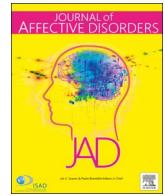




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Research paper

Qualitative study of the psychological experience of COVID-19 patients during hospitalization

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ABSTRACT

Background: Coronavirus disease 2019 (COVID-19) continues to spread across the globe, but patient experiences are rarely documented.

Objective: To explore the psychology of COVID-19 patients during hospitalization.

Methods: A phenomenological and robust sampling approach was employed. Sixteen patients admitted to the First Affiliated Hospital of Henan University of Science and Technology with COVID-19 from 20th January to 1st March 2020 were selected. Data were collected through semi-structured interviews, phone calls, or face-to-face interviews using quarantine measures. Data were analyzed using the Colaizzi method.

Results: The psychological experience of COVID-19 patients during hospitalization could be summarized into five themes. Firstly, attitudes toward the disease included fear, denial, and stigma during the early stages, which gradually developed into acceptance in the later stages. Secondly, the major source of stress included the viral nature of the disease, quarantine measures, and concerns regarding the health of family members. Thirdly, reactions of body and mind included disease stage-dependent emotional responses, excessive attention to symptoms, rumination, and changes in diet, sleep, and behavior. Fourthly, supportive factors included psychological adjustments, medical care, and family and social support. Finally, the disease resulted in psychological growth and patients viewed problems with gratitude through the cherishing of life, family, bravery, and tenacity.

Conclusion: COVID-19 patients gradually changed their attitude toward the disease and displayed emotional responses dependent on the stage of the disease. Negative emotions dominated during the early stages but gradually gave way to mixed positive and negative emotions. Active guidance of psychological growth may therefore promote physical and mental recovery in COVID-19 patients.

1. Introduction

Coronavirus disease 2019 (COVID-19) is highly infectious and pathogenic (Zhou et al., 2020) and has spread rapidly in just 9 months, resulting in a global pandemic. As of writing, 17,396,943 confirmed cases and 675,060 deaths have occurred worldwide due to COVID-19 (WHO, 2020). The epidemic in China was serious but has been effectively contained. As of August 1st 2020, 748 active cases have been confirmed, including 36 severe cases. In total, 84,385 confirmed cases have been reported, of which 79,003 were cured and discharged. A total of 4,634 patients died. Close contacts of 791,054 individuals were traced, 21,445 of whom remain under medical observation (China,

Health Emergency Office of National Health Commission, 2020). The psychological experience of these patients requires urgent attention.

Epidemic outbreaks of emerging infectious diseases including severe acute respiratory syndrome (SARS) (Hong et al., 2009; Lee et al., 2007; Mak et al., 2009), Ebola (James et al., 2019; Kamara et al., 2017; Shultz et al., 2016), influenza A (H1N1) (Luyt et al., 2012), and Middle East respiratory syndrome (MERS) (Kim et al., 2018) have led to serious psychological effects on patients including anxiety, fear, and depression. In severe cases, post-traumatic stress disorder (PTSD) and other mental disorders have occurred. The SARS outbreak was a catastrophic event for mental health (Mak et al., 2009). During the epidemic, survivors of infected medical staff displayed high levels of stress which

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manifested as depression and anxiety. Up to 64% of these individuals developed lasting mental illnesses such as PTSD (Lee et al., 2007). In addition, 50% of Ebola patients have exhibited mild distress or depression, anxiety, sadness, and social problems. Approximately 20% of patients required psychotropic medications (Kamara et al., 2017). Similarly, H1N1 survivors retained psychological barriers and a poor quality of life one year after discharge from the intensive care unit (ICU) (Luyt et al., 2012). The MERS epidemic increased the risk of psychological distress and mental illness, with 70.8% of survivors showing mental symptoms and 41.7% diagnosed and treated for psychological symptoms during hospitalization (Kim et al., 2018).

