

IN-PATIENT COSTS OF CORONAVIRUS DISEASE 2019 WITH FINANCIAL REGULATIONS AND HEALTH ECONOMY

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Abstract: Introduction: Coronavirus Disease 2019 (COVID-19) is an emerging disease that infects patients, who have critical and complex health problems, that need to be treated in hospitals. The financial regulations and health economy to management efficiency in hospitals is an important indicator for hospital administrators to make decisions for efficient health service provision. Then, the purposes were to: analyze the cost of in-patient with COVID-19 per day and per admission, and compare COVID-19 severity with the cost of in-patient.

Methods: This retrospective study using secondary data from the standard data set HOSxP data system program 43 folders of 18 , between 2021 and 2022 was conducted. The total hospital costs was analyzed from the 4191 samples of in-patients with COVID-19 on the 18 community hospital in Sakon Nakhon Province, Thailand.

Results: The majority of samples were females 52.6%, age group between 30 - 39 of 26.0 %, the insurance type was Social Security Scheme 60.9% (average sleeping days 11 days), lived in Sakon Nakhon province, Thailand 77.7%, no medical conditions 97.7 %, the severity of disease was asymptomatic and mild symptoms 80.5%. In addition, the cost of an in-patient COVID-19 ward was 104.1 USD per day. The cost of complication diseases resulted from 1,063.3 USD - 1,681.1 USD per admission, moderate symptoms and pneumonia were 1,681.1 USD per admission, and mild symptoms were 1,063.3 USD per admission, which was higher than the standard cost ($p < 0.015$). Furthermore, the cost of mild symptoms was 1,063.3 USD per admission was higher than the estimated cost ($p < 0.05$), and the cost of moderate symptoms with pneumonia was 1,681.1 USD per admission, higher than the estimated cost ($p < 0.001$).

Conclusions: As a consequence, the various levels of clinical severity and the cost of an in-patient with COVID-19 is higher than the standard cost and estimated cost. However, there is still no suitable fiscal legislation.

Keywords: Financial, COVID 19, Estimated cost, an in-patient, Regulations, Health economy

Introduction

The World Health Organization declared COVID-19, caused by SARS-CoV-2, a pandemic on March 2020.^[1] The pandemic has spread to almost all countries and territories worldwide, infecting millions of individuals and causing many deaths.^[2,3] Thailand has a government gazette declaring coronavirus disease 2019 or COVID-19 as a dangerous contagious disease on February 26th, 2020.^[4] As of August, 2022, Thailand have been about 4 million confirmed cases of COVID-19, including about 31,000 deaths, including Sakon Nakhon province, Thailand had been about 32,000 confirmed cases of COVID-19, including about 200 deaths.^[5] The infectious patients, who had critical and complex health problems, that needed to be treated in hospitals.^[6] In addition, the community hospitals are considered to service health for people and provide provincial areas and are located

in all districts and provide health care service prevention, medical treatment, and rehabilitation for the people in the area. The provisions of service are resource-intensive and cost in the production of services.^[7] The Community Hospitals have a problem with finance, mainly due to inadequate budget allocation or lack of administrative efficiency and improper use of resources. Expenditures incurred are greater than revenues from the hospital's revenue collection.^[8]

