

## Article

# Physician's Hesitancy in Treating COVID-19 Patients and Its Associated Occupational Risk Factors in Indonesia: An Online Cross-Sectional Survey

Dewi Sumaryani Soemarmo<sup>1\*</sup>, Aria Kekalih<sup>1</sup>, Ari Fahrial Syam<sup>2</sup>, Evy Yuniastuti<sup>3</sup>, Herikurniawan Herikurniawan<sup>4</sup> and Mikhael Yosia<sup>1</sup>

<sup>1</sup>Department of Community Medicine, Faculty of Medicine Universitas Indonesia, Jakarta, Indonesia

<sup>2</sup>Division of Gastroenterology, Department of Internal Medicine, Cipto Mangunkusumo Hospital – Faculty of Medicine Universitas Indonesia, Jakarta, Indonesia

<sup>3</sup>Division of Allergy and Clinical Immunology, Department of Internal Medicine, Cipto Mangunkusumo Hospital – Faculty of Medicine Universitas Indonesia, Jakarta, Indonesia

<sup>4</sup>Division of Respiratory and Critical Illness, Department of Internal Medicine, Cipto Mangunkusumo Hospital – Faculty of Medicine Universitas Indonesia, Jakarta, Indonesia

\* Correspondence: dewisoemarmo@yahoo.com

## Abstract

This study is a cross-sectional survey involving physicians around Indonesia aimed to explore physician hesitancy to treat COVID-19 patients after experiencing COVID-19 infection coupled with associated occupational risk factors. The questionnaire was distributed via contact information from the Indonesian Physician Association database. Out of 383 participants, 25.6% suffered from moderate symptoms of COVID-19 and 2.9% were admitted for critical care. Hesitancy to treat suspected, probable, or confirmed COVID-19 patients was found in 20.3% of physicians. A higher hesitancy rate was found in older physicians and those with less experience in treating COVID-19 patients. Specialist trainees and those who work in public hospitals were physicians with the lowest hesitancy in treating COVID-19 patients. There is a significant hesitancy in treating COVID-19 patients among physicians who have suffered from COVID-19 which calls for further action by management and policy makers.

**Keywords:** hesitancy; covid-19; post-covid; medical doctors; indonesia

## INTRODUCTION

Coronavirus Disease 2019 (COVID-19) is an infectious disease that attacks the respiratory system. Common signs and symptoms of this disease include acute respiratory disorders such as fever, cough, and shortness of breath.<sup>1,2</sup> WHO has declared COVID-19 a global pandemic due to its rapid spread, with Indonesia being one of the countries with a high incidence and mortality rate. The risk is especially true for frontline

health workers who are at risk of contracting the disease through direct contact with asymptomatic and symptomatic COVID-19 patients. Additional unpreparedness during the pandemic (such as lack of information on infection management, limited PPE and diagnostic test tools, rampant untreated psychosocial stress, excessive workload, and fatigue) further increased health workers' vulnerability to COVID-19 infection.<sup>3-5</sup>

Contracting COVID-19 is a traumatic experience that physically and psychologically scars its survivor. The severity of symptoms felt by many at the beginning of the pandemic, paired with psychological stress from continuous isolation, had made the disease especially challenging. In addition to the strenuous path to recovery, there are also long-lasting sequelae of COVID-19. (recently dubbed as “Long COVID-19”; including prolonged anosmia, fatigue, shortness of breath, etc.) that could last for months after a negative COVID-19 result. Obviously, this had also contributed to the fact that most survivors had to deal with myriads of psychological problems such as anxiety and depression.<sup>6</sup> Doctors who have survived COVID-19 are not an exception to these issues and complications, which surely lead to hesitancy in treating COVID-19 patients.<sup>7</sup>

However traumatic the experience of COVID-19 infection is, doctors were still crucially needed at the frontline of the fight against the pandemic.<sup>8</sup> The importance of doctors returning to service necessitates assessing their reluctance in treating COVID-19 patients, especially doctors who had survived COVID-19 infection. This study will investigate the presence of hesitancy in treating COVID-19 patients in physicians who had survived COVID-19 infections, followed by an investigation of associated individual and occupational risk factors leading to the hesitancy. This study will assist individual doctors, hospital management, and related stakeholders in preparing intervention strategies to prepare doctors returning to duty after surviving COVID-19. More importantly, the results of this study may be used as ways of preparing physicians to face future pandemics.

