

# Investigation of the Psychological disorders in the healthcare nurses during a coronavirus disease 2019 outbreak in China

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## Abstract

The first case of atypical pneumonia caused by coronavirus disease 2019 (COVID-19) was reported in Wuhan, China in December 2019. Since then, cases of novel coronavirus-infected pneumonia (NCIP) have been reported throughout China as well as in 25 other countries. With the rapid growth of this global outbreak, psychological disorders or impact among the healthcare nurses caused by the COVID-19 pandemic is of great importance and worth to be evaluated. Here, we aimed to determine the levels of stress and psychological disorders of nurses who provided nursing care during the COVID-19 outbreak. A total of 159 nurses who provided healthcare work for COVID-19 patients were enrolled in our study. The psychological disorders and stress level were assessed via a questionnaire implemented by the mobile app. The results showed that the nurses who worked in the non-critical care ward (general ward in which the invasive medical procedure such as mechanical ventilation is absent) scored significantly higher on the traumatization condition ( $P < .05$ ) and stress level ( $P < .01$ ) as well as the impact of event scale -revised level ( $P < .01$ ) compared with those worked in the critical care ward. In contrast to the previous report, our findings revealed that the future intervention for preventing the mental crisis among the healthcare nurses needs to be focusing on the individuals in the non-critical care ward instead of those in the critical care ward under the spreading of COVID-19.

**Abbreviations:** COVID-19 = coronavirus disease 2019, IES-R = impact of event scale -revised.

**Keywords:** coronavirus disease 2019, critical care, healthcare nurses, psychological disorders

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HX, XC, and XS contributed this work equally. Dr K. Shou had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

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## 1. Introduction

In December 2019, the atypical pneumonia cases of unknown etiology were reported in Wuhan, China.<sup>[1–3]</sup> The pathogen has been later identified as a novel coronavirus (SARS-CoV-2).<sup>[4]</sup> With rapid increases in international and overseas travel as the result of the globalization, the rapid escalation of cases and deaths has now been reported all over the world.<sup>[5]</sup> During this outbreak, a large number of patients with the infection have been admitted to the hospitals, leading to the tremendous burden for the healthcare settings in China and other countries.<sup>[6]</sup>

Many healthcare staff experience serious emotional distress during the pandemic of infectious disease such as severe acute respiratory syndrome (SARS).<sup>[7,8]</sup> Notably, healthcare workers, especially nurses, are vulnerable to have a plenty of psychological disorders when facing the pandemic situation.<sup>[9,10]</sup> Thus, to protect the mental health in the healthcare workers is paramount not only to constitute the front line response against high-threat pandemic pathogens but also to set good example for the public as healthcare workers are the main force to perform the medical procedures for patients.

It was reported that a huge proportion of nurses working for the patients with SARS infection experienced psychological problem.<sup>[11]</sup> In addition, most of healthcare nurses in Saudi Arabia were found to have an emotional impairment during the medical process in treating patients with Middle East respiratory syndrome (MERS) infection.<sup>[12]</sup> Currently, as the rapid escalation of coronavirus disease 2019 (COVID-19) over the global scale accompanied with the increasing number of the deaths derived from this pandemic disease, elevated levels of anxiety and stress

among the healthcare nurses could be attributed to involuntary affection occurred in the bidirectional interactions deriving from the patients even their colleagues.<sup>[13]</sup> Moreover, if the patients are dead, there is a higher probability of traumatization disorders occurring on these healthcare workers who cover these patients.

The close contact with the patients in the severe condition combined with the tense atmosphere in the work environment may render the nurses working in the CCU (Critical Care Unit) and ICU (Intensive Care Unit) more possibility of being vulnerable to the psychological stress than those working in the general ward.<sup>[14,15]</sup> However, the previous report revealed that vicarious traumatization severity of non-frontline nurses is more serious than that of front-line nurses when under the current COVID-19 outbreak.<sup>[16]</sup> Therefore, the evidence of the psychological condition of the nurses working in the different ward is still lacking. To this end, this study aimed to provide the updated information with regard to the mental health condition among the frontline nurses working in the different ward treating with COVID-19 patients.

## 2. Methods

### 2.1. Settings and participants

The data collection of the study is performed by using the questionnaire survey (<https://www.wjx.cn>) via an app named “Wechat” (Chinese version of WhatsApp) on the smart cellphone due to the official requirement of keeping the safe distance and avoiding the gathering. From February 26, 2020 to March 19, 2020, this survey was completed by 2 independent medical staff. This study was approved by the ethics committee of Yichang Central People’s Hospital.

At the time of the COVID-19 outbreak, a total of 159 nurses who were providing nursing care for patients with COVID-19 infection in our hospital participated our survey by filling in the questionnaire.

