ORIGINAL ARTICLE

Current status of and factors influencing anxiety and depression in front-line medical staff supporting Wuhan in containing the novel coronavirus pneumonia epidemic

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Abstract

Aim: This research aimed to shed light on the relationship between the sociodemographic characteristics of front-line medical workers and their anxiety and depression, to provide the basis and reference for targeted mental health education and for relevant departments to formulate appropriate policies during the COVID-19 outbreak.

Methods: This study adopted a convenient sampling method and examined the psychological status of 150 front-line medical workers from Zhejiang Province with questionnaire surveys using the Hamilton Anxiety and Depression Scale.

Results: The participants had severe anxiety and depression; the top three items under the category of anxiety were genitourinary symptoms, behavior at interview, and respiratory symptoms, whereas the top three items under depression were feelings of guilt, weight loss, and retardation. Among all personal data, the following factors influenced anxiety, in decreasing order: degree of suspicion of being infected when showing associated symptoms, degree of fear of yourself and your family being infected, and the affiliated hospital ($p < .05$). As for depression, the factors were the degree of suspicion of being infected when showing associated symptoms and the degree of fear of yourself and your family being infected ($p < .05$).

Conclusion: This study revealed that front-line medical staff presented symptoms of anxiety and depression when dealing with the COVID-19 outbreak and the factors influencing their psychological stress. Guiding policies and psychological interventions is crucial to maintaining their psychological well-being. Different measures may be implemented to solve this problem.

KEYWORDS

anxiety, depression, influencing factors, medical workers, novel coronavirus pneumonia

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1 | INTRODUCTION

The novel coronavirus pneumonia (NCP) has the novel coronavirus as its pathogen. On January 12, 2020, the World Health Organization (WHO) officially named the disease as the 2019 coronavirus disease (COVID-19). The first case of COVID-19 was found in Wuhan on December 12, 2019 (Chinese Center for Disease Control and Prevention, 2020a; Wuhan Municipal Health Commission, 2019). Although COVID-19 shares some similarities with SARS-CoV and MERS-CoV, the rapidly increasing number of cases and evidence of more human-to-human transmission have shown that COVID-19 is more contagious than the other two and that it is a new strain of coronavirus that had not previously been found in human beings (Li et al., 2020; WHO, 2020). The common signs of NCP infections include fever, cough, shortness of breath, and breathing difficulties. In more severe cases, pneumonia, severe acute respiratory failure, renal failure, and even death can occur (Huang et al., 2020). There is currently no special treatment for NCP. The incidence of confirmed cases has increased rapidly within a short period, with confirmed cases exceeding 80,000 and deaths reaching 2,912 by March 1, 2020 (Chinese Center for Disease Control and Prevention;, 2020b), all of which have placed a heavy burden and pressure on local prevention and treatment. Medical workers became susceptible to complex emotional reactions and psychological distress (Kang et al., 2020). The mental health problems of medical workers impaired their attention, cognitive functioning, and clinical decision-making (LeBlanc, 2009; Panagioti et al., 2018), consequently increasing the occurrence of medical errors and incidents and, ultimately, putting patients at risk. Furthermore, it is well known that acute stress during emergencies may have lasting effects on overall well-being (Grace & VanHeuvelen, 2019; Grassi & Magnani, 2000; Mulfinger et al., 2019).