## **MATERIAL AND METHODS**

### **Study Design**

The study was a cross-sectional survey exploring physicians' hesitancy to treat COVID-19 patients after experiencing at least one episode of COVID-19 infection. The study also investigates individual risk factors (e.g., age, gender, married status) and occupational risk factors (e.g., type of health facility, working

hours, experience in treating COVID-19 patients), which may lead to hesitancy. The study was a part of a core study titled: "The Behavioral Adaptation Survey of Doctors After Being a Covid-19 Survivor in Indonesia", which aims to find out the changes in the behaviour of doctors after surviving COVID-19 infection. This research was conducted by distributing online survey forms through social media from October 2020 to December 2020.

### Questionnaire Design

The questionnaire used in this study was developed by an expert panel involving specialists and consultants from internal medicine, occupational medicine, and community medicine. Prior to distribution to participants, the questionnaire had been pretested and revised accordingly. Hesitancy was assessed by asking: "After you are cured of COVID-19, are you willing to treat suspected, probable, or confirmed COVID-19 patients?". Individual risk factors assessed were the type of physician (GP, specialist, or specialist trainee), age, marital status, and gender. Medical practice locations included big islands in Indonesia like Java, Sumatera, and Kalimantan, with special highlights given to Jakarta as the capital city and the primary locus of COVID-19 in Indonesia.

Occupational risk factors identified in this study were the type of health facility where the physician worked (hospital or primary care clinic, private or public, COVID-19 referral hospital or non-referral), working hours (above or less than 40 hours per week), responsibility in clinical services (emergency, outpatient, isolation and high critical unit) and managerial duty. The level of COVID-19 occupational risk exposure was subjectively determined from low to very high by the physician's assessment of their workplace condition. Disease morbidity characteristics were symptom (asymptomatic, mild, moderate, or critical), illness duration, treatment in hospital or self-isolation, and whether other family members were infected with COVID-19.

### Participants

The target population for this study are doctors who had been infected with COVID-19 in Indonesia. Inclusion criteria were: [1] Registered physician in the Indonesian Doctors Association database, [2] Actively conducting medical practice (handling patients directly), [3] Had a history of confirmed COVID-19 infection based on nasopharyngeal and or oropharynx swab RT-PCR examination and have been declared COVID-19

negative before participating in this study. All participants are asked to give their consent and fill out the survey form from start to finish.

### Data Collection

The study utilized non-probability sampling using the consecutive sampling method. All subjects who fulfilled the inclusion criteria, accepted the invitation, and gave their consent were included in the study. Invitation to join the study was distributed via social media groups containing members of associations of doctors or specialists. Data collection was carried out for three months, from October 2020 to December 2020. The sample size was performed using the estimated 50% proportion of doctors who are proven to have been infected with COVID-19, and an absolute error of 5%, resulting in a minimum sample size of 380 subjects.

### Statistical Analysis

Data processing utilizes SPSS (Statistical Product for Social Science) version 20.0 program. Categorical data in this study will be presented in frequency distribution and 95% confidence interval. The proportion of hesitancy was presented with data that includes and excludes specialist trainees (since their status as trainees and work obligation to be reassigned to a hospital might interfere with the result). Bivariate analysis was done using Chi-square and Fisher analytical to determine the relationship between individual risk factors, disease severity, occupational risk factors and physician hesitancy to treat COVID-19 patients after COVID-19 infection. Binary logistic regression was done using significant factors found in bivariate analysis. Results were then presented using adjusted Odds Ratio (aOR), 95% confidence interval, and R square to show relations of risk factors to variation of the outcome.

## **RESULT**

Among 383 participants included in this study, 49% were general practitioners, 31% specialists, and 19% specialist trainees. Most participants worked in a hospital (77%), especially in a COVID-19 referral hospital (62%). Large numbers of participants reside in Jakarta (46%), Java (26%), and Sumatera (15%), while small portions live in Kalimantan, Sulawesi, and others. Forty-one per cent of the participants work for more than 40 hours per week. Most subjects were female and less than 40 years old. Only four per cent of subjects work in low-risk COVID-19 exposure areas, while 11% and 41% work in a very high and high-risk health facility (Table 1).

