

# Developing mental health nursing strategies for the inbound quarantined population in China during the COVID-19 global pandemic

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**Abstract. – OBJECTIVE:** The aim of the study was to develop mental health nursing strategies for the inbound quarantined population based on the results of a survey study and frontline nursing experiences.

**SUBJECTS AND METHODS:** A mixed research method was selected, we collected data by questionnaires from 128 quarantined people, and by semi-structured interviews from 5 registered nurses. Generalized anxiety disorder-7 (GAD-7), the patient health questionnaire-9 (PHQ-9), the Pittsburgh Sleep Quality Index (PSQI), Social Support Rating Scale (SSRS) were used in the quantitative research to identify the prevalence of psychological issues and risk factors. Semi-structured interviews were conducted in the qualitative study to conclude nursing experiences from RNs.

**RESULTS:** The overall prevalence of anxiety, depression, and insomnia were 34%, 41%, and 18% respectively. Binary logistic regression analysis showed that social support, urban residence, and chronic disease were associated with mental health problems in certain aspects. Three themes were emerged from the analysis of RNs interviews: personality, chronic diseases, and social support.

**CONCLUSIONS:** The prevalence of mental health issues in the inbound quarantined population was the same as the general population in the initial stage of COVID-19 outbreak, and significantly lower than people who lived in high-risk areas. Living in urban areas, with chronic diseases, and obtaining less social support are the risk factors. Finally, four nursing strategies were proposed by the research team for mental health well-being.

*Key Words:*

Quarantined population, Mental health well-being, Global pandemic, Nursing strategies.

## Introduction

The initial report of the unusual cases with pneumonia caused by coronavirus was in Wu-

han, China, in December 2019<sup>1</sup>. To prevent and control the spread of this novel coronavirus, the Chinese government immediately implemented a lockdown of Wuhan city on January 24, 2020. However, the lockdown did not control and prevent the spread of this newly emergent coronavirus. Meanwhile, the first case outside China was reported on January 13, 2020 in Thailand<sup>2</sup>. Since then, the coronavirus-caused pneumonia outbreak has been diagnosed worldwide.

Early on February 29, 2020, the World Health Organization (WHO) suggested a short-term travel restriction to enable countries to rapidly implement effective preparedness measures. This travel restrictions policy played a vital role in controlling the initial spread of coronavirus disease 2019 (COVID-19) globally<sup>3</sup>. Despite its success, there is an increasing concern in the transport industry, economy, education, long-term pandemic prevention and social development<sup>4</sup>. Instead, global cooperation of infectious diseases, on one hand, reduced the impact of the disease and, on the other hand, minimized the side effects of economic, trade, and social development<sup>5</sup>. Besides the short-term travel restriction, the WHO also recommended that travelers returning from affected areas should self-monitor for 14 days and follow the national protocol of receiving countries, such as entry quarantine, a negative result of COVID-19 Polymerase Chain Reaction (PCR) test. These pandemic prevention procedures created a nervous atmosphere to a certain extent for the public.

For individuals in long-time quarantine duration, they are subjected to a range of negative psychological impacts<sup>6</sup>. Strict quarantine inevitably resulted in societal isolation, income reduction, discrimination, stigmatization and family separation. Previous studies have noticed that these factors could have a significant association between loneliness and increased all-cause mortality<sup>7-9</sup>. What's more, the COVID-19 quarantine was also related to clinical

symptoms of anxiety, depression and stress in physicians and general public<sup>10,11</sup>. In this context, there is little chance for psychiatrists to alleviate generalized anxiety and balance pandemic perspectives because psychiatrists also face massive deficits under the pandemic<sup>12</sup>. Therefore, to hypothesis that without special attention and help from professional health-care workers, people under quarantines have a great chance to suffer from psychological issues.

