

# Post COVID-19 Syndrome Monitoring in Confirmed COVID-19 Patients with Telemedicine at Cipto Mangunkusumo Hospital

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## ABSTRACT

**Background:** The incidence of post-covid-19 syndrome is quite high and requires further monitoring after the patient is discharged from treatment. So we need a proper monitoring method and description of the Covid-19 syndrome in Indonesia. **Methods:** This retrospective cohort study with total sampling method uses data from medical records and telemedicine observations of confirmed COVID-19 patients who received treatment in the Kiara room at Cipto Mangunkusumo. The data were then analyzed using chi-squared and multinomial logistic regression techniques. **Results:** A total of 133 samples were used, including 44.4% male and 55.6% female, with an average age Standard Deviation (SD) of 40.36 (17.94). The severity levels of Covid-19 were mild (66.9%). The most common post-Covid-19 symptom manifestations was cough expressed at the first follow-up (first week after recovery) and second follow-up (the fourth week after recovery). Furthermore, the significant relationship between severity levels and post-Covid-19 symptomatic syndrome outcomes is the critical headache or vertigo symptoms with an RR of 8.70 (95% CI, 1.10-68.69.). In comparison, the telemedicine quality assessment was declared good, as shown by 98.7% of an examined sample. **Conclusion:** The most manifestation shown in the first and fourth week of follow-up is cough. Other symptoms tend to decrease in the second follow-up. The severity level associated with post-Covid-19 manifestations are severe-critical with headache or vertigo as a risk factor and mild with symptoms of headache or vertigo as a preventative. Meanwhile, the quality of telemedicine services was recognized as good by the majority of the sample.

**Keywords:** post-Covid-19 manifestations, Covid-19, Headache, Telemedicine, Indonesia.

## INTRODUCTION

Approximately 89.2% of post-treatment COVID-19 patients that have been declared cured experienced *sequelae* (residual symptoms), with 32.4% having a persistent impact. These include pulmonary fibrosis with symptoms of short breath aggravated by activities, dry cough,

hypertension, heart rhythm disturbances, heart failure, depression, anxiety, and psychosis, consequently, these are known as post-COVID syndromes.<sup>1,2</sup> Indonesia one of countries affected by this COVID-19 Pandemic, has a fatality rate of 8.9% at the end of March, 2020.<sup>3</sup>

Telemonitoring is a process of exchanging

information related to symptoms and physiological data like vital signs and other health-related conditions through electronic, web-based, and telephone-based media,<sup>4</sup> and possibly applied to monitor post-COVID-19 patients. Advantages of using telemonitoring include providing early handling instructions for patient's worsening condition, reducing the number of patient admissions in the hospital, reducing the use of Personal Protective Equipment (PPE) as well as its efficiency in empowering human resources and disrupting the prevalence of the virus.<sup>5</sup>

Aims of this study are to make further observation of this phenomenon as there is still a paucity of studies or articles that discuss about the issue of *sequelae* in Indonesia and describe the quality of telemedicine, one of tools for monitoring patient which can be used to monitor COVID-19 patients, as it has an important role to reduce length of stay and prevent hospital overloading in this pandemic era.

## METHODS

This study uses cohort retrospective method and the subject population is determined by using total sampling method which consists of 216 patients with 133 of them fulfilling all inclusion and exclusion criteria. Based on retrospective cohort formula for minimum sample, the minimum sample needed for this research is 76, so 133 patient data is enough for this research.

Inclusion criteria consists of: Patient agrees to be included in this research, Patients of all age categories, Post-treatment patients from Cipto Mangunkusumo Hospital (CMH) with Confirmed COVID-19 status based on clinical practice guidelines, Patients who are under the management of the hospital, while the exclusion criteria being: suspected and probable COVID-19 Patients, patients with ARI and/or pneumonia due to other than COVID-19, Patients with confirmed COVID-19 after hospitalization with death status<sup>6,7</sup>

Patients come from emergency room with confirmed COVID-19 status, then transferred to CMH Kiara room for treatment where there are two type of isolation rooms; regular isolation room from mild to moderate status and intensive care unit isolation room from severe to

critical status. Patient treated under COVID-19 protocol, between March 2021 and August 2021. After the symptoms subside, patient who are discharged can then be monitored using telemedicine as a stepdown mechanism to reduce length of stay. Treatment procedures use a team oriented approach method by COVID-19 board management, that consist of internist, pediatrician and anesthetist.