It was found that during the COVID-19 pandemic in 2021, the patients on service were reduced. The services of health promotion and medical treatments have to be closed.^[4,9] Hospital fiscal management is an important indicator for hospital management to use to make effective health service decisions. The relevant data was then used to study and analyzed the cost of medical care for patients in COVID-19 in community hospitals in order to be able to know the healthcare costs incurred and contribute to the proper management of resources and budgets in the best interests of the management.^[11] This will affect the effective management of the hospital's fiscal finances, formulate long-term management policies, and create fiscal stability of the community hospital. As a result, the hospital might be more worried about the healthcare industry and related expenses. Due to a lack of suitable fiscal restrictions, health economics principles, and knowledge of practical hospital initiatives that aim to increase quality while lowering or managing expenses, hospital overhead expenditures are not adequately offset by hospitals.^[11] Furthermore, normative empirical legal research was used by collecting literature, regulations, and updated news online and printed to answer how SOHC assists in handling the Covid-19 impact. The research shows that SOHC maintains health, social safety, and purchasing power or anything related to business. Each sector of SOHC is functioned as (PSO) in handling the Covid-19 impact. The actions taken to deal with the impact of the Covid-19 pandemic are focused on health issues, social safety, and people's purchasing power maintenance or matters related to the business sectors.^[12] Therefore, the interactions of various types of financial regulation. The regulations that control fire-sale risk are critical for delivering financial stability and improving the welfare of savers and borrowers. the combinations of capital regulations, margin requirements, liquidity regulation, and dynamic provisioning that are most effective in this respect. A policy that combines countercyclical capital requirements with margin restrictions produces economic results that are on par with or better than those of an unfettered financial system. Yet creating combinations of regulations is simple. In particular, the National Health Insurance Act stipulates that the hospital had the right to obtain reimbursement from the Fund for costs associated with providing public health services as long as it followed the regulations, processes, and requirements laid out. The factors used to calculate the cost are subject to the hospital's unique circumstances.^[13,14] Then, the purposes were to: analyze the cost of in-patient with COVID-19 per day and per admission, and compare COVID-19 severity with in-patient costs of coronavirus disease 2019, financial regulations and health economy principle.

Methods

Study Design : This study was Retrospective study from a provider's perspective. The total samples of 4191 in-patient were diagnosed with coronavirus 2019 at Community Hospital in Sakon Nakhon Province, Thailand.^[10]

Data Collection

Secondary data collection of in-patients that have diagnosis COVID-19 who were treated at community hospital in October 1st, 2021 to September 30th, 2022. The 4191 samples were collected from the standard data set HOSxP data system program. In addition, data cleaning was processed by the following criteria. First, we identified duplicated records by hospital numbers(HN); then we constructed a new dataset containing individual records which combined inpatient data. The new dataset contained the following variables: sex, age, occupation, underlying diseases (diabetes mellitus, hypertension, obesity, cirrhosis), date of first visit, address, treatment procedures, length of hospital stay, and discharge status (recovered or death), as shown in figure 1.

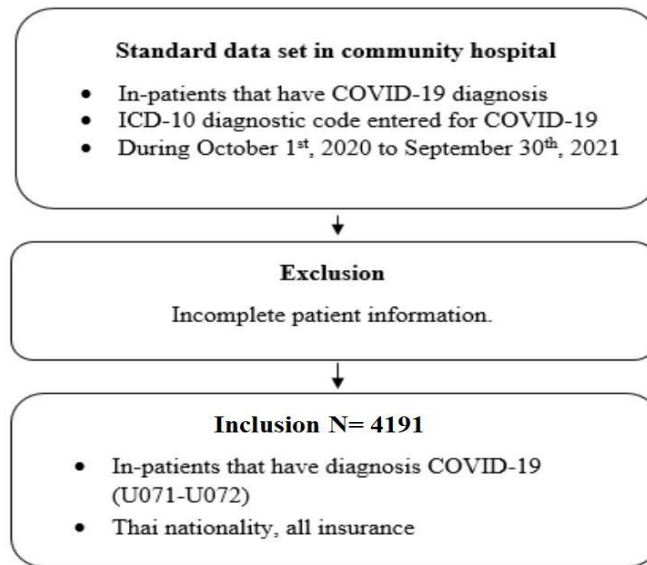


Figure 1. Flow Chart for selected data sample of COVID-19 in-patients

Data Analysis

1) Data about characteristics of patients were analyzed by descriptive statistics (Frequency, Percentage, Mean, and Standard deviations).

2) T-Test statistics were used to compare the cost of in-patient that was categorized into COVID-19 severity, with the standard cost, and the estimated cost, according to National Health Act, B.E. 2550 (A.D. 2007).