More than 30,000 medics from nationwide medical teams have supported Wuhan (China State Council, 2020), which has eased the pressure on local rescue work for treating critically ill patients with NCP. Some medical workers have been seriously infected in Wuhan and other parts of Hubei Province, with over 3,000 medical staff confirmed to have the infection (China State Council, 2020), which has greatly intensified the psychological stress of front-line medics. Preserving their mental health is of paramount importance, and several interventions may help to mitigate their psychological burden (Gold, 2020; Warren, McMahon, Dalais, Henry, & Siskind, 2020). Studies outside the critical care setting have shown a high prevalence of insomnia, anxiety, and depression in medical workers managing COVID-19 patients (Pappa et al., 2020). Eighty-five nurses working in the intensive care unit (ICU) of a hospital in Zhejiang Province were surveyed and it was found that the main symptoms were decreased appetite or indigestion (59%), fatigue (55%), difficulty sleeping (45%), nervousness (28%), frequent crying (26%), and even suicidal thoughts (2%) (Shen, Zou, Zhong, Yan, & Li, 2020). A study revealed that, among 34 ICUs in China, the ICU staff working in Wuhan, China, experienced the highest degrees of psychological burden, with up to half of healthcare workers presenting symptoms of anxiety and depression. (Lai et al., 2019). Identifying risk factors for anxiety and depression in a large number of medical workers is paramount to allow for risk stratification and referral of the highest-risk professionals to the appropriate level of care. Some demographic characteristics, related concerns, and impacts of COVID-19 were found to be significantly associated with both anxiety and depression (Han et al., 2020). When screening strategies with the appropriate referrals are already in place, there is less risk, in the event of a crisis, of underestimating symptoms as inevitable reactions. Because psychological burden is highly prevalent in front-line medical workers, notably those working in ICUs, studies are needed to help design preventive strategies in the event of a health crisis (Joynt et al., 2010).

Therefore, this study analyzes the status and the influencing factors of anxiety and depression of front-line medical staff in dealing with the NCP to provide an objective basis for prevention and intervention measures. The study aimed to shed light on the relation between the sociodemographic characteristics of the front-line medical workers and their anxiety and depression, to provide the basis and reference for targeted mental health education and the relevant departments to formulate appropriate policies.

2 | METHODS

2.1 | Study design

This quantitative study was conducted using a psychometric properties questionnaire.

2.2 | Setting and sample

This study used convenient sampling to collect information from 150 front-line medics from different level hospitals in Zhejiang Province between February 1 and 20, 2020. Chinese hospitals are classified into three main levels according to the number of beds. The number of

beds in first-level hospitals is 100 or less, those in second-level hospitals are 101 to 499, and those in tertiary hospitals are more than 500. The inclusion criteria for the participants were as follows: (a) they were front-line medical workers; (b) they gave their written informed consent to participate in the study.

2.2.1 | Sample size calculation

The study mainly discusses the correlation between sociodemographic characteristics and psychological stress. Multiple regression analysis was applied. It was estimated that 16 variables may be entered into the model. Because the sample size is estimated to be at least 10–15 times the variable entered into the model, 160 participants were required. The loss to follow-up rate is calculated at 10%, so the sample size was 180 people.

2.3 | Data collection

Two investigators underwent unified training. The data collection was conducted with online interviews. All the front-line medics stayed in hospitals. The investigators explained the research objectives and methods and obtained the consent and cooperation from those who met the inclusion and exclusion criteria. Informed consents were obtained via online interview, and the research data were collected via online questionnaire survey. The front-line medics who consented to participate received a link to access the questionnaires. Participants completed the questionnaires immediately upon receipt. To ensure anonymity, nobody can see the IP address or any private information about the participants except the researchers.

2.4 | Study measures

Three questionnaires were used in this study. The questionnaire for the sociodemographic characteristics of the medical staff included 16 items: hospital, department, occupation, gender, age, highest level of education, years of service, technical titles, marital status, having children or not, residence, having training relevant to public health emergencies response or not, having family support while working on the front-line during the epidemic or not, level of fear about them and their family getting infected, level of worry about getting infected when presenting symptoms associated with NCP, and recent completion of comprehensive medical observation.

The Hamilton Depression Scale, compiled by Hamilton in 1960, is the most used scale for the clinical evaluation of depression status. This scale has 17 items and adopts a five-point scoring method with points ranging from 0 to 4: (0) absent; (1) mild; (2) moderate; (3) severe; (4) incapacitating. The less severe the depression, the lower is the total score. If the score is less than 7, the participant is regarded as having no depression; with a score between 17 (included) and 24, the participant is considered as being mildly or moderately depressed; and a score of 24 and above indicates severe depression. The reliability coefficient r of the scale is between .88 and .99, and the content validity coefficient .80 or above, showing good reliability and validity (Si & Pan, 2019). The reliability coefficient r of the scale in this study is .92.