The patients are observed using telemedicine by general practitioner twice, guided by RSCM clinical practice guideline, in the first and fourth week after being declared free of COVID-19 based on a gold-standard laboratory test and reverse transcription-polymerase chain reaction (RT-PCR). Short contact period of observation is done to make data less biased. The patient's data taken include gender, age, the severity level of COVID-19, the manifestation of post-COVID-19 syndrome symptoms, and assessment of telemedicine.<sup>8-10</sup>

The data were then stored for COVID-19 monitoring, and this study was approved by the Ethical Committee of Faculty of Medicine, University of Indonesia, with reference number KET-404/ UN2.F1/ETIK/PPM.00.02/2021.

## RESULTS

The study involved 133 post-treated patients with free or recovered status from COVID-19, including 59 males (44.4%) and 74 females (56.6%). The data also shows the average age SD being 40.36 with an approximate standard deviation of 17.94. The severity levels of COVID-19 for the samples are presented in **Table 1**.

**Table 1.** Demographic Data and Proportion of COVID-19 patient based on Severity (N=133).

Variables	Participants, n (%)	
<b>Gender</b>		
- Male	59	44.4 %
- Female	74	55.6 %
<b>Age, mean (SD)</b>	40.36 (17.94)	
<b>Severity</b>		
- Mild	89	(66.9)
- Moderate	32	(24.1)
- Severe	6	(4.5)
- Critical	6	(4.5)

In **Table 2**, the data on the proportion of post-COVID-19 symptom syndromes were summarized at the first follow-up and it was observed that the symptoms of the post-COVID-19 syndrome were mostly expressed in patients with mild symptoms including cough and excessive phlegm (19.1%) and sometimes fatigue and lethargy (13.5%).

In **Table 3**, there are data on the proportion of post-COVID-19 symptom syndromes in the second follow-up.

**Table 4** contains the analysis carried out

on the severity levels and its relationship to the manifestation of the post-COVID-19 symptomatic syndrome.

From **Table 4**, It is known that the relationship between severity and outcome of post-COVID-19 syndrome is significant, shown by the relative risk about 8.70 (95% CI, 1.10-68.69) of having Post COVID-19 symptom of headache or vertigo after severe-critical infection. Furthermore, at a mild level it was proven to be a protective factor against headache or vertigo with relative risk about 0.12 (95% CI, 0.02-0.91).

**Table 2.** Post COVID-19 Syndrome on First Follow Up.

Manifestation	Severity of COVID-19		
	Mild, n (%)	moderate, n (%)	severe-critical, n (%)
Fatigue	12 (13.5)	6 (18.8)	2 (16.7)
Dyspepsia	1 (1.1)	1 (3.1)	0
Chest pain	0	1 (3.1)	0
Anosmia	1 (1.1)	1 (3.1)	0
Diarrhea	1 (1.1)	0	0
Anorexia	2 (2.2)	1 (3.1)	0
Tinnitus	0	0	0
Intermittent fever	0	1 (3.1)	0
Myalgia	3 (3.4)	1 (3.1)	0
Cough	17 (19.1)	7 (21.9)	2 (16.7)
Dry mucous	0	0	0
Headache or vertigo	2 (2.2)	1 (3.1)	2 (16.7)
Dyspnea	1 (1.1)	4 (12.5)	0
Anxiety	0	1 (3.1)	0

