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Contents lists available at ScienceDirect

American Journal of Infection Control

journal homepage: www.ajicjournal.org

Major Article

A qualitative study on the psychological experience of caregivers of COVID-19 patients



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Key Words:

Coronavirus disease 2019 (COVID-19)
Epidemic outbreak
Nurse
Psychological experience
Qualitative study

Background: The coronavirus disease 2019 (COVID-19) is spreading rapidly, bringing pressure and challenges to nursing staff.

Objective: To explore the psychology of nurses caring for COVID-19 patients.

Methods: Using a phenomenological approach, we enrolled 20 nurses who provided care for COVID-19 patients in the First Affiliated Hospital of Henan University of Science and Technology from January 20, to February 10, 2020. The interviews were conducted face-to-face or by telephone and were analysed by Colaizzi's 7-step method.

Results: The psychological experience of nurses caring for COVID-19 patients can be summarized into 4 themes. First, negative emotions present in early stage consisting of fatigue, discomfort, and helplessness was caused by high-intensity work, fear and anxiety, and concern for patients and family members. Second, self-coping styles included psychological and life adjustment, altruistic acts, team support, and rational cognition. Third, we found growth under pressure, which included increased affection and gratefulness, development of professional responsibility, and self-reflection. Finally, we showed that positive emotions occurred simultaneously with negative emotions.

Conclusions: During an epidemic outbreak, positive and negative emotions of the front-line nurses interweaved and coexisted. In the early stage, negative emotions were dominant and positive emotions appeared gradually. Self-coping styles and psychological growth played an important role in maintaining mental health of nurses.

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INTRODUCTION

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is a newly discovered ribonucleic acid coronavirus isolated and identified from patients with unexplained pneumonia in Wuhan, China in December 2019.¹ Before it was named by the International Committee of Viral Classification on February 12, 2020, it was called 2019-nCoV. SARS-CoV-2 mainly causes respiratory and digestive tract symptoms,²

with symptoms ranging from mild self-limited disease to severe pneumonia, acute respiratory distress syndrome, septic shock, and even systemic multiple organ failure syndrome. The infection source of coronavirus disease 2019 (COVID-19) is mainly patients with SARS-CoV-2 infection. Asymptomatic infected patients may also become the source of infection, mainly via aerosols from the respiratory tract, but also through direct contact.³ Elderly people with underlying diseases are more likely to be infected with the virus and develop severe disease and children and infants are also at risk. At present, there are no specific drugs for this disease. The treatment and nursing mainly include antiviral and traditional Chinese medicine treatment, isolation, symptomatic support, and close monitoring of disease progression.³

Since the first case of unexplained pneumonia in Wuhan, 52 countries in the world have confirmed cases by 28 February according to WHO data, of which about 94% are in China.⁴ On that day in China, there

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Conflicts of interest: None to report.

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were 37,414 active confirmed cases (including 7,664 severe cases) in 31 provinces, 39,002 recovered and discharged cases, 2,835 deaths, amounting to 79,251 confirmed cases as well as 1,418 suspected cases.⁵ A total of 658,587 close-proximity interactions were tracked, including 58,233 close-proximity interactions under medical observation.

Although China experienced SARS in 2003 and H1N1 in 2009, the outbreak of COVID-19 as a new infectious disease severely tested the country's public health system. In this context, medical workers, as the main force in the battle against the epidemic, bear the monumental task. Unfortunately, many front-line personnel have sacrificed their own well-being and have been infected or died, which causes increasing psychological pressure. According to the Chinese Center for Disease Control and Prevention, by February 11, over 3,000 health care personnel in China were suspected to be infected with SARS-CoV-2. Among them, 1,716 were confirmed cases and 5 had died.⁶ Previous studies have shown that during sudden natural disasters and infectious diseases, nurses will sacrifice their own needs to actively participate in the antiepidemic work and make selfless contributions out of moral and professional responsibility.⁷ At the same time, nurses would be in a state of physical and mental stress and feel isolated and helpless in the face of health threats and pressure from the high-intensity work caused by such public health emergencies.⁸ Previous studies have shown that when nurses are in close contact with patients with emerging infectious diseases such as SARS,⁹ MERS-CoV,^{10, 11} Ebola,¹² H1N1,¹³ they will suffer from loneliness, anxiety, fear, fatigue, sleep disorders, and other physical and mental health problems. Studies have shown that the incidence of depression, insomnia, and post-traumatic stress among nurses involved in the treatment of SARS patients was 38.5%, 37%, and 33%, respectively.¹⁴ In a study on the psychological status of Ebola patients' caregivers, 29% of respondents felt lonely and 45% received psychological counselling.¹⁵ On the contrary, some studies also demonstrate the positive experience and growth brought by the collective antiepidemic efforts.^{13,16}

