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Clinical study

A preliminary study on the anxiety and depression situation and psychological intervention of the first-line medical staff in our hospital during the COVID-19 epidemic



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ABSTRACT

To assess the anxiety and depression situation and psychological intervention effect of the first-line medical staff in our hospital during the COVID-19 epidemic. A total of 384 front-line medical staff in our hospital from January 25 to March 8, 2020 were selected as subjects, which were divided into group A and group B respectively. PHQ-9 depression scale and GAD-7 self-rating anxiety scale questionnaire were used to investigate their anxiety and depression. After 1 month, all subjects were re-self-assessed for anxiety and depression, which were named as A1 and B1 group respectively. The GAD-7 anxiety scale had mild, moderate, and severe anxiety scores before group A, which were significantly higher than those in group B ($P < 0.05$); after psychological intervention, group A1 had significantly reduced anxiety scores ($P < 0.05$). And there were no markedly difference of PHQ-9 scale scores before and after psychological intervention between groups A and B, A and A1, and B and B1 ($P > 0.05$). The first-line medical staff in our hospital have different degree of anxiety and depression during COVID-19. Early positive psychological intervention has an effect on ameliorating the anxiety.

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1. Introduction

The coronavirus pneumonia (COVID-19) caused by the new coronavirus (SARS-CoV-2) in 2019 is a pandemic and was first reported in Wuhan, China [1–4] and has become an increasingly serious public event without effective treatment [5–7]. Medical and health workers are the first-line soldiers to treat patients with coronavirus. Frontline medical staff face challenges that ordinary people can't imagine and they need to overcome their inner fear of being infected at any time and endure the fear of their families and focus on the treatment of patients. Enlighten patients and their families, they look desperately at the comrades in their arms infected by the virus but are powerless. Faced with a shortage of medical supplies, they are under unprecedented overwork pressure, shouldering the expectation of the entire society to fight the epidemic and have the huge psychological pressure [8,9]. Therefore, while protecting medical personnel from being infected

by viruses, it is also necessary to deeply understand the psychological characteristics of first-line medical personnel and promptly and scientifically and effectively conduct psychological counseling [10–12] to ensure that all medical staff struggling on the frontline overcome the epidemic physically and mentally. Our study intends to understand the anxiety and depression of the frontline medical staff in our hospital during COVID-19 period and provide reference for the promotion and application of psychological state and psychological intervention for medical staff in response to emergencies.

2. Materials and methods

2.1. The research subjects

200 people from the first-line medical staff who participated in the prevention and control of COVID-19 from January 25, 2020 to March 8, 2020 were randomly selected as group A, and 184 non-anti-epidemic front-line medical staff were enrolled as group B to conduct PHQ-9 Depression and GAD-7 anxiety scale questionnaire survey. No inclusion criteria and exclusion criteria were

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included in this study, and informed consents were not required during the outbreak. This study ultimately judged whether the research object was combined with anxiety and depression. The diagnosis of clinical psychologists was made based on the “gold standard”.

2.2. Investigation method

The PHQ-9 (Patient Health Questionnaire-9) depression and GAD-7 (General Anxiety Disorder-7) anxiety scale questionnaires were distributed to medical staff participating in the frontline of epidemic prevention and control to evaluate their general information and evaluate emotional conditions such as anxiety and depression. General information included: Gender, age, job title, division of work, academic qualifications, whether the family supports front-line work, and the degree of cognition of COVID-19 was divided into not understanding, understanding, and familiar. The general information of the two groups of research subjects was shown in Table 1.

2.3. Diagnostic criteria

2.3.1. PHQ-9 questionnaire

PHQ-9 was compiled based on the symptomatic criteria of depression in DSM-IV (Diagnostic and Statistical Manual of Mental Disorders, 4th Edition) [13], a depression self-assessment scale consisting of 9 items. The scale included 0–3 points to each entry, and the total score was 27 points. The degree of depression was assessed based on the score: 0–4 points: no depression; 5–9 points: Mild depression; 10–14 points: Moderate depression and 15 points or above: Severe depression.

2.3.2. GAD-7 questionnaire

GAD-7 was prepared based on the DSM-IV anxiety symptomatic criteria [14], a generalized anxiety self-assessment scale consisting of 7 items. The questionnaire also included 0–3 points for each item, with a total score of 21 points. The degree of anxiety was

Table 1
Basic characteristics of enrolled participants.

