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RESEARCH ARTICLE

Cost of illness for COVID-19 inpatients in West Nusa Tenggara, Indonesia

Cyntiya Rahmawati, Baiq Nurbaety, Nurul Qiyaam, Sulton Dini, Laelatul Maftuhah
Department of Pharmacy, Muhammadiyah University of Mataram, Mataram, West Nusa Tenggara, Indonesia

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Correspondence

Cyntiya Rahmawati
Department of Pharmacy
Muhammadiyah University of Mataram
West Nusa Tenggara
Indonesia
cyntiya.apt@gmail.com

Abstract

Background: COVID-19 is still a pandemic worldwide, including in Indonesia. The high number of COVID-19 cases, especially in West Nusa Tenggara (NTB), has a financial impact, considering that inpatient costs are borne by the government. **Objective:** To calculate the cost of illness for COVID-19 inpatients at the NTB Provincial hospital. **Method:** The method used was the cost of illness from a payer's perspective. The population consisted of 822 patients. **Results:** The total direct medical cost of COVID-19 patients at the NTB Provincial hospital in 2020 was IDR 45,589,962,670, with an average of IDR 55,462,242. The average cost of COVID-19 inpatients without comorbidities was IDR 45,545,441 and IDR 71,926,056 for those with comorbidities. **Conclusion:** The total cost of illness of COVID-19 in West Nusa Tenggara, Indonesia, was high. Therefore, preventive efforts are needed to reduce the incidence of COVID-19 in Indonesia, especially in West Nusa Tenggara.

Introduction

Coronavirus disease 2019 (COVID-19) is caused by the SARS-CoV-2, and its most common symptoms are fever and cough. However, patients with this disease often present without fever, and many do not have abnormal radiological findings (Guan *et al.*, 2020). In January 2020, the World Health Organization (WHO) declared COVID-19 a public health emergency of international concern (WHO, 2020). This pandemic has hit Indonesia for more than a year. However, positive cases are still growing. In August 2021, the total number of confirmed positive cases was 3.9million, according to the government data (Satuan Tugas Penanganan COVID-19, 2021). In West Nusa Tenggara (NTB), COVID-19 positive cases reached 24,763 cases, and a total of 1,555 cases were treated (Dinas Kesehatan NTB, 2021).

The global expenditure of the COVID-19 outbreak was estimated at USD 1trillion for 2020 (Singh & Misra, 2020). The total costs for healthcare personnel (HCP) management were estimated at EUR 1,735,830 (EUR 772,890 for HCP with COVID-19 and EUR 962,940 for exposed HCP). In Indonesia, treating COVID-19 patients is very expensive, with an average of IDR 184 million

per person in need for special treatment, such as Intensive Care Unit (ICU), ventilators, and medications for comorbidities (Tim Komunikasi Komite Penanganan COVID-19 dan Pemulihan Ekonomi Nasional, 2020). Based on the Infectious Disease Outbreak Act, the government has the duty to bear the financial burden of the treatment the community undergoes due to infectious diseases, in this case, COVID-19.

Cost of illness studies measure the economic burden of disease and estimate the maximum value that can be saved or obtained if the disease can be cured (Rascati, 2009). This study aimed to conduct a health technology assessment through the cost of illness for COVID-19 patients to gain insight into the direct medical costs of COVID-19 inpatients at the West Nusa Tenggara (NTB) Provincial hospital in 2020 from the payer's perspective.

Methods

This study was an economic evaluation of health, i.e. the cost of illness with a top-down prevalence approach and used retrospective data from 2020. Patient demographic data and cost data were obtained from medical records and receipts issued by hospitals. Demographic data recorded were the length of hospitalisation, comorbidities, gender, age, and hospital discharge status. Cost data were calculated based on the payer's perspective, namely the government. Thus, the calculated costs were direct medical costs (treatment room costs, doctor visit costs, treatment costs, laboratory costs, other service costs, pharmaceutical costs, and emergency room costs). The cost of each component was calculated for each patient, then the average cost was calculated.