### 2.2. Measures

First, the demographic data consisting of gender, age, professional titles, years of working, educational background, marriage status, number of child, duration of shift, precaution measures, previous experience of working with the pandemic outbreak, prior knowledge about COVID-19 as well as the whole working time in this outbreak were collected. Next, the psychological condition of the healthcare nurses working with the COVID-19 patients in different ward was assessed. Basically, the subjects were divided into 2 groups, 1 for the critical care ward (Intensive Care unit (ICU), Respiratory and Critical Care Medicine as well as Infectious Disease) which provide the nursing care mainly consisting of invasive procedure such as mechanical ventilation, and the other 1 for the non-critical care ward (general ward) which provided the medical care for COVID-19 patients with mild symptoms or condition. The questionnaire was modified according to the reported trauma-related evaluation, such as the Traumatic Stress Institute Belief Scale,<sup>[17]</sup> Impact of event scale revised (IES-R)<sup>[18]</sup> as well as the stress questionnaire<sup>[19]</sup> for assessing the psychological disorders and distress in hospital workers. Cronbach’s alpha (internal consistency)<sup>[20]</sup> for the questionnaire in our study reached 0.94, demonstrating its favorable reliability.

### 2.3. Statistical analysis

SPSS (version 25.0) was used for all analyses. Mean  $\pm$  SD was used to describe the continuous measurements if they are normally distributed or the interquartile range (IQR) was used if not, and categorical variables were presented as count (%). A *t*-test or ANOVA was utilized to evaluate the group difference for continuous measurements and Chi-squared analysis was used to assess the group difference for categorical variables. Data were considered statistically significant when  $P < .05$ .

## 3. Results

### 3.1. Investigation of general characteristic between nurses from critical care ward and non-critical care ward

A total of 159 individuals (75 nurses in critical care ward, and 84 nurses in non-critical care ward) were enrolled in our study. There was no significant difference between these 2 groups regarding to the gender, age, years of working, professional titles, educational background, the number of child as well as prior knowledge about COVID-19 ( $P > .05$ ). However, a significant difference was observed between the 2 groups with regard to the duration of shift ( $P = .011$ ), precaution measures ( $P = .000$ ), previous experience of working with the pandemic outbreak (eg, SARS) ( $P = .037$ ) and whole working time in this outbreak ( $P = .042$ ) (Table 1).

### 3.2. Comparison of traumatization condition and stress level between nurses from critical care ward and non-critical care ward

The traumatization condition scores consisting of physiological, emotional, behavioral and psychological responses as well as the life beliefs showed a statistical difference between the critical care ward and non-critical care ward ( $P < .05$ ), suggesting the nurses from non-critical care ward experienced more severe psychological distress during this outbreak of COVID-19 (Table 2). Similarly, the markedly increased level of stress was observed in the nurses working in the non-critical care ward compared with those in the critical care ward ( $44.05 \pm 2.7$  vs  $35.33 \pm 8.25$ ,  $P < .01$ ).

### 3.3. Evaluation of IES-R sub-scores between nurses from critical care ward and non-critical care ward

The healthcare nurses working in the non-critical care ward had significantly higher IES-R scores (total,  $P < .01$ ) and sub-items, consisting of hyperarousal ( $P < .05$ ), avoidance ( $P < .05$ ), intrusion ( $P < .05$ ), and sleep and numbness ( $P < .05$ ), than those who were engaged in the critical care ward (Table 3).

## 4. Discussion

Although the global pandemic of COVID-19 stimulated a number of related researches, few evidence was reported on the psychological impact of healthcare nurses who directly provide the nursing care for infectious patients.<sup>[21,22]</sup> Notably, psychological evaluation in medical professionals especially the nurses, are of great importance for controlling the spreading of pandemics, further providing solid evidence for rapid social recovery after this COVID-19 outbreak. In this study, our findings revealed that during the COVID-19 outbreak, the nurses

**Table 1**  
**Comparison of general characteristics nurses from the critical care ward and non-critical care ward.**

	Critical care ward (n=75)	Non-critical care ward (n=84)	P value
Gender, n(%)			
Male	26	30	.169
Female	49	54	
Age, median (IQR), yr	29 (26–32)	28 (22–35)	.877
Years of working, median (IQR), yr	7.5 (2–9)	7 (2–10)	.912
Professional titles			
Primary	49	55	.990
Secondary	23	26	
Senior	3	3	
Educational background			
College degree	11	13	.878
Bachelor degree	55	63	
Master degree	9	8	
Marriage			
Unmarried	27	31	.980
Married	43	48	
Divorced or others	5	5	
No. of child, n (%)			
0	49	55	.976
1	10	12	
≥2	16	17	
Duration of shift			
≤4 h	33	21	.011
> 4 h	42	63	
Precaution measures			
No	0	0	.000
Grade I	0	0	
Grade II	16	71	
Grade III	59	13	
Previous experience of working with the pandemic outbreak (eg, SARS)			
Yes	6	1	.037
No	69	83	
Prior knowledge about COVID-19			
Yes	11	13	.887
No	64	71	
Whole working time in this outbreak			
≤4 wk	46	38	.042
> 4 wk	29	46	

COVID-19 = coronavirus disease 2019.

working in the non-critical care wards not only exhibited higher traumatization condition and stress level but also scored higher on the IES-R level, pointing out the future potential target for the mental healthcare of the nurses—those working in the non-critical care ward. Our results are consistent with the findings reported

