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Research paper

Anxiety and depression symptoms of medical staff under COVID-19 epidemic in China

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ABSTRACT

Background: It is well known that unexpected pandemic has led to an increase in mental health problems among a variety of populations.

Methods: In this study, an online non-probability sample survey was used to anonymously investigate the anxiety and depression symptoms among medical staff under the COVID-19 outbreak. The questionnaire included Perceived Stress Scale-10 (PSS-10), Generalized Anxiety Disorder 7-Item Scale (GAD-7) and Patient Health Questionnaire-9 (PHQ-9). Factors associated with anxiety and depression symptoms were estimated by logistic regression analysis.

Results: A total of 1090 medical staff were investigated in this study. The estimated self-reported rates of anxiety symptoms, depression symptoms and both of the two were 13.3%, 18.4% and 23.9% respectively. Factors associated with self-reported anxiety symptoms include married status (OR = 2.3, 95%CI: 1.2, 4.4), not living alone (OR = 0.4, 95%CI: 0.2, 0.7), never confiding their troubles to others (OR = 2.2, 95%CI: 1.4, 3.5) and higher stress (OR = 14.4, 95%CI: 7.8, 26.4). Factors associated with self-reported depression symptoms include not living alone (OR = 0.4, 95%CI: 0.3, 0.7), sometimes/often getting care from neighbours (OR = 0.6, 95%CI: 0.4, 0.9), never confiding their troubles to others (OR = 2.0, 95%CI: 1.3, 3.0) and higher stress (OR = 9.7, 95%CI: 6.2, 15.2).

Limitations: The study was a non-probability sample survey. Besides, scales used in this study can only identify mental health states.

Conclusions: Under outbreak of COVID-19, self-reported rates of anxiety symptoms and depression symptoms were high in investigated medical staff. Psychological interventions for those at high risk with common mental problems should be integrated into the work plan to fight against the epidemic.

1. Introduction

An outbreak of pneumonia was reported in central China’s Wuhan city in December 2019. The disease, which has spread across China and beyond, is caused by a novel coronavirus, officially named as COVID-19. It has gained intense attention both nationwide and globally (Xiang et al., 2020). At 3:32 a.m., on January 31, 2020, the World Health Organization declared that the outbreak constituted a Public Health Emergency of International Concern (PHEIC) (WHO, 2020). PHEIC was defined as "Unusual events that pose public health risks to other countries through the international spread of disease and may require a coordinated international response." As of 11 February, a total of 1716 medical staff were confirmed to have COVID-19 infections in mainland China, accounting for 3.8% of all confirmed cases (The Novel Coronavirus Pneumonia Emergency Response Epidemiology Team, 2020). As of Feb. 23, there have been more than 330 medical teams composed of more than 41600 medical staff to support Hubei Province. As of 9:03 p.m., on April 16, 2020, COVID-19 has spread

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rapidly worldwide, particularly in the United States of America (Total confirmed cases: 639,733), Spain (Total confirmed cases: 182,816), Italy (Total confirmed cases: 165,155), Germany (Total confirmed cases: 134,753), and France (Total confirmed cases: 134,598) (Johns Hopkins University, 2020).

Whether in Wuhan or elsewhere, all medical staff were under tremendous pressure, resulting from overwork, a high risk of infection, uncertainty about medical technology and personal capabilities, a lack of contact with their families, and isolation during COVID-19 (Kang et al., 2020). The severe situation might cause mental health problems such as stress, anxiety, depressive symptoms, insomnia, denial, anger, and fear (Kang et al., 2020). Several studies have reported mental health problems among medical staff (Zhang et al., 2020; Lu et al., 2020; Guo et al., 2020), however, the results vary depending on the measurement tools, survey time and location.

2. Method

2.1. Study design

This survey, based on non-probability sampling design, was conducted from 24 February to 9 March, 2020. We surveyed medical staff who had been working in the hospitals during the outbreak, using an online questionnaire administered via a Web-based survey platform. During the survey, the Quick Response code (QR code) linked the online questionnaire was sent to the WeChat group of eight hospitals located in seven provinces. Among the respondents, there were also a small number of participants who were contacted through the help of medical staff working in hospitals. Only clinical healthcare workers were included, and non-clinical were excluded, such as administrative personnel, logistics and ambulance drivers. Those who have come into contact with fever patients or patients with COVID-19 are defined as the front-line medical staff. Each individual could complete the questionnaire only once. Electronic informed written consent was obtained from all respondents before the data collection. Besides, the research was approved by the Research Ethics Board at The First Affiliated Hospital of Nanchang University (Ethical number: 2020-048).