Yunnan province, a popular tourist destination located in the southwest of China, adjacent to Laos, Vietnam, and Burma, received millions of domestic and foreign tourists each year. Because of the geographic characteristics, Yunnan province had to take strict travel restrictions to prevent the pandemic. Inbound and outbound traveler management in border areas of Yunnan province is the core of pandemic prevention<sup>13</sup>. Registered Nurses (RNs) were assigned in the inbound quarantine sites to complete the routine work and guarantee the safety of quarantined people. In this circumstance, RNs in charge of health-related problems and disease management of quarantined population. Effective nursing strategies played an important role in the mental health of quarantined population.

To the best of our knowledge, few previous studies has been completed in terms of mental health nursing of quarantined population. This study aimed to develop mental health nursing strategies for the inbound quarantined population based on the results of a survey study and front-line nursing experiences.

## Subjects and Methods

### Study Design

We used a mixed research design. A face-to-face questionnaire was administered to quarantined people; semi-structure interviews were conducted with key RNs.

### Selection of Participants

A total of 128 quarantined people participated in the questionnaire survey. They were provided an informed consent with a yes-no question confirming their willingness to respond. The inclusion criteria were:

- 1) experience in inbound quarantine
- 2) understanding of the questionnaires
- 3) willingness to participate in research.

The exclusion criteria were:

- 1) low literacy level
- 2) unwillingness to participate in research.

The questionnaire survey collected data in quarantine sites in border areas of Yunnan during November 28, 2020 and December 17, 2020.

### Interviews

A semi-structure interview was held with 5 RNs. To recruit RNs, we established some criteria, which can be divided into three categories:

- 1) more than 2 years of working experience as a registered nurse
- 2) worked separately in the inbound quarantine sites
- 3) connected with quarantine populations daily.

Face-to-face interviews data collection during 1 April 2021 and 30 April 2021 in Yunnan.

### Data Collection

The Chinese version of the generalized anxiety disorder-7 (GAD-7)<sup>14</sup>, and the Chinese version of the patient health questionnaire-9 (PHQ-9)<sup>14</sup> were utilized for the prevalence of anxiety and depression<sup>15</sup>. A four-point Likert scale was rated by respondents, “0 = not at all” “1= several days” “2= more than half the days” “3= nearly every day” for each questionnaire. We adopted cut-off score of 5, 10, 15 as the mild, moderate, and severe anxiety and depression<sup>16</sup>.

PSQI is a self-reported questionnaire used to measure sleep quality in diverse populations. The 18-item PSQI could be divided into 7 derived component scores regarding sleep: quality, latency, duration, efficiency, disturbance, medication use, and daytime dysfunction<sup>15</sup>. A four-point Likert scale was rated by respondents, “0= not during the past month” “1= less than once a week” “2= once or twice a week” “3= three or more times a week”, the questionnaire had a good sensitivity and specificity when set the cut-off point at 8<sup>17</sup>.

SSRS is a 10 items self-report scale assessing social support. There are 10 items comprised 3 factors: subjective support (4 items), objective support (3 items), and support seeking behaviors (3 items). The total score ranges from 0 to 50, with higher scores indicate stronger social support, the cut-off point was set as <20 points, 20-29 points, and  $\geq 30$  points. The Chinese version of SSRS shows a strong internal consistency with Cronbach's alpha 0.949<sup>18</sup>.

In the last part of questionnaire, we also examined social demographic factors regard to age, occupation, nationality, ethnicity, family number, chronic disease, education level, and income were collected at the last part of questionnaire.

We used a semi-structured interview to discover personal experience and perspectives of RNs<sup>19</sup>. Data collection occurred during face-to-face interviews. Demographic information (age, work length, gender) of the participated RNs was collected before the interview.

### Statistical Analysis

The data was analyzed by the means of descriptive statistics. We also examined the frequencies, percentages, mean score, and standard deviation of GAD-7, PHQ-9 and PSQI, the prevalence of anxiety, depression, insomnia. Binary logistic regression analyses were implemented to explore factors associated with depression, anxiety, and insomnia. Odds ratio (OR) with a 95% confidence interval were reported. Statistical package for the social science (version 26) were used for all data analysis, with  $p$ -value  $< 0.05$  indicating statistical significance.