Quarantine and prevention and control measures during an epidemic can result in inadequate or absent psychological interventions of patients and medical staff (Lima et al., 2020; Xiang et al., 2020). It has been shown that stress, depression, anxiety, and post-traumatic stress disorder (PTSD) are prevalent among all healthcare workers (Tan et al., 2020a). Under psychological stress, 33.4% of healthcare workers show ≥ 4 physical symptoms, of which headache is the most common, accounting for 32.3% of cases (Chew et al., 2020). The impact of the pandemic on the general population is also widespread. A study of 1,210 respondents from 194 cities in China found that during the beginning of the COVID-19 outbreak, more than 50% had moderate to severe psychological impact, with $\sim 30\%$ reporting moderate to severe anxiety (Wang et al., 2020a). Mental patients displayed more serious symptoms relating to physical health and suicidal ideation (Hao et al., 2020). Patients with suspected or confirmed COVID-19 exhibited higher levels of psychological stress. A study of 3,947 participants from Vietnam found that those with suspected symptoms of COVID-19 had higher depression scores and lower quality-of-life scores (Nguyen et al., 2020). A survey of 714 clinically stable COVID-19 patients in Wuhan, China, found that the prevalence of major post-traumatic stress symptoms associated with COVID-19 was as high as 96.2% (Bo et al., 2020).

It is imperative to study psychosocial data related to the entire population, vulnerable groups, and COVID-19 patients to improve intervention measures and address the psychological impact of the COVID-19 pandemic (Holmes et al., 2020). Qualitative studies of the psychological experience of medical caregivers of COVID-19 patients have been conducted (Sun et al., 2020; Liu et al., 2020), but such studies of the psychological experience of patients with confirmed COVID-19 during hospitalization have not been reported. The present study explored the psychological experience of COVID-19 patients and provides new data to support future targeted interventions.

2. Methods

2.1. Study subjects

Sixteen COVID-19 patients were selected through a robust sampling process in the Department of Infectious Diseases of the First Affiliated Hospital of Henan University of Science and Technology from January 20th to March 1st 2020. Inclusion criteria were as follows: (1) COVID-19 patients were diagnosed according to the "Diagnosis and Treatment Regimen for COVID-19 (Trial Version 6) (China Medical Administration and Hospital Administration, 2020); (2) Patients who volunteered to participate. Patients with language barriers and who were not able to use a mobile phone were excluded. Patients who met the study criteria were interviewed. Where data was repeated two further cases were added to ensure no new information appeared. Data collection ceased when the quantity reached saturation. The study was reviewed by the Ethics Committee of the First Affiliated Hospital of Henan University of Science and Technology (Ethics Number: 2020-03-B001). All participants provided informed consent.

2.2. Interview outline

Relevant literature and expert opinions were used to design

interview questions. Two patients were pre-interviewed to determine the outline of the interview. The main interview questions were as follows: (1) How did you feel during hospitalization as a patient with COVID-19? (2) What was your main form of stress during hospitalization? (3) How did the illness affect you? How did you respond? (4) What did you feel or think about this illness? (5) Are there any other ideas you would like to express?

2.3. Data collection

Due to isolation, prevention of epidemic, and control requirements, interviews were conducted by telephone, WeChat voice, or face-to-face. Prior to the interview, the doctor and nurse in charge of the patient were contacted to ascertain any changes in the patient's condition. If the condition of the patient was deemed stable and suitable for interview, it was conducted via WeChat or telephone at an appointed timeslot, typically in the afternoon when diagnosis and treatment activity was reduced. To establish a relationship between the consultant and visitors and to improve data collection, all subjects were initially interviewed face-to-face. The study was performed in a negative pressure ward by nurses working in the infectious disease department trained in qualitative interviewing. During diagnosis and treatment and where time allowed, a recorded face-to-face interview with each patient was conducted for at least 20 minutes. During the interview, nurses were protected by wearing isolation garments, gloves, masks, goggles, and face screens, in accordance with the disinfection and isolation procedures of the COVID-19 infection ward. Telephone interviews were performed in the clean area of the office of the infectious diseases department to ensure privacy and without the presence of a third party. Patients were contacted by telephone or WeChat. Interviews were performed using a hands-free device and recorded. Each interview lasted for 20–60 min, depending on the condition of the patient. If the patient felt unwell or was unwilling to continue the interview, the interview was terminated immediately. As a supplement to the interview, WeChat was used to communicate and interact with the patients for data analysis. The final analysis was returned to the research subjects for verification. To avoid secondary psychological harm caused by the interview, psychological interventions were performed to deal with any psychological distress. Due to the need for dynamic observations based on the theory of timing (Cameron and Gignac, 2008), the hospitalization period was divided into three stages: (1) Early stage: from admission to the infectious diseases department to the first positive nucleic acid test period; (2) Late stage: from the first negative viral nucleic acid test to discharge from hospital; (3) Middle stage: the hospitalization interval between the early and late stages. Depending on circumstances, 1–2 interviews were conducted during each period. Interviews generally took place within 24 hours of admission, receiving positive nucleic acid test reports, receiving a negative nucleic acid test report and receiving a discharge notice. The arrangements for interviews were determined according to the patient's condition and willingness. The numbers and intervals of interviews are presented in Table 1. For critically ill patients, interviews were performed upon stabilization of their condition. All data were strictly confidential.

