000.000	Rp8.128.406.000
3	Confirmation	Rp65.569.500.000	Rp64.041.870.000

The calculation of the cost of caring for Covid-19 patients is based on the cost per day (cost per day) which is calculated from the time the patient begins to be treated at the hospital and still follows the INA-CBG's tariff provisions. Payment of Covid-19 claims uses a cost per day system so that it shows that there is a surplus received by the hospital. Despite this, overall hospital revenue has decreased due to a decrease in the number of patient visits during the COVID-19 pandemic. All costs of Covid-19 treatment are borne by the Indonesian government so that there are no fees charged to patients or cost sharing with patients. The average direct medical cost for Covid-19 patients without comorbidities based on hospital rates is IDR 27,892,962 and IDR 35,162,758.25 for

patients with comorbidities. The average direct medical costs for all patients treated based on hospital rates during the period January to December 2021 amounted to IDR 31,804,267 with a total direct medical cost of IDR 38,939,836,401 (Table 3)

Table 3. The Real Cost of Treating Covid-19 Patients

Cost Component	Patients without comorbidities (n =565)	Patient with comorbid (n =658)
Administrative costs	8.746.582,33	9.448.104,59
Medical Service fees	4.293.707,96	6.462.462,00
Medical action costs	4.173.505,14	5.609.199,05
Medical support cost (Laboratory)	1.446.858,88	2.230.458,62
Radiology	204.227,07	263.005,05
Rehabilitation	10.663,60	10.106,32
Medicine	8.242.271,90	9.930.432,09
Medical goods	164.753,55	234.715,32
Surgery	704.698,00	909.460,56
The average cost of treatment is based on hospital rates	27.892.962,18	35.228.439,25
The average cost of treatment is based on hospital rates (n=1223)	**31.839.604,60**	
The average cost of treatment is based on INACBG's (n=1223)	**59.152.523,30**	

The cost of treating Covid-19 patients consists of administrative costs such as the cost of special isolation treatment rooms for Covid-19 (negative pressure / normal ventilation), emergency room, inpatient room, intensive care room (ICU/HCU), special Covid-19 delivery room, ward Operations, and so on. In addition, the cost of medical services is also required for visits and examinations by general practitioners and various specialist doctors, such as pulmonary specialists, surgeons, and others. Costs for medical procedures are needed for the installation and maintenance of infusions, the use and installation of oxygen, intravenous injections, blood sampling, and so on. On the other hand, the cost of treating Covid-19 patients also consists of medical support costs which include laboratories, radiology and rehabilitation as well as other medical support including the cost of the SARS-CoV-2 Polymerase Chain Reaction (PCR) swab. Covid-19 patients also need other treatment costs such as medicines, medical consumables and costs for surgical procedures. The results of the study showed that the highest total cost for treating inpatients with Covid-19 was the component of the cost of medicines, amounting to IDR. 11,191,107,947.00.

The results of the analysis show that there is a significant difference between the cost of care based on hospital rates and the cost of treatment based on INA CBG's rates (p=0.000). The average total cost of treating Covid-19 patients based on the INACBG's rate is IDR 59,152,523.30. This fee is higher than the average real total cost based on hospital rates, which is IDR 31,839,605.00. This shows that the hospital gets more difference with an average of IDR 27,312,918.00 for each Covid-19 patient being treated. The cost of treating Covid-19 is very expensive, so the Indonesian government needs a health budget that is quite large to deal with the Covid-19 pandemic. Therefore, promotive and preventive efforts are needed in order to reduce the transmission of Covid-19 cases (18).The results of the linear regression test in Table 4 show that the variables that significantly affect the cost of illness of Covid-19 patients are age, length of stay, number of comorbidities and severity.

Table 4. Multivariate Analysis of Factors Affecting the Cost of Illness in Covid-19 Patients

Model	df	F	Sig
Regression	6	3481.661	0.000
Residual	1216		

No	Model	Standardized Coefficients Beta	t	Sig
1	Age	0.049	6.645	0.000
2	Gender	-0.005	-8.04	0.421
3	LOS	0.963	118.206	0.000
4	Covid Category	0.000	-0.017	0.986
5	Number of Comorbidities	0.114	13.938	0.000
6	Severity Level	-0.35	-4.272	0.000

Most of the Covid-19 patients in this study were aged 23 to 65 years. The prevalence of suffering from more severe disease due to Covid-19 occurs in the elderly. More than 81% of deaths caused by Covid-19 occur in patients over 65 years of age (17) and in patients with comorbidities and multiple comorbidities. Consistent with previous findings showing that Covid-19 patients who have co-morbidities such as hypertension or diabetes mellitus, have a higher prevalence of care in the Intensive Care Unit (ICU) (19). The presence of abnormal arterial hypoxemia in the lung mechanism in Covid-19 patients causes acute respiratory distress so that the need for oxygen increases (20). Covid-19 patients who receive treatment using ventilators have longer treatment days, resulting in higher treatment costs. In this case, the higher the severity of the Covid-19 patient, the more health services and types of drugs are provided so that it is directly proportional to the costs required (21).

Covid-19 patients with comorbidities have an average higher direct medical cost than Covid-19 patients who do not have comorbidities. This is due to the need for specialist services, ICU, ventilators, medicines, and more laboratory tests in comorbid patients (22,23). Comorbid diseases can worsen the patient's condition, increase the number of deaths so that it has implications for economic losses (24).

Long-term losses due to the Covid-19 pandemic can have an impact on the occurrence of a global economic recession. This condition is in accordance with IMF (International Monetary Fund) estimates which state that the Covid-19 pandemic will harm the global economy of 12.5 trillion dollars by 2024 (25). Delay in implementing strategies to suppress transmission will lead to worse outcomes resulting in fewer lives being saved (26). Therefore, appropriate health financing policies are needed so that they can be used to deal with economic shocks (27). Analysis related to Covid-19 financing can assist in the development of a comprehensive approach for decision making and future risk management planning.

4. Conclusion

Covid-19 patients with comorbidities have an average higher direct medical cost than Covid-19 patients who do not have comorbidities. Long-term losses due to the Covid-19 pandemic can have an impact on the occurrence of a global economic recession.

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