Table 1. Characteristic of physician who survived COVID-19 (n=383)

Characteristics	n	(%)
<b>Physician type</b>		
General Practitioners	190	(49.6%)
Specialist	120	(31.3%)
Specialist trainee	73	(19.1%)
<b>Gender</b>		
Male	166	(43.3%)
Female	217	(56.7%)
<b>Marriage status</b>		
Married	286	(74.7%)
Divorced	12	(3.1%)
Never married	85	(22.2%)
<b>Age</b>		
<40 years	249	(65.0%)
40-59 years	116	(30.3%)
≥ 60 years	18	(4.7%)
<b>Type of health facility</b>		
private primary clinic	28	(7.3%)
public health care	57	(14.9%)
private hospital	140	(36.6%)
public hospital	158	(41.3%)
<b>Location</b>		
Sumatera	59	(15.4%)
Java excluding Jakarta	101	(26.4%)
Jakarta	176	(46.0%)
Kalimantan	18	(4.7%)
Sulawesi	25	(6.5%)

Papua, Bali and Nusa Tenggara	4	(1.0%)
<b>Total working hours per week</b>		
≤ 40 hours	225	(58.7%)
> 40 hours	158	(41.3%)
Are you the main provider in your family?	178	(46.5%)
Subject's work in COVID-19 referral hospital	240	(62.7%)
<b>COVID-19 occupational risk exposure level in the workplace</b>		
Low	18	(4.7%)
Middle	162	(42.3%)
High	158	(41.3%)
Very high	45	(11.7%)
Duty in office/administration beside in health services	157	(41.0%)
Duty in emergency ward	159	(41.5%)
Duty in outpatient ward	91	(23.8%)
Duty in isolation ward	115	(30.0%)
Duty in high critical unit (HCU/ ICU/ ICCU/ PICU/ NICU)?	122	(31.9%)
Involve in treating suspected, probable, or confirmed COVID-19 patient before infected?	267	(69.7%)

Most COVID-19 survivors experienced mild (47%) and moderate (25%) symptoms, with 3% suffering from critical illness. The source of COVID-19 infection comes from either a patient they treat (48%) or other health workers (23%). More than 50% of subjects had >7 days of illness duration and were self-isolated. Almost 70% of physicians treating COVID-19 patients are either suspected, probable or confirmed with COVID-19 (Table 2).

Table 2. Characteristic of COVID-19 severity and treatment among COVID-19 survivors' physician (n=383)

COVID-19 morbidity characteristic	n	(%)
Disease symptomp		
Asymptomatic	93	(24.3%)
Mild	181	(47.3%)

Moderate	98	(25.6%)
Critical	11	(2.9%)
COVID-19 illness duration		
1-7 days	182	(47.5%)
8-14 days	107	(27.9%)
> 14 days	94	(24.5%)
Type of treatment after COVID-19 diagnosis		
Self-isolation	211	(55.1%)
In-ward in hospital	172	(44.9%)
No. of family member with positive COVID-19 (including subject)		
None	240	(62.7%)
1 member	81	(21.1%)
More than 1 member	62	(16.2%)
Suspected of source of infection		
Patient treated in health facility	183	(48.0%)
Other health worker in health facility	90	(23.6%)
Family	43	(11.3%)
Other non health-worker in workplace	18	(4.7%)
During transportation	7	(1.8%)
Unknown	40	(10.5%)

Physician hesitancy to treat COVID-19 patients were divided into two figures: including and excluding specialist trainee. When specialist trainee was included, the hesitancy was at 18%. When the trainee is excluded, hesitancy slightly increases to 20.3%. (Table 3).

Table 3. Physician's hesitancy to treat COVID-19 patients after survived from COVID-19 infection; excluding and including specialist trainee

Without specialist trainee (n=310)	All physicians including specialist trainee (n=383)
------------------------------------	---

After you are declared cured,

are you willing to treat n % (CI 95%) n % (CI 95%)

COVID-19 patients?

No	63	20.3% (16.2-25.1)	69	18.0% (14.5-22.2)
Yes	247	79.7% (74.8-83.8)	314	82.0% (77.8-88.5)

All the risk factors associated with hesitancy to treat COVID-19 patients were presented in Table 4. In bivariate analysis, significant risk factors associated with hesitancy included marital status and age of more than 40 years old. In terms of occupational risk, hesitancy to treat COVID-19 patients is seen in general practitioners, specialists, and physicians who never treated COVID-19 patients. In terms of the workplace, participants who work in a private primary clinic, non-COVID-19 referral hospitals, and lower COVID-19 occupational risk were prone to hesitancy in treating COVID-19 patients after they have survived the disease. In multivariate analysis, the most dominant factor risk was age over 60 years (aOR 9.2; CI 95% 2.8-30.1) and inexperienced in treating COVID-19 patients (aOR 5.8; CI 95% 3.1-10.9). Binary logistic regression was performed with R-square at 31.2%. The detailed bivariate and multivariate results can be seen in Table 4.

