Perceived occupational stressors among nurses in a level-1 trauma center under normalized COVID-19 epidemic prevention and control in China: A qualitative study

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A R T I C L E   I N F O

A B S T R A C T

Background: Nurses in trauma centers encounter emergency patients and are exposed to occupational stressors under normalized pandemic control and prevention.
Objective: The objective of this study was to examine the occupational stressors that nurses perceived during the COVID-19 pandemic in a level-1 trauma center in China.
Methods: From December 2020 to May 2021, a qualitative study was conducted, employing conventional content analysis as the research methodology. A total of twelve nurses were purposefully selected from a trauma center at a major hospital in Beijing to participate in semi-structured interviews (40–50 min' duration). The data collected in this study were analyzed using the conventional content analysis approach proposed by Graneheim and Lundman.
Results: After analyzing the data, two themes emerged: 1) Critical conditions under normalized pandemic prevention and control; 2) Concerns about loved ones and colleagues, along with financial problems. Both these themes further revealed four categories: the complexity and uncertainty of epidemic prevention and health hazards in the former, and concerns for and from families and colleagues, and financial stress in the latter.
Conclusions: The results of this study provide valuable insights into the practical implementation of epidemic prevention and control measures in Chinese trauma centers and shed light on the psychological stress faced by nurses. Improving the tripartite support system of hospital, family, and society, and providing emotional support may help reduce stress among nurses, thereby improving their health and care quality.

1. Introduction

The global impact of coronavirus disease 2019 (COVID-19) pandemic has been felt in over 200 countries spanning six continents [1]. As of October 2021, the total number of confirmed COVID-19 cases reported worldwide surpassed 237 million, with deaths reaching over 4.8 million, according to the World Health Organization [2]. Meanwhile, China has been able to effectively control the pandemic using strict administrative and government orders [3,4]. While sporadic cases continue to be reported throughout the country, the number of domestic COVID-19 cases has significantly decreased [4,5]. As of November 2022, although there has been a

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decrease in the number of COVID-19 cases, hospitals in low-risk areas across the country have continued to implement precautionary measures. These measures include the mandatory use of personal protective equipment (PPE) by staff, regular nucleic acid testing, and the screening of all hospitalized patients through X-rays. These measures are referred to as "normalized COVID-19 epidemic prevention and control" [4].

Numerous research studies have delved into the physical and psychological impacts of the COVID-19 pandemic on the medical personnel deployed to Wuhan during the initial stages of the outbreak [6,7]. In a previous research conducted on 1803 nurses stationed in low-risk areas in Jiangsu during the COVID-19 pandemic, it was found that 20 % of the participants experienced moderate to extreme levels of depression and stress, even with the implementation of standardized disease prevention and control measures [4].

Trauma centers are classified into different levels according to their specific capabilities, with level-1 being the highest. A level-1 trauma center provides comprehensive access to specialized medical and nursing care, encompassing emergency medicine, trauma surgery, critical care, neurosurgery, orthopedic surgery, anesthesiology, and radiology. Additionally, it is equipped with a diverse range of highly advanced surgical and diagnostic equipment for sophisticated medical interventions [8]. Trauma centers often receive patients from emergency departments, and these patients often require urgent screening; thus, there is a need for upgrading protection of the medical staff (wearing N95 masks, protective clothing, etc.). This may result in extra psychological pressure on medical staff.

In this study, qualitative content analysis was employed to obtain a concise and comprehensive depiction of the phenomena at hand [9]. Qualitative content analysis has been utilized in nursing research and education to analyze diverse sets of data and to interpret them at varying depths [10]. Although, the mental health of nurses under the epidemic situation is a matter of great concern [11,12], our literature search revealed no qualitative studies regarding the stressors on nurses in trauma centers. Therefore, the current study, aimed to explore nurses' perceived stressors in a level-1 trauma center under normalized COVID-19 epidemic prevention and control in China. Although many studies have been conducted regarding the stress and anxiety of nurses in emergency departments or the intensive care units of COVID-19, this study is innovative, in that, it focuses on the stressors of nurses in the trauma center under the principle of normalized prevention and control, as well as how they cope with and adjust to their psychological status.

2. Methods

2.1. Study design

A qualitative exploratory study design was employed. Semi-structured, individual interviews were recorded and analyzed based on the conventional content analysis approach in a level-1 trauma center in Beijing between December 2020 to May 2021. The five steps adopted in the analyses included: dividing into meaning units, condensing meaning units, coding, generating sub-categories and categories, and forming themes [10].

