

## Research Article

# Burnout of Frontline Health Care Workers Working during Sporadic and Cluster Periods of the COVID-19 Pandemic: A Comparative Study

Munkh E<sup>1,2</sup>, Luvsannyandag B<sup>1,2</sup>, Oyunsuren D<sup>1\*</sup>, Naranzul D<sup>3</sup>, Oyungerel R<sup>3,4</sup> and Khishigsuren Z<sup>1</sup>

<sup>1</sup>Department of Mental Health, School of Medicine, Mongolian National University of Medical Sciences

<sup>2</sup>National Center for Mental Health, Ulaanbaatar, Mongolia

<sup>3</sup>National Center of Communicable Diseases, Ulaanbaatar, Mongolia

<sup>4</sup>Department of Infectious Diseases, School of Medicine, Mongolian National University of Medical Sciences

## Abstract

The new SARS-n-CoV2 (COVID-19) pandemic is a global threat to the mental, physical and social health of the population. There is an urgent need to conduct psychological, social and mental health research related to the pandemic and to plan long-term interventions. At the beginning of the outbreak, British scholars identified that the priority objectives of research on COVID-19 are to study and report collected information related to anxiety, depression, self-harm (or suicide) and other mental health problems among the general population and vulnerable groups, including frontline staff and health care workers.

**Keywords:** Burnout; COVID-19 pandemic; Depression

## Introduction

Some studies by Chinese researchers in the early stages of the pandemic noted the need for immediate identification of symptoms, such as anxiety, depression and stress, among physicians, nurses and other health care professionals [1]. Who care for and diagnose

**\*Corresponding author:** Oyunsuren D, Department of Mental Health, School of Medicine, Mongolian National University of Medical Sciences, Janyan St 3, Ulaanbaatar, Mongolia, Tel: +9 7699078521; E-mail: oyunsuren.d@mnums.edu.mn

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infected patients and conduct comprehensive mental health care and stress management interventions for them [2,3].

According to a review of 13 studies on the prevalence of SARS-CoV and MERS-CoV in the MEDLINE database of German scholars, quarantine interventions have negative psychological impacts, such as depression, anxiety, anger, stress, posttraumatic stress disorder, social isolation, loneliness and discrimination, not only among the general population but also among frontline health care workers [4].

The COVID-19 pandemic has a significant negative impact on health care workers. This is caused by factors including (but not limited to) increased workload, fear of becoming ill or of family members' becoming ill, shortages of personal protective equipment and decreases in the care of critically ill patients due to fear [5,6]. Many researchers have established that the COVID-19 outbreak has increased stressors in the health care system and has already increased burnout related to workplace stress [7,8].

Although the information regarding the COVID-19 outbreak's impact on the mental health of health care workers is incomplete, it is possible to draw some preliminary conclusions based on the research related to previous major epidemics. For example, during and after the SARS outbreak in 2003 and the MERS outbreak in 2012, reports emerged of psychological distress, such as anxiety, fear, discrimination, fatigue and posttraumatic stress disorder, among frontline health care workers [9-11]. Indian researchers have observed that four-stage psychological responses (as in the Kubler-Ross model) in the catastrophic period were manifested for grief in countries affected by the COVID-19 pandemic and having high morbidity and mortality rates [12,13]. According to them, the first stage of this four-stage response occurs in the sporadic or imported cases period, during which the anxiety and fear caused by psychological denial predominate. The next stage of the response is during the period of local transmission (cluster cases), during which psychological distress, such as anxiety, fear and worry, is more likely to increase. The third stage of the response involves community transmission, during which negative emotions, such as anger and rage, may be expressed in depression and anxiety related to the state of uncertainty and unknown. Stage 4 accompanies an epidemic that affects the whole country or region, during which depression may escalate to despair, although people will be able to accept the reality and assess what to do [12].