Parameters	Group A (200)	Group B (184)	P value
<i>Gender</i>			
Male (%)	46	50	0.345
Female (%)	154	134	0.345
<i>Age</i>			
20 ≤ age < 30	50	53	0.401
30 ≤ age < 40	122	110	0.807
40 ≤ age < 50	28	21	0.525
<i>Work division</i>			
Doctors	59	55	0.933
Nurses	141	129	0.933
<i>Job title</i>			
Junior	83	70	0.489
Intermediate	102	100	0.512
Senior	15	14	0.968
<i>Education background</i>			
College	22	20	0.967
Bachelor	138	127	0.996
Master or above	40	37	0.979
<i>Family support</i>			
Yes	189	162	0.263
No	17	22	0.263
<i>Understanding of COVID-19</i>			
Unfamiliar	32	37	0.295
Familiar	128	110	0.395
Very familiar	40	37	0.979

assessed based on the score: 0–4 points: without anxiety; 5–9 points: mild anxiety; 10–14 points: moderate anxiety and 15 points or above: Severe anxiety.

2.4. Psychological intervention

The hospital carried out psychological counseling lines and columns through the establishment of WeChat groups, etc. to collect emergency psychological changes, and targeted, regularly opened online and offline psychological clinics to receive psychological counseling from all first-line medical staff. 1) Medical staff who may have mild-to-moderate anxiety and depression on the scale use group psychological intervention to promote the knowledge of prevention and control of COVID-19, humanistic care, and specific measures included psychological support, psychological counseling, cognitive therapy, behavior correction, music interventions such as therapy. 2) Medical and nursing personnel who may have severe anxiety and depression were diagnosed with psychological counseling experts, and one-on-one psychological intervention, online and offline psychological clinics, severely diagnosed patients with anti-anxiety and depression drugs if necessary according to the needs of the ward or withdraw from the front line and give proper rest to promote mental health. The psychological intervention time was 1 month. One month later, the PHQ-9 depression and GAD-7 anxiety scale questionnaires were conducted again on the above two groups of subjects, which were A1 (190 questionnaires were recovered, effective recovery rate was 95.0%) and B1 group (176 questionnaires were recovered, effective recovery rate was 95.7%).

2.5. Statistical methods

SPSS 22.0 software was used to perform statistical processing on the general characteristics. The scores of the four groups of PHQ-9 depression and GAD-7 anxiety scales, the measurement data was expressed as mean ± standard deviation, and the count data was expressed as a percentage (%). The comparison of data was made by *t*-test, chi-square test, or multi-factor analysis of variance (ANOVA). $P < 0.05$ was considered statistically significant.

3. Results

3.1. The distribution of anxiety

The Anxiety Scale counted 81 people without anxiety and 119 people with anxiety tendencies in Group A (mild: 57, moderate: 51 and severe: 11) with a detection rate of 59.5%. There were 95 people with anxiety in group B (mild: 53, moderate: 40 and severe: 8) with a detection rate of 51.6%. In addition, 71 people had no anxiety and 119 people had anxiety tendencies in A1 group (mild: 71, moderate: 34 and severe: 8) and detection rate was 62.6%, whereas, there 85 people had no anxiety and 91 people with anxiety tendencies in group B1 (mild: 58, moderate: 26 and severe: 7) and detection rate was 51.7%.

3.2. The score statistics of anxiety scale

The GAD-7 anxiety scale had higher scores for mild, moderate, and severe anxiety before psychological intervention in group A than group B, and there was a statistical difference ($P < 0.05$). After psychological intervention, the score of light to moderate anxiety in group A1 was significantly lower than that in group A ($P < 0.05$) without difference of other indicators ($P > 0.05$) (Table 2).

Table 2
Score statistics of the anxiety scale of the four groups.

	Group A	Group B	Group A1	Group B1
No anxiety	2.48 ± 1.13	2.30 ± 1.13	2.22 ± 1.09	2.22 ± 1.09
Mild anxiety	6.81 ± 0.95ab	6.35 ± 0.96	6.15 ± 1.28	6.48 ± 1.14
Moderate anxiety	12.37 ± 1.54ab	11.32 ± 1.01	11.55 ± 1.15	11.42 ± 0.95
Severe anxiety	18.73 ± 2.05a	15.75 ± 0.71	16.50 ± 1.41	16.14 ± 1.86

a: Group A compared with Group B, P < 0.05.
b: Group A compared with Group A1, P < 0.05.