2.2. Measurements

The measurements contained the following four parts: Sociodemographic data and others, Perceived Stress Scale-10, Generalized Anxiety Disorder 7-Item Scale and Patient Health Questionnaire-9.

2.2.1. Sociodemographic data and others

Sociodemographic data included gender, age, qualification, marital status, the nature of work, job type, professional title, and work experience. Besides, other questions included "Whether living alone", "The frequency of caring from the neighbours (Never/Almost never OR Sometimes/Often)", "The frequency of helping from friends (Never/Almost never OR Sometimes/Often)", "Whether confiding their troubles to others", "Do you need to contact fever patients or patients diagnosed with COVID-19?"

2.2.2. Perceived stress scale-10 (PSS-10)

This questionnaire had a professional appearance, and was formatted in such a way as to make it easy to fill in (Lee, 2012). Each of the 10 items was divided into a five-point frequency scale (0 = never; 1 = almost never; 2 = sometimes; 3 = fairly often; 4 = very often) in relation to the past month. The PSS-10 consisted of six negative items and four positive items. The positive items were reversely coded when calculating the total score of the PSS-10 (Cohen et al., 1983). Scores for 10 items were summed to obtain a PSS-10 total score, ranging from 0 to 40. Higher scores indicated a higher level of perceived stress. In this study, higher stress was defined as a total score of PSS-10 ≥15.

2.2.3. Generalized anxiety disorder 7-item (GAD-7) Scale

This was a self-rating measure used to assess general anxiety disorder, consisting of 7 items (Kertz et al., 2013). Each item was rated on a four-point degrees of the scale (0 = not at all; 1 = some of the time; 2 = more than half the time; 3 = nearly every day) in relation to the past two weeks. The scale had demonstrated good reliability and validity as established measures of anxiety (Spitzer et al., 2006; Kertz et al., 2013). The GAD-7 severity score ranged from 0 to 21. The study reported that it was of more clinical significance to use 10 as the cut-off points for anxiety symptoms (Löwe et al., 2008). Therefore, 10 points was taken as the cut-off point in this study.

2.2.4. Patient health questionnaire-9 (PHQ-9)

This was a self-rating measure used to assess depression and depression severity (Levis et al., 2019). Each of the 9 items was divided into a four-point degrees of the scale (0 = not at all; 1 = some of the time; 2 = more than half the time; 3 = nearly every day) in the past two weeks. PHQ-9 was the most widely used instrument for screening depression in primary health care (Levis et al., 2019; Spitzer et al., 1999). The total score ranged from 0 to 27. The study reported that it was of more clinical significance to use 10 as the cut-off points for depression symptoms (Manea et al., 2015). Therefore, 10 points was taken as the cut-off point in this study.

2.3. Statistical analyses

Chi-square test was used to compare the distribution characteristics of cases with self-reported anxiety symptoms and depression symptoms. Binary logistic regression analysis was performed to screen factors associated with self-reported anxiety symptoms, self-reported depression symptoms, calculate ORs (Odds Ratios) and its 95% CI (Confidence Interval). Statistical tests were two-tailed with p<0.05 and the database was constructed by using EpiDate3.1 and analyzed by SPSS 25.0.

3. Results

3.1. Characteristics of the sample

59.8% of the participants worked in Jiangxi province, 18.5% worked in Heilongjiang province; 80.2% were women and 19.8% were men; 40.6% were doctors and 59.4% were nurses; 34.0% were front-line medical staff and 66.0% were the non-front-line medical staff. 39.2% were aged <30 years, 32.7% were aged 26 to 40 years; the total score ranged from 0 to 27. The study reported that it was of more clinical significance to use 10 as the cut-off points for depression symptoms (Manea et al., 2015). Therefore, 10 points was taken as the cut-off point in this study.

3.2. The self-reported rates of anxiety symptoms and depression symptoms among medical staff

The self-reported rates of anxiety symptoms and self-reported depression symptoms were 13.3% and 18.4% respectively; self-reported anxiety or depression symptoms was 23.9%; self-reported anxiety and depression symptoms was 7.8%.

Significantly higher proportions of self-reported anxiety symptoms were found in investigated medical staff with the following characteristics: married status, living alone, never/almost never getting help from friends, never/almost never getting care from neighbours, never confiding their troubles to others and higher stress (see Table 1).

Significantly higher proportions of self-reported depression symptoms were found in investigated medical staff with the following characteristics: <30 years old, living alone, never/almost never getting help from friends, never/almost never getting care from neighbours, never confiding their troubles to others and higher stress.