The population in this study consisted of all the patients with confirmed COVID-19 hospitalised at the NTB Provincial hospital during 2020 (n = 822 patients). The samples were taken from the entire population or total sampling.

Results

Overview of COVID-19 patients¹² in West Nusa Tenggara, Indonesia

West Nusa Tenggara (NTB) Provincial Hospital is one of the referral hospitals for patients with confirmed COVID-19. A total of 822²² COVID-19 patients have been admitted to the hospital, of whom 309 had comorbidities, mainly pneumonia, diabetes mellitus, essential hypertension, and other comorbidities. The average length of hospital stay was approximately 13 days. For COVID-19 patients with no comorbidities, it was around 12 days and about 15 days for those with comorbidities. Hospital discharge status was 95% alive and 5% dead. The patients who died were mainly in late adulthood, elderly with comorbidities, or patients with multiple comorbidities (Table I).

Cost components

All the direct medical costs were borne by the government, so there was neither cost charged to patients nor cost-sharing with patients. The average direct medical cost for COVID-19 patients without comorbidities was IDR 45,545,441 and IDR 71,926,056 for those with comorbidities. For all the patients admitted to the NTB Provincial hospital during 2020, the average direct medical cost was IDR 55,462,242, and the total direct medical cost was IDR 45,589,962,670.

Table I: Overview of COVID-19 patients at West Nusa Tenggara

Demography of patients	Total (n=822)	Percentage
Comorbidity		
Patients without comorbidities	513	62%
Patients with comorbidities	309	38%
Gender		
Male	454	55%
Female	368	45%
Age		
0-12 years old (children)	23	2.8%
13-22 years old (teenager)	102	12.4%
23-39 years old (early adulthood)	350	42.6%
41-65 years old (late adulthood)	292	35.5%
> 65 years old (elderly)	55	6.7%
Hospital discharge status		
Alive	780	95%
Dead	42	5%

Table II: Average cost of components

Cost components	Patients without comorbidities (n=513)	Patients with comorbidities (n=309)	Cost average of COVID-19 patients (n=822)
Room	IDR5,183,791	IDR9,168,608	IDR6,681,734
Doctor	IDR733,830	IDR1,053,123	IDR853,856
Care	IDR1,215,179	IDR3,238,007	IDR1,975,585
Laboratory	IDR1,655,366	IDR5,222,448	IDR2,996,277
Other services	IDR967,510	IDR501,657	IDR792,390
Pharmaceutical	IDR35,507,406	IDR52,046,729	IDR41,724,743
Emergency	IDR282,358	IDR695,483	IDR437,657
Total Cost Average	IDR45,545,441	IDR71,926,056	IDR55,462,242

The treatment room cost consisted of a COVID-19 isolation room with a ventilator, a negative pressure isolation room without a ventilator, a natural airflow isolation room without a ventilator, an intermediate room, and so on. Doctor visit costs were the costs paid for the visits and examinations by general practitioners and various specialist doctors, such as pulmonary specialists, surgeons, etc. Other service costs or medical support costs included the cost of the SARS-CoV-2 RT Polymerase chain reaction (PCR) swab. Furthermore, the treatment costs were the installation and maintenance of infusions, the use and installation of oxygen, high care per day, intravenous injection, blood sampling, and so on.

Discussion

In this study, COVID-19 patients were predominantly male (55%). Previous findings suggest that although sex-disaggregated data for COVID-19 shows the same number of cases between men and women, men seem to be more likely to die due to immunological differences and the prevalence and patterns of smoking (Wenham *et al.*, 2020). Most COVID-19 patients in this study were adults aged 23 to 65 years. Older adults are more likely to suffer from a severe illness. More than 81% of COVID-19 deaths occur in people over 65 (CDC, 2021).