3.3. Distribution of the number of subjects in four groups

According to the depression scale, 94 people had no depression and 106 people had depression tendency in group A (mild: 60, moderate: 37 and severe: 9) and detection rate was 53.0%; whereas, 85 people had no depression and 99 people had depression (mild: 57, moderate: 34 and severe: 8) in group B and detection rate was 53.8%. 94 people had no depression and 82 people had depression tendencies (mild: 56, moderate: 35 and severe: 5) in A1 group with a detection rate of 48.9%. 81 people had no depression and 95 people with depression in group B1 (mild: 59, moderate: 32 and severe: 4) with a detection rate of 54.0%.

3.4. The score statistics of the four groups of subjects

No significant differences of PHQ-9 scale score before and after psychological intervention between group A and B, A and A1, and B and B1 groups were found (P > 0.05) (Table 3). In addition, there was no statistical difference of the anxiety and depression status and educational background in Group A, B, B1 and A1, which may be related to the training on COVID-19 prevention and control knowledge for the medical staff organized by the hospital. As shown in the Table 1, about 82% of the subjects were familiar with COVID-19 prevention and control knowledge, which may partly explain no statistical difference overserved among these groups.

4. Discussion

As we all know, the outbreak of major infectious diseases will have a certain psychological impact on ordinary people and medical personnel. Studies have reported that medical staff experienced acute stress responses and related psychological sequelae during the outbreak of severe acute respiratory syndrome (SARS) in 2003 [15–17]. At present, the epidemic outbreak of New Coronary Pneumonia has been curbed in my country but it has not been controlled worldwide, and the international epidemic situation is still severe [18]. New Coronary Pneumonia, as a new type of infectious disease, is generally susceptible to the population [19], many people are in a state of psychological stress, and some severe people may have acute stress disorder, post-traumatic stress disorder, anxiety, depression and other emotional disorders and even behavioral disorders such as impulse wounding, self-inflicted suicide, alcohol and drug dependence, etc [20]. These severe patients are in a state of psychological crisis and require psychological help. Our hospital is located in the northeast of Chongqing and is one of Chongqing’s COVID-19 hospitals which received about half of

the patients with new coronary pneumonia in Chongqing. Facing the strong infectiousness of COVID-19, non-specific treatment drugs, high exposure risk and the relative shortage of medical protective materials, it was a great challenge for the medical staff in our hospital, especially for the front-line workers, which may cause a series of physical and mental problems.

In recent years, PHQ-9 and GAD-7 based on the Depression and Anxiety Symptomology of the US Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) have higher reliability in identifying depression and anxiety because of high reliability and validity sensitivity and specificity [21,22], and widely used in the identification of depression and anxiety in grassroots communities or disease-specific populations [22–24]. Health questionnaire depression symptom scale (PHQ-9) and generalized anxiety disorder (GAD-7) are also important methods recommended by the World Health Organization (WHO) for screening and evaluating patients’ depression and anxiety in recent years. It has been translated into different languages and used for depression and anxiety screening in different countries [13]. At present, the application researches on the assessment of mental state of patients in cardiovascular medicine, neurology and malignant tumors showed that these two scales are simple and easy to use, and can effectively and reliably screen patients for depression and anxiety. Therefore, the PHQ-9 and GAD-7 questionnaires with fewer entries, concise content, and better compliance can effectively reflect the psychological status of medical staff in clinical practice.

Yang et al. [25] used the Symptom Self-Assessment Scale (SCL-90), Cornell Health Index (CMI), Anxiety Self-Assessment Scale (SAS), Depression Self-Assessment Scale (SDS), and Posttraumatic Stress Disorder (PTSD) diagnostic criteria to assess the mental health status of medical staff who have participated in dealing with SARS in the first year. The incidence of PTSD symptoms in the psychological intervention group and the non-intervention group were compared and found that the mental health of the first-line medical staff participating in SARS was lower than that of control group and intervention group was superior to non-intervention group. It is necessary to provide psychological intervention as soon as possible. Zhang [26] and other studies found that the prevalence of psychological symptoms of medical staff during the epidemic of new coronavirus pneumonia in China was higher than that of non-medical staff. Apart from the statistical difference in the degree of family support, our research subjects have no statistical difference in other general characteristics. We used the PHQ-9 and GAD-7 scale questionnaires to find that during the peak of the COVID-19 epidemic, the medical and nursing groups in our hospital showed varying degrees of anxiety and

Table 3
Scores of depression scale of four groups.