The results of studies done during and after previous major outbreaks of coronavirus show that the psychological impacts of quarantine during a pandemic can lead to irritability, self-infection, fear of infecting loved ones and family members, denial, anger, frustration, insomnia, loneliness, despair, depression and, in some cases, even suicide [14-16].

In Mongolia, the period of sporadic or imported cases started in March 2020, when the first imported case of COVID-19 was reported, while the period of cluster cases started in November 2020. We aimed in this study to identify the burnout syndrome of frontline health care

workers with some mental symptoms, comparing the sporadic and cluster periods of the COVID-19 pandemic.

## Goal

To identify the severity of burnout syndrome in frontline health care workers and identify some mental symptoms, comparing periods of the COVID-19 pandemic.

## Methods

### Study design

The study was conducted in two stages using a descriptive cross-sectional design. The first stage of the study was conducted from August through September 2020 and organized among frontline health care workers caring only for imported cases at the National Center for Communicable Diseases (NCCD), the Central Military Hospital, the National Center for Zoonotic Diseases, the National Center for Mental Health and among some residents who worked in isolation facilities. The second phase of this study was conducted in November 2020, when the domestic outbreak was reported and was organized only among frontline health care workers of the NCCD who worked with cluster cases.

### Inclusion criteria

We considered all respondents, such as frontline health care workers, who worked with imported/cluster cases of SARS-CoV2 infected patients, people in isolation who came from infection-outbreak countries and people working in surveillance, screening, disinfection and other COVID-19-related services. Citizenship, nationality, age and gender were not taken into account when recruiting participants in the study; individuals gave written informed consent and we obtained the approval of the health organizations where the individuals worked. Anyone declining to participate in the study was excluded. We used a questionnaire that included general demographic questions, such as age, gender, educational status, occupation, position, marital status, family, living condition, household monthly income, working years and questions to solicit information related to pandemic care, such as the experience of pandemic care and current duties.

### Method of evaluating fear of the COVID-19 infection

We used a 5-point question, with a higher score reflecting a greater fear of COVID-19 infection.

### Method of evaluating the anxiety of frontline staff

We used the Generalized Anxiety Disorder 7-item (GAD-7) [17], a self-completed questionnaire for assessing anxiety level that is widely used in primary health care. The reliability of the answers to the questions was 0.90 using Cronbach's alpha coefficient.

### Method of evaluating the depression of frontline staff

We used the Patient Health Questionnaire 9-item (PHQ-9) [18], a self-completed questionnaire for assessing depression that is widely used in primary health care. The reliability of the answers to the questions was 0.90 using Cronbach's alpha coefficient.

### Method of evaluating the stress level of frontline staff

We used the Impact of Event Scale-Revised (IES-R) [19], a self-completed questionnaire for assessing stress impact and the reliability

of the answers to the questions was 0.94 using Cronbach's alpha coefficient.

### Method of evaluating burnout of frontline staff

We used the Maslach Burnout Inventory (MBI) [20], a self-completed questionnaire for assessing burnout syndrome and the reliability of the answers to the questions was 0.86 using the Cronbach's alpha coefficient.

### Ethical statement

Ethical approval was obtained from the Medical Ethics Committee of the Ministry of Health on July 08, 2020 (No. 172). All subjects gave written informed consent. The data were collected only after the administrative approvals were obtained by signed consent.

### Statistical Analysis

The statistical analysis of the results of the survey was done using descriptive analysis using SPSS 21.0 and STATA 16.0. The data were processed by Microsoft Word and Microsoft Excel and were initially analyzed using descriptive statistics, mean, standard deviation, Pearson correlation and multiple logistic regression analysis. The non-parametric correlation was significant at the  $p < 0.01$  level and  $p < 0.05$  level (two-tailed). All reference categories were "Yes," and the dependent variables were seven variables leading to burnout, with a binary outcome answered by "Yes" or "No." Multiple regression analysis showed the relationships between burnout and the above seven variables. The reliability of the answers to the questions in the questionnaires for assessing the mental health state of the health care workers was calculated using Cronbach's alpha.

