The mental health status among nurses from low-risk areas under normalized COVID-19 pandemic prevention and control in China: A cross-sectional study

Xian Chen, Anne Arber, Junyu Gao, Li Zhang, Meili Ji, Dan Wang, Jinfeng Wu and Junjie Du

1Jiangsu Nursing Association, Nanjing, China, 2Faculty of Health and Medical Sciences, The University of Surrey, Guildford, UK, 3Emergency Department, The First Affiliated Hospital of Nanjing Medical University, Nanjing, 4Nephrology Department, Zhongda Hospital Southeast University, Nanjing, 5Department of Geriatrics, Nanjing First Hospital Nanjing Medical University, Nanjing, 6Oncology Department, The Affiliated Hospital of Xuzhou Medical University, Xuzhou, 7Department of Geriatrics, The First Affiliated Hospital of Nanjing Medical University, Nanjing, and 8Department of Cardiovascular Surgery, The First Affiliated Hospital of Nanjing Medical University, Nanjing, China

ABSTRACT: This study aimed to investigate the mental health status of nurses from low-risk areas of novel coronavirus (COVID-19) pandemic, its potential impact factors, and the main stressors under the normalized prevention and control in China. A mobile phone app-based survey was conducted among registered nurses in Jiangsu province via a region-stratified sampling method. The questionnaire consisted of items on the demographic characteristics of the nursing staff and their Depression, Anxiety, Stress Scale-21 (DASS-21) along with questions for self-assessment of stressors that are associated with COVID-19. STROBE guideline was used. Among 1803 nurses who were working in the low-risk areas in Jiangsu, 22.0%, 29.8%, and 16.1% of them reported moderate to extreme levels of depression, anxiety, and stress, respectively. Having 11–15 years of working experience and being a fixed-term contract nurse were associated with experiencing worse mental health outcomes while supporting-Wuhan working experience and having mental health preparation course training were independent factors that had beneficial impact on their psychological well-being afterward. In terms of source of pressure, a key finding of this study is that the main stressor among these nurses was the lack of patient’s understanding and cooperation (71.2%) which calls for better psychosocial communication between nurses and
patients. The present findings would provide information for other regions at low risk of COVID-19 and may aid the provision of support and interventions for the benefit of the psychological well-being of nurses who are exposed to life-threatening occupational risks and are more vulnerable to the pandemic than others.

**KEY WORDS:** anxiety, China, COVID-19, cross-sectional, depression, health status, mental health, nursing staff.

**BACKGROUND**

The coronavirus disease 2019 (COVID-19) caused by the novel coronavirus strain SARS-CoV-2 is currently a global pandemic (Wang et al., 2020a). In the beginning, the epidemic broke out on a large scale in Wuhan and its surrounding areas. With the strict administrative orders and extreme measures of the Chinese government authorities, the epidemic situation has been effectively controlled (Xinhua Press, 2020b). Although there are still scattered cases reported all over the country, the number of domestic cases has been greatly reduced. China classified all counties as low risk for COVID-19 from 7 May 2020 as no domestic cases had been reported on the Chinese mainland for four consecutive days, with no new deaths for 22 consecutive days (Xinhua Press, 2020a). Correspondingly, the national epidemic prevention and control policy has been changed from the blockade policy at the beginning of the outbreak to the gradual opening policy in public places under orderly control. However, hospitals in low-risk areas around the country still maintain a certain intensity of measures such as staff wearing personal protective equipment, having virus nucleic acid testing and chest X-rays for all hospitalized patients, which refers to ‘normalized COVID-19 epidemic prevention and control’ (The State Council, 2020).

In the battle with the COVID-19 epidemic, Chinese healthcare workers around the country experienced an elevated psychological burden (Chen et al., 2020; Kuo et al., 2020; Ning et al., 2020; Tan et al., 2020). On one hand, several research studies have validated the negative physical and psychological effect on the medical staff who were sent to Wuhan during the outbreak of COVID-19 (Hu et al., 2020; Kang et al., 2020; Mo et al., 2020; Ni et al., 2020; Tu et al., 2020). Those who directly engaged in the diagnosis, treatment, and care for patients with COVID-19 are known to have experienced high psychological distress (Lai et al., 2019). Among them, nurses who participated in front-line work in high-risk areas experienced great pressure on their mental health (Huang et al., 2020; Zhan et al., 2020; Zhao et al., 2020; Zhu et al., 2020). A previous study on the experience of medical staff responding to the SARS outbreak shows that effects on mental health have both short-term and long-term impacts (Maunnder et al., 2006). Therefore, it is desirable to understand the impact on supporting-Wuhan nurses’ mental health status after they finished their tasks in high-risk areas for COVID-19 and went back to work in low-risk areas. On the other hand, there are a majority of nurses nationwide who had never worked in high-risk areas and since the outbreak are facing a long period of normalized epidemic prevention and control. These nurses have been experiencing unprecedented times to deliver safe and equitable care to all populations in need. It is also important to understand their psychological pressures and whether they have different experiences compared with their supporting-Wuhan counterparts in terms of mental health status. However, evidence-based evaluation of the psychological effects on nurses from low-risk areas under normalized COVID-19 epidemic prevention is still missing. It is also unclear to what extent supporting-Wuhan nurses experience stress during normalized COVID-19 measures and to what extent this impacts on their psychological well-being afterward. It is vital to understand these questions as they may have a great impact on evidence-based mental health support services and policy to support nurses working during and after the pandemic under normalized COVID-19 regulations.