Ethical Approval: Ethical approval was obtained from the Ethical Committee Board at Sakon Nakhon Provincial Health Office (SKN REC 2023-007).

Results

Social Demographic Characteristics

The majority of samples were female 52.6%, age group between 30 - 39 of 26.0 %, the insurance type was Social Security Scheme 60.9% (average sleeping days 11 days), lived in Sakon Nakhon province, Thailand 77.7%, no medical conditions 97.7 %, the severity of disease was asymptomatic and mild symptoms 80.5%. as shown in figure 2.

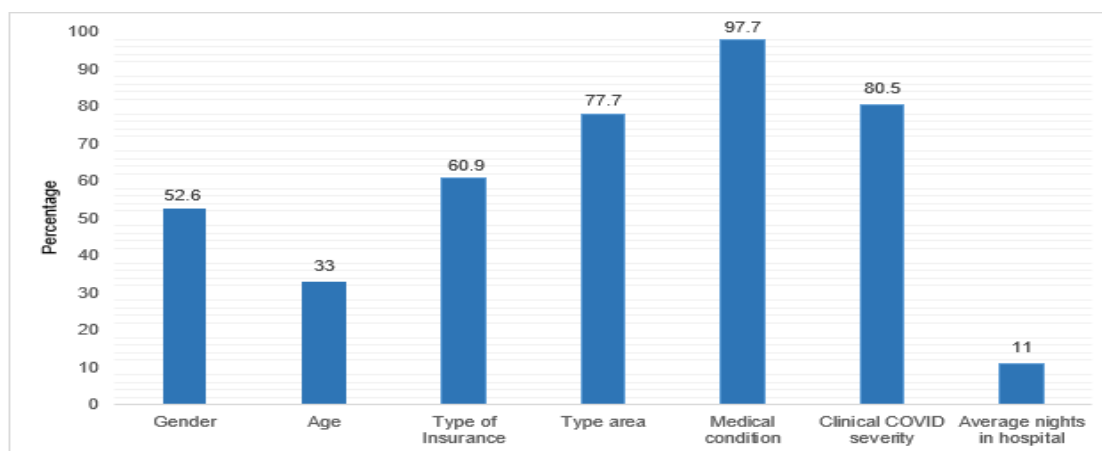


Figure 2. Characteristics of patients



Cost analysis

The highest medical expenses category included room and food, medical supplies/equipment, and other services are not directly related to medical treatment, such as the cost of referring, Personal protective equipment (PPE), and car cleaning fees, that were shown in Table 1

Table 1. Medical expenses category in-patient of Community Hospital (n =4191)

The medical expenses category	Cost (THB)	Cost (USD)
Room and food	78,560,000	104,687.6
Medical supplies equipment	55,461,000	94,537.4
Other services for medical treatment	684,220	17,878.3
Nursing service	661,150	17,275.5
Non-Medical Equipment	292,850.5	7,652
Medicine	203,783.5	5,324.8
Lab investigation	184,605	4,823.6
Imaging	89,750	2,345.1
Home-medicine	4,204	109.9
Prosthetic organs and equipment for treatment	1,100	28.7
Procedure and anesthesia	350	9.2
Other special diagnostic tests	200	5.2
Blood service and blood components	50	1.3
Total	9,746,803	254,678.7

The cost of an in-patient COVID-19 ward was THB 3,984.4 (104.1 USD) per day and the cost of an in-patient COVID-19 was THB 45,311.8 (1,183.9 USD) per admission and compared to the standard cost was THB 41,924.3 (1,095.5 USD), higher than the standard cost of THB 3,387.5 (88.5 USD) statistically significantly $p=0.015$ as shown in Table 2.