### Results

A total of 435 health care workers aged 21-63 years participated in the study. Of the respondents, 369 (84.8%) were health care workers who worked during the sporadic period of the COVID-19 pandemic. The average age of the respondents was  $38.4 \pm 8.7$  years and the average of years working in the health care sector was  $11.3 \pm 8.8$ . Some demographic variables of the respondents are summarized in (Table 1).

As shown in (Table 1), females ( $p = 0.009$ ), health care workers aged 25-44 years and medical doctors and nurses ( $p = 0.001$ ) with higher education ( $p = 0.03$ ) were more likely to be involved in this study at any period of the COVID-19 pandemic.

As shown in (Table 2), of the total respondents, 84%-92.4% had fear of the COVID-19 infection, 23.6%-51.1% were anxious, 49.1%-69.1% were depressed, 19%-34.8% were severely stressed and 6.7%-13.6% had statistically significant burnout syndrome. Also, 51.5%-67.7% of frontline health care workers in the COVID-19 pandemic reported that they had previous experience with an outbreak of infection, such as SARS, H1N1, or hand-foot-mouth disease ( $p = 0.001$ ).

Table 3 summarizes the results of three components of burnout syndrome among frontline health care workers during the sporadic and cluster periods of the COVID-19 pandemic. As shown in (Table 3), 89.7% of the respondents who worked at the frontline of health care during the sporadic period of the COVID-19 pandemic had Emotional Exhaustion (EE), which is a component of burnout syndrome and the mean score of EE was  $7.78 \pm 6.25$ . Among the

Variables	Sporadic period		Cluster period		Total (n)
	Number of participants (n)	Percent (%)	Number of participants (n)	Percent (%)	
<b>Sex</b>					
Male	86	23.3	6	9.1	92
Female	283	76.7	60	90.9	343
Total	369	100	66	100	435
<b>Age group</b>					
Under 24 y.o.	11	3.0	1	1.5	12
25-34 y.o.	136	36.9	18	27.3	154
35-44 y.o.	127	34.4	20	30.3	147
45-54 y.o.	83	22.5	24	36.4	107
55-64 y.o.	12	3.2	3	4.5	15
Total	369	100	66	100	435
<b>Education</b>					
Higher	245	66.4	30	45.4	275
High	70	19.0	19	28.8	89
Secondary	15	4.1	4	6.1	19
Technical and vocational education	7	1.9	4	6.1	11
Specialized secondary education	29	7.8	8	12.1	37
Primary	3	0.8	1	1.5	4
Total	369	100	66	100	435
<b>Occupation</b>					
Medical doctor	122	33.1	9	13.6	131
Nurse	84	22.8	29	43.9	113
Epidemiologist	17	4.6	0	0	17
Biomedical specialist	6	1.6	2	3.0	8
Medical specialist	60	16.3	7	10.6	67
Other	80	21.6	19	28.9	99
Total	369	100	66	100	435

Table 1: Some demographic variables of the total respondents.

Variables	Sporadic period		Cluster period		Total (n)	p-value
	Number of participants (n)	Percent (%)	Number of participants (n)	Percent (%)		
<b>Fear of COVID-19 infection (by Likert score of 0-5)</b>						
No fear (0-1)	59	16.0	5	7.6	64	0.001
Mild (2-3)	156	42.3	14	21.2	170	
Moderate (4)	80	21.7	21	31.8	101	
High (5)	74	20.0	26	39.4	100	
Total	369	100	66	100	435	
<b>GAD-7 score</b>						
Minimal (0-4)	245	66.4	27	40.9	272	0.001
Mild (5-9)	99	26.8	28	42.4	127	
Moderate (10-14)	21	5.7	8	12.1	29	
Severe (15-21)	4	1.1	3	4.6	7	
Total	369	100	66	100	435	
<b>PHQ-9 score</b>						
Minimal (1-4)	188	50.9	21	31.9	209	0.004
Mild (5-9)	143	38.8	29	43.9	172	
Moderate (10-14)	29	7.9	14	21.2	43	
Moderately severe (15-19)	2	0.5	0	0	2	
Severe (20-27)	7	1.9	2	3.0	9	
Total	369	100	66	100	435	