The interview data were transcribed, and coded, thematic analysis was conducted to categorize and label into initial themes. Then, identified relationships were found between the themes. The results were sent back to the participants to ensure that the data aligned with their original intent.

## Results

### Demographic Characteristics of the Quarantined Population

Among 147 selected quarantined people, a total of  $n=128$  completed the surveys. As reported in Table I, the mean age was 29.27 years (standard deviation SD: 8.90), participants were mostly male (85.94%). 7.81% reported chronic diseases, most of them only had high school degree (92.97%), 14-days quarantine was an economic burden for 76.56% of participants, 73.54% had personal yearly income less than 45,000 RMB (\$ 6,500), and 75.78% attended COVID-19 education before (Table I).

### Prevalence of Anxiety, Depression, Insomnia, and Social Support

Table II presents the prevalence of anxiety, depression, insomnia within inbound quarantine population, and their social support score. The mean anxiety score was 4.43 (SD: 5.21), 34.37% of the respondents had GAD-7 scored  $\geq 5$ , including 21.88% with mild anxiety, 3.91% with moderate anxiety and 8.59% with severe anxiety. The mean depression score was 5.10 (SD: 5.70),

**Table I.** Demographics of the participants.

N (%)	
<b>Mean age (standard deviation)</b>	29.27 (8.90)
<b>Nationality</b>	
China	128(100%)
Other	0 (0%)
<b>Gender</b>	
Male	110 (85.94%)
Female	18 (14.06%)
<b>Health status</b>	
Healthy	118 (92.19%)
Chronic disease.	10 (7.81%)
<b>Degree</b>	
High school	119 (92.97%)
Bachelor	8 (6.25%)
Master	1 (0.78%)
<b>Yearly income</b>	
<30,000 yuan	51 (39.84%)
30,000- 45,000 yuan	43 (33.59%)
45,000-60,000 yuan	16 (12.50%)
>60,000 yuan	18 (14.06%)
<b>Quarantine fee be economic burden</b>	
Yes	98 (76.56%)
No	30 (23.44%)
<b>Attended COVID-19 education before</b>	
Yes	97 (75.78%)
No	31 (24.22%)

40.63% of the respondents had PHQ-9 scored  $\geq 5$ , including 22.66% with mild depression, 8.59% with moderate depression and 9.38% with severe depression. For insomnia, the mean score of PSQI was 4.71(SD: 3.88), with 17.97% scored  $\geq 8$ . The self-reported social support score was measured by SSRS, with an outcome that mean score was 17.05 (SD:8.25), and 65.62% scored  $< 20$ , 25.78% scored 20-29, 8.59% scored  $\geq 30$ .

### Factors Associated with Anxiety, Depression, and Insomnia

Binary logistic regression analyses were performed identify demographic and contextual factors associated with anxiety, depression and insomnia. Table III presented the results, several factors were identified independently associated with anxiety (GAD  $\geq 5$ ), depression (PHQ  $\geq 5$ ), insomnia (PSQI  $\geq 8$ ). Residence place was associated with both anxiety and depression (OR= 0.14, 95% CI 0.05 to 0.37,  $p < 0.001$  and OR=0.22, 95% CI 0.09 to 0.54,  $p < 0.01$ , respectively), chronic diseases was associated with depression (OR= 0.07, 95% CI 0.01 to 0.44,  $p < 0.01$ ) and insomnia (OR= 0.06,

**Table II.** Prevalence of anxiety, depression, insomnia and social support score of the participants, n=128.

	<b>GAD-7 (anxiety)</b>	<b>PHQ-9 (depression)</b>		<b>PSQI (insomnia)</b>		<b>SSRS (social support)</b>
<b>Mean (standard deviation)</b>	4.43 (5.21)	5.10 (5.70)		4.71 (3.88)		17.05 (8.25)
<b>Rating level</b>	<b>N (%)</b>	<b>N (%)</b>	<b>Rating level</b>	<b>N (%)</b>	<b>Rating level</b>	<b>N (%)</b>
Mild (score 5-9)	28 (21.88%)	29 (22.66%)	Score < 8	105 (82.03%)	Score < 20	84 (65.62%)
Moderate (score 10-14)	5 (3.91%)	11 (8.59%)	Score ≥ 8	23 (17.97%)	Score 20-29	33 (25.78%)
Severe (score ≥15)	11 (8.59%)	12 (9.38%)			Score ≥ 30	11 (8.59%)