Due to the sudden outbreak of the epidemic, nurses from the Department of Infectious Diseases had to enter the negative pressure ward to care for the patients after only undergoing a brief training on COVID-19. Nurses from other departments were required to go through 3 training stages before starting nursing duties for patients with COVID-19: prejob training, adaptive training by nursing other patients in the infection department, and negative pressure ward training. This process occupied about 1 week. Nurses who entered the negative pressure ward would work for 0.5–3 months before being transferred to other non-anti-epidemic positions. Because COVID-19 is a new disease and the medical system and culture of different countries varies, further research is needed on the psychological experience of frontline nurses fighting against COVID-19. Currently, published studies have highlighted the disease prevalence,¹⁷ clinical characteristics, diagnosis, and treatment.² Some reports have paid attention to the severity of psychological problems in medical personnel¹⁸ and the urgency of providing psychological care¹⁹. However, no qualitative studies have been published on the psychological experience of nurses.

Therefore, our study aims to understand the subjective experience of nurses participating in nursing COVID-19 patients through semi-structured interviews and to analyse the data using phenomenological methods,²⁰ providing fundamental data for the psychological experience of nurses.

METHODS

Research design

Our research used the Colaizzi's phenomenological method to qualitatively analyse the psychological experience of nurses caring for patients with COVID-19. Colaizzi's phenomenological method

focuses on the experience and feelings of participants and finds shared patterns rather than individual characteristics in the research subjects. This scientific approach guarantees the authenticity of the collected experience of participants to adhere to scientific standards.

Study subjects

By using a purposeful sampling method, we selected 20 nurses caring for patients with COVID-19 in the First Affiliated Hospital of Henan University of Science and Technology from January 20, 2020 to February 10, 2020. The inclusion criteria included (1) nurses who entered the negative pressure ward and provided nursing care for confirmed COVID-19 patients and (2) volunteers who participated in the study. The exclusion criteria were inability to conduct 2 or more interviews during the study period. We determined the number of required respondents by interviewing nurses who met the inclusion criteria until the data were saturated and no new topics were generated.

Interview outline

We determined the interview outline by consulting relevant literature, seeking experts' opinions, and selecting 2 nurses for preinterview. The main interview questions posed to the participants are the following: (1) What are the main psychological feelings of nursing care providers for COVID-19 patients? (2) What are your coping strategies? and (3) What are your insights in the face of the epidemic? In addition, we asked the following subquestions: (1) How did you feel when accepting the antiepidemic task? (2) How do you feel when you are working with COVID-19 patients? (3) What has changed in your life? (4) How do you cope with changes in your work and life? (5) What are your thoughts and feelings about this antiepidemic task?

Data collection

We communicated the purpose and significance of the study with the participant in advance and scheduled the interview time at their convenience. The interviewer possessed a Master of Science in Nursing with experience in qualitative interview and had worked as a head nurse in the SARS isolation ward and was experienced in epidemic prevention and control. With 20 years of clinical nursing, teaching, and scientific research experience and 5 years of psychological consultation experience, the researcher obtained a Second Level Psychological Consultant Certificate (the highest level in China) issued by the Ministry of Human Resources and Social Security of China. Therefore, the researcher was able to carry out this research independently.

The one-to-one interviews were conducted in a separate room in a quiet manner without interruptions. The interviews were recorded, which were kept strictly confidential. The interviews took 40–60 minutes per person. If the participant exhibited emotional problems during the interview, adequate psychological intervention was provided to prevent secondary psychological harm. The study subjects were allowed to withdraw consent at any time. The researchers remained neutral in collecting the data and established good relationships with the participants. We used techniques such as unconditional acceptance, active listening, and clarification to promote the authenticity of the data and to avoid bias. For each participant, at least 1–2 face-to-face interviews and 1–2 telephone interviews were arranged as needed to ensure data collection at multiple time points.

Data analysis

Within 24 hours of each interview, the recording was transcribed and analysed by Colaizzi's phenomenological analysis method. Two researchers independently reviewed the interview materials, summarized and extracted meaningful statements, and formulated the

themes present. Conflicting opinions on the contents of a theme were discussed and resolved by a research group composed of a master of nursing, a doctor of nursing, and 2 chief nurses.