IES-R score						
0-23	299	81	43	65.2	342	0.009
24-32	34	9.2	8	12.1	43	
33-38	12	3.3	7	10.6	19	
39 and above	24	6.5	8	12.1	32	
Total	369	100	66	100	435	
Burnout syndrome						
Have no burnout syndrome	348	94.3	57	86.4	405	0.019
Have burnout syndrome	21	5.7	9	13.6	30	
Total	369	100	66	100	435	

**Table 2:** Some mental health variables of the frontline health care workers during the COVID-19 pandemic.

respondents, 73.4% had Depersonalization (D), which is a component of burnout syndrome and the mean score of D was  $4.30 \pm 5.09$  during the sporadic period of the COVID-19 pandemic. Furthermore, 70.7% of the respondents had Personal Accomplishment (PA), which is a component of burnout syndrome and the mean score of PA was  $34.48 \pm 15.82$  during the sporadic period of the pandemic.

Among the respondents, 95.5% who worked at the frontline of health care during the cluster period of the COVID-19 pandemic had EE and the mean score of EE was  $10.17 \pm 8.28$ . Of the respondents, 77.3% had D during the cluster period of the pandemic and the mean score of D was  $6.55 \pm 7.79$ . During the cluster period of the pandemic, 78.8% of the respondents had PA and the mean score of PA was  $33.23 \pm 16.09$ .

In other words, physicians and health care workers working at the frontline of the COVID-19 pandemic saw an increase in the incidence of these three symptoms of burnout syndrome by 5.8%-9.1%, but no statistically significant differences between the pandemic periods were observed (Figure 1). Shows the results of the COVID-19 pandemic using a comparison of the symptoms of burnout syndrome in frontline physicians, nurses, and other health care workers according to their roles.

As seen in (Figure 1), 76.9%-93.6% of the total 78 physicians who worked at the frontline of the COVID-19 pandemic care had burnout syndrome (EE 93.6%; D 80.8%; PA 76.9%) at mild to high levels, while 73.6%-89.1% of the 110 responding nurses who cared for infected cases had burnout syndrome (EE 89.1%; D 73.6%; PA 73.6%) at mild to high levels. Of the 247 respondents in other roles (laboratory staff, worker at an isolation facility, management, meal preparer, driver, epidemiologist, etc.) at the frontline of pandemic health care, 69.6%-90.3% had burnout syndrome (EE 90.3%; D 72.1%; PA 69.6%) at mild to moderate levels. An average of two-thirds of physicians and other health workers at the frontline of pandemic care were assessed with burnout syndrome. Nurses who cared for infected cases were more burned out than others (Table 4). Summarizes the results of correlation analysis for the factors related to the burnout of frontline health workers during the cluster period of the COVID-19 pandemic. These factors were used as independent variables for the univariate and multivariate regression. Burnout was significantly related to cluster period, previous experience, fear of infection, anxiety, depression, high IES-R score and immune suppression.

Working during the cluster period of the COVID-19 pandemic was significantly related to working at the NCCD, working as a nurse caring for infected cases, previous experience, fear of infection,

anxiety, depression and high IES-R score. Unexpectedly, burnout and cluster period were not significantly related to working as a physician. In this study, univariate and multiple regression analyses were conducted. A summary of the variables associated with influencing factors for COVID-19-related burnout among the 435 respondents are provided in (Table 5).