2.2. Setting and sample

The study was conducted at a trauma center that offers 24-h services to patients, including early treatment for suspected severe trauma in its resuscitation room. The trauma center has a dedicated team of qualified trauma surgeons, anesthesiologists, laboratory personnel, and blood bank staff who are available 24/7. The initial assessment and rescue of trauma patients strictly adhere to the principles of advanced trauma life support, and the activation of the trauma team follows a protocol based on the nature of the traumatic event.

Our hospital operates on a profit and loss basis, and the monthly bonuses for nurses are closely linked to their respective departments. These bonuses are determined based on factors such as job titles, seniority, workload, and other relevant considerations. However, due to the COVID-19 pandemic, the trauma center has seen a decrease in the number of non-COVID-19 patients. As a result, this situation may have an impact on the income of nurses working in the trauma center.

The studied center had 18 nurses (12 female and 6 male), having a maximum and minimum experience of 15 years and 2 years, respectively. To ensure a comprehensive range of data for our analysis, we implemented a purposive sampling strategy that aimed to capture maximum variation. This approach allowed us to include diverse participants and generate a wide spectrum of information [13]. We selected participants, whose characteristics varied in terms of age, work experience, educational background, position, and marital status. To be eligible for inclusion in our study, participants were required to have a minimum of two years of work experience in a trauma center and express their willingness to participate. The participants included 12 nurses purposively selected from this center. All the participants agreed to take part and none quit during the interview.

Table 1
Interview questions.

<!–Col Count:1–>1. Please tell me about your role and responsibility in the trauma center.
2. What are the current stressors concerning normalized epidemic prevention and control during your worktime in the center?
3. What were the challenges when you were confronted with emergency operations under the pandemic?
4. What was the feedback from your families when you worked in the emergency department under the pandemic?
5. How would you evaluate your salary after the onset of the pandemic?
6. What suggestions would you like to give to your colleagues or hospital leaders in terms of coping with stressors?

2.3. Data collection

Dr. ZD conducted in-depth semi-structured face-to-face interviews with the participants in a designated meeting room at the trauma center, where data was collected. The interviews were conducted outside working hours and with the participants' permission. Initially two pilot interviews, which we did not include in the final analysis, were conducted to develop an interview guide. The pilot interviews, as well as the interview guide developed by one of the authors, were evaluated for integrity and accuracy. This guide was then utilized for conducting the subsequent interviews. The interview questions are listed in Table 1. The interviews lasted between 40 and 50 min and were recorded using a recording pen. Each interview was immediately electronically transcribed verbatim. Data collection was carried out until reaching saturation, indicated by the completion of 12 interviews. To ensure data saturation, an additional four interviews were conducted, but it was confirmed that data collection was complete after the initial 12 interviews. All interviews were conducted in Chinese, with selected responses translated into colloquial English. The English translations underwent thorough review and approval by a professional linguist.

2.4. Data analysis

The analysis of the data was conducted simultaneously with the data collection, employing Graneheim and Lundman's conventional content analysis approach consisting of five steps [10,14]. First, the transcript of each interview was read several times to obtain a sense of the whole; second, the text was divided into meaning units that were condensed; third, primary codes were generated; fourth, the codes were classified based on their similarities and differences, and subsequently organized into sub-categories and categories; lastly, the latent content with conceptual similarities of categories was formulated into main themes. Dr. ZD conducted the interviews, and Dr. TBW coded the data.

2.5. Trustworthiness

The credibility of the data was established through the application of Guba and Lincoln's four criteria [14]. In order to ensure credibility, the researchers maintained ongoing involvement with the data and employed member checking to validate the findings. Following the extraction of initial codes, the transcripts were shared with participants to verify or clarify the intended meanings and initial codes. Additionally, confirmability was ensured through peer checking, where two external peers with expertise in qualitative research evaluated all the interviews, codes, and categories to confirm the accuracy of the data analysis.

Dependability was also ensured throughout the data analysis process. The authors achieved this by sharing and comparing their findings, and coming to a consensus on the analysis. To ensure transferability, sampling was purposely performed to ensure maximal variation, and participant characteristics are described in Table 1. Moreover, study findings were compared to the findings of other studies.