The Hamilton Anxiety Scale, compiled by Hamilton in 1959, is one of the most commonly used scales in psychiatric clinics and has 14 items rated using a five-point score of 0 to 4, with standards at all levels being (0) absent, (1) mild, (2) moderate, (3) severe, and (4) incapacitating. If the total score is 29 points or more, the respondent may suffer from serious anxiety; if the score is higher than 21 (included), the participant has obvious symptoms of anxiety; if the score is more than 14 (included), the participant has anxiety; if the score is more than 7, the respondent might have anxiety; if the score is less than 7, the respondent does not have symptoms of anxiety. This scale has a reliability coefficient of .92 and a content validity coefficient of .86, suggesting good reliability and validity (Chuai, 2014). In this study, the scale has a reliability coefficient of .94.

2.5 | Ethical considerations

This study adopted an online questionnaire method and the researchers conducted the survey after unified training. The research was approved by Ningbo College of Health Sciences ethics review board (NCHS-062). We approached the medical staff on the front line and explained the research objectives, methods, and other relevant information to them to facilitate cooperation. After obtaining their agreement, we then requested them to sign a letter of consent online, informing them that participation was fully voluntary and that they could choose to withdraw from the research at any time. We then conducted the online survey by sending the questionnaire link to a total of 180 medical staff.

2.6 | Statistical methods

SPSS 22.0 was used to perform data analysis after the logical testing. $p < .05$ was considered statistically significant.

TABLE 1 Demographic information of front-line medical workers (N = 150)

Item	Number	Composition ratio (%)
Hospital level[a]		
Level 3	133	88.7
Level 2	17	11.3
Department		
Internal medicine	36	24.0
Surgery	35	23.3
Obstetrics and gynecology	4	2.7
Pediatrics	2	1.3
Emergency	28	18.7
Critical medicine	25	16.7
Outpatient	5	3.3
Operation	2	1.3
Others	13	8.7
Occupation		
Doctor	43	28.7
Nurse	107	71.3
Gender		
Male	56	37.3
Female	94	62.7
Age distribution (years)		
Under 25 years	4	2.7
26–35 years	84	56.0
36–45 years	41	27.3
Over 45 years	21	14.0
Highest level of education		
Secondary specialized school	2	1.3
College	10	6.7
Bachelor's degree	99	66.0
Master's degree and above	39	26.0
Years of service		
5 years and less	20	13.3
6–10 years	51	34.0
11–15 years	32	21.3
16–20 years	21	14.0
More than 20 years	26	17.3
Technical titles		
Primary	63	42.0
Intermediate	52	34.7
Senior	35	23.3
Marital status		
Unmarried	33	22.0
Married	111	74.0
Divorced	6	4.0

TABLE 1 (Continued)

Item	Number	Composition ratio (%)
Have children or not		
Yes	109	72.7
No	41	27.3
Current residence		
Living alone	35	23.3
Living with family	112	74.7
Living in shared apartment	3	2.0
Have you taken part in training in responding to public health emergencies?		
Yes	112	74.7
No	38	25.3
Does your family support you working at the front line of anti-epidemic containment?		
Yes	142	94.7
No	8	5.3
Level of fear for oneself and one's family getting infected		
High	9	6.0
Moderate	60	40.0
Mild	40	26.7
Not present	41	27.3
Level of worry about getting infected when having symptoms associated with NCP		
High	67	44.7
Moderate	45	30.0
Mild	22	14.7
Not present	16	10.7
Are you under medical observation lately?		
Yes	23	15.3
No	127	84.7

[a]Level 1 hospitals: the number of beds is 100 or less; level 2 hospitals: the number of beds is 101 to 499; level 3 hospitals: the number of beds is more than 500.

2.6.1 | Descriptive statistics

Mean, *SD*, and frequency values were used to describe the demographic data of the front-line medical staff; mean and *SD* values were used to describe the anxiety and depression scores of front-line medical workers who were supporting Wuhan in its efforts to control NCP.