Jiangsu province has been defined as a low-risk area of the COVID-19 pandemic since the beginning of the outbreak (Jiangsu Commission of Health, 2020). It is a highly developed region in eastern China with a population of 80 million and a 20 million floating population. Since the outbreak of the COVID-19 epidemic, Jiangsu had taken a series of measures with the highest level of strictness to control the spread of the virus. Check points were set at the main entrances of all public areas to take travellers’ body temperature and check their recent itineraries. Suspected or confirmed
patients with COVID-19 were sent to local fever clinics or assigned to a special hospital for separation and treatment. Jiangsu is the only place in China’s five major economic provinces with a total number of confirmed cases not exceeding 700 (by the time of conducting of this survey). Among China’s 34 provincial administrative regions, only Jiangsu, Tibet, Qinghai, Ningxia, and Macao have achieved zero mortality, in which only Jiangsu is in China’s top 10 economic provinces. In addition, all 13 prefecture-level cities in Jiangsu have sent medical teams to Hubei province to support Wuhan and its surrounding areas in fighting the epidemic. In total, Jiangsu has sent more than 2800 medical staff including 1935 nurses, which counted the largest number from a single province in China. Therefore, in this study we conducted a regional-stratified sampling survey among nurses in Jiangsu province to investigate the mental health status of nurses from low-risk areas, the stressors for nurses, and their psychological care needs during normalized epidemic prevention and control of COVID-19.

METHODS

Study design and participants

A cross-sectional study was conducted with registered nurses in Jiangsu province. The study employs a mobile phone app-based anonymous survey questionnaire (Wenjuanxing, www.wjx.cn). The data collection period was from 29 July to 9 August 2020 (i.e. within a period of 8 weekdays and 4 weekends). The STROBE guideline for cross-sectional studies was used.

Upon approval by the Ethics Committee of the First Affiliated Hospital of Nanjing Medical University (approval number: 2020-SRFA-340) and the Jiangsu Nursing Association (JNA), JNA distributed an anonymous, self-rated questionnaire to all current members in Jiangsu via a WeChat applet and invited them to participate in the study. All study participants provided informed consent electronically prior to participating in the survey. The informed consent page presented two options (yes/ no). Only subjects who chose yes were guided to the questionnaire pages, and participants could quit the process at any time.

In order to represent the situation of nurses proportionally in the whole province, a regional-stratified sampling method was applied. Registered nurses located in 13 prefecture-level cities in Jiangsu province were divided into 13 groups (regions) based on their geographic locations. The questionnaire was distributed to all 13 regions and 150 filled questionnaires from each region were randomly selected if there were more than 150 responses in that region; otherwise all questionnaires from one region were included in case there were less than 150 responses in that region. Finally, a total of 1803 valid questionnaires were enrolled in the study (Figure 1).

Instruments

The questionnaire consists of three parts: basic demographic and professional data, Chinese version of Depression Anxiety Stress Scale 21 (DASS-21) questionnaire, and self-assessment of stressors that are associated with the COVID-19.

Demographic and professional data

The first domain of the questionnaire collected demographic and professional data including gender (male or female), age (divided into 5 ranks from 18 years to >51 years), marital status (single, married, or divorced), educational levels (technical secondary school diploma, college degree, bachelor degree, or master degree or above), working experience (divided into 5 ranks based on their working years), levels of nursing specialties (primary nurses, senior nurses, managers or deputy chief nurses or higher), employment type (permanent contract employees or fixed-term contract employees), hospital classification (tertiary, secondary or primary hospitals/surgeries), nurses that had supporting-Wuhan experience or had been at a local fever clinic, and whether they had received any mental health training preparation.

Mental health questionnaire

Mental health status was measured using the validated DASS-21 questionnaire (Norton, 2007). The DASS-21 questionnaire is a 21-item self-report tool to assess negative emotions of depression, anxiety, and stress, respectively. The participants were asked to rate their experience on each symptom on the DASS-21 over the past week from ‘never’ to ‘most of time’ on a 4-point severity scale. Scores of each scale were later added and categorized as normal, mild, moderate, severe, and extremely severe according to the DASS manual. The DASS-21 questionnaire has been translated into multiple languages including Mandarin which has been validated for its use (Chew et al., 2020). The DASS-21 has been demonstrated to be a valid measure in assessing mental health in the Chinese population during the COVID-19 epidemic (Tan et al., 2020).
Self-assessment of stressors that are associated with the COVID-19

A self-designed questionnaire of stressors was used to identify the personal, social, and work-related stressors of the nurses. The stressor questionnaire contains 12 items which was adapted from Kuo and colleagues’ recent study investigating healthcare workers’ stress during the COVID-19 pandemic (Kuo et al., 2020). The participants were asked to give their opinions on each item as to whether it is a stressor based on their own experience. An attitudinal scale was applied to these items which required participants to make ratings along a five-point ranging from ‘strongly agree’ (score 1) to ‘strongly disagree’ (score 5).