Table 2. Comparison of COVID-19 in-patient and standard costs (THB 3,387.5 ; 88.5 USD)

Comparison	N	Mean	S.D.	t	M.D.	95%CI		p-value
						Lower	Upper	
The cost of an in-patient COVID-19	4191	62670.8	52884.9	25.3	20746.5	19144.9	22348.1	0.001**

**p < .001

The comparison of the cost of COVID-19 with moderate symptoms and pneumonia was THB 64,338.5 (1,681.1 USD) was higher than asymptomatic and mild symptoms THB 40,692.36 (1,063.3 USD) as shown in table 3.

Table 3. Comparison of COVID-19 severity with the cost of in-patient (n=4191)								
Clinical Management	N	Mean	Std. Deviation	M.D.	95%CI		t	p-value
					Lower	Upper		
Asymptomatic & Mild	3019	50711.8	41861.3	12353.4	10859.6	13847.3	16.2	0.001**
Moderate & With Pneumonia	1172	93634.9	64422.1					

**p < .001

The cost of COVID-19 with asymptomatic and mild symptoms were THB 40,692.3 (1,063.3 USD) higher than the estimated cost THB 2,334.2 (60.9 USD). The cost of COVID-19 with moderate symptoms and pneumonia were THB 64,338.5 (1,681.1 USD) higher than the estimated cost THB 21,149.8 (552.6 USD). Therefore, the cost of COVID-19 with mild, moderate symptoms and pneumonia was higher than the standard cost and estimated cost as shown in figure 3.

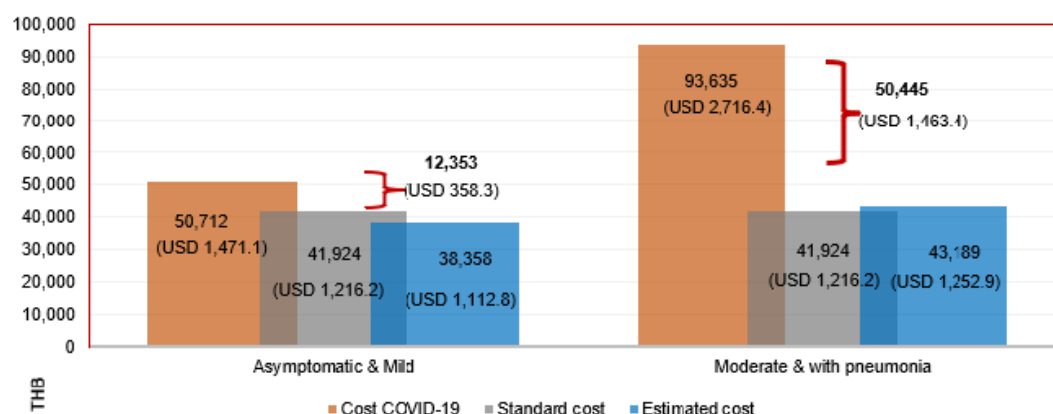


Figure 3. Comparison the cost of an in-patient COVID-19

Discussion

The cost of COVID-19 per 104 USD in Thailand (Asia), which had similar medical costs to a study by Edoka et al.^[15] in South Africa found that the costs of patients in COVID-19 in general wards with moderate symptoms and pneumonia did not use oxygen machines. The 119.4 USD per day of sleeping was a treatment that did not have the equipment to treat complex therapy. However, Czernichow et al.^[13] found that the average costs of a hospital bed day for a general hospital admission in Europe per 941.8 USD. This showed that the cost for COVID-19 patients in developed countries was higher than in developing countries.^[16,17]

The cost of COVID-19 per admission was between 1,063.3 - 1,681.1 USD or an average of USD 1188.5. It found that the highest cost of treatment items were room and food.^[18,19,20] Medical supplies/equipment fees and other service charges that were not directly related to medical treatment, such as transportation and drop-off, kits, etc. PPE, car cleaning due to coronavirus infection 2019 (COVID-19) was an emerging disease that required isolation of patients from the general public, with patients having to stay inside isolation wards to prevent spread of infection. It was characterized by a negative pressure isolation chamber in accordance with international standards. Medical supplies/equipment costs. Most of them were personal protection equipment (PPE) that personnel were while working with patients. This was consistent with a study by Edoka et al.^[21] that found the greatest cost in the general wards of coronavirus patients was personal protection equipment (PPE).^[22,23,24,25]