Ethical review

This study was reviewed and approved by the Ethics Committee of the First Affiliated Hospital of Henan University of Science and Technology (ethics code: 2020-03-B001). All participants signed informed consent. The authors promise that there will be no academic misconduct such as plagiarism, data fabrication, falsification, and repeated publication.

RESULTS

In our study, we enrolled 3 males and 17 females between 25 and 49 with an average age of 30.60 ± 6.12 . The working experience ranged from 1 to 28 years with an average of 5.85 ± 6.43 . All nurses possessed a bachelor's degree. Seven nurses were married with children, 5 were married without children, and 8 were unmarried without children. There were 17 general nurses and 3 head nurses. [Table 1](#) outlines the baseline characteristics of the participants.

We explored the psychological experience of caregivers of patients with COVID-19 using phenomenological methods. We found 4 themes that are summarized below. Exemplar quotes for each theme are displayed in [Table 2](#).

Theme 1: Significant amount of negative emotions in the early stage

All study subjects experienced a significant amount of negative emotions in the first week, especially in the period from the first pre-job training to the first time they entered the negative pressure ward.

As the number of patients continued to rise, the workload of all nurses ($n = 20$) increased proportionally with 1.5–2 times normal work hours and workloads. Nurses were required to conserve protective clothing by reducing the number of times they wear it since protective equipment was in short supply, resulting in fatigue and discomfort. Failing to meet physical and psychological needs brought a sense of helplessness.

All participants ($n = 20$) expressed their fears, which peaked when they entered the negative pressure ward for the first time, which then gradually declined. Similarly, outsourced support nurses ($n = 12$) also experienced a strong sense of fear when they first entered the Department of Infectious Diseases, but gradually eased as their work adjusted. Most nurses ($n = 11$) expressed concerns about patients in an isolated environment with relatively few caregivers and many patients. They were mainly concerned about the unknown conditions of the patients, severe emergencies, and the patients' psychological state.

Table 1
Baseline characteristics of participants ($n = 20$)

Characteristics	N (%) or mean \pm SD	Median (range)
Gender	Male	3 (15%)
	Female	17 (75%)
Age	30.60 ± 6.12	29 (25–49)
Nationality	Han Chinese	20 (100%)
Working Experience	5.85 ± 6.43	3.5 (1–28)
Education	Undergraduate	20 (100%)
Duty	Head nurse	3 (15%)
	General nurse	17 (75%)
Marriage and offspring	Married with children	7 (35%)
	Married without children	5 (25%)
	Unmarried without children	8 (40%)
Number of interviews	3.05 ± 0.89	3 (2–5)

As with any emerging infectious disease, work processes and nursing routines need to be explored while working. Most of the participants ($n = 15$) felt different levels of anxiety. Under the challenges of changes in working environment and team members, 50% of nurses said they felt anxious.

Most nurses in this study were between 25 and 40 years old. Some came from a single-child family and have elderly and children in their family. All nurses expressed concern about the impact of the outbreak on the health of their families. They also said that their families were also worried about their health. Those who did not live with their parents ($n = 9$) chose to hide the fact that they work in isolation ward from their parents. After separation from their families, they felt helpless and guilty. The nurses ($n = 4$) with the elderly and children at home were particularly worried of their families.

Theme 2: Coping and self-care styles

All nurses ($n = 20$) activated psychological defence mechanisms, such as speculation, isolation, depression, distraction, self-consciousness, humour, rationalization, etc. Nurses used existing knowledge and new knowledge of psychological decompression communicated by colleagues or the internet to adjust themselves and actively or passively used psychological techniques, such as writing diary and letters, breathing relaxation, mindfulness, music meditation, and emotional expression and venting.

Most nurses ($n = 14$) chose to adjust their sleep when stressed by work. Some nurses will increase their food intake and some will exercise regularly and maintain physical strength to ensure normal work ability.

During times of stress, nurses ($n = 13$) cared and helped each other and showed support for stress relief. Most nurses said that they felt the collective power and the team cohesion was stronger.

Some nurses ($n = 9$) took the initiative to process information and use medical knowledge for analysis. Their attitudes were calm and rational. Nurses also took the initiative to compare situations, find favourable information, and encourage themselves.

Theme 3: Growth under pressure

All participants ($n = 20$) mentioned their gratitude for the support from colleagues, relatives, friends, and all sectors of society. They also realised the importance of health and family. Most nurses ($n = 15$) said that they would work and live with a state of appreciation and gratitude in the future.