The items in the stressor questionnaire were developed based on the description of stressors of COVID-19 in the literature and expert consultation (Kuo et al., 2020). The stressor items are divided into three themes: personal factors with three items (worried about being infected; stressed about decreasing income; worried about insufficient knowledge of COVID-19), social factors with four items (worried about lack of friends and families’ support; worried about friends and families getting infected; discrimination by others; worried about the COVID-19 pandemic spread), and work factors with five items (worried about the lack of essential medical supplies; stressed about discomfort when wearing personal protective equipment; worried about the increased workload since COVID-19 restrictions began; stressed about the lack of patients’ understanding and cooperation; worried about lack of management team’s support). The content validity index of the scale was 0.92 in the original study by Kuo et al. (2020). The Cronbach’s alpha value

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of the complete scale was 0.86 and for the three sub-
scales was 0.73 to 0.82.

There were eight nurses from the Jiangsu Province
Hospital who were asked to complete the questionnaire
as a pilot study before the present survey to evaluate
the feasibility and clarity of the questions. It took aver-
age 5 min for participants to fill out the questionnaire
and they reported no barriers to completing the ques-
tionnaire and found it was easy to understand.

Statistical analysis

Data were analysed using IBM SPSS (version 22.0).
Descriptive analysis was used to describe the general
data. For count data, frequencies and percentages were
used. The Mann–Whitney U-test was used to compare
the differences for categorical variables with two
groups and the Kruskal–Wallis test was used when hav-
ing more than two groups. To determine potential risk
factors for the development of anxiety, stress, and
depression, ordinal logistic regression analysis was per-
formed, and the associations between risk factors and
outcomes are presented as odds ratios (ORs) and 95%
CIs, after adjustment for confounders. \( P \) value < 0.05
indicated that a difference was statistically significant.

RESULTS

Demographic characteristics

A total of 1803 valid questionnaires were analysed. The
demographic data are shown in Table 1. Among the
sample of 1803 nurses, 1762 (97.7%) were women and
41 (2.3%) were men. Most of the participants were
married (72.4%), 454 (25.2%) were single, and 43
(2.4%) were divorced. The sample comprised nurses
aged from 18–25 (14.6%), 26-30 (29.17%), 31–40
(40.43%), 41–50 (12.65), and 51–60 (3.05%). The
majority of nurses had bachelor degrees (81%), fol-
lowed by college degrees (17.3%). Five hundred and
fifty-five (30.8%) nurses had 6-10 years of working
experience and 433 (24%) reported less than 6 years of
nursing working experience. Among all the participants,
1224 (67.9%) were fixed-term contract nursing staff
and 1591 (88.2%) were from tertiary hospitals. One
hundred and twenty-nine (7.2%) nurses reported that
they had supported Wuhan hospitals during the out-
break, and 422 (23.4%) had worked at a fever clinic
department in local hospitals. A total of 586 (32.5%)
participants stated that they had received mental health
training courses.

| variables                                | Number | Percentage (%) |
|------------------------------------------|--------|----------------|
| Total                                    | 1803   | 100            |
| Gender                                   |        |                |
| Male                                     | 41     | 2.3            |
| Female                                   | 1762   | 97.7           |
| Age (years)                              |        |                |
| 18–25                                    | 264    | 14.6           |
| 26–30                                    | 526    | 29.2           |
| 31–40                                    | 729    | 40.4           |
| 41–50                                    | 228    | 12.6           |
| ≥51                                      | 56     | 3.1            |
| Marriage                                 |        |                |
| Single                                   | 454    | 25.2           |
| Married                                  | 1306   | 72.4           |
| Divorced                                 | 43     | 2.4            |
| Education level                          |        |                |
| Technical secondary school diploma       | 23     | 1.3            |
| College degree                           | 312    | 17.3           |
| Bachelor degree                          | 1460   | 81.0           |
| Master degree or above                   | 8      | 0.4            |
| Working experience (years)               |        |                |
| 0–5                                      | 433    | 24             |
| 6–10                                     | 555    | 30.8           |
| 11–15                                    | 344    | 19.1           |
| 16–20                                    | 207    | 11.5           |
| >20                                      | 264    | 14.6           |
| Level of nursing specialties             |        |                |
| Primary nurse                            | 309    | 17.1           |
| Senior nurse                             | 721    | 40             |
| Manager                                  | 582    | 32.3           |
| Deputy chief nurse or higher             | 191    | 10.6           |
| Employment type                          |        |                |
| permanent contract employee              | 579    | 32.1           |
| Fixed-term contract employee             | 1224   | 67.9           |
| Hospital classification                  |        |                |
| Tertiary hospital                        | 1591   | 88.2           |
| Secondary hospital                       | 202    | 11.2           |
| Primary hospital/Surgery                  | 10     | 0.6            |
| Supporting-Wuhan experience              |        |                |
| Yes                                      | 129    | 7.2            |
| No                                       | 1674   | 92.8           |
| Had been at a local fever clinic         |        |                |
| Yes                                      | 422    | 23.4           |
| No                                       | 1381   | 76.6           |
| Received mental health course training   |        |                |
| Yes                                      | 586    | 32.5           |
| No                                       | 1217   | 67.5           |