2.6.2 | Statistical inference

Multiple regression analysis was used to analyze the influence of the sociodemographic data of medical workers on their levels of anxiety and depression. The total scores of anxiety and depression were chosen as the dependent variables. The 16 items measuring sociodemographic characteristics were the independent variables. The stepwise method was used when the independent variables entered into the regression. The assignment method of the independent variables is also shown.

3 | RESULTS

3.1 | General information on front-line medical workers

A total of 180 questionnaires were collected online, of which 150 were considered valid, with an effective recovery rate of 83.33%. The detailed personal information collected is listed in Table 1.

3.2 | Status of anxiety and depression among front-line medical staff

According to the total score of anxiety and depression among the front-line medical staff, the results showed severe anxiety and depression. Of the participants, 39.3% ($n = 59$) scored 14 or higher on the Hamilton Anxiety Scale and were classified as having anxiety, and 44.7% ($n = 67$) scored 17 or higher on the Hamilton Depression Scale and were classified as having depression. The top three items under the category of anxiety were genitourinary symptoms, behavior at interview, and respiratory symptoms; and the top three depression items were feelings of guilt, weight loss, and retardation. The details are shown in Tables 2 and 3.

3.3 | Analysis of factors of anxiety and depression, influence on front-line medical staff

Multiple regression analysis was conducted, with the total scores of anxiety and depression as the dependent variables. Sixteen items of personal data were the independent variables: hospital, department, occupation, gender, age, highest level of education, years of service, technical titles, marital status, having children or not, residence, having training relevant to public health emergencies response or not, having family support while

TABLE 2 Results of current anxiety status of front-line medical staff ($N = 150$)

Variable[a]	Average (mean)	SD
Anxious mood	3.23	1.21
Tension	3.17	1.26
Fears	3.26	1.22
Insomnia	3.01	1.26
Intellectual	3.19	1.26
Depressed mood	3.27	1.24
Somatic (muscular)	3.40	1.16
Somatic (sensory)	3.39	1.13
Cardiovascular symptoms	3.43	1.11
Respiratory symptoms	3.48	1.07
Gastrointestinal symptoms	3.23	1.17
Genitourinary symptoms	3.56	0.85
Autonomic symptoms	3.43	1.07
Behavior at interview	3.54	1.03
Total score of anxiety	46.59	14.78

[a]A five-point scoring method with points ranging from 0 to 4.

TABLE 3 Results of current depression status of front-line medical staff ($N = 150$)

Variable[a]	Average (mean)	SD
Depressed mood	3.18	1.31
Feelings of guilt	3.61	1.06
Suicide	3.43	0.79
Initial insomnia (difficulty falling asleep)	2.92	1.32
Insomnia (during the night)	2.81	1.40
Delayed insomnia (waking up in early hours of the morning)	3.04	1.34
Work and interests	3.17	1.25
Retardation	3.45	1.07
Agitation	3.41	1.12
Psychiatric anxiety	3.13	1.28
Somatic anxiety	3.25	1.22
Gastrointestinal somatic symptoms	3.19	1.16
General somatic symptoms	3.33	1.16
Genital symptoms	3.40	1.06
Hypochondriasis	3.35	1.17
Weight loss	3.56	0.97
Outlook	3.25	1.15
Total score of depression	55.88	17.11

[a]A five-point scoring method with points ranging from 0 to 4.

TABLE 4 Assignment method regarding the independent variables of factors influencing the mental health status of front-line medical workers

Item	Assigning value
Hospital level	With other levels as reference
Department	With other departments as reference
Occupation	Doctor = 0; nurse = 1
Gender	Female = 0; male = 1
Age	Under 25 years = 1; 26–35 years = 2; 36–45 years = 3; 45 years and older = 4
Highest level of education	Secondary specialized school = 1; college = 2; undergraduate = 3; Master's degree and above = 4
Years of service	5 years and less = 1; 6–10 years = 2; 11–15 years = 3; 16–20 years = 4; 20 years or more = 5
Technical titles	Primary = 1; intermediate = 2; advanced = 3
Marital status	Take other marital status as reference
Have children or not	Yes = 0; no = 1
Current residence	Take other living conditions as reference
Have you taken part in training in responding to public health emergencies?	Yes = 0; no = 1
Does your family support you working on the front line of anti-epidemic containment?	Yes = 0; no = 1
Level of fear for oneself and one's family getting infected	No = 1; mild = 2; moderate = 3; high = 4
Level of worry about getting infected when having symptoms associated with NCP	No = 1; mild = 2; moderate = 3; high = 4
Are you under any medical observation lately?	Yes = 0; no = 1