Significantly higher proportions of self-reported anxiety or depression symptoms were found in investigated medical staff with the following characteristics: nurse, junior college or below, living alone,
Correlators associated with anxiety and depression symptoms among medical staff

Table 2

| Characteristic | Groups         | Anxiety symptom % (95%CI) | Depression symptom % (95%CI) | Any of the two % (95%CI) |
|----------------|----------------|---------------------------|------------------------------|--------------------------|
| Work experience, years | < 5 | 268 | 10.4 (6.8-14.1) | 20.1 (15.3-25.0) | 23.9 (18.7-29.0) |
| | > 5 | 380 | 13.7 (10.2-17.2) | 15.0 (11.4-18.6) | 21.3 (17.2-25.5) |
| Marital status | Married | 829 | 14.6 (12.2-17.0) | 18.0 (15.4-20.6) | 24.2 (21.3-27.2) |
| | No | 973 | 12.0 (10.0-14.1) | 16.5 (14.2-18.9) | 21.7 (19.1-24.3) |
| Help from friends | Never/AIMost never | 465 | 18.1 (14.6-21.6) | 24.9 (21.0-28.9) | 32.0 (27.8-36.3) |
| | Sometimes/Often | 625 | 9.8 (7.4-12.1) | 13.6 (10.9-16.3) | 17.9 (14.9-21.9) |
| Care from neighbours | Never/AIMost never | 804 | 15.2 (12.7-17.7) | 21.0 (18.2-23.8) | 27.2 (24.2-30.3) |
| | Sometimes/Often | 286 | 8.0 (4.9-11.2) | 11.2 (7.5-14.9) | 14.7 (10.8-18.6) |
| Whether living alone | Yes | 117 | 23.9 (16.1-31.8) | 34.2 (25.5-42.9) | 42.7 (33.6-51.8) |
| | No | 973 | 12.0 (10.0-14.1) | 16.5 (14.2-18.9) | 21.7 (19.1-24.3) |
| Qualification | Junior college or below | 205 | 14.6 (9.8-19.5) | 22.9 (17.1-28.7) | 30.7 (24.4-37.1) |
| | Bachelor | 715 | 13.7 (11.2-16.2) | 17.6 (14.8-20.4) | 23.1 (20.0-26.2) |
| | Master degree or above | 170 | 10.0 (5.4-16.4) | 16.5 (10.8-22.1) | 19.4 (13.4-25.4) |
| Professional title | No title/Junior title | 545 | 12.5 (9.7-15.3) | 20.7 (17.3-24.1) | 25.5 (21.8-29.2) |
| | Intermediate title | 334 | 14.4 (10.6-18.2) | 15.9 (11.9-19.8) | 23.1 (18.5-27.6) |
| | Senior title | 211 | 13.7 (9.1-18.4) | 16.6 (11.5-21.6) | 21.3 (15.8-26.9) |
| Qualification | Bachelor | 715 | 13.7 (11.2-16.2) | 17.6 (14.8-20.4) | 23.1 (20.0-26.2) |
| | Master degree or above | 170 | 10.0 (5.4-16.4) | 16.5 (10.8-22.1) | 19.4 (13.4-25.4) |
| Professional title | No title/Junior title | 545 | 12.5 (9.7-15.3) | 20.7 (17.3-24.1) | 25.5 (21.8-29.2) |
| | Intermediate title | 334 | 14.4 (10.6-18.2) | 15.9 (11.9-19.8) | 23.1 (18.5-27.6) |
| | Senior title | 211 | 13.7 (9.1-18.4) | 16.6 (11.5-21.6) | 21.3 (15.8-26.9) |
| Qualification | Bachelor | 715 | 13.7 (11.2-16.2) | 17.6 (14.8-20.4) | 23.1 (20.0-26.2) |
| | Master degree or above | 170 | 10.0 (5.4-16.4) | 16.5 (10.8-22.1) | 19.4 (13.4-25.4) |
| Professional title | No title/Junior title | 545 | 12.5 (9.7-15.3) | 20.7 (17.3-24.1) | 25.5 (21.8-29.2) |
| | Intermediate title | 334 | 14.4 (10.6-18.2) | 15.9 (11.9-19.8) | 23.1 (18.5-27.6) |
| | Senior title | 211 | 13.7 (9.1-18.4) | 16.6 (11.5-21.6) | 21.3 (15.8-26.9) |

Note: *p < 0.05, **p < 0.01, ***p < 0.001.