Mental health status among nurses at low-risk
areas

In general, a considerable proportion of participants
had demonstrated moderate to extreme levels of
depression (396, 22%), anxiety (538, 29.8%), and stress
(289, 16.1%). Fixed-term contract nurses reported
experiencing more severe levels of depression (\( P = 0.026 \)), anxiety (\( P = 0.001 \)), and stress (\( P = 0.026 \)) compared with permanent contract nurses. Nurses who had experience of supporting-Wuhan or had received mental health training courses were more likely to report less severe level of depression, anxiety, and stress than those who had not such experience or had not received any training courses (all \( P < 0.01 \)). Otherwise, the levels of depression, anxiety, and stress reported by nurses in this study showed no significant differences when the nurses were categorized by demographic characteristics such as gender, age, marital status, educational level, working experience, levels of nursing specialties, hospital classification, and whether they had fever clinic experience (Table 2).

Risk factors for mental health outcomes identified by ordinal logistic regression analysis

Results of ordinal logistic regression analysis listed in the Table 3 showed that having 11–15 years working experience was associated with a higher level of depression (OR, 1.744, 95% CI, 1.042–2.918; \( P = 0.034 \)) and anxiety (OR, 1.758, 95% CI, 1.076–2.869; \( P = 0.024 \)). Compared with the fixed-term contract nurses, permanent contract nurses had a lower level of depression (OR, 0.678, 95%CI, 0.518–0.889; \( P = 0.005 \)), anxiety (OR, 0.621, 95%CI, 0.480–0.804; \( P < 0.001 \)), and stress (OR, 0.687, 95%CI, 0.509–0.927; \( P = 0.014 \)). Nurses who had worked supporting-Wuhan hospitals were associated with a lower level of depression (OR, 0.541, 95%CI, 0.356–0.820; \( P = 0.004 \)) and anxiety (OR, 0.503, 95%CI, 0.340–0.744; \( P = 0.001 \)). Moreover, nurses who reported that had received mental health training courses showed the lowest levels of depression (OR, 0.629, 95%CI, 0.511–0.773; \( P < 0.001 \)), anxiety (OR, 0.708, 95%CI, 0.583–0.860; \( P = 0.001 \)), and work pressure levels (OR, 0.642, 95%CI, 0.510–0.808; \( P < 0.001 \)).

Stressor factors

The answers for the stressor questionnaire were summarized in Table 4. Among the personal factors, the majority of nurses (65.6%) reported (strongly agree and agree) feeling stressed about their decreasing incomes. Among the social factors, most nurses (68.7%) worried about the COVID-19 pandemic spread. Regarding the work factors, a majority of nurses (71.2%) in this study reported feeling stressed about lack of patient’s understanding and cooperation and 70.3% reported discomfort when wearing personal protective equipment followed by feeling stressed about increased workload (69.8%). In addition, approximately half of nurses (49%) felt that they did not get enough support and understanding from the hospital authorities.

DISCUSSION

To our best of knowledge, this is the first study to assess the mental health status of nurses from low-risk areas under normalized COVID-19 epidemic prevention and its associated factors. This cross-sectional survey recruited 1803 registered nurses from Jiangsu province and revealed a considerable high prevalence of depression, anxiety and stress among them under normalized COVID-19 epidemic prevention and control in China. Overall, 22.0%, 29.8%, and 16.1% of all participants reported moderate to extreme levels of depression, anxiety, and stress, respectively. Our study further indicated that having 11–15 years of working experience and being a fixed-term contract nurse were associated with experiencing worse mental health outcomes. Interestingly and informatively, supporting-Wuhan working experience and having mental health preparation course training were independent factors that had beneficial impact on their psychological well-being afterward.