working on the front-line during the epidemic or not, level of fear about them and their family getting infected, level of worry about getting infected when presenting symptoms associated with NCP, and recent completion of comprehensive medical observation. The assignment method is detailed in Table 4. The values for entering into and deleting from a regression equation were set as 0.10 and 0.15, respectively. The research results showed that factors influencing anxiety could be arranged in decreasing order of influencing degree as follows: level of worry about getting infected when having symptoms associated with NCP, level of fear for one's own and family getting infected, and affiliated hospital ($p < .05$). The factors affecting depression could be ordered as follows, with the influencing degree from high to low: level of worry about getting infected when having symptoms associated with NCP and level of fear for one's own and family getting infected ($p < .05$), as detailed in Tables 4 and 5.

4 | DISCUSSION

Wuhan was the first area to be hit by the COVID-19 outbreak. The rising numbers of cases and deaths, coupled with the unprecedented lockdown of Wuhan, may create and spread public fear, panic, and distress. The front-line medical staff working in Wuhan may be facing a serious psychological challenge. The results of the analysis indicated that 39.3% of medical workers had anxiety and 44.7% of medical workers had depression. One single-center, cross-sectional survey showed that 1,509 (29.8%), 681 (13.5%), and 1,218 (24.1%) out of 5,062 health workers reported acute stress, depression, and anxiety symptoms, respectively (Zhu et al., 2020). A psychological survey of Chinese health workers from January 29, 2020 to February 3, 2020 involving 34 hospitals in China showed that 35% of health workers reported moderate to severe stress, 14.8% moderate to severe depression, and 12.3% moderate to severe anxiety (Lai et al., 2019). However, a study on the psychological impact on healthcare workers during Singapore's COVID-19 outbreak from February 19 to March 13, 2020, showed a much lower prevalence of stress (7.7%) than our study (Tan et al., 2020). This may be related to the difference in period and place, which posed greater stress on the health workers in our study.

The present results showed that front-line medical workers had anxiety and depression, with the top three items under the category of anxiety being genitourinary symptoms, behavior at interview, and respiratory symptoms, and the top three depression items being feelings of guilt, weight loss, and retardation. Specifically, as the front-line medical staff are in direct contact with the patients infected with NCP, they are among the people with the highest risk of contracting NCP. Meanwhile, they have a profound understanding of the harmful effects of NCP and are thus susceptible to anxiety and

TABLE 5 Multiple linear regression analysis results of factors influencing the mental health conditions of front-line medical workers

Variable	B	Beta	T value	p value
Anxiety				
Constant	3.498		21.574	.000
Hospital level	1.342	.151	2.306	.023
Department	0.010	.008	0.117	.907
Occupation	0.085	.067	1.022	.308
Gender	0.160	.126	1.952	.053
Age	0.065	.052	0.788	.432
Highest level of education	0.126	.100	1.524	.130
Years of service	0.094	.076	1.138	.257
Technical titles	0.086	.069	1.035	.302
Marital status	0.037	.030	0.446	.626
Have children or not	0.044	.035	0.532	.595
Current residence	0.101	.079	1.218	.225
Have you taken part in training in responding to public health emergencies?	0.079	.063	0.951	.343
Does your family support you working on the front line of anti-epidemic containment?	0.085	.067	1.033	.303
Level of fear for oneself and one's family getting infected	1.082	.398	5.381	.000
Level of worry about getting infected when having symptoms associated with NCP	1.174	.312	4.236	.000
Are you under any medical observation lately?	0.155	.122	1.883	.062
Depression				
Constant	3.621		23.304	.000
Hospital level	0.145	.118	1.776	.078
Department	0.015	.012	0.180	.858
Occupation	0.102	.082	1.233	.219
Gender	0.156	.126	1.913	.058
Age	0.034	.028	0.410	.682
Highest level of education	0.135	.110	1.650	.101
Years of service	0.057	.047	0.689	.492
Technical titles	0.076	.062	0.920	.359
Marital status	0.030	.024	0.363	.717
Have children or not	0.025	.020	0.306	.760
Current residence	0.098	.080	1.195	.234
Have you taken part in training in responding to public health emergencies?	0.061	.050	0.743	.458
Does your family support you working on the front line of anti-epidemic containment?	0.095	.076	1.152	.251
Level of fear for oneself and one's family getting infected	1.271	.367	4.899	.000
Level of worry about getting infected when having symptoms associated with NCP	1.385	.326	4.349	.000
Are you under any medical observation lately?	0.157	.127	1.918	.057