2.4. Data analysis

Data were transcribed within 24 hours of the interview and analyzed using Colaizzi's phenomenological method. Colaizzi's analysis is divided into seven stages (Trice, 1990): (1) Reading all interview materials to form a general understanding of the research object; (2) Extracting statements related to the research problem; (3) Summarizing, extracting and encoding the extracted data; (4) Summarizing the encoded ideas and seeking common concepts to form themes and theme groups; (5) Performing a detailed description of the relationship between the theme and the research object; (6) Stating the essential structure that constitutes the phenomenon; (7) Returning the final

Table 1
Baseline characteristics of the study participants (n = 16).

Characteristics		N (%) or mean \pm SD
Gender	Male	9 (56.25%)
	Female	7 (43.75%)
Age(Years)		41.00 \pm 12.58
	Youth (18-)	10 (62.50%)
	Middle aged (45-)	5(31.25%)
	Elderly (60-)	1 (6.25%)
Education	University	4 (25.00%)
	College	5(31.25%)
	High school and lower	6 (37.50%)
	Illiterate	1 (6.25%)
Marital status	Married	12 (75.00%)
	Unmarried	4 (25.00%)
Comorbid diseases	With	6 (37.50%)
	Without	10 (62.50%)
Complications	With	4 (25.00%)
	Without	12 (75.00%)
Critical illness	Yes	2 (12.50%)
	No	14 (87.50%)
Occupation	Worker	5 (31.25%)
	Businessman	3 (18.75%)
	Company employee	5 (31.25%)
	Student	1(6.25%)
	Teacher	1(6.25%)
	Housewife	1(6.25%)
Long-term residence	Town	4 (25.00%)
	City	12(75.00%)
Residential Address	Wuhan, China	5 (31.25%)
	Luoyang, China	10 (62.50%)
	Nanyang, China	1(6.25%)
Financial situation	Medium	5 (31.25%)
	Middle and lower	4 (25.00%)
	Poor	7 (43.75%)
Relatives infected with new coronary pneumonia	Yes	9 (56.25%)
	No	7 (43.75%)
Number of days in hospital (days)		19.38 \pm 5.74
Number of interviews(times)	Total times	4.00 \pm 0.73
	Number of face-to-face interviews	1.06 \pm 0.25
	Telephone interviews	2.94 \pm 0.77
Interview interval (Days)		4.50 \pm 2.23

analysis to the research object for verification. Two researchers independently coded, summarized, and refined the interview materials to form primary and secondary themes. Discrepancies were solved by discussions and coming to consensus with experienced peers within the research team. Patients were contacted if doubts arose during data confirmation.

Table 2
Themes identified through interviews with COVID-19 patients.

Theme	Sub-theme
I.Attitude towards the disease	i.Fear, denial, and stigma during the early stages ii.Acceptance and confrontation at middle and late stage iii.Uncertainty for the disease and the expectation of examination results
II.Stressors	i.Virus-mediated disease ii.Quarantine treatment iii.Concerns regarding the health of family members
III.Body and mind reactions	i.Emotional responses at different stages of the disease ii.Changes in diet, sleep and behavior iii.Excessive attention to their symptoms iv.Pensive rumination
IV.Factors promoting epidemic prevention	i.Self-psychological adjustments ii.Care from medical staff iii.Family and social support
V.Psychological growth and outlook	i.Assessing the problem from the perspective of gratitude ii.Cherishing life and family iii.Bravery and tenacity