More than 70% of the participants mentioned that professional responsibility prompted them to participate in the mission to contain the epidemic. Most nurses ($n = 9$) reviewed the value of the nursing profession and identified more with their chosen profession.

Table 2
Themes identified through interviews with nursing staff

Theme	Subtheme	Quotations
I. Significant amount of negative emotions in the early stage	i. Fatigue, discomfort, and helplessness caused by high-intensity work and self-protection	<p>"After working 12-16 hours every day, I feel very tired and can even sleep when standing with pain all over my body."</p> <p>"After putting on protective clothing, nursing duties are awkward to carry out. Protective clothing needs to be worn for 8 hours or more without drinking water and eating food and urinating was done with adult diapers."</p> <p>"When wearing protective clothing for a long time, I have headaches, chest tightness, and palpitations. The surgical mask strap pinches my ears. When I take off my protective clothing, my whole body is sweaty and I feel like I'm going to collapse."</p> <p>"...There are a lot of patients. Our job is not only to care for them, but also to participate in training, information reporting, disinfection, and isolation. I feel I don't know where to start and I'm under a lot of pressure. But I don't have time to go to psychological counselling, I even don't have time to sleep..."</p>
	ii. Fear of viral infections and concern for patients	<p>"Although I volunteered to work in the Department of Infectious Diseases, I still feel very scared. After all, it is a new infectious disease and there are no specific drugs at present. I was scared to see reports of the sacrifice of medical staff in other cities."</p> <p>"...The moment I walked through the door of the Department of Infectious Diseases, I felt very scared. I felt much better after I got used to it. And I felt scared when I pushed the door of the negative pressure room for the first time, but I was fine the second time."</p> <p>"After all, it is a new disease and the patient's condition is unpredictable. I am always worried about what to do if the patient's condition deteriorates in the next second."</p> <p>"Although the technology and equipment are very good, I am still very worried. If the patient's condition changes and rescue is needed, or the coordination is lacking in various aspects, or there is insufficient manpower, what should we do?"</p> <p>"The patient is suffering after being infected and isolated in a single room. Their psychological condition is very worrying."</p>
	iii. Anxiety caused by lack of knowledge, environmental changes, and presence of strangers	<p>"Although I have worked in the Department of Infectious Diseases, a lot of knowledge still needs to be learned because this is a new infectious disease. We also need to train new colleagues. I feel anxious."</p> <p>"When I first came here, I felt that there were a lot of hallways in the Department of Infectious Diseases. The environment was unfamiliar and my colleagues were also unfamiliar. The operating procedures and disease care routines were different from previous work. I felt very anxious."</p>
	iv. Bidirectional concerns with their own family members	<p>"I am worried that I will infect my children"</p> <p>"My partner is very worried that I will be infected."</p> <p>"I am the only child and my mother cries every day and fears that I will be infected, and I worry more about them..."</p> <p>"I can't tell my parents about my work, lest they worry about me."</p> <p>"I agreed with my child to talk on the phone twice a day, but every time I get off work, it's already midnight."</p> <p>"I have set aside life and death, but I am worried about the children and the elderly in the family... (crying)"</p>
II. Coping and self-care styles	i. Active or passive psychological adjustment	<p>"I've often thought how much better it would be if the epidemic disappeared when I wake up..."</p> <p>"My method is not to think about stress, I shield it out of my life."</p> <p>"...I forget everything when I am busy..."</p> <p>"It makes me feel good to think that I'm treating people every day."</p> <p>"When using diapers, I tell myself you're young enough to become a baby (laughs)."</p> <p>"I write a diary and sometimes write letters."</p> <p>"The progressive breathing relaxation method recommended by my colleague is good, I often use it."</p> <p>"When I rest, I watch comedy, listen to meditation music, or practice yoga."</p> <p>"I can't help crying when I'm under too much pressure and I feel relaxed after crying."</p> <p>"I feel good using mindfulness-based stress reduction."</p>
	ii. Life adjustment	<p>"I feel sleep is the best stress relief, I just want to sleep."</p> <p>"I think eating and drinking will increase my resistance. I don't lose weight now; I eat a lot."</p> <p>"I am exercising less than before because the heavy workload is also exercise and the right amount is the best."</p>
	iii. Taking the initiative to be altruistic and seeking team support by "huddling together for warmth"	<p>"Everyone is very welcoming and friendly. Experienced colleagues will take the initiative to teach me. I also take the initiative to teach new colleagues."</p> <p>"Everyone is willing to do more work so colleagues can rest more. Colleagues are particularly united."</p> <p>"If someone is uncomfortable, everyone will take care of him and work for him."</p> <p>"We encourage each other. It doesn't feel like I'm fighting alone, I'm not afraid."</p>