As summarized in table 5, previous experience (odds ratio [OR] = 0.40), fear of infection (OR = 0.29), anxiety (OR = 0.19), depression (OR = 0.11), high IES-R score (OR = 0.18) and immune suppression (OR = 0.14) were not affected alone in the cluster period of COVID-19-related burnout syndrome by univariate regression analysis. However, previous experience (OR = 2.47;  $p = 0.047$ ), fear of infection (OR = 2.74;  $p = 0.03$ ), depression (OR = 5.07;  $p = 0.021$ ), high IES-R score (OR = 4.61;  $p = 0.022$ ) and immune suppression (OR = 4.38;  $p = 0.005$ ) were significantly associated with the COVID-19 pandemic-related burnout syndrome, with nearly 2.5-5.1 fold risks in the multivariate regression analysis.

## Discussion

In other outbreaks of the coronavirus group, such as the SARS-CoV-1 outbreak [21], many psychiatric symptoms (posttraumatic stress disorder, anxiety, depression, etc.) were recorded in the community and among medical staff, just as during the outbreak of the new SARS-CoV-2 virus [22,23]. Scholars in the U.K., Lebanon and China have found that high levels of anxiety, depression and fear were registered among physicians and nurses working with isolated cases of the new coronavirus infection [24-26]. Also, physicians and nurses working in frontline or isolation facilities feared spreading the infection to their families and close friends [27,28]. According to the results of the study, which included sampling from 194 cities in China, the psychological impact of the COVID-19 pandemic was rated as moderate to severe, with the findings assessing moderate to severe anxiety and depression in the population [29].

In 14 studies on health care workers in departments of infectious diseases, internal medicine and intensive care wards, depression and anxiety symptoms were more commonly reported among those with less stressful experience and the severity of mental symptoms was influenced by age, gender, occupation, specialization, type of activities performed and proximity to COVID-19 patients [30,31]. According to our findings, the fear of infection, anxiety and depression of frontline health care providers at any time during the pandemic were statistically significant and close to the results of the studies mentioned above.

Burnout syndrome is caused by chronic stress in the workplace and, according to Maslach and Jackson [32], has three basic dimensions:

Variables	The sporadic period of the COVID-19 pandemic		The cluster period of the COVID-19 pandemic		Total (n)	Chi-square p-value
	Cases (n)	Percent (%)	Cases (n)	Percent (%)		
<b>Level of emotional exhaustion</b>						
Never	38	10.3	3	4.5	41	6.751 0.08
Low	294	79.7	50	75.8	344	
Moderate	30	8.1	11	16.7	41	
High	7	1.9	2	3.0	9	
Total	369	100	66	100	435	
<b>Level of depersonalization</b>						
Never	98	26.6	15	22.7	113	5.903 0.116
Low	161	43.6	25	37.9	186	
Moderate	82	22.2	15	22.7	97	
High	28	7.6	11	16.7	39	
Total	369	100	66	100	435	
<b>Level of personal accomplishment</b>						
Never	123	33.3	27	40.9	150	3.215 0.36
Low	47	12.7	6	9.1	53	
Moderate	91	24.7	19	28.8	110	
High	108	29.3	14	21.2	122	
Total	369	100	66	100	435	
<b>Burnout syndrome</b>						
Have no burnout syndrome	348	94.3	57	86.4	405	5.504 0.019
Have burnout syndrome	21	5.7	9	13.6	30	
Total	369	100	66	100	435	

Table 3: Burnout syndrome among frontline health care workers during COVID-19 pandemic.