The cost of medical care for patients with COVID-19 who were asymptomatic or mild symptom higher than the estimated cost that would be reimbursed. Statistically significantly, $p=0.050$ people with moderate symptoms and pneumonia exceeded the median and estimated medical expenses to be compensated. Statistically significant $p=0.001$, which was consistent with the results of the Barasa et al.^[26] studied the cost of medical care in patients with COVID-19 in Kenya, that the cost of treatment was two to four times higher than the cost of reimbursement, and was also consistent with the study of Nugraha et al.^[27] which studied claimed treatment cost data in Indonesia. It found that the medical expenses incurred were higher than the medical bills charged through the state's compensation system. It showed that the actual cost of COVID-19 is

higher than the estimate.^[28,29,30,31] However, the medical expenses incurred vary depending on the severity of the disease.^[32,33,34,35]

The cost of COVID-19 in community hospitals incurred during the recent pandemic had been incurred was the difference in estimates of compensation to be received from various funds resulting in hospitals being burdened with the costs incurred.^[36,3738,39] At the same time, according to the results of this study, medical expenses were paid. Executives could use it to plan appropriate resource management and budgets and to effectively manage the hospital's fiscal finances and to formulate long-term management policies and ensuring fiscal stability of community hospitals. The same study applied to studying the cost of COVID-19 in other research studies.^[40,41,42] However, the hospitals can reduce the cost of COVID-19 treatment by taking the right actions to prevent COVID-19 while in the hospitals.^[43,44,45] It is interesting to analyze its impact to many hospitals in independency of financial and services.^[46,47,48] It takes a while for the world economy to recover from the contraction of COVID-19. The National Health Insurance Act states that the hospital was entitled to receive expenses for public health services from the Fund in accordance with the rules, procedures, and conditions specified. The criteria for determining the cost are subject to the state of considering the hospital's differences. The Ministry of Public Health has established requirements and policies for developing fiscal and health service systems to suit and meet the standards. Therefore, the related agencies should consider paying appropriate compensation to the hospital.^[49,50]


Conclusions


This study presents evidence on the costs of COVID-19 case management at community hospital in Sakon Nakhon Province, Thailand. Specifically, it presents costs for the management of In-patient COVID-19 with asymptomatic, mild, moderate and pneumonia. Most of the in-patients COVID-19 are female, age group between 30 - 39, the insurance type was Social Security Scheme, average sleeping days 11 days, lived in community hospital, no medical conditions, the severity of disease was asymptomatic and mild symptoms. In addition, the cost of an in-patient COVID-19 ward was THB 3,984.4 (104.1 USD) per day. The cost of COVID-19 with complication resulted from THB 40,692.6 - THB 64,338.5 (1,063.3 USD - 1,681.1 USD) per admission, moderate symptoms and pneumonia were THB 64,338.5 (1,681.1 USD) per admission, and mild symptoms were THB 40,692.36 (1,063.3 USD) per admission, which was higher than the standard cost ($p < 0.015$). Furthermore, the cost of mild symptoms was THB 40,692.36 (1,063.3 USD) per admission was higher than the estimated cost ($p < 0.05$), and the cost of moderate symptoms and pneumonia was THB 64,338.5 (1,681.1 USD) per admission, higher than the estimated cost ($p < 0.001$). And therefore, cost-sharing is contradictory to effective fiscal policy and the fundamentals of health economics.

COVID-19 is an emerging disease, therefore difficult to predict costs. The findings of this research showed various levels of clinical severity and the cost of an in-patient with COVID-19 was THB 45,311.8 (USD 1,183.9) per admission, which was higher than the standard cost and estimated cost. As a result, community hospitals have to bear the burden of average costs of THB 3,387.5 (USD 88.5) per person.

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