Table 4. Identified risk factors associated with hesitancy to treat COVID-19 patients

Risk factors	Hesitancy to treat COVID-19				p	OR (CI 95%)	p	aOR (CI 95%)
	Yes		No					
	n	%	n	%				
Physician type								
General Practitioners	40	(21.1%)	150	(78.9%)	Reference	1		
Specialist	23	(19.2%)	97	(80.8%)	0.772	0.8 (0.5-1.6)		
Specialist trainee	6	(8.2%)	67	(91.8%)	0.017	0.3 (0.1-0.8)		
Type of health facility								
private primary clinic	13	(46.4%)	15	(53.6%)	<0.001	11.9 (4.5-31.9)		
public health care	13	(22.8%)	44	(77.2%)		4.1 (1.7-9.9)		
private hospital	23	(16.4%)	117	(83.6%)		2.7 (1.2-5.9)		
public hospital	20	(12.7%)	138	(87.3%)		1		
Total working hours per week								
≤ 40 hours	50	(22.2%)	175	(77.8%)	0.011	2.1 (1.2-3.7)		
> 40 hours	19	(12.0%)	139	(88.0%)		1		



**Marriage status**

Married	60	(21.0%)	226	(79.0%)	0.027	2.9 (1.3-6.7)
Divorced	2	(16.7%)	10	(83.3%)		2.2 (0.4-12.2)
unmarried	7	(8.2%)	78	(91.8%)		1

**Age**

<40 years	31	(12.4%)	218	(87.6%)	<0.001	1	0.001	1
40-59 years	28	(24.1%)	88	(75.9%)		2.2 (1.3-3.9)		1.6 (0.8-3.1)
≥ 60 years	10	(55.6%)	8	(44.4%)		8.8 (3.2-23.9)		9.2 (2.8-30.1)

**No. of family member with positive COVID-19 (including subject)**

None	35	(14.6%)	205	(85.4%)	0.020	1
1 member	23	(28.4%)	58	(71.6%)		2.3 (1.3-4.2)
More than 1 member	11	(17.7%)	51	(82.3%)		1.2 (0.6-2.6)

**Involve in treating suspected, probable, or confirmed COVID-19 patient before infected??**

No	47	(40.5%)	69	(59.5%)	<0.001	7.6 (4.3-13.4)	<0.001	5.8 (3.1-10.9)
Yes	22	(8.2%)	245	(91.8%)		1		1

**Subject's workplace is in COVID-19 referral hospital**

No	39	(27.3%)	104	(72.7%)	<0.001	2.6 (1.5-4.5)
Yes	30	(12.5%)	210	(87.5%)		1

**COVID-19 occupational risk exposure level in the workplace**

Low	9	(50.0%)	9	(50.0%)	<0.001	14 (3.1-62.2)
Middle	44	(27.2%)	118	(72.8%)		5.2 (1.5-17.7)
High	13	(8.2%)	145	(91.8%)		1.2 (0.3-4.6)
Very high	3	(6.7%)	42	(93.3%)		1

## DISCUSSION

The study's novelty lies in gathering data from Indonesian physicians who had survived COVID-19 infection. Even though the study utilizes an online survey, it still manages to collect data on survivors' locations, types of health facilities where they work (hospitals or primary health centres), age, gender, and their location of clinical service (emergency, outpatient or isolation). Most COVID-19 physician survivors are asymptomatic and have mild symptoms with less than 14 days of treatment, which are in line with the characteristics of COVID-19 survivors in health workers or doctors in developing countries like Indonesia.<sup>9</sup> A higher proportion of survivors of severe symptoms was found in countries with more advanced health and treatment systems.<sup>10</sup> The number of doctors in our study who have survived COVID-19 and require treatment at the hospital is nearly equal to those who only needed self-isolation (45:55). Most infection sources were transmitted from patients and other health workers, as per similar studies in health workers.<sup>11,12</sup>

Hesitancy to re-treat COVID-19 patients may indicate a problem in doctors' productivity when returning to work after being infected. The physician's hesitancy rate of up to 20% shows that the COVID-19 impacts the doctor's thought and perspective when they are returning to work. A doctor usually has the ability and responsibility to treat all patients with any condition; hesitancy will lead doctors to presenteeism, where doctors can return to work but underperform because of reluctance or refusal to provide services under certain conditions.<sup>13</sup> A possible consequence of refusal is an increase in the referral of COVID-19 patients, resulting in an accumulation of patients to units and doctors who are still (either by choice or by default) conducting COVID-19 services, thereby increasing the risk of transmission to health workers at that particular institution.