3. Results

Twelve participants (8 female and 4 male) were interviewed for the study. Their ages ranged from 23 to 37 years, whereas their years of work experience ranged from 3 to 10 years. Seven of them were married and five were unmarried (Table 2). The identified stressors were categorized into two major themes: (1) critical conditions under normalized pandemic prevention and control in the trauma center, and (2) concerns about loved ones and colleagues, and financial problems (Table 3). Descriptions of the categories and subcategories, along with quotes from participants have been included. In the presentation of this qualitative study, we have followed the guidelines outlined by the Consolidated Criteria for Reporting Qualitative Studies (COREQ) [14,15].

Table 2
Demographics of the participants.

Participant code	Gender	Age (years)	Educational background	Work experience (years)	Position	Marital Status
1	Female	23	Master of Nursing	3	Registered nurse	Unmarried
2	Female	37	Bachler of Nursing	8	Emergency room registered nurse	Married
3	Male	31	Bachler of Nursing	6	Critical care registered nurse	Married
4	Female	24	Bachler of Nursing	3	Registered nurse	Unmarried
5	Male	37	Bachelor of Nursing	10	Clinical nurse supervisor	Married
6	Female	35	Bachelor of Nursing	7	Emergency room registered nurse	Married
7	Female	29	Bachelor of Nursing	4	Critical care registered nurse	Married
8	Female	30	Bachelor of Nursing	4	Emergency room registered nurse	Married
9	Female	22	Graduate of Nursing	3	Registered nurse	Unmarried
10	Male	27	Graduate of Nursing	3	Registered nurse	Unmarried
11	Female	36	Master of Nursing	6	Clinical nurse supervisor	Unmarried
12	Male	31	Master of Nursing	5	Surgical assistant registered nurse	Married

Table 3
Perceived stressors among nurses in the trauma center.

Theme	Category	Subcategory
Critical conditions under normalized pandemic prevention and control	The complexity and uncertainty of epidemic prevention	Increased workload due to epidemic prevention and control
		Prolonged admission time due to SARS-CoV-2 screening
		Upgrading prevention and control measures for emergency operations
		Family members of patients' lack of understanding and cooperation
	Health hazards	Worries about being infected
		Physical discomfort caused by wearing PPE
Concerns about loved ones and colleagues and financial problems	Concerns for and from families and colleagues	Concern from families and relatives
		Fear of infecting families or colleagues
		Less time with children
	Concerns regarding financial strains	Reduced personal income due to COVID-19

4. Critical conditions under normalized pandemic prevention and control

Nurses in trauma centers usually receive severe trauma patients from emergency departments. Under normalized epidemic prevention and control conditions, they are required to wear PPE when receiving patients, and follow strict admission and hospitalization screening procedures. The implementation of these measures gives rise to numerous challenges in the provision of care. This overarching theme can be further divided into two categories:

(a) The complexity and uncertainty of epidemic prevention

The nurses in the trauma center not only encounter patients with severe and multiple traumatic injuries, but must also triage patients in accordance with the principles of epidemic prevention and control, while protecting their own health and safety. The four subcategories of this thematic category were as follows:

(i) *Increased workload due to epidemic prevention and control*: The participants reported that according to the hospital's epidemic prevention requirements (in operation from 2020 to 2022 and repealed since 2023), they were required to wear clean hats, N95 masks, and gowns every time they admitted patients. This added measure increased their workload as well as increased their psychological pressure.

"The newly admitted patients need nucleic acid results within 24 hours, which increases my workload. Sometimes I can't even stop for a drink of water, and at the end of the day, my arms are sore and painful. Such conditions cause me great stress." (P7)

"There are still a lot of trauma patients during the epidemic period. We must deal with them using the prevention, control, and screening measures that are in place, which adds a lot of work." (P3)

(ii) *Prolonged admission time due to SARS-CoV-2 screening*: Participants noted that according to the hospital's epidemic prevention requirements, all hospitalized patients were required to have a COVID-19 nucleic acid test and chest x-ray before being admitted. The test took at least 2 h, greatly prolonging the admission time. This was especially problematic when patients needed emergency surgery; so, this put additional pressure on the medical staff.

"I had to complete the patient's nucleic acid and chest X-ray before I could admit him to the hospital. Fortunately, the patient did not need emergency surgery, or I would have had to upgrade." (P5)

(iii) *Upgrading prevention and control measures for emergency operations*: The participants reported that in cases where patients needed emergency surgery, and nucleic acid results were not available, medical staff were required to upgrade the protective measures and perform surgery in a dedicated operating room. These emergency measures put pressure on the participants.