3. Results

3.1. Study population

The study cohort included 9 male and 7 female COVID-19 patients, aged 24–65 years. The majority of patients were married and educated to a high level. Six patients (6/16; 37.50%) had chronic diseases. Among them, hypertension was found in two cases and there was one case each of diabetes, chronic gastritis, hyperlipidemia, and coronary heart disease. COVID-19-related complications accounted for 25.00% (4/16) of all cases. These comprised one case each with liver damage, allergic dermatitis, liver damage combined with dermatitis, and atelectasis. A total of 14 cases were non-life-threatening (87.50%) and 2 were deemed critical (12.50%). Hospital stays ranged between 10 and 28 days; interviews were conducted on average 3–5 times, including 1–2 face-to-face interviews and 2–4 telephone interviews. The interview interval was determined according to the patient's condition and willingness, with the shortest being one day and the longest seven days (Table 1).

3.1.1. Five themes

The psychological experience of hospitalized COVID-19 patients was explored using phenomenological methods. All findings were summarized into five themes (Table 2).

3.2. Theme 1: attitude towards the disease

3.2.1. Sub-theme 1: fear, denial, and stigma during early disease stages

All patients expressed fear when showing clinical symptoms such as cough with fever where they had a history of exposure to individuals from Wuhan. P4: "I'm done, it must be (novel coronavirus) pneumonia. I'm very scared and my body is shaking." the majority of patients experienced a fear of death. P16: "The first thought I think of is death, I feel like I can't live, and I'm scared." At the same time, some patients remained in denial. P8: "Surely not, how could it be such a coincidence? It may be a cold."

A common observation was that patients were afraid of hospitalization and quarantine. At the time of admission, patients considered concealing their contact history or absconding from the Department of Infectious Diseases after hospitalization but took no action. P5: "I really don't want to say that I have a history of residence in Wuhan, I really want to just take some antipyretics. I don't want to be hospitalized and it feels scary to be hospitalized." P10: "I think about whether I can escape after hospitalization, of course, it's just a thought (laughs)." Some patients would fantasize or worry that the test results were incorrect. P4: "I often think that the test results may be wrong or they have taken the wrong test report."

Simultaneously, patients would feel stigma, discrimination, and abandonment. P2: "It feels like the plague, others will definitely dislike me, so shameful (crying)." P11: "Everyone is highly protected when they contact me and I have the feeling of being abandoned."

3.3.2. Sub-theme 2: acceptance and confrontation during the middle and late stages

All patients (100%) said they felt more relaxed following diagnosis. P3: "I feel relieved after the results of the second viral nucleic acid test. I said to myself that it is the disease and to accept the reality."

During this period, patients would actively cooperate with various diagnostic and treatment plans. The emotions of the patients gradually stabilized. P12: "What else can I do other than to heal from the disease? The only thing I can do is to fight the disease to the end."

3.3.3. Sub-theme 3: uncertainty and expectations following examination

The majority of patients reported a sense of uncertainty arising from the stress of diagnosis with the disease and treatment for COVID-19. were This new disease represented many unknown factors. P15: "I'm always worried. I keep asking the doctor about my diagnosis and I get the answer "you will be told when the test results come out". I know I'm too nervous, but I can't control it."

All patients indicated a fear of the test results and reported fear, particularly of CT assessments and viral nucleic acid tests. The patients feared a diagnosis of COVID-19 during the early stages and feared that their condition would deteriorate. Concerns that the viral nucleic acid tests would not become negative during middle or later stages. Concern over the delay or prevention of discharge was also expressed. P11: "I basically ask for my test results every time I see a nurse and doctor but they are not ready, I think, what if they are positive?" P1: "I feel the period before the diagnosis is the hardest and every day I dread the results. When the doctor told me the results, I felt my heart in my throat (heart palpitations)."

3.3. Theme 2: stressors

Numerous stress triggers were recorded, most notably the viral nature of the disease, life and social changes as a result of quarantine, and concerns regarding the health of family members.

3.3.1. Sub-theme 1: virus-mediated disease

The majority of patients noted discomfort caused by the symptoms of COVID-19. P4: "I feel chest tightness, difficulty breathing, and coughing that makes me uncomfortable, and I feel weak after abatement of the fever."

Most patients stated that they feared death and were concerned regarding their prognosis. P9: "I think I may die, and if I don't die, I will have other lasting effects, which makes me uncomfortable."

The effectiveness of treatment regimens was frequently questioned. P11: "It was said on the internet that there were no specific drugs, so I wonder whether or not these drugs work? I feel hopeless."