	Group A	Group B	Group A1	Group B1
No anxiety	1.84 ± 1.23	2.11 ± 1.30	2.06 ± 0.96	1.73 ± 1.11
Mild anxiety	6.78 ± 1.04	6.44 ± 1.32	6.48 ± 1.21	6.32 ± 1.26
Moderate anxiety	11.38 ± 1.46	11.38 ± 1.41	11.45 ± 1.04	11.19 ± 0.97
Severe anxiety	16.89 ± 1.17	16.25 ± 1.04	16.00 ± 0.71	18.00 ± 2.58

depression and there was a certain acute stress response. The study found that the scores of mild, moderate and severe anxiety in group A were higher than those in non-first-line group B before psychological intervention ($P < 0.05$). After psychological intervention, the mild-moderate anxiety scores in group A1 were significantly decreased compared with before intervention ($P < 0.05$). However, there was no significant difference in psychological intervention before and after depression, suggesting that early psychological intervention is valuable. At present, many domestic studies [27,28] reported that during the prevalence of COVID-19, the mental health status of medical care group caused a significant negative impact. There were varying degrees of anxiety and depression among medical staff, which is consistent with our research. It has great significance to conduct active and effective psychological crisis interventions on frontline medical staff to minimize the psychological trauma of frontline medical staff, improve work morale and combat effectiveness, and better serve the majority of patients. Through preventive and post-disaster collective interviews, professionals can ease the panic of first-line medical staff and provide corresponding support and comfort. To a certain extent, they can prevent first-line medical staff from experiencing post-traumatic stress disorder after the epidemic. Therefore, we call for attention to the promotion and application of the mental health of first-line medical staff and the necessary psychological intervention.

Our study has some limitations. Firstly, we used the PHQ-9 and GAD-7 self-rating questionnaires to roughly assess the anxiety and depression of the medical staff in our hospital. The accuracy needs to be compared with the clinical interview of the Hamilton Anxiety and Depression Scale. Secondly, due to the urgent situation and limited manpower, energy, and professionalism, we did not investigate the clinical symptoms and the risk factors of anxiety and depression among the subjects. Thirdly, statistical difference of anxiety was observed between first-line group A and non-first-line group B, which was different from the results obtained from depression. Further investigations would be necessary to reveal the mechanism of these findings. Last but not least, our sample size is small, and the research time is still short, which may affect our results. It needs to be further evaluated by a large sample and multi-center clinical study. We intend to further evaluate the clinical physical symptoms of our research subjects after the epidemic, and obtain the relationship between psychological sequelae and various physical symptoms.

5. Conclusions

The first-line medical staff in our hospital have different degree of anxiety and depression during COVID-19. Early positive psychological intervention has an effect on ameliorating the anxiety.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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References