(continued)

Table 2 (Continued)

Theme	Subtheme	Quotations
	iv. Adjusting cognition to face the situation rationally	"Through data analysis, compared with the SARS epidemic, this epidemic spread quickly. But the virus is weak, the mortality rate is low, and young people without underlying diseases do not have to worry too much even if they are infected." "In fact, the chance of medical staff infection is very low and the protection of negative pressure wards is better than other departments." "My attitude towards the epidemic is to neither loosen prevention and control nor be overly nervous." "The medical staff in Wuhan is really tough and some have sacrificed their own life. Compared with them, we feel that we are lucky so my mental state has improved."
III. Growth under pressure	i. Increased affection and grateful sentiments	"I really appreciate the people who care for and support me and I cherish this emotion." "This experience made me feel that life is precious and family is important..." "To live well every day is to love my family" "After work I find the sky is blue and everything is beautiful." "...I feel this is a special work experience. It is a gift. I cherish it."
	ii. Professional responsibility and identity	"Although I was scared in the face of the epidemic, I haven't flinched. I don't have grand ideas. I think this is responsibility." "I used to work to earn a salary, but now it feels like a responsibility." "Saving lives is the responsibility of nurses and I like this profession more." "Maybe there was a discrimination against nurses in the society but now I am proud of my choice."
	iii. Self-reflection	"Although I am very tired, I find that I have survived and I have done a good job. I can't believe it." "I never thought I could be so strong." "...I'm not even afraid of death, what else could I be afraid of?" "It feels like there's nothing I can't overcome (laughs)."
IV. Positive emotions occurred simultaneously or progressively with negative emotions	i. Confidence in the government, the medical environment and self-prevention ability	"I feel that the government has strong prevention and control measures and the epidemic will be controlled very soon. But after all, we have a large population and it is a process." "Equipment in the Department of Infectious Diseases is relatively advanced. We also use robotic aids and the patient's health is guaranteed."
	ii. Calmness and relaxation at work and with patients	"As long as we have 2-way protection and disinfection and isolation steps as required, there is no problem." "I volunteered to sign up and I have no psychological burden when signing up." "I felt quite calm when notified to take part in the fight against the epidemic and did not resist or want to resign."
	iii. Happiness from multiple social support sources	"My mood is much better after starting pre-job training." "After entering the negative pressure ward, I saw that both the patient and the doctor were protected. So, I felt safe and relieved." "Every time I take care of the patients, they will take the initiative to put on a mask. I feel particularly safe in my heart. After treatment, they will keep saying 'thank you' and it feels good." "Patients are very cooperative with our work. Although some patients have emotions due to illness, they show great respect to us." "My family calls or sends WeChat greetings every day, and I feel very happy." "The hospital has an extra bonus for us and we have priority in promotion. The union also gave us gifts and expresses sympathy to us." "Many colleagues called me to encourage me and I felt that there were many people who cared about me." "Online reviews say we are heroes..." "A lot of companies donated money and supplies to support our fight against the epidemic and I was very moved!" r[institution] also actively paid for our antiepidemic health insurance; it feels like everyone is supporting us."

Half of the nurses (n = 10) conveyed that although the epidemic prevention work was hard, they started to self-reflect. For example, they strengthened their will, discovered their potential, and increased their courage to face life.

Theme 4: Positive emotions occurred simultaneously or progressively with negative emotions

Although most nurses had negative emotions such as fear, anxiety, and worry, positive emotions appear synchronously or progressively. After a week, positive emotions prevailed in 70% of the nurses.

While fear and anxiety were brought on by the epidemic, nurses also evaluated the epidemic prevention and control progress and felt confidence in the medical capability of the government and its subunits. At the same time, they felt confidence in self-prevention and control ability after training and practice. All nurses actively accepted antiepidemic tasks and most (n = 11) volunteered. Most nurses (n = 16) showed calmness when receiving these tasks. Although, as mentioned earlier, there were negative emotions such as fear and anxiety in the early stages, these subsided after the pre-job training and environmental adaptation. Most nurses (n = 14) said that after entering the negative pressure ward to care for patients, they felt calm and relaxed.