95% CI 0.01 to 0.33,  $p < 0.01$ ). Female gender (OR= 0.24, 95% CI 0.06 to 0.92,  $p < 0.05$ ) was associated with insomnia. Lack of social support was associated with anxiety (OR= 0.37, 95% CI 0.18 to 0.78,  $p < 0.05$ ), depression (OR= 0.35, 95% CI 0.17 to 0.73,  $p < 0.01$ ) and insomnia (OR= 0.31, 95% CI 0.10 to 0.91,  $p < 0.05$ ).

**Experiences of RNs**

All participants (N=5) included in the study finished an interview more than one hour. Two males and three females were recruited, all of them came from county hospitals. The mean age of the participants was 23, the average length of work was 3.4 years, with a range of 2 years to 9 years. There were three themes emerged from the analysis of interviews: personality, chronic diseases, and social support.

**Personality**

The personality of individuals is a key symbol mentioned among all participants. As one RN described “I found that the outgoing people and disciplined people were always kept a stable

emotion, they asked help directly if needed”. Besides, three of the RNs illustrated that they had never received professional mental health related training, which led them distinguish the states of quarantined population by their experience, rather than knowledge. It is worth noticing that RNs in the quarantine sites were overwhelmed by their workload, they had no time to chat with the quarantined populations. In this situation, extroverted people often have the opportunity to talk to nurse, while those who are always silent tend to be more overlooked. Introverted people could be paid more attention if the RNs have adequate mental health knowledge.

**Chronic Diseases**

Inevitably, chronic diseases easily caused mental health issues. All RNs talked about the negative performance of people with chronic disease. As one nurse said “Now, I will check the person daily if he has a history of chronic disease. I remembered once I cared a person with hyperthyroidism. He had typical symptoms, including high temperature and polycardia. He worried about

**Table III.** Binary logistic regression analysis of factors associated with anxiety, depression, and insomnia.

Variable	Anxiety		Depression		Insomnia	
	OR	95%CI	OR	95% CI	OR	95% CI
Gender	1.54	0.45 to 5.31	0.96	0.30 to 3.05	0.24	0.06 to 0.92*
Yearly income	0.83	0.53 to 1.32	1.07	0.68 to 1.67	0.72	0.42 to 1.37
Residence place	0.14	0.05 to 0.37 ***	0.22	0.09 to 0.54**	0.37	0.12 to 1.13
Education level	1.58	0.39 to 6.34	1.27	0.36 to 4.52	3.94	0.99 to 15.71
Economic burden	0.81	0.28 to 2.31	1.23	0.45 to 3.39	0.78	0.19 to 3.14
With chronic disease	0.51	0.10 to 2.65	0.07	0.01 to 0.44**	0.06	0.01 to 0.33**
Formal COVID-19 education	1.58	0.56 to 4.48	0.75	0.27 to 2.11	1.00	0.27 to 3.72
Knowledge about COVID-19	1.21	0.68 to 2.16	0.70	0.36 to 1.36	1.37	0.65 to 2.86
SSRS	0.37	0.18 to 0.78*	0.35	0.17 to 0.73**	0.31	0.10 to 0.91*

n= 128, \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$

*the high temperature was caused by coronavirus. Also, polycardia made him whiny. So, I needed to spend a lot of time checking him every day. When the time quarantine finished, he was still anxious. That's the reason why I think long-term observation was still needed. It was an unforgettable memory. From that time on, I will check the medical records regards chronic diseases first when new quarantined people were admitted".* The same situation has been described amongst all the participants when the interviewer spoke about chronic diseases. RNs mentioned that the old people with chronic diseases were easier to struggle in the feeling of depression.