Note: for Anxiety, $R^2 = 0.386$, F = 30.546, and $p = .000$; for Depression, $R^2 = 0.353$, F = 40.014, and $p = .000$.

depression. Confidence in infection control measures may also mitigate and facilitate mental problems in medical workers. A recent study found that more intensive training on personal protective equipment and infection control measures were found to support medical workers (Tan et al., 2020) and develop psychological resilience during the COVID-19 pandemic (Ho, Chee, & Ho, 2020). There is a shortage of protective equipment in Wuhan and, as such, some medical staff members wear only one set each day to avoid waste, which compels them to refrain from drinking water. Some have gone so far as to wear diapers for urination, which can lead to genitourinary symptoms, if not replaced for a long time. Moreover, wearing protective equipment for a long time can lead to poor vision, poor mobility, clumsy operation, poor breathing, communication difficulties, and other problems that bring anxiety to the medical staff. In addition, 5.3% of the front-line medical staff reported not having their family's support for going to the anti-epidemic front line; they may experience self-blame for being in an environment with high risks of infection. Meanwhile, because of overtime work on the front line, they could only sleep for a few hours a day and have irregular eating times, which can lead to weight loss. Owing to mental retardation arising from poor physical health, the front-line medics can face severe depression. The results of this study suggest that the psychological issues of the front-line medical workers, such as depression and anxiety, urgently demand attention from psychologists and team leaders. Only when equipped with good professional advantages and psychological qualities for self-adjustment and self-protection can the front-line medical workers better overcome the epidemic. The conclusions of this study are partially consistent with those on the mental health status of medical workers on the front line of efforts to contain SARS in 2003 (Wang et al., 2004).

Influence of the level of worry about getting infected when exhibiting symptoms associated with NCP and the level of fear for oneself and one's family getting infected aggravate the medical worker's anxiety and depression. The source of NCP infection is mainly patients infected with NCP, and people with recessive infection (i.e., asymptomatic infection) may also become the source of infection (La et al., 2020). Front-line medical staff members face high risks of getting infected because of frequent close contact with patients in the treatment of and care for the latter (Chan et al., 2020). Among the 138 patients admitted to the Zhongnan Hospital in Wuhan University between January 1 and 28, 2020, the proportion of medical workers was as high as 29% (Wang et al., 2020). A retrospective analysis of the 1,099 patients diagnosed with NCP (diagnosis date as of 29 January) in 552 hospitals in 31 provinces found that the proportion of

medical staff was 2.09% (Hui et al., 2020). Therefore, medical workers belong to the high-risk group and experience great psychological pressure. If they are infected when supporting anti-epidemic efforts in Hubei Province, the effects are not only on their own physical and mental health but also those of their families. Thus, with the appearance of symptoms and the corresponding increase in the degree of worry, especially for 15.3% of the front-line medical workers who were under medical observation, their anxiety and depression would become aggravated, which could heavily affect their physical and mental health and, subsequently, the treatment of patients infected with NCP. Therefore, targeted psychological interventions are needed for the front-line medical workers who appear to have related symptoms and those receiving medical observation to relieve their physical and psychological burdens and facilitate a speedy recovery.