Despite difficult conditions and challenges in the fight against the disease, 60% of the nurses reported feeling happy. Firstly, the nurses felt the patient's goodwill, respect, active cooperation, and gratitude. Secondly, family and team support brought happiness. Contact with family was a key factor in our study. In addition, the hospital has a reward and welfare system in place to support and motivate nurses. The encouragement of colleagues also brought happiness to nurses. Other forms of social support were important to the nurses' feeling of appreciation.

DISCUSSION

This study explored the psychological experience of caregivers of patients with COVID-19 using phenomenological methods and we summarised our findings into 4 themes: significant amounts of negative emotions at an early stage, self-coping styles, growth under stress, and positive emotions that occur simultaneously or progressively with negative emotions.

The nurses caring for COVID-19 patients felt extreme physical fatigue and discomfort caused by the outbreak, intense work, large number of patients, and lack of protective materials, which was consistent with the studies on the outbreak of MERS-CoV^{10, 21} and Ebola.¹⁵ In this study, nurses' concerns about family members were consistent with the study of Lee et al.,²² especially those with elderly and children in the family. The physical exhaustion, psychological helplessness, health threat, lack of knowledge, and interpersonal unfamiliarity under the threat of epidemic disease led to a large number of negative emotions such as fear, anxiety, and helplessness, which have been reported by several studies.^{8, 10, 11} We showed that nurses' negative emotions are more pronounced in the first week when entering pre-job training and negative pressure ward for the first time. Therefore, early psychological intervention is particularly important to nurses in an epidemic. It is best to conduct stress assessment and screening of nurses immediately after receiving the epidemic prevention tasks and to provide professional, flexible, and continuous psychological intervention^{15, 22} to promote emotional release and improve nurses' mental health.²³ At the same time, it is important to establish early support systems,⁹ such as adequate supplies of protective materials, reasonable allocation of human resources, elderly and infant care services for nurses' families, pre-job training, and interpersonal interaction among nurses to facilitate nurses' adaptation to the antiepidemic tasks.

It is known that coping style, cognitive evaluation, and social support are all mediators of stress. Studies have shown that psychological adaptation and social support play an intermediary role in psychological rehabilitation under outbreak stress.²⁴ Pressure of the epidemic may prompt nurses to use their medical and psychological knowledge to actively or passively make psychological adjustments. In our study, nurses adopted avoidance, isolation, speculation, humour, self-consciousness, and other psychological defences to psychologically adjust to the situation. It has been demonstrated that all coping measures under the epidemic disaster can alleviate stress and promote mental health.²⁵ Participants adopted breathing relaxation, music, meditation, mindfulness, and other ways to reduce stress, which was consistent with the study of nurses in the SARS wards that adopted multiple ways to deal with stress.^{22, 26} In addition, our results showed active altruism and greater team solidarity, reflecting the study of Kim et al.¹⁰ and Shih et al.²⁷ Generally, nurses can adjust their cognitive rationality to adapt to the epidemic, which may also be related to health care professionals' rich medical knowledge and more rational and positive attitude.²⁸ According to American psychologist Richard Lazarus' stress and coping model, whether the stressors are effective or not depends mainly on the process of cognitive evaluation and coping. When stressed, nurses constantly adjust cognitive evaluation through professional knowledge to promote self-psychological

balance, take the initiative to be altruistic, seek team support,¹³ take the initiative to reduce stress, adjust sleep, diet and exercise to adapt to internal and external environment changes, and prevent injuries caused by stress, which has positive significance for mental health.²³

Many studies have shown that epidemic outbreaks can cause psychological trauma for caregivers.^{14, 18, 19} In contrast, the results of our study demonstrate that most nurses grew psychologically under pressure. Nurses partook in self-reflection of their own values and found positive forces such as expressing more appreciation for health and family and gratitude for social support, which was consistent with study of Shih et al.²⁷ The sense of responsibility brought by professional ethics in an epidemic^{7, 11} encouraged nurses to actively participate in antiepidemic tasks and boosted their professional identity and pride, in line with previous reports.¹⁶ Therefore, actively guiding and inspiring nurses to realise their own psychological growth during an epidemic may play a positive role in psychological adjustment.