**Table 3**  
**Comparison of IES-R sub-scores between the nurses from the critical care ward and non-critical care ward.**

Items	Critical care ward (n=75), Mean ± SD	Non-critical care ward (n=84), Mean ± SD	P value
Total	22.28 ± 2.42	27.08 ± 4.44	0.008
Hyperarousal	6.97 ± 1.41	8.75 ± 1.57	0.016
Avoidance	5.02 ± 2.20	7.23 ± 0.93	0.013
Intrusion	5.92 ± 1.72	7.93 ± 1.16	0.007
Sleep and numbness	4.92 ± 1.99	6.93 ± 1.98	0.037

IES-R = Impact of Events Scale-Revised.

by Yang et al. who concluded that vicarious traumatization scores were significantly lower in the front-line nurses during COVID-19 outbreak.<sup>[16]</sup> To our best knowledge, this study is the first to evaluate the psychological disorders condition among the frontline nurses working in the different occupational wards.

The main symptoms of psychological disorders after the outbreak of infectious diseases consisted of several unique aspects such as fear, physical decline, irritability, sleep disorder, numbness, fatigue, inattention, and even despair. Normally, these symptoms may give rise to trauma responses and interpersonal conflicts.<sup>[2,3]</sup> Previous study has also proved that the post-traumatic stress disorder (PTSD) showed tremendously increased prevalence among the healthcare workers at the end of the infectious diseases.<sup>[24]</sup> Thus, the medical staff will more or less experience mental disorder during and after the COVID-19 pandemic. To this end, recognizing and providing optimized strategy to solve this mental stress issues among the healthcare professionals at an early stage is crucial.

In the past, the healthcare individuals who performed MERS related tasks showed more serious mental impact upon themselves compared with general public.<sup>[25]</sup> Consistently, the research focusing on the 2003 SARS outbreak proving that nearly a half of healthcare staffs experienced serious mental stress after the outbreak.<sup>[8,26]</sup> Among the different occupational ward, it is well acknowledged that the nurses working in the critical care ward may easily experience more severe psychological problems or distress because they normally perform routine task involving invasive procedures (airway suction, manual ventilation, etc) with high risk exposure to the infectious patients.<sup>[27,28]</sup> However, in our study, we reveal that the traumatization distress and psychological impact of non-critical care ward nurses are more severe than those working in the critical care wards. We consider it may be attributed to the several reasons as follows: First, the nurses who worked in the critical care ward were selected preferentially upon those who have previous experience with the similar pandemic outbreak (eg, SARS) ( $P < .05$ , compared with

**Table 2**  
**Comparison of traumatization condition and stress level between the nurses from the critical care ward and non-critical care ward.**

Items	Critical care ward (n=75)	Non-critical care ward (n=84)	P value
Physiological responses, (IQR: 25%–75%)	18 (15–20.8)	22.4 (16–26)	.035
Emotional responses, (IQR: 25%–75%)	16 (14–19)	19 (18–21)	.03
Behavioral responses, (IQR: 25%–75%)	14 (11–17)	18.3 (15–19)	.012
Life beliefs, (IQR: 25%–75%)	15 (11–19)	18 (15–21)	.030
Psychological responses, (IQR: 25%–75%)	42 (39–51)	49.7 (47–55)	.016
Level of stress, Mean ± SD	35.33 ± 8.25	44.05 ± 2.76	.001

IQR = interquartile range, SD = standard deviation.

the nurses in the non-critical care ward). In other word, the mental endurance of nurses working in the critical care ward is stronger. Second, advanced precaution measures implemented on the nurses working in the critical care ward ( $P < .001$ ) rendered them more invulnerable when facing the similar negative psychological impact. Third, the more serious psychological burden derived from the longer duration of shift of the nurses working in the non-critical care ward may partially explain the difference in the psychological impact.

Our findings may provide critical information for further strategy to manage and address the psychological distress among healthcare professionals:

- (1) Optimal or advanced precaution measures need to be implemented for all the nurses who perform the COVID-19 related tasks;
- (2) Effective strategy to curtail the working duration in each shift should be taken in consideration to minimize the fear, distress and other psychological disorder among the nurses;
- (3) The government is compulsory to announce the elaborate information regarding to the epidemic characteristics of COVID-19 especially for the healthcare nurses.

This study has several limitations. First, limited numbers of subjects may give rise to the selection bias, which may result in certain impact upon the conclusion. Thus, we are further planning to enroll more subjects in our study to enlarge the research scale to address this issue. Secondly, as a descriptive cross-sectional 1, the correlation between different factors is difficult to assess in our study. To this end, a longitudinal large-sized intervention study involving more medical staff such as doctors or medical workers needs to be evaluated for better investigation of the detailed underlying characteristics of psychological disorder in the healthcare setting.

## 5. Conclusion

Our results suggest that the traumatization condition and stress level of non-critical care ward is more serious than that of critical care ward. Therefore, future intervention for preventing the mental crisis among the healthcare nurses needs to be focusing on the individuals in the non-critical care ward instead of those in the critical care ward.

## Author contributions

Dr K. Shou had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis.

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