"Once I received a patient, who had fallen from a height of three meters, resulting in cerebral hernia, and had to immediately undergo damage control surgery. We couldn't wait for the nucleic acid results; so, we directly upgraded the protection and helped perform the surgery in a separate operating room. I was so stressed that I didn't want to delay his medical treatment." (P12)

(iv) *Family members of patients' lack of understanding and cooperation:* Participants reported that family members of the patients often did not understand the epidemic prevention and control measures and tried to interfere with the work of the medical staff.

"A family member once urged me to quickly arrange hospitalization. However, I had no choice, but to reply that the arrangements could only be made after the nucleic acid screening. I hoped he would understand and cooperate with me." (P2)

(b) Health hazards

Both, working during a rapidly developing epidemic and having to conform to normalized prevention and control, together pose a threat to the health of medical workers and put additional pressure on them. This thematic category was named "health hazards," with the following two subcategories:

(i) *Worries about being infected*: Participants noted that during the pandemic, emergency patients were often admitted without nucleic acid screening, exposing healthcare workers to the risk of infection.

"Nucleic acid tests would even give false negative results. The virus is so cunning that I became overly sensitive and woke up in the night with nightmares about these." (P9)

"Whenever a patient with a fever needs to be intubated, I am always on tenterhooks for fear of aerobic transmission." (P10)

(ii) *Physical discomfort caused by wearing PPE*: Participants reported that the various kinds of protective equipment (e.g., medical masks, hats, gloves, N95 masks, protective clothing, etc.) were physically uncomfortable and sometimes painful to wear.

"Wearing the isolation suit feels very stuffy, and the whole person becomes bulky, which greatly increases the difficulty of nursing operations. One gets really tired by the end of a shift." (P1)

5. Concerns about loved ones and colleagues, and financial problems

External and internal emotional problems were reported as another major stressor for nurses in trauma centers. This main theme had two categories:

(a) Concerns for and from their families and colleagues

Being a front-line nurse during a pandemic affects not only one's own safety, but also the safety of those with whom one comes into contact with. Within this category, there were three subcategories:

(i) Concerns from families and relatives

Participants reported that since the outbreak of the epidemic, they often felt worried about the care of their families, which caused them stress.

"Feverish patients were seen every day, requiring a lot of screening, and my family was worried about my infection and health." (P4)

(ii) Fear of infecting family members or colleagues

Respondents shared about being worried that if they became infected, they would infect their colleagues or family members, which caused them psychological stress.

"I am a strong woman. My family understands and supports my work very much. I feel contradictory about it and guilty, as I am afraid of my family getting infected." (P11)

(iii) *Lack of time with children*

Respondents with children worried about being unable to look after them because they were too busy at work.

"My child is only two years old, I have sent her to my parents for safekeeping. I miss her very much, and I'm afraid she will forget me after the long absence." (P8)

(b) Financial stress

Many hospitals have experienced a decline in non-COVID patients and subsequent financial shortfalls amid the pandemic. Participants noted that reduced personal income due to COVID-19 put a lot of pressure on them.

(i) *Reduced personal income due to COVID-19*

Participants reported that the epidemic greatly impacted the revenue of hospitals and affected their income to varying degrees.

> "Earning wages is important for employees like me to support our families. My salary has still not reached the pre-epidemic standard, and I have thought about quitting, but I am still holding on." (P6)

6. Discussion

To our knowledge, this study is the first to examine the perceived stressors among trauma center nurses in China during the normalization of COVID-19 prevention and control measures. The findings of this study allow us to better understand the realities of epidemic prevention and control implementation in Chinese trauma centers and the psychological stress experienced by nurses at this time. According to the data, the primary occupational stressors perceived by the participants were: the critical conditions under normalized pandemic prevention and control, and personal emotional conflicts.

At present, the epidemic in China—as elsewhere—is recurring and persistent [16]. It has been reported that a considerable percentage of healthcare workers have experienced psychiatric symptoms during the pandemic [17]. Our study revealed that one of the primary stressors for trauma center nurses during this time were the critical conditions under normalized pandemic prevention and control. Within this theme, we further exposed the complexity and uncertainty of epidemic prevention and health hazards. In one previous study in China, 70.3 % of nurses reported discomfort when wearing PPE, and 69.8 % reported feeling stressed about increased workload [4]. Another study showed that work overload, lack of support and understanding, death, and fear of infection were especially relevant for nurses [18]. These stressors were also reported in our study, especially, those related to epidemic prevention and SARS-CoV-2 screening. The requirements of epidemic control measures have undoubtedly put pressure on medical staff in emergency and trauma centers.