**Table 3.** Post COVID-19 Syndrome on Second Follow Up.

Manifestation	Severity of COVID-19		
	Mild, n (%)	moderate, n (%)	severe-critical, n (%)
Fatigue	2 (2.3)	0	0
Dyspepsia	0	0	0
Chest pain	0	0	0
Anosmia	0	0	0
Diarrhea	0	0	0
Anorexia	0	0	0
Tinnitus	0	0	0
Intermittent fever	0	0	0
Myalgia	0	1 (3.1)	0
Cough	8 (9.0)	1 (3.1)	1 (16.7)
Dry mucous	0	0	0
Headache or vertigo	2 (2.2)	2 (6.3)	1 (16.7)
Dyspnea	3 (3.4)	3 (3.4)	1 (16.7)
Anxiety	1 (1.1)	1 (3.1)	2 (33.4)

**Table 4.** Correlation Between Severity of COVID-19 with the Manifestation of Post-COVID-19-Syndrome.

Manifestation	Severity of COVID-19					
	Mild (RR 95% CI)	p-value	Moderate (RR 95% CI)	p-value	Severe-critical, (RR 95% CI)	p-value
Fatigue	1.28 (0.25-6.59)	0.765	0.68 (0.23-1.98)	0.475	0.78 (0.15-3.99)	0.765
Dyspepsia	2.84 (0.17-46.77)	0.465	0.35 (0.02-5.80)	1.000	n/a	n/a
Chest pain	n/a	n/a	0.35 (0.02-5.80)	1.000	n/a	n/a
Anosmia	2.84 (0.17-46.77)	0.465	0.35 (0.02-5.80)	1.000	n/a	n/a
Diarrhea	2.84 (0.17-46.77)	0.465	n/a	n/a	n/a	n/a
Anorexia	0.12 (0.02-0.91)	0.540	0.35 (0.02-5.80)	1.000	n/a	n/a
Tinnitus	n/a	n/a	n/a	n/a	n/a	n/a
Intermittent fever	n/a	n/a	0.35 (0.02-5.80)	1.000	n/a	n/a
Myalgia	0.21 (0.01-0.33)	0.999	0.35 (0.02-5.80)	1.000	n/a	n/a
Cough	0.85 (0.17-4.23)	0.840	0.84 (0.31-2.27)	0.736	1.18 (0.24-5.89)	0.840
Dry mucous	n/a	n/a	n/a	n/a	n/a	n/a
Headache or vertigo	0.12 (0.02-0.91)	0.040	0.71 (0.06-8.14)	0.785	8.70 (1.10-68.69)	0.040
Dyspnea	2.84 (0.17-46.77)	0.465	0.103 (0.04-0.204)	0.999	n/a	n/a
Anxiety	n/a	n/a	0.35 (0.02-5.80)	1.000	n/a	n/a

Meanwhile, the quality of telemedicine was measured based on the five indicators contained in the questionnaire with eight questions.<sup>11,12</sup> The description of the results of the questionnaire

itself is shown in **Table 5**.

Telemedicine quality measurement includes aspects of direct evidence, reliability, responsiveness, assurance and empathy.<sup>12</sup> It can

**Table 5.** An Overview of the Quality of Telemedicine in Terms of Convenience, Comfort and Safety as an Innovation in Monitoring Post-Treatment COVID-19 Patients at The CMH.

Variable of quality	Quality evaluation of telemedicine		
	Agree n(f%)	Neutral n(f%)	Disagree n(f%)
<b>Direct Evidence</b>			
The monitoring method via telephone carried out by RSCM, for post-treatment patients is quite good	126 (94.7)	6 (4.5)	1 (0.8)
The monitoring team always introduces themselves as health workers, every time they make contact	130 (97.7)	2 (1.5)	1 (0.8)
<b>Reliability</b>			
RSCM Health Officers who carry out monitoring have a clear voice and articulation	132 (99.2)	1 (0.8)	0
Monitoring officers respond well to questions, complaints and suggestions	126 (94.7)	7 (5.3)	0
<b>Responsiveness</b>			
Questions, complaints or suggestions submitted by the patient are immediately responded to by the monitoring team	124 (93.2)	9 (6.8)	0

<b>Assurance</b>			
Patients feel safe with officers who provide information according to what patient needs	130 (97.7)	2 (1.5)	1 (0.8)
<b>Empathy</b>			
Monitoring officers understand what the problem is and can provide solutions to the problems raised	127 (95.5)	6 (4.5)	0
Patients feel cared for directly as individuals in this monitoring process	130 (97.7)	3 (2.3)	0

be seen that the quality of telemedicine in the 5 assessment indicators that have been determined, almost all patients stated that the quality of telemedicine was in the good category, based on the dimensions of direct evidence (94.7%) and (97.7%), reliability (99.2%) and (94.7%), responsiveness (93.2%), assurance (97.7%) and empathy (95.5%) and (97.7%).