### **Social Support**

It is difficult to discuss the role of social support without mentioning personality. With the help of healthcare providers, some people might have a great chance to live a good life. From the experience of participants, social support has a significant influence on their lifestyle during quarantine. Majority of quarantined people who were allocated in quarantine sites with better infrastructure, such as wi-fi, have better chance to fight loneliness as they could keep in touch with their family and friends. Besides, many RNs agree that there are several ways for quarantined people to get support, including doing some exercise, having a regular daily routine and getting food delivery. All these made quarantined people felt that they could get social support even lived alone for 14 days.

## **Discussion**

It is the first study focusing on the mental health well-being of inbound quarantined populations during the COVID-19 pandemic. This study exhibited the mental health status and associated risk factors of inbound populations. It also concluded nursing experiences from nurses who worked in quarantine sites. The findings provide essential information and implicate further interventions during the pandemic.

The current study found that the prevalence of anxiety, depression and insomnia was consistent with that of the general population in China<sup>20,21</sup>, but lower than that of the general population in Hong Kong and health workers in mainland China<sup>10,14</sup>. This finding suggested that the quarantined population had the same prevalence of mental health symptoms as the initial stage of COVID-19. How-

ever, it might not be as serious as people living in high-risk environments. The same result was found in the binary logistic analysis, suggesting that urban area residence was significantly associated with anxiety and depression prevalence. This is due to the fact that urban areas had higher population density, where the virus spread more easily. Individuals living in urban areas with a higher density of COVID-19 cases usually had a greater psychological impact than rural individuals<sup>22,23</sup>.

There is no surprise that chronic diseases are closely related to the psychological issues. During COVID-19 pandemic, the global medical systems were overwhelming<sup>24</sup>. The previous studies<sup>25,26</sup> have revealed that chronic diseases, including hypertension, diabetes, COPD, cardiovascular disease were identified as significant risk factors for COVID-19. Frontline nurses had observed that individuals with diseases were more likely to be anxious, and seek help more often. Some disease, which affect metabolism and hormone level, inevitably result in anxious, depression, or insomnia.

As expected, the social support score was positively related to mental health well-being. Living in a quarantined hotel with wi-fi makes it easier for quarantined people to get in touch with their family members and friends. They were more likely to be satisfied and showed fewer psychological syndromes. The same phenomenon was found in those who received more attention from healthcare providers.

Most nurses seriously lack mental health education. They have a large workload, and their training mainly focuses on environmental disinfection, temperature monitoring and other nursing operations. As a result, most nurses found it challenging to recognize psychological problems at an early stage. RNs felt they would pay attention to high-risk person if they were aware of their condition. In addition, quarantined people need pandemic related health education, ongoing care, and longitudinal follow-up for long-term well-being.

Four aspects of mental health nursing strategies for inbound quarantined population were concluded in the study: (1) train front-line nurses periodically to timely identify psychological issues; (2) identify high-risk groups by reading the demographic information and medical records of quarantined people; (3) write medical records for confirmed patients and make plans for continuous care and follow-up; (4) provide sufficient support during isolation and educate them to maintain a good lifestyle.

There are several limitations in this study. Firstly, we adopt a cluster sample with a small sample size, and the sample was not necessarily a well representation. Therefore, the possibility of selection bias should be fully considered when interpret to the broader population under inbound quarantine. Secondly, the strategies interpreted from nurses' described experiences were not examined in other settings. Further studies are still needed to complement the conclusions.

### Conclusions

This study has shown that the prevalence of mental health issues in the inbound quarantined population was the same as the general population in the initial stage of COVID-19 outbreak and significantly lower than that of the population in high-risk areas. It is also identified that people who lived in urban areas, with chronic diseases, and received less social support are the high-risk population. Finally, four nursing strategies were concluded for the prevention and remission of psychological problems.

### Acknowledgement

The authors thank all the quarantined people and registered nurses who participated in the study for their support.

### Authors' Contributions

Xiao Ling Ma and Ping Zhao contributed equally to the whole process of the research. All authors approved the final draft of the manuscript.

### Conflicts of Interest

The authors declare that they have no conflict of interests.

### Funding

No funding or benefits was received.

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