Bivariate analysis for individual risk factors found that hesitancy to treat COVID-19 patients was more common in married doctors, possibly because of the impact on their families. This condition is especially true if the doctor is the backbone of the family economy, where they strongly prefer to avoid the risk of treating COVID-19 patients (isolation or death), all of which will significantly impact the family's financial condition. Hesitancy was also found in physicians older than 60 years, associated with the potential for more comorbidities with increasing age.<sup>14</sup>

Multivariate analysis found that age was the most dominant factor causing hesitancy to treat COVID-19 patients directly. One potential solution is technical training in providing telemedicine health consultations to older expert doctors to provide safe remote services from home, although this is limited to non-

surgical/surgical consultation services.<sup>15,16</sup> With the current rise in telemedicine platforms and applications in Indonesia, it could be a practical solution to reduce hesitancy in older physicians.<sup>17</sup>

Bivariate analysis for occupational risk factors found that hesitancy was more common in general practitioners (21%) and those working in primary care (46%), which may be related to the low readiness of personal protective equipment facilities in smaller clinics; this is in accordance with the finding that hesitancy is also more commonly found in workplaces where the risk of COVID-19 transmission is low – resulting in somewhat lower real experience and knowledge of COVID-19 among its physician.

The possibility of limited COVID-19 skills and knowledge of physicians would also need to be considered because hesitancy is much higher for doctors who were not previously involved in treating COVID-19 patients, which is a factor that proved to be the most dominant based on multivariate analysis. Tackling this problem can be done via lectures and online classes explicitly catered to primary health care clinicians; this is especially important considering the increasingly unspecific or asymptomatic symptoms of COVID-19 with increasing variants of the COVID-19 virus.<sup>18</sup>

The limitation of this study is that although the distribution of the location of the subject area is widespread with large sample size, it is carried out with a non-probability sampling design, resulting in an absolute error as wide as 10%. Although steps have been taken to ensure reliability, the assessment of variables was done based on an online survey without direct confirmation to the respondent.

Although cases of COVID-19 seem to have subsided, COVID-19 patients and patients with subsequent sequelae of COVID-19 are still present. With COVID-19 itself, the world has become more aware that there are still threats of other pandemics in the future. There is probable evidence that hesitancy in treating COVID-19 patients may affect physicians' performance in treating other infectious diseases, making it imperative that the causes of this hesitancy be addressed and possibly treated. COVID-19 surviving doctors who are reluctant to serve COVID-19 patients might benefit from psychological consultation support to restore their mental readiness. Hospital management also needs to consider setting work policies for doctors who have survived COVID-19 to work in places with a lower risk of COVID-19 transmission or reduce service hours to lower transmission potential and hesitancy.<sup>19</sup>

## CONCLUSION

Despite 20% hesitancy to treat COVID-19 patients, physicians are still needed in the frontline to fight the current and any other subsequent pandemic. With support from healthcare management, physicians need to be more prepared to handle COVID-19 patients and manage their emotional readiness before and especially after COVID-19 infection. Future research involving psychology experts to manage the hesitancy is needed because physicians' roles are essential in healthcare management throughout the world.

## DECLARATIONS

**Ethics approval and consent to participate:** Ethical approval was received from the Ethic Committee of the Faculty of Medicine, Universitas Indonesia (02/29/SI/FKUI/IV/2020). Written informed consent was obtained from all subjects involved in the study.

**Consent for publication:** The participant has consented to the submission of their questionnaire result to the journal.

**Availability of data and materials:** Data supporting result of this study can be obtained via written request to the corresponding author.