The outbreak of COVID-19 puts enormous pressure on the Chinese healthcare system and its staff, leading to increased levels of stress and burnout among healthcare workers (Liu et al., 2020a; Zhang et al., 2020a; Zhang et al., 2020b). A number of studies have showed that medical staff had suffered negative psychological outcomes during the COVID-19 pandemic and the mental health status of health care was worse than that of the general public (Li et al., 2020; Qiu et al., 2020; Wang et al., 2020c; Zhu et al., 2020). A previous study used the same instrument (DASS-21) to assess the psychological impact among 1210 average people from 194 cities in China during the COVID-19 outbreak (Wang et al., 2020b). Their findings showed that the general population had moderate to extreme depression in 16.5%, anxiety in 28.8%, and stress in 8.1%, which are less than the results of the nurses from our study. Furthermore, studies showed that nurses had higher psychological distress compared with other medical staff and were more vulnerable to stress (Chew et al., 2020; Salopek-Ziha et al., 2020; Zhu et al., 2020). Therefore, it is important to find ways to reduce their psychological stress and to increase their well-being to successfully combat COVID-19 (Maben & Bridges, 2020; Stelnicki et al., 2020).
| Depression level | Normal N (%) | Mild N (%) | Moderate N (%) | Severe N (%) | Extreme N (%) | P value |
|------------------|--------------|------------|---------------|-------------|--------------|---------|
| Total number     | 1078 (59.8)  | 330 (18.2) | 279 (15.5)    | 63 (3.5)    | 54 (3.0)     | 0.096   |
| Gender           |              |            |               |             |              |         |
| Male             | 26 (63.4)    | 6 (14.6)   | 7 (17.1)      | 1 (2.4)     | 1 (2.4)      |         |
| Female           | 1052 (59.7)  | 323 (18.3) | 272 (15.4)    | 62 (3.5)    | 53 (3.0)     |         |
| Age              |              |            |               |             |              | 0.095   |
| 18–25            | 165 (62.5)   | 41 (15.5)  | 39 (14.4)     | 7 (2.7)     | 13 (4.9)     | 0.091   |
| 26–30            | 314 (56.7)   | 99 (18.8)  | 80 (15.2)     | 15 (2.9)    | 18 (3.4)     |         |
| 31–40            | 430 (59.0)   | 120 (17.3) | 120 (16.5)    | 33 (4.5)    | 20 (2.7)     |         |
| 41–50            | 126 (51.1)   | 51 (22.4)  | 38 (16.7)     | 8 (3.5)     | 3 (1.3)      |         |
| 51+              | 41 (73.2)    | 12 (21.4)  | 5 (9.4)       | 0 (0.0)     | 0 (0.0)      |         |
| Marriage status  |              |            |               |             |              | 0.445   |
| Single           | 278 (62.1)   | 74 (16.3)  | 66 (14.5)     | 15 (3.3)    | 21 (4.6)     | 0.170   |
| Married          | 778 (59.6)   | 246 (18.8) | 206 (15.8)    | 44 (3.4)    | 32 (2.5)     |         |
| Divorced         | 22 (51.2)    | 9 (20.9)   | 7 (16.3)      | 4 (9.3)     | 1 (2.3)      |         |
| Educational level|              |            |               |             |              | 0.684   |
| Technical        | 13 (56.5)    | 4 (17.4)   | 4 (17.4)      | 2 (8.7)     | 0 (0.0)      |         |
| College degree   | 186 (59.6)   | 62 (19.9)  | 43 (13.8)     | 9 (2.9)     | 12 (3.8)     |         |
| Bachelor         | 873 (59.8)   | 261 (17.9) | 232 (15.9)    | 52 (3.6)    | 42 (2.9)     |         |
| Master degree or above | 6 (75.0) | 2 (25.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0.000 |
| Working experience|              |            |               |             |              | 0.405   |
| 0–5              | 276 (63.7)   | 64 (14.8)  | 61 (14.1)     | 14 (3.2)    | 18 (4.2)     | 0.813   |
| 6–10             | 524 (58.2)   | 113 (20.4) | 89 (16.0)     | 14 (2.5)    | 16 (2.9)     |         |
| 11–15            | 199 (57.0)   | 60 (17.4)  | 62 (19.9)     | 16 (4.7)    | 10 (2.5)     |         |
| 16–20            | 122 (58.9)   | 38 (18.4)  | 33 (15.9)     | 9 (4.3)     | 5 (2.4)      |         |
| >21              | 161 (61.0)   | 54 (20.5)  | 34 (12.9)     | 10 (3.8)    | 5 (1.9)      |         |
| Level of nursing specialties | 0.781 | | | | | |
| Primary nurse    | 192 (62.1)   | 54 (17.5)  | 39 (12.6)     | 10 (3.2)    | 14 (4.5)     | 0.926   |
| Senior nurse     | 429 (59.5)   | 122 (16.9) | 119 (16.5)    | 24 (3.3)    | 27 (3.7)     |         |
| Manager          | 341 (58.6)   | 115 (19.8) | 94 (16.2)     | 22 (3.8)    | 10 (1.7)     |         |
| Deputy chief nurse or higher | 0.781 | | | | | |
| Permanent contract employee | 363 (62.7) | 109 (18.8) | 81 (14.0) | 15 (2.6) | 11 (1.9) | 0.026 |
| Fixed-term contract employee | 715 (59.4) | 220 (18.0) | 198 (16.2) | 48 (3.9) | 43 (3.5) | 0.026 |
| Hospital classification | 0.444 | | | | | |
| Tertiary hospital | 950 (59.7) | 281 (17.8) | 251 (15.8) | 58 (3.6) | 49 (3.1) | 0.406 |
| Secondary hospital | 121 (60.9) | 45 (22.3) | 25 (12.4) | 5 (2.5) | 4 (2.0) | 0.007 |
| Hospital | 0.001 | | | | | |
| Yes | 982 (58.7) | 315 (18.8) | 264 (15.8) | 60 (3.6) | 53 (3.2) | 0.019 |
| No | 360 (57.4) | 14 (10.9) | 15 (11.6) | 3 (2.3) | 1 (0.8) | 0.000 |