The analysis showed that correlators associated with any of the two self-reported symptoms included higher stress (OR = 9.7, 95% CI: 6.2, 15.2), never confiding their troubles to others (OR = 2.0, 95% CI: 1.3, 3.0), not living alone (OR = 0.4, 95% CI: 0.3, 0.7) and sometimes/often getting care from neighbours (OR = 0.6, 95% CI: 0.4, 0.9).

The analysis showed that correlators associated with self-reported depression symptoms included higher stress (OR = 9.7, 95% CI: 6.2, 15.2), never confiding their troubles to others (OR = 2.0, 95% CI: 1.3, 3.0), not living alone (OR = 0.4, 95% CI: 0.3, 0.7) and sometimes/often getting care from neighbours (OR = 0.6, 95% CI: 0.4, 0.9).

Note: *p < 0.05, **p < 0.01, ***p < 0.001.
4. Discussion

During the COVID-19 epidemic, medical staff had to work in the hospital and some even were involved in the treatment of patients with COVID-19 (Xiang et al., 2020). They might suffer from great mental health problems.

In this study, up to one-fifth of medical staff had anxiety or depression symptoms. Anxiety and depression were the most common mental health problems in the general population. The estimated self-reported rate of anxiety and depression symptoms among medical staff during the COVID-19 epidemic was higher than that from the general population (Huang et al., 2019) and similar to those reported in medical staff using the same measurement (Pappa et al., 2020). Working in the hospital during the epidemic, medical staff suffered great psychological pressure, not only worried about their high risk of being infected, but also about their patients being treated (Kang et al., 2020; Bao et al., 2020). Therefore, it was important to provide psychological interventions for this population to reduce their depression symptoms and anxiety symptoms.

The results of this study showed that medical staff who perceived a higher level of stress tend to develop anxiety and depression symptoms. Under the effect of a long-term negative event, people were more vulnerable and stressful, and more likely to be involved in serious psychological problems such as depression and anxiety (Schneiderman et al., 2005). Similar to findings from other studies (Sun et al., 2019), those lacked care from their neighbours and never told troubles to others were at high risk for depression symptoms. In terms of qualification, medical staff with relatively low educational background had a higher risk for anxiety or depression symptoms. This population might lack knowledge of the disease and easily feel helpless in the face of the epidemic, thus easily causing adverse psychological reactions (Guo et al., 2020). Similar to findings from other studies (Zhang et al., 2020; Chen et al., 2019), married medical staff had a high risk of anxiety symptoms. The main reason might be related to their higher family burdens.

Not only did the level of perceived stress significantly affect the occurrence of mental problems, but it also affected its severity (Schneiderman et al., 2006). This study found the average score of PSS-10 for medical staff was 13.97 ± 5.83, which was higher than the standard level (Lauridsen et al., 2017). Under the epidemic of COVID-19, perceived stress of medical staff significantly increased, which had been shown to be related to psychological problems in our study.

During the epidemic, the medical worker had high prevalence of self-reported anxiety symptoms, depression symptoms and suffered from great stress. Psychological interventions should be offered to the medical staff, especially for those living alone, being married, with relatively low educational background, lacking of care from the neighbours, never confiding their troubles to others, and having higher perceived stress.

5. Limitations

The limitations of this study were as follows: firstly, the study used a non-probability sample survey instead of a random sample survey due to the limitation during the COVID-19 epidemic. In addition, the difference between the online survey and the traditional face-to-face survey should also be considered. Therefore, extrapolation of the results should be cautious. Secondly, all the diagnoses in this study were mental health states, not mental disorders.

6. Conclusions

We found that the self-reported rates of anxiety symptoms and depression symptoms were high in investigated medical staff. Correlators associated with anxiety symptoms and depression symptoms varied. Bearing in mind the importance of precision prevention, our findings suggest that targeted psychological interventions for medical staff should be integrated into the work plan to fight against the COVID-19 epidemic.

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Author contributions

Mengqian Li and Hongguang Chen planned the study. Mengqian Li, Hongguang Chen, Yuan liu, Nan Zhang, Bo Hu, Xing Wang, Qiinyi Fan, Yuling Zhang, and Liping Huang took part in the process of data collection. Yuan liu and Nan Zhang carried out analysis and interpreted results, Yuan liu, Nan Zhang, and Bo Hu drafted the manuscript and Hongguang Chen and Mengqian Li revised it for critically important intellectual content and all gave final approval of the version to be published.

Declaration of Competing Interest

None.

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