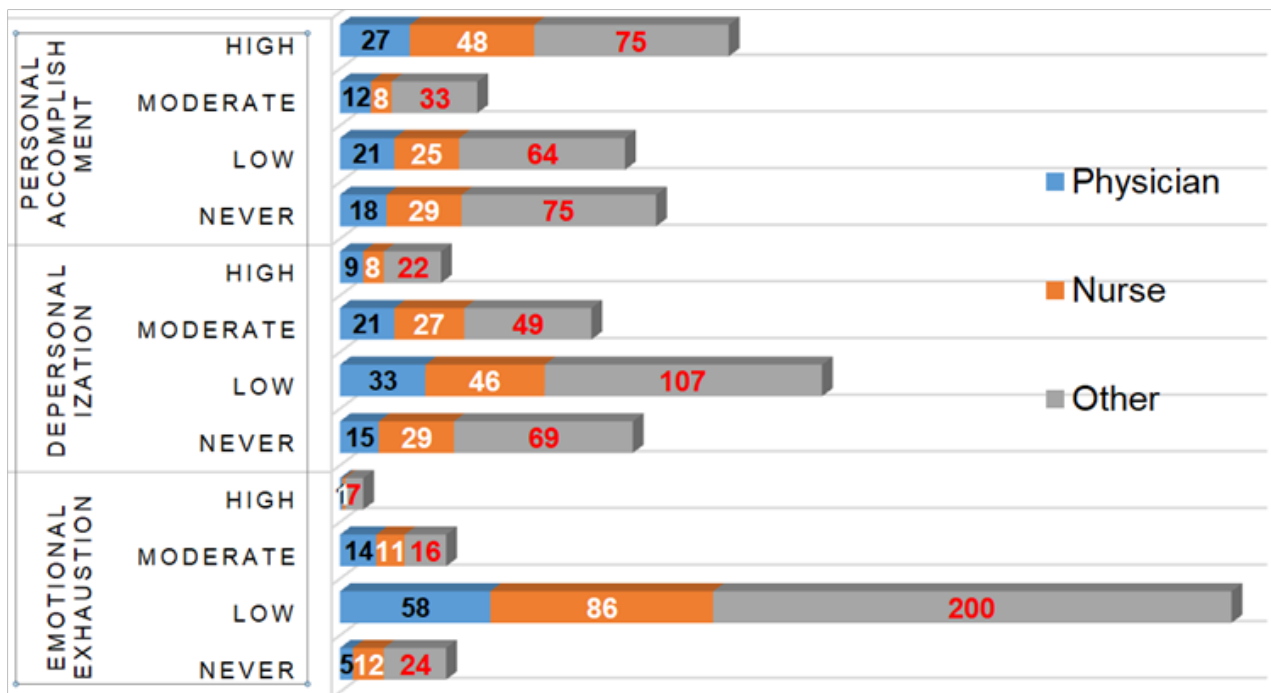


Figure 1: Three components of burnout syndrome in frontline health care workers (by their roles).

EE, D and PA. The burnout of the health care workers depends on the safety and fate of critically ill patients [33,34]. Furthermore, many studies are suggesting that burnout is more linked to anxiety,

depression, familial stress, alcohol and drug abuse and suicide among health care workers [35-37].

Variables	Burnout	Cluster period	Working at the NCCD	Physician	Nurse	Previous experience	Fear of infection	Anxiety	Depression	High IES-R score	Immune suppression
Burnout	1										
Cluster period	0.112*	1									
Working at the NCCD	0.068	0.388**	1								
Physician	0.015	-0.064	-0.064	1							
Nurse	0.05	0.137**	0.067	-0.272**	1						
Previous experience	0.105*	0.107*	0.301**	0.022	0.197**	1					
Fear of infection	0.148*	0.212**	0.138**	0.012	-0.072	0.004	1				
Anxiety	0.202**	0.189**	-0.023	0.01	-0.046	-0.067	0.092	1			
Depression	0.207**	0.137**	0.05	-0.018	0.083	0.018	0.024	0.564**	1		
High IES-R score	0.164**	0.129**	0.016	-0.012	0.031	0.017	0.028	0.183**	0.115*	1	
Immune suppression	0.236**	0.077	0.029	0.006	-0.002	-0.005	0.110*	0.273**	0.218**	-0.06	1

Table 4: Results of correlation analysis for the factors related to the burnout of frontline health care workers during the cluster period of the COVID-19 pandemic.