- [1] Li Q, Guan X, Wu P, Wang X, et al. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *N Engl J Med* 2020;382:1199–207.
- [2] Gandhi PA, Kathirvel S. Epidemiological studies on COVID-19 pandemic in India: too little and too late?. *Med J Armed Forces India* 2020.
- [3] The L. COVID-19: too little, too late?. *Lancet* 2020;395:755.
- [4] Day M. Covid-19: surge in cases in Italy and South Korea makes pandemic look more likely. *BMJ* 2020;368:m751.
- [5] Guan WJ, Ni ZY, Hu Y, Liang WH, et al. Clinical characteristics of coronavirus disease 2019 in China. *N Engl J Med* 2020;382:1708–20.
- [6] Zhou P, Yang XL, Wang XG, Hu B, et al. A pneumonia outbreak associated with a new coronavirus of probable bat origin. *Nature* 2020;579:270–3.
- [7] Wang M, Cao R, Zhang L, Yang X, et al. Remdesivir and chloroquine effectively inhibit the recently emerged novel coronavirus (2019-nCoV) in vitro. *Cell Res* 2020;30:269–71.
- [8] Zhu J, Sun L, Zhang L, Wang H, et al. Prevalence and influencing factors of anxiety and depression symptoms in the first-line medical staff fighting against COVID-19 in Gansu. *Front Psychiatry* 2020;11:386.
- [9] Montemurro N, Perrini P. Will COVID-19 change neurosurgical clinical practice?. *Br J Neurosurg* 2020;1–2.
- [10] Bao Y, Sun Y, Meng S, Shi J, et al. 2019-nCoV epidemic: address mental health care to empower society. *Lancet* 2020;395:e37–8.
- [11] Kang L, Li Y, Hu S, Chen M, et al. The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. *Lancet Psychiatry* 2020;7:e14.
- [12] Liu S, Yang L, Zhang C, Xiang YT, et al. Online mental health services in China during the COVID-19 outbreak. *Lancet Psychiatry* 2020;7:e17–8.
- [13] Garabiles MR, Lao CK, Yip P, Chan EWW, et al. Psychometric validation of PHQ-9 and GAD-7 in Filipino migrant domestic workers in Macao (SAR), China. *J Pers Assess* 2019;91:1–12.
- [14] Spitzer RL, Kroenke K, Williams JB, et al. A brief measure for assessing generalized anxiety disorder: the GAD-7. *Arch Intern Med* 2006;166:1092–7.
- [15] McAlonan GM, Lee AM, Cheung V, Cheung C, et al. Immediate and sustained psychological impact of an emerging infectious disease outbreak on health care workers. *Can J Psychiatry* 2007;52:241–7.
- [16] Tam CW, Pang EP, Lam LC, Chiu HF. Severe acute respiratory syndrome (SARS) in Hong Kong in 2003: stress and psychological impact among frontline healthcare workers. *Psychol Med* 2004;34:1197–204.
- [17] Grace SL, Hershenfeld K, Robertson E, Stewart DE. The occupational and psychosocial impact of SARS on academic physicians in three affected hospitals. *Psychosomatics* 2005;46:385–91.
- [18] Del Rio C, Malani PN. 2019 novel coronavirus – important information for clinicians. *JAMA* 2020.
- [19] Huang C, Wang Y, Li X, Ren L, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet* 2020;395:497–506.
- [20] Montemurro N. The emotional impact of COVID-19: from medical staff to common people. *Brain Behav Immun* 2020;87:23–4.
- [21] Esser P, Hartung TJ, Friedrich M, Johansen C, et al. The generalized anxiety disorder screener (GAD-7) and the anxiety module of the hospital and depression scale (HADS-A) as screening tools for generalized anxiety disorder among cancer patients. *Psychooncology* 2018;27:1509–16.
- [22] Kertz S, Bigda-Peyton J, Bjorgvinsson T. Validity of the generalized anxiety disorder-7 scale in an acute psychiatric sample. *Clin Psychol Psychother* 2013;20:456–64.
- [23] Martin A, Rief W, Klaiberg A, Braehler E. Validity of the brief patient health questionnaire mood scale (PHQ-9) in the general population. *Gen Hosp Psychiatry* 2006;28:71–7.
- [24] Williams LS, Brizendine EJ, Plue L, Bakas T, et al. Performance of the PHQ-9 as a screening tool for depression after stroke. *Stroke* 2005;36:635–8.
- [25] Yang L, Wu X, Zhang Y. Investigation and research on the long-term mental health of first-line medical staff during SARS. *Chin J Health Psychol* 2005;15:567–9.
- [26] Zhang WR, Wang K, Yin L, Zhao WF, et al. Mental health and psychosocial problems of medical health workers during the COVID-19 epidemic in China. *Psychother Psychosom* 2020;1–9.
- [27] Deng S. Survey of psychological status of medical staff in Yongchuan Hospital affiliated to Chongqing Medical University during COVID-19. *Basic Med Clin* 2020;40:601–3.
- [28] Xu Y, Zhao M, Tang X, Zhu X, et al. Study on the correlation between mental health and coping style of medical staff during the epidemic of new coronavirus pneumonia. *Anhui Med* 2020;41:22–5.