TABLE 2 Depression, anxiety, and stress levels of the nurses categorized by their demographic characteristics
Our study found some factors that had a beneficial impact on the nurses’ psychological well-being under normalized COVID-19 regulations. These factors included supporting-Wuhan working experience and having mental health preparation training courses. We found that 129 nurses who had experience going to Wuhan as part of supporting medical teams during the pandemic had lower levels of anxiety, work stress and depression than their nursing colleagues who did not go to Wuhan area. Some previous studies have shown that the front-line nurses who were working in Wuhan had more severe symptoms of anxiety, depression, and stress during the outbreak (Hu et al., 2020; Lai et al., 2019). However, when they finished their difficult tasks in Wuhan, these supporting-Wuhan nurses may feel relieved to be back in a low-risk environment but had also got the necessary confidence and experience in infection control procedures. Most of the supporting-Wuhan nurses were more knowledgeable about the epidemic as most of them were selected from infectious diseases departments such as the respiratory department, intensive care unit, and infection control department or had working experience at fever clinics. They had more experience of dealing with critical medical conditions and developed proper coping skills, therefore, felt more confident in infection control procedures (Hu et al., 2020). In addition, the selected supporting-Wuhan nurses mostly were mostly from the main middle-level backbone staff from each hospital with sufficient working experience and psychological capacity (Li et al., 2020). An official data showed that there were zero infections and zero mortality among the Jiangsu medical team who went to support Hubei province, which indicates they were well trained and prepared for this situation (Jiangsu Commission of Health, 2020). In the present survey, 586 nurses (35.5%) reported that they had received at least one mental health training course and this group demonstrated lower levels of anxiety, work pressure, and depression compared with those who never had such training during the pandemic. This result is consistent with other studies showing that mental health training is an effective measure to reduce the psychological pressure of the medical staff (Adams & Walls, 2020). Although such mental health training courses are usually available in many hospitals, they are most likely to have been neglected by a few, if not many, hospital administrators. Therefore, organizations should undertake awareness as well as interventional strategies, such as group interventions and counselling sessions in mental health on a regular basis, to minimize the stress and behavioural burden during the pandemic scare.
Mental health course training

Had been at a local fever clinic

Working experience

Educational level

Marriage

Gender

Employment type

Variable

Table 3 Risk factors for mental health outcomes identified by ordinal logistic regression analysis

| Variable                           | Depression | Anxiety | Stress |
|------------------------------------|------------|---------|--------|
|                                    | OR  95% CI | P       | OR  95% CI | P       | OR  95% CI | P    |
| Gender                             |            |         |        |
| Male                               | 1 [Reference] |         |        |
| Female                             | 0.766 0.401–1.465 0.421 | 0.858 0.477–1.652 0.707 | 1.210 0.55–2.641 0.632 |
| Age                                |            |         |        |
| 18–25                              | 1 [Reference] |         |        |
| 26–30                              | 0.890 0.570–1.391 0.610 | 0.921 0.605–1.404 0.703 | 0.987 0.608–1.602 0.958 |
| 31–40                              | 0.832 0.464–1.492 0.538 | 0.814 0.468–1.415 0.465 | 0.951 0.502–1.802 0.878 |
| 41–50                              | 1.036 0.434–2.472 0.938 | 0.664 0.287–1.537 0.338 | 0.828 0.314–2.181 0.702 |
| ≥51                                | 0.464 0.160–1.347 0.158 | 0.313 0.1130.863 0.025 | 0.333 0.096–1.149 0.082 |
| Educational level                  |            |         |        |
| Technical secondary school diploma | 1 [Reference] |         |        |
| College degree                     | 0.696 0.300–1.614 0.398 | 0.654 0.293–1.464 0.302 | 0.386 0.161–0.929 0.033 |
| Bachelor degree                    | 0.647 0.282–1.486 0.304 | 0.660 0.298–1.462 0.306 | 0.433 0.183–1.025 0.057 |
| Master degree or above             | 0.300 0.047–1.931 0.205 | 0.112 0.012–1.034 0.053 | 0.000 0.000–0.000 1.000 |
| Working experience                 |            |         |        |
| 0–5                                | 1 [Reference] |         |        |
| 6–10                               | 1.380 0.941–2.022 0.099 | 1.425 0.991–2.048 0.056 | 1.214 0.799–1.844 0.364 |
| 11–15                              | 1.744 1.042–2.918 0.034 | 1.758 1.076–2.869 0.024 | 1.433 0.814–2.527 0.213 |
| 16–20                              | 1.616 0.914–2.585 0.099 | 1.650 0.959–2.538 0.070 | 1.534 0.822–2.563 0.179 |
| >20                                | 1.501 0.638–3.529 0.353 | 2.312 1.014–5.275 0.046 | 1.629 0.628–4.221 0.316 |
| Nursing specialties                 |            |         |        |
| Primary nurse                      | 1 [Reference] |         |        |
| Senior nurse                       | 1.075 0.724–1.594 0.722 | 0.869 0.599–1.261 0.460 | 0.837 0.547–1.281 0.413 |
| Manager                            | 1.100 0.672–1.797 0.706 | 1.037 0.651–1.654 0.579 | 0.815 0.478–1.391 0.453 |
| Deputy chief nurse or higher       | 1.146 0.606–2.164 0.676 | 0.955 0.520–1.752 0.881 | 1.020 0.509–2.044 0.956 |
| Employment type                    |            |         |        |
| Fixed-term contract employee       | 1 [Reference] |         |        |
| Permanent contract employee        | 0.678 0.518–0.889 0.005 | 0.621 0.480–0.904 0.000 | 0.687 0.509–0.927 0.014 |
| Hospital classification            |            |         |        |
| Tertiary hospital                  | 1 [Reference] |         |        |
| Secondary hospital                 | 0.862 0.636–1.168 0.335 | 0.899 0.674–1.200 0.470 | 0.856 0.611–1.201 0.370 |
| Primary hospital                   | 1.754 0.550–5.601 0.342 | 2.214 0.723–6.794 0.164 | 2.370 0.720–7.807 0.156 |
| Supporting-Wuhan experience        |            |         |        |
| No                                 | 1 [Reference] |         |        |
| Yes                                | 0.541 0.356–0.820 0.004 | 0.503 0.340–0.744 0.001 | 0.694 0.439–1.097 0.118 |
| Had been at a local fever clinic   |            |         |        |
| No                                 | 1 [Reference] |         |        |
| Yes                                | 1.097 0.882–1.363 0.404 | 1.060 0.861–1.306 0.582 | 1.250 0.987–1.582 0.064 |
| Mental health course training      |            |         |        |
| No                                 | 1 [Reference] |         |        |
| Yes                                | 0.629 0.511–0.773 0.000 | 0.708 0.583–0.860 0.001 | 0.642 0.510–0.808 0.000 |