The other major stressors reported in our study were concerns for and from family (internal/personal and external problems) as well as financial stressors (external problems). A previous study noted that healthcare workers felt stressed due to the conflict between their duties and safety concerns for themselves as well as their patients, colleagues, and families [19]. Keller et al. [20] reported that the stressful life of emergency department healthcare workers was significantly associated with work-family conflict. In a study carried out among healthcare workers in Spain during the early stages of the COVID-19 outbreak, it was observed that 74 % of participants reported experiencing psychological distress. Interestingly, they expressed more concern about potentially infecting their loved ones than about contracting the virus themselves [21]. Besides the concerns for family reported in previous studies, our study further pointed out that worries from family also cause burden and stress to the participants. In addition, mothers are worried about less time with their children, which is also one of the sources of stress. According to a separate study, a significant number of nurses expressed stress and anxiety specifically related to the reduction in their income during the pandemic. In China, monthly bonuses for nurses are typically influenced by the performance of their respective departments. Due to the COVID-19 outbreak, many departments experienced a decrease in the number of non-COVID-19 patients, which resulted in a decline in their bonuses [4]. Providing financial recognition for the dedication and hard work of these nurses during the pandemic can serve as a catalyst for their motivation to continue serving in any future epidemics or pandemics [19].

According to previous research, frontline nursing and medical personnel, particularly during the initial stages of epidemics, have experienced anxiety as a result of inadequate personal protective equipment (PPE) and limited understanding of the pathogen [22]. However, in our study, our participants did not reflect the pressure caused by inadequate PPE and insufficient understanding of the virus, which may be due to the fact that our hospital pays sufficient attention to the supply of epidemic prevention materials and our staff's knowledge education. In addition, a recent study reported that the shortage of staff contributed to nurses assuming greater workloads [12]. However, this was not a source of stress in our trauma center.

In line with the stressors noted in our study, previous studies have reported that healthcare workers have faced different degrees of psychological problems during the COVID-19 pandemic [4,23–25]. Given that, there are several recommendations that can be made to mitigate the negative impact of the pandemic based on organizational strategies [26]. We recommend that nurses' mental health should be monitored in the future, and suggest providing a platform to address job stressors and share helpful coping strategies in relation to COVID-19 [25]. Additionally, to enhance the psychological well-being of healthcare workers in trauma centers, it is recommended for hospital managements to offer mental health training courses or counseling sessions [4]. Recent research has highlighted the positive impact of social support and coping strategies on alleviating physiological, psychological, and social symptoms experienced by frontline nurses [27]. Policymakers and managers have a crucial role to play in supporting frontline workers during pandemics, and this includes offering appropriate training and interventions to help them effectively manage and cope with stress [28]. Hospitals should promote any form of community interaction and education about admission procedures to patients and their families. These measures could greatly reduce the screening time of patients and the workload of nurses, thus reducing their pressure.

Further, these interventions should be pragmatic, flexible, and responsive to unique system pressures, as modified by individual needs [17].

There are a few limitations worth noting in this study. Firstly, the sample consisted solely of participants from a single center, potentially limiting its representativeness to low-risk areas across the entire country. Additionally, the findings can only be applied to China and cannot be extrapolated to other countries. Another limitation is the relatively small sample size, highlighting the need for larger-scale studies to enhance the generalizability of the results [1,14].

7. Conclusions

The findings of this study allow us to better understand the realities of epidemic prevention and control implementation in Chinese trauma centers and the psychological stress experienced by nurses. Improving the tripartite support system of hospital, family, and society, and providing emotional support may help reduce stress among nurses, thereby improving their health and care quality. To gain a deeper understanding of the stressors affecting nurses in trauma centers and their implications for health and performance, further research is required. This includes both quantitative and qualitative studies that delve into the specific factors contributing to stress in this setting. By conducting more comprehensive research, we can enhance our knowledge and develop targeted strategies to support nurses in managing and coping with these stressors.

Ethics approval

This study was approved by the Institutional Ethics Committee of Peking University People's Hospital (2020PHB122). All research methods adhered to the applicable guidelines and regulations, as outlined by the Declaration of Helsinki. To protect confidentiality, all data analyzed in this study were anonymized.

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Data availability statement

Data will be made available on request.

CRediT authorship contribution statement

Zhe Du: Writing – original draft, Resources, Investigation. **Yajun Zhang:** Supervision, Investigation, Data curation. **Wei Huang:** Writing – review & editing, Supervision, Conceptualization. **Tianbing Wang:** Writing – review & editing, Supervision, Conceptualization.

Declaration of competing interest

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

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