The questionnaire has been validated by Pearson validity test and Cronbach alpha reliability test with the results of the significance value of each of the 8 question points being  $< 0.05$ , so it is considered valid and the Cronbach alpha value is 0.884 where if the Cronbach alpha value is above 0.6, then the study is considered reliable.

## DISCUSSION

The data taken from 133 people used as the study sample shows that the post-COVID-19 symptoms are commonly at a mild level followed by moderate, severe, and critical. This finding is in line with Kamal et al,<sup>13</sup> which reported that the most commonly found symptom severity is mild level with 80.2%, followed by moderate with 14.9%, and severe with 4.9%.

The post-covid-19 manifestations at the first follow-up indicate that the most common symptoms are cough and weakness/fatigue, this is different from other similar studies, such as the study conducted by Kamal *et al*,<sup>13</sup> which showed that the most common complaints were weakness/fatigue (72.8%). Furthermore, Huang *et al*<sup>14</sup> stated that the most common post-COVID-19 symptoms were muscle weakness or fatigue (63%), difficulty in sleeping (26%), and hair loss (22%).

However, symptoms of the post-COVID-19 syndrome at the second follow-up presented in the fourth week showed almost similar

results with Carfi *et al*<sup>15</sup> that observed a patient for two months after recovering from COVID-19 and concluded that the most prominent symptoms were fatigue (53.1%). This was further substantiated by Weerahandi *et al*<sup>16</sup> that observed between the 30<sup>th</sup> and 40<sup>th</sup> day after the patient was declared hospitalized with severe COVID-19 status reported that the most common post-COVID-19 symptoms were shortness of breath by 74% and worsening of the patient's mental and physical health. The difference in the proportion of symptoms is believed to be a manifestation of the incidence of severe primary infection accompanied by a systemic inflammatory response and usually followed by a counterbalancing compensatory anti-inflammatory response syndrome (CARS). This leads to post-infection immunosuppression that varies in different patients.<sup>1</sup>

The relationship between severity levels and outcome of the post-COVID-19 symptomatic syndrome is related to Severe-critical COVID-19 symptom severity as a risk factor for post-COVID-19 headache or vertigo. This result is in line with Kamal *et al*,<sup>13</sup> which stated that there is a relationship between the severity level of COVID-19 infection and the level of manifestation, where the higher the severity level, the higher the prevalence of symptom. According to Del rio,<sup>17</sup> SARS-CoV-2 has the ability to penetrate the brain through blood vessels or affect the nerves, thereby leading to loss of smell, headache, or vertigo.

The quality of telemedicine in the five predetermined assessment indicators are good according to the patients. This result agrees with Silven *et al*,<sup>5</sup> which showed that telemonitoring conducted on 55 Covid-19 patients at home with mild to moderate symptoms levels demonstrated good service quality with no adverse effects

such as death or emergency care. However, this study is limited given that it used a population with non-homogeneous levels. Further studies are then expected to use a more homogeneous sample population in the context of the population per severity level. Also, it is recommended to analyze the relationship between the decrease in the incidence of manifestations at the second follow-up and the first one.

## CONCLUSION

The manifestations shown in the first and fourth week of follow-up are the same, including cough and other symptoms that decreased in the second follow-up. The severity level associated with post-Covid-19 manifestations are severe-critical with headache or vertigo as a risk factor and mild with symptoms of headache or vertigo as a preventative. Meanwhile, the quality of telemedicine services was recognized as good by the majority of the sample.

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