Our study also showed that being a nurse on a fixed-term contract was associated with more severe depression, anxiety, and work stress compared with permanent contract nurses. There are several reasons why this may happen but the issue of nursing pay, which is a legacy of Chinese healthcare system reform, remains its major cause. In fact, more than 65% of nurses in this survey reported feeling stressed because of decreasing incomes. Nursing pay policy in China includes three main parts: basic wage, task-related pay, and monthly bonuses (Cooke & Zhan, 2013). The amount of the basic wage is decided by the nurse’s working experience, professional titles, job classification and his/her contract type. In China, fixed-term contract
nurses usually receive lower pay, have less job security, and are reported to have less job satisfaction than their counterparts with permanent contracts (Cooke & Zhan, 2013). Although the China Ministry of Health carried out the Nurse Regulations in 2008 which emphasized a need for ‘equal pay for equal work’ despite the nurse employment type, this regulation has produced very little effect and fixed-term contract nurses continue to experience a lower level of pay (Ministry of Human Resources & Social Security, 2020). The different incomes between fixed-term contract and permanent contract nurses have become more noteworthy due to the COVID-19 pandemic. In most hospitals in China, healthcare workers’ monthly bonuses are heavily dependent on their individual departments. During the COVID-19 pandemic, many departments had fewer patients than usual and some departments had been locked down when confirmed COVID-19 cases were identified in the department. These situations ended up with nurses having few bonuses or even no bonuses adding to financial insecurity for some nurses, especially for fixed-term contract nurses.

In terms of a source of pressure, a key finding of this study is that the main stressor among the nurses at low-risk areas was the lack of patient’s understanding and cooperation (71.2%). Several studies have mentioned the importance of psychosocial communication skills for medical and nursing staff during the early stage of pandemic when patients are frightened and anxious due to a lack of knowledge about the disease (Chen et al., 2020; Liu et al., 2020b). There could be issues related to trust whether nurses are unable to deal with patients’ anxiety, panic, and other emotional problems properly which will inevitably have a pernicious influence on nurses’ mental health. Under the normalized epidemic prevention and control of COVID-19, although the knowledge of COVID-19 and prevention measures are well distributed among societies, the general public, especially those in low-risk areas, may not take the prevention and control measures seriously enough. In hospitals, such misconduct of patients and their family members includes unwilling to wear face masks all the time, walking in and out of the wards at their own will, frequent rotation of family members to look after the patients. Medical staff, especially nurses, have to deal with improper behaviours with increasing chances of disadvising or stopping patients and their relatives, which means that the