**Competing interests:** The authors declare no conflict of interest.

**Funding:** The APC was funded by Danone Specialized Nutrition Indonesia (Grant number: 32/SCIENCE/V/22)

**Authors' contributions:** Conceptualization, Dewi Soemarko, Ari Syam, Evy Yuniastuti and Herikurniawan Herikurniawan; Data curation, Aria Kekalih and Mikhael Yosia; Formal analysis, Aria Kekalih; Funding acquisition, Dewi Soemarko; Methodology, Aria Kekalih, Evy Yuniastuti and Herikurniawan Herikurniawan; Project administration, Dewi Soemarko; Resources, Dewi Soemarko, Ari Syam, Evy Yuniastuti and Herikurniawan Herikurniawan; Supervision, Dewi Soemarko, Ari Syam, Evy Yuniastuti and Herikurniawan Herikurniawan; Writing – original draft, Mikhael Yosia; Writing – review & editing, Mikhael Yosia.

**Acknowledgements:** The authors would like to thank fellow colleagues in Faculty of Medicine, Universitas Indonesia for their support.

## REFERENCES

1. Ruan S. Likelihood of survival of coronavirus disease 2019. *The Lancet Infectious Diseases*. 2020.
2. WHO. 2019-nCoV outbreak is an emergency of international concern. World Health Organization. 2020.
3. Belingheri M, Paladino ME, Riva MA. COVID-19: Health prevention and control in non-healthcare settings. Oxford University Press UK; 2020.
4. Wong LY, Tan AL, Leo YS, Lee VJM, Toh MPHS. Healthcare workers in Singapore infected with COVID-19: 23 January-17 April 2020. *Influenza Other Respi Viruses*. 2021;
5. Jain U. Risk of COVID-19 due to Shortage of Personal Protective Equipment. *Cureus*. 2020;
6. Choi EPH, Hui BPH, Wan EYF. Depression and anxiety in Hong Kong during covid-19. *Int J Environ Res Public Health*. 2020;
7. Sahebi A, Nejati-Zarnaqi B, Moayedi S, Yousefi K, Torres M, Golitaleb M. The prevalence of anxiety and depression among healthcare workers during the COVID-19 pandemic: An umbrella review of meta-analyses. *Prog Neuro-Psychopharmacology Biol Psychiatry*. 2021;
8. Mahendradhata Y, Andayani NLPE, Hasri ET, Arifi MD, Siahaan RGM, Solikha DA, et al. The Capacity of the Indonesian Healthcare System to Respond to COVID-19. *Front Public Heal*. 2021;
9. Kambhampati AK, O'Halloran AC, Whitaker M, Magill SS, Chea N, Chai SJ, et al. COVID-19–Associated Hospitalizations Among Health Care Personnel — COVID-NET, 13 States, March 1–May 31, 2020. *MMWR Surveill Summ*. 2020;
10. Gibson DM, Greene J. Risk for Severe COVID-19 Illness Among Health Care Workers Who Work Directly with Patients. *Journal of General Internal Medicine*. 2020.
11. Ali S, Noreen S, Farooq I, Bugshan A, Vohra F. Risk assessment of healthcare workers at the frontline against COVID-19. *Pakistan J Med Sci*. 2020;
12. Wang J, Zhou M, Liu F. Reasons for healthcare workers becoming infected with novel coronavirus disease 2019 (COVID-19) in China. *Journal of Hospital Infection*. 2020.
13. Kinman G, Grant C. Presenteeism during the COVID-19 pandemic: Risks and solutions. *Occupational Medicine*. 2021.
14. Yuki K, Fujiogi M, Koutsogiannaki S. COVID-19 pathophysiology: A review. *Clinical Immunology*.

---

2020.

15. Bahl S, Singh RP, Javaid M, Khan IH, Vaishya R, Suman R. Telemedicine technologies for confronting covid-19 pandemic: A review. *J Ind Integr Manag*. 2020;
16. Portnoy J, Waller M, Elliott T. Telemedicine in the Era of COVID-19. *Journal of Allergy and Clinical Immunology: In Practice*. 2020.
17. Gudi N, Konapur R, John O, Sarbadhikari S, Landry M. Telemedicine supported strengthening of primary care in WHO South East Asia region: Lessons from the COVID-19 pandemic experiences. *BMJ Innov*. 2021;
18. Zhang M, Zhou M, Tang F, Wang Y, Nie H, Zhang L, et al. Knowledge, attitude, and practice regarding COVID-19 among healthcare workers in Henan, China. *J Hosp Infect*. 2020;
19. Than HM, Nong VM, Nguyen CT, Dong KP, Ngo HT, Doan TT, et al. Mental health and health-related quality-of-life outcomes among frontline health workers during the peak of covid-19 outbreak in Vietnam: A cross-sectional study. *Risk Manag Healthc Policy*. 2020;