From the perspective of the hospital level, medical professionals from high-level hospitals have high anxiety scores. In the present study, the front-line medical personnel were sent to different levels of hospitals, including level 3 and level 2. Hospitals of a higher level have more medical equipment and receive more patients with NCP, who also tend to be at a more serious stage of infection. Therefore, the higher the hospital level, the heavier its anti-epidemic tasks, and the higher the professional and technical requirements for the medical workers. Meanwhile, society, including the media, tends to pay the highest attention to medical workers in high-level hospitals; thus, the latter have to set a leading model role in the efforts against the epidemic and also endure more physical and mental pressure compared to their counterparts in lower-level hospitals. Previous studies on mental health at the time of similar events have reported the same insights (Wang et al., 2004).

4.1 | Limitations and further research

The generalizability of the research results is limited by its cross-sectional design using convenient samples from front-line medical workers in one province. Based on the current study, future research may use a longitudinal approach with a wider scope of samples to measure the psychological state of front-line medical professionals from multiple dimensions. This approach is expected to identify the interaction between demographics and psychological states in a more comprehensive manner.

5 | CONCLUSION

In the face of such a catastrophic emergency as the COVID-19 epidemic, and influenced by various

subjective and objective factors, the presence of some psychological disorders is a form of stress response for front-line medical staff. These disorders can also be seen as an explanatory, emotional, and defensive response process within the human body, and also the body's physiological response to physical needs or harm. While working in such unique environments, front-line medics can experience disorders with respect to their work, life, emotions, and other normal states. Owing to the requirements for isolation and disinfection, medical workers have to wear several layers of isolation gowns, which adds to their physical labor, consumes a large amount of energy, and leads to a severe lack of oxygen, resulting in physical and psychological symptoms. When confronted with a disaster, people in good mental health would take the initiative to adopt countermeasures, such as speaking out, shifting attention, compensating, relaxing, and turning to humor, self-comfort, and reason. The present results demonstrated that front-line medical workers experience serious anxiety and depression in their efforts to control the NCP epidemic. The psychological testing showed that people experience a process of adaptation to catastrophic emergencies, from initial unacceptance, shock, and fear, to routine, acceptance, and calmness, until co-existence is reached, which is a process with its order. Facing such sudden disasters as the NCP outbreak, both medical professionals and patients experience psychological clinical symptoms. For front-line medical staff, while ensuring the completion of their duties, keeping good mental health is crucial. Given the special circumstances, it is urgently worth discussing how to strengthen the mental health monitoring of front-line medical workers and establish an active, systematic, and scientific system for psychological protection.

5.1 | Relevance to clinical practice

Our results found that front-line medical staff have anxiety and depression symptoms when dealing with the outbreak of COVID-19, and are presented with considerable psychological stress in the face of the growing number of confirmed cases and the current absence of special treatment. Consequently, guiding policies and psychological interventions are crucial to maintaining their psychological well-being. Different measures may be implemented to solve this problem. For example, organized rotation and shifts would allow for breaks from working in high-risk areas and to facilitate the arrangement of family and social time. Expressed appreciation and support on the part of medical organizations would help to prevent burnout and build a resilient team to conserve strength for working in a stressful environment during the outbreak of an emerging infectious disease. Educational programs for medical workers to fulfill their desire for related knowledge as well as mental health programs to improve their mental well-being are essential and may relate to better control of the infectious disease.

DISCLOSURE AND CONFLICT OF INTERESTS
The authors declare they have no any involvement, financial or otherwise, that may potentially bias their work.

AUTHORS' CONTRIBUTIONS
The authors were responsible for the paper as follows: LYL and NS, conception, design, analysis, and data interpretation, drafting the manuscript, revising the manuscript, and its final approval; NS, acquisition of data, project administration, manuscript revisions, and its final approval; LBY and SQC, formal analysis, manuscript revision, and final approval; SY and HYL, conception, manuscript revision, and final approval; and SDF, conception, design, funding acquisition, project administration, manuscript revision, and final approval. All the authors have read and approved the final manuscript.

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