\* p<0.05, \*\* p<0.01

Variables	Univariate analysis		Multivariate analysis	
	Beta	p value	Beta	p value
Cluster period	0.382 (0.167-0.876)	0.023	0.987	0.980
Previous experience	0.403 (0.175-0.927)	0.033	2.477	0.047
Fear of infection	0.288 (0.125-0.662)	0.003	2.741	0.030
Anxiety	0.194 (0.084-0.447)	0.001	1.416	0.517
Depression	0.107 (0.032-0.359)	0.001	5.068	0.021
High IES-R score	0.179 (0.060-0.537)	0.002	4.608	0.022
Immune suppression	0.140 (0.058-0.341)	0.001	4.383	0.005

Table 5: Analysis of variables associated with influencing factors for COVID-19-related burnout in frontline nurses during the cluster period of the pandemic.

Although the burnout of health care workers related to the COVID-19 pandemic has not been fully studied, it may be associated with a variety of workplace problems, job conditions and psychological responses, such as anxiety and depression. There are several risks in the pandemic situation, including increased workloads for health care workers in times of extreme stress, rapid changes related to new care guidelines, using new guidelines in clinical practice, the need for high-risk relocation, the need to avoid infecting loved ones, etc. Therefore, during the first six months of the pandemic, health care workers may become burnt out due to job changes, workplace safety and psychological trauma [24,38,39].

Researchers argue that the risk of burnout among physicians is greater because they exceed the level of experience and are more prone to stress than other professionals. Furthermore, burnout is associated with decreased PA and low efficiency among physicians as well as reduced job satisfaction [40,41]. Irritability and dissatisfaction with work can negatively affect personal well-being, willingness to work and the ability to care for patients [42,43]. Furthermore, physician burnout increases the risk of professional mistakes, which can adversely affect the patient's condition [44-46]. It is important to consider that increased levels of depression among physicians and health professionals may increase the risk of suicide [47-50].

According to Portuguese researchers, the high levels of stress and depression among 2,008 health care workers at the frontline of the COVID-19 pandemic were statistically significant, with a high incidence of the three dimensions of burnout syndrome [51].

As our results show, burnout syndrome among frontline health care workers during the COVID-19 pandemic is associated with nearly 2.5-5.1 fold increased risks related to their work experience, fear of infection, depression, high impact of severe stress and immune suppression due to severe stress. This result, as many researchers have noted, suggests that the outbreak of COVID-19 is a sign that health workers are becoming overwhelmed and exhausted.

### Limitations of the study

There were several difficulties in conducting this study. First, there had been no previous study on mental health problems during an acute infection outbreak in our country, so special attention should be paid to infection control and ethics. Second, there was a tendency for respondents to be limited to a few organizations, as confirmed cases of COVID-19 were treated only at the NCCD at the beginning of the sporadic and cluster periods and close contacts with confirmed cases and isolated cases of underlying comorbidities were observed and isolated in other medical facilities. Third, the printed questionnaires with research information could not be removed from inside the facility under the infection control regime, there was limited access to the staff at the facility due to limited internal and external networks and there were possible ethical issues related to privacy. Additionally, the data of this study were collected from July through December 2020, so more data were gathered from respondents who worked during the sporadic period than from those who worked during the cluster period of the COVID-19 pandemic. Finally, it was not possible to fully determine whether the psychiatric symptoms and burnout experienced by health care workers were present before the COVID-19 pandemic or whether these symptoms emerged during the pandemic.

## Conclusion

Burnout syndrome among frontline health care workers in the COVID-19 pandemic was not more strongly associated with any period of the pandemic, but it represented nearly 2.5-5.1 fold increased risks related to their work experience, fear of infection, depression, high impact of severe stress and immune suppression due to the impact of severe stress.

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