Our finding of the existence of positive emotions in our nurses such as confidence, calmness, relaxation, and happiness, which simultaneously or gradually appeared with negative emotions, was in contrast to the results several studies that describe only the presence of a large amount of negative emotions during outbreak stress.^{18, 19} However, other studies report similar findings.^{13, 16, 21} In the case of an outbreak, confidence in safety, early training, and confidence in professional skills are all factors that promote medical staff's willingness to actively participate in antiepidemic work.²⁹ Physical and mental rewards to nurses from work units are also important supporting factors.¹¹ Our participants generally believed that positive emotions were related to the multi-dimensional support of patients, family members, team members, government, social groups etc. Therefore, social support is critical for nurses in the fight against epidemics.^{14, 16, 21} The calmness and ease of most nurses in this study after starting the antiepidemic tasks is rarely mentioned in other studies and may be related to nurses' gradual adaptation, acceptance, positive response, and personal growth.^{14, 26} Studies have shown that positive emotions play an important role in the recovery and adjustment of psychological trauma.³⁰ Optimism has a protective effect on psychological trauma under disasters and can promote the psychological rehabilitation of post-traumatic stress disorder.³¹ Therefore, in the process of psychological intervention of nurses in an epidemic, strengthening multi-dimensional social support, adjusting cognitive evaluation, guiding positive coping styles, and stimulating positive emotions are crucial to promote the psychological health of nurses.

Strengths

Most existing qualitative studies are retrospective studies. In contrast, this study established a good relationship of consultation and visit with the participants in an early stage when the participants just accepted the antiepidemic tasks. We collected the psychological experience data of the participants over time through multiple interviews. This led to a deep understanding of their work experience, resulting in comprehensive and authentic data. Diverging from the results of many studies on the experience of negative emotions during outbreak stress, we found that positive emotions coexist with negative emotions, as well as psychological adjustment and growth under pressure, and preliminarily discussed its impact on nurses' mental health.

Limitation

Due to the characteristics of qualitative research, the sample size of this study was limited. Firstly, most of the participants were nurses, including 3 nursing managers. The experiences of other health care workers and administrators besides nurses need to be further explored. Secondly, due to the nature of outbreak prevention

and control, we were unable to conduct focus group interviews and did not collect data from multiple centres in order to avoid potential cross-infection. In addition, this study was a short-term study. Long-term experience of the research subjects would be a valuable avenue to explore in the future.

CONCLUSIONS

This study provided a comprehensive and in-depth understanding of the psychological experience of caregivers of patients with COVID-19 through a phenomenological approach. We found that during the epidemic, positive and negative emotions of frontline nurses against the epidemic interweave and coexist. In the early days, negative emotions were dominant and positive emotions appeared simultaneously or gradually. Self-coping style and psychological growth are important for nurses to maintain mental health. This study provided fundamental data for further psychological intervention.