One deaths in COVID-19 patients in this study were found in patients with comorbidities and multiple comorbidities, consistent with previous findings showing that COVID-19 patients with comorbidities, such as hypertension or diabetes mellitus, were more likely to develop a more severe course and progression of the disease. Furthermore, older patients with comorbidities, especially those aged 65 and above, have an increased admission rate into the intensive care unit (ICU) and mortality from COVID-19 (Sanyaolu *et al.*, 2020). Based on a study in the United States, cumulative deaths were estimated at 625,000, yielding \$4.4 trillion in losses for premature death (Cutler & Summers, 2020).

In this study, COVID-19 patients with comorbidities had a higher average direct medical cost than those without comorbidities, i.e., the costs of treatment rooms, doctor visits, care, laboratories, pharmaceuticals, and emergency rooms. The reason is that COVID-19 patients with comorbidities require additional care and treatment, such as medicines, specialist doctors, ICU, ventilators, and laboratory tests, to overcome the comorbidities and COVID-19. Similarly, research in India reported that interruption of medical care and supervision during lockdowns might be deleterious for patients with diabetes, coronary artery disease, and other chronic non-communicable diseases. Indeed, it may add to further economic losses due to increased complications and disease burden, and more people with chronic conditions, particularly among poor, rural, and marginalised populations who experienced difficulties in accessing healthcare and had been severely affected both socially and financially by the COVID-19 pandemic (Singh & Misra, 2020; Singh *et al.*, 2021). Moreover, the syndemic of tuberculosis with diabetes may worsen, adding further to the morbidity and mortality burden and thus economic losses (Hogan *et al.*, 2020). In the United States, losses from long-term COVID-19 complications were estimated at USD 2.6 trillion and lost income from the COVID-19-induced recession accounted for 50% of the total losses, and in Europe, the costs of COVID-19 associated with diabetes

were higher than those of patients without diabetes (Cutler & Summers, 2020; Bain *et al.*, 2020).

The results of this study show that the highest average cost for COVID-19 inpatients, both with and without comorbidities, was pharmaceutical costs (IDR 41,724,743), reaching 72% of the total cost. Pharmaceutical costs consisted of the cost of medicines, medical supplies, and personal protective equipment (PPE). The cost of Level three PPE reached 96% of the total pharmaceutical expenditure, and the remaining 4% was for medicines and other medical equipment. PPE protect doctors and other medical personnel from getting infected when treating COVID-19 patients. A minimum of four Level 3 PPE sets were needed per patient per day. Also, the most used medications to treat COVID-19 patients were oseltamivir 750 mg and N-Acetylcysteine 200 mg.

In this study, only direct medical costs incurred by the government were calculated. Indirect costs were difficult to calculate in real terms because data were retrospective and did not provide information on COVID-19 patients' employment status or income. Thus, an estimate of indirect costs was used from the cost of productivity lost, calculated from the regional minimum wage in West Nusa Tenggara in 2020, then multiplied by the average length of hospital stay. The regional minimum wage was IDR 2,183,883 per month. Considering that one month includes 26 working days, the estimated cost of productivity lost becomes IDR 1,007,946 for patients without comorbidities and IDR 1,259,932 for patients with comorbidities. Moreover, the estimated average cost of illness for COVID-19 patients without and with comorbidities was between IDR 46,553,387 and IDR 73,185,989, with a higher cost of illness for COVID-19 patients with comorbidities in West Nusa Tenggara. Delays in implementing the strategies to suppress transmission will lead to worse outcomes and fewer lives saved" (Walker *et al.*, 2020).

Limitations of study

This study only calculated direct medical costs incurred by the government. Moreover, it did not calculate other costs such as direct non-medical costs and indirect costs in real terms. Future research is necessary to evaluate costs from a different perspective.

Conclusion

The total cost of illness of COVID-19 in West Nusa Tenggara, Indonesia, was found to be high. Therefore, preventive efforts are needed to reduce the incidence

of COVID-19 in Indonesia, especially in West Nusa Tenggara.

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Conflict of interest

The authors declare no conflict of interest.

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