| Stressors associated with COVID-19 | Number | Percentage (%) |
|----------------------------------|--------|----------------|
| **Personal factors**             |        |                |
| 1. Worried about being infected  |        |                |
| Strongly agree and agree         | 865    | 48.0           |
| Not sure                         | 379    | 21.0           |
| Disagree and strongly disagree   | 559    | 31.0           |
| 2. Stressed of decreasing income |        |                |
| Strongly agree and agree         | 1182   | 65.6           |
| Not sure                         | 294    | 16.3           |
| Disagree and strongly disagree   | 327    | 18.1           |
| 3. Worried about the insufficient knowledge of Covid-19 | | |
| Strongly agree and agree         | 357    | 19.8           |
| Not sure                         | 377    | 20.9           |
| Disagree and strongly disagree   | 1069   | 59.3           |
| **Social factors**               |        |                |
| 4. Worried about lack of friends and families’ support | | |
| Strongly agree and agree         | 258    | 14.3           |
| Not sure                         | 450    | 25.0           |
| Disagree and strongly disagree   | 566    | 47.5           |
| 5. Worried friends and families getting infected | | |
| Strongly agree and agree         | 1087   | 60.3           |
| Not sure                         | 277    | 15.4           |
| Disagree and strongly disagree   | 439    | 24.3           |
| 6. Discrimination by others      |        |                |
| Strongly agree and agree         | 449    | 24.9           |
| Not sure                         | 500    | 25.0           |
| Disagree and strongly disagree   | 944    | 51.1           |
| 7. Worried about the COVID-19 pandemic spread | | |
| Strongly agree and agree         | 1239   | 68.7           |
| Not sure                         | 263    | 14.6           |
| Disagree and strongly disagree   | 301    | 16.7           |
| **Work-related factors**         |        |                |
| 8. Worried about the lack of essential medical supplies | | |
| Strongly agree and agree         | 400    | 27.6           |
| Not sure                         | 850    | 57.0           |
| Disagree and strongly disagree   | 566    | 35.5           |
| 9. Stressed about the discomfort to wear the protective equipment | | |
| Strongly agree and agree         | 1208   | 70.3           |
| Not sure                         | 223    | 12.4           |
| Disagree and strongly disagree   | 312    | 17.3           |
| 10. Worried about the increased workload since COVID-19 restrictions began | | |
| Strongly agree and agree         | 1259   | 69.8           |
| Not sure                         | 255    | 14.1           |
| Disagree and strongly disagree   | 585    | 36.0           |
| 11. Stressed about the lack of patient’s understanding and cooperation | | |
| Strongly agree and agree         | 1283   | 71.2           |
| Not sure                         | 286    | 15.9           |
| Disagree and strongly disagree   | 234    | 13.0           |
| 12. Worried about lack of manage team’s support | | |
| Strongly agree and agree         | 885    | 49.0           |
| Not sure                         | 355    | 19.7           |
| Disagree and strongly disagree   | 565    | 31.3           |
nurses experience high levels of misunderstanding among their patients and the public. Therefore, there is a need for effective psychosocial communication and understanding to contribute to the trust among patients, caregivers and nurses to reduce their anxiety.

**IMPLICATIONS**

The present findings would certainly provide information for all regions at low risk of COVID-19 in China which may aid the provision of support and interventions, such as providing mental health training courses or counselling sessions, for the benefit of the psychological well-being of nurses who are facing the unprecedented challenges at the moment and are more vulnerable to the pandemic than others. It also addresses the needs for enacting supportive legislation and regulation for nursing staff to improve their mental health in the workplace (Rosa et al., 2020). This information may be taken as a source of reference by healthcare policy makers from other countries with caution due to the different nature of nursing in different countries.

**LIMITATIONS**

A limitation for this study was that all participants were from a single province which may not represent the situations in all low-risk areas nationwide. When designing the sampling, we considered to issue the questionnaire from different regions in the province and try our best to sample within the maximum range. In addition, for the timeliness of the survey, we did not spend much time to reach nurses from primary hospitals which may result in the uneven composition of the sample as 88.2% nurses came from tertiary hospitals, 11.2% from secondary hospitals and only 0.6% from primary hospitals. Therefore, the results may not be generalized to all nurses in Jiangsu province.

**CONCLUSIONS**

This study investigated the mental health status of nurses from low-risk areas in Jiangsu China. The results showed that a large portion of nurses from low-risk area were suffering from mental health disturbance under the normalized COVID-19 epidemic prevention and control. Having supporting-Wuhan experience and receiving mental health preparation courses had a positive impact on their psychological well-being afterward. Nurses with fixed-term contracts reported high rates of symptoms of anxiety, depression, and stress which requires special attention. The challenge of communication between these nurses and patients was one of the main sources of psychosocial stress.

**RELEVANCE FOR CLINICAL PRACTICE**

Our findings provide information that nurses from low-risk area were suffering from mental health disturbance under the normalized COVID-19 epidemic prevention and control. Such information may aid government or hospital authorities to take the necessary measures providing support and interventions for the benefit of the psychological well-being of nurses who are more vulnerable to the pandemic than others.

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**ETHICAL APPROVAL**

The ethical approval was given by the Ethics Committee of the First Affiliated Hospital of Nanjing Medical University (approval number: 2020-SRFA-340).

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