References

- Zhu N, Zhang D, Wang W, et al. A novel coronavirus from patients with pneumonia in China, 2019. *N Engl J Med*. 2020;382:727–733.
- Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet North Am Ed*. 2020;395:497–506.
- Interpretation of pneumonia diagnosis and treatment scheme for novel coronavirus infection (trial version 6) [EB/OL]. (2020). Available at: <http://www.nhc.gov.cn/xcs/zhengcwj/202002/8334a8326dd94d329df351d7da8aefc2.shtml>. Accessed February 2, 2020.
- WHO Novel Coronavirus(2019-nCoV) Situation Report –39[EB/OL]. (2020). Available at: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200228-sitrep-39-covid-19.pdf?sfvrsn=aa1b80a7_2. Accessed February 29, 2020.
- Office of Health Emergency, National Health Commission. Update on pneumonia of new coronavirus infection as of 24:00 on February 28[EB/OL]. (2020). Available at: <http://www.nhc.gov.cn/xcs/yqfkdt/202002/4ef8b5221b4d4740bda3145ac37e68ed.shtml>. Accessed February 29, 2020.
- China Disease Control Report: more than 3,000 medical staff infected with new crown virus [EB / OL]. (2020). Available at: <http://hb.sina.com.cn/news/n/2020-02-18/detail-iimxyqvz3722095.shtml>. Accessed February 18, 2020.
- Aliakbari F, Hammad K, Bahrami M, et al. Ethical and legal challenges associated with disaster nursing. *Nurs Ethics*. 2015;22:493–503.
- O'Boyle C, Robertson C, Secor-Turner M. Nurses' beliefs about public health emergencies: fear of abandonment. *Am J Infect Control*. 2006;34:351–357.
- Chung BPM, Wong TKS, Suen ESB, Chung JWY. SARS: caring for patients in Hong Kong. *J Clin Nurs*. 2005;14:510–517.
- Kim Y. Nurses' experiences of care for patients with Middle East respiratory syndrome-coronavirus in South Korea. *Am J Infect Control*. 2018;46:781–787.
- Khalid I, Khalid TJ, Qabajah MR, Barnard AG, Qushmaq IA. Healthcare worker sem-otions, perceived stressors and coping strategies during MERS-CoV outbreak. *Clin Med Res*. 2016;1303:1–22..
- Liu C, Wang H, Zhou L, et al. Sources and symptoms of stress among nurses in the first Chinese anti-Ebola medical team during the Sierra Leone aid mission: a qualitative study. *Int J Nurs Sci*. 2019;6:187–191.
- Honey M, Wang WY. New Zealand nurses perceptions of caring for patients with influenza A (H1N1). *Nurs Crit Care*. 2013;18:63–69..
- Su TP, Lien TC, Yang CY, et al. Prevalence of psychiatric morbidity and psychological adaptation of the nurses in a structured SARS caring unit during outbreak: a prospective and periodic assessment study in Taiwan. *J Psychiatr Res*. 2007;41:119–130.
- Smith MW, Smith PW, Kratochvil CJ, et al. The psychosocial challenges of caring for patients with Ebola virus disease. *Health security*. 2017;15:104–109.
- Liu H, Liehr P. Instructive messages from Chinese nurses' stories of caring for SARS patients. *J Clin Nurs*. 2009;18:2880–2887..
- Hui DS, I Azhar E, Madani TA, et al. The continuing 2019-nCoV epidemic threat of novel coronaviruses to global health—the latest 2019 novel coronavirus outbreak in Wuhan, China. *Int J Infect Dis*. 2020;91:264–266.
- Kang L, Li Y, Hu S, et al. The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. *Lancet Psychiatry*. 2020.
- Xiang YT, Yang Y, Li W, et al. Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. *Lancet Psychiatry*. 2020.
- Colaizzi PF. *Psychological Research as the Phenomenologist Views It*. New York: Oxford University Press; 1978. 1978.
- Kang HS, Son YD, Chae SM, et al. Working experiences of nurses during the Middle East respiratory syndrome outbreak. *Int J Nurs Pract*. 2018;24:e12664.
- Lee SH, Juang YY, Su YJ, et al. Facing SARS: psychological impacts on SARS team nurses and psychiatric services in a Taiwan general hospital. *Gen Hosp Psychiatry*. 2005;27:352–358. (Smith M W, 2017).
- National Health Commission of the People's Republic of China. The guideline of psychological crisis intervention for 2019-nCoV pneumonia. Available at: <http://www.nhc.gov.cn/jkj/s3577/202001/6adc08b966594253b2b791be5c3b9467.shtml>. Accessed January 27, 2020.
- Mak WWS, Law RW, Woo J, et al. Social support and psychological adjustment to SARS: the mediating role of self-care self-efficacy. *Psychol Health*. 2009;24:161–174.
- Main A, Zhou Q, Ma Y, et al. Relations of SARS-related stressors and coping to Chinese college students' psychological adjustment during the 2003 Beijing SARS epidemic. *J Counsel Psychol*. 2011;58:410.
- Wong TW, Yau JKY, Chan CLW, et al. The psychological impact of severe acute respiratory syndrome outbreak on healthcare workers in emergency departments and how they cope. *Eur J Emerg Med*. 2005;12:13–18.
- Shih FJ, Liao YC, Chan SM, et al. The impact of the 9–21 earthquake experiences of Taiwanese nurses as rescuers. *Soc Sci Med*. 2002;55:659–672.
- Mishra P, Bhadauria US, Dasar PL, et al. Knowledge, attitude and anxiety towards pandemic flu a potential bio weapon among health professionals in Indore City. *Przegl Epidemiol*. 2016;70. 41-5, 125-7.
- Aoyagi Y, Beck CR, Dingwall R, Nguyen-Van-Tam JS. Healthcare workers' willingness to work during an influenza pandemic: a systematic review and meta-analysis. *Influenza Other Respir Viruses*. 2015;9:120–130..
- Waugh CE. The regulatory power of positive emotions in stress: a temporal functional approach. *The Resilience Handbook: Approaches to Stress and Trauma*. New York, NY: Routledge;2013:74–75.
- Carbone EG, Echols ET. Effects of optimism on recovery and mental health after a tornado outbreak. *Psychol Health*. 2017;32:530–548.