3.3.2. Sub-theme 2: quarantine

Most patients felt stressed as a result of quarantine. This was caused by separation from their families, social disruption, and changes to life. P6: "Eating, drinking, defecation, and urination are all confined to this small ward. Using household goods is not easy and I can't see my family, so I'm anxious."

All patients expressed loneliness due to quarantine restrictions. P14: "I cannot come out of the door of the ward and I don't even have a person to talk to in my room. I feel very lonely. I lie in bed and stare at the ceiling. The room is so quiet that I can only hear the sound of (medical) instruments..."

3.3.3. Sub-theme 3: concerns regarding the health of family members

Many patients expressed concerns regarding the health of their

families due to a history of close contact. P2: "My family has been quarantined (medical observation) because of me, I am worried that they are infected by me and my family is also worried about me."

Family members and others that were previously in close contact with the patients required isolation and medical observation. This led to feelings of guilt. P7: "Because of my illness, they need to isolate nearly a hundred people under medical observation, I feel that I really am a troublemaker and I feel guilty."

3.4. Theme 3: reactions to body and mind

3.4.1. Sub-theme 1: emotional response at different stages of the disease

Patients exhibited a range of time-dependent emotional reactions. During the early stages, anger, anxiety, and worry were the main manifestations. Patient anger was caused by two factors, including: (1) A belief was that the patient was an innocent bystander. P6 said "I feel that I am infected for no reason at all. I am so annoyed and I cannot find the people who infected me. I feel so bad for myself"; (2) A source of anger and a breach of personal privacy due to epidemic tracking and media reports. P9: "I feel that my privacy has been stolen online and even the privacy of my family and friends has been exposed. I am angry in my heart and have nowhere to release my emotions." Most patients displayed anxiety and restlessness. P5: "I feel restless and very anxious."

During the middle stage, patients displayed ease and calmness following acceptance of the disease. P8: "I finally feel relieved, my heart is calm and I want to be cured of the disease." However, long-term quarantine led to loneliness, anxiety, depression, and helplessness. P12: "I am very anxious, upset, and want to lose my temper, sometimes I cry, and my heart is very helpless." During the later stages, patients expressed happiness, excitement, and agitation over the course of the disease. They were excited when they learned that the viral nucleic acid test was negative, but expressed concerns regarding disease recurrence after discharge and the views of those around them. P16: "I'm glad to know that the (viral nucleic acid) test is negative, but what should I do if my conditions change after discharge from the hospital? What do my neighbors think of me? Won't they all hide from me and ignore me?"

3.4.2. Sub-theme 2: changes in diet, sleep and behavior

Most patients experienced dietary changes, insomnia, or nightmares. A number of patients experienced physical symptoms including palpitation and dizziness. P15 said: "I don't feel like eating, I can't sleep, and I have nightmares. My heart is agitated!" The symptoms improved following adaption to hospitalization or timely intervention. Some patients reported obsessive-compulsive behavior including repeated hand washing, wearing a mask, and pacing. P6: "I always want to wash my hands and change my mask."

3.4.3. Sub-theme 3: excessive attention to their symptoms

Up to 80% of patients were concerned about their disease symptoms, to the point of extreme suspicion and doubt. Patients were worried that they would not recover or that their disease would worsen if symptoms progressed. P8: "I feel scared when I have two coughs. What if it becomes more severe?" Patients would frequently call the doctor or nurse when in discomfort and experienced nervousness, even regarding symptoms unrelated to COVID-19. P3: "Although knowing that my body temperature is not high, I repeatedly measure it. When I feel a little pain in my lower back I wonder whether it has worsened."

3.4.4. Sub-theme 4: pensive rumination

Over half of the patients stated that they replay the scenes before and after hospitalization in their minds, particularly regarding their contact history prior to infection and their memories of the occurrence of symptoms, admission, and hospitalization. P13: "I repeatedly recalled how I was infected, how I was not allowed to go home after admission for fever, when I entered the ward, what the doctors and nurses said. It is like a movie and it won't stop, over and over." P7: "I've been

repeatedly thinking about what this disease brought to me? I started thinking a lot."

3.5. Theme 4: factors promoting epidemic prevention

3.5.1. Sub-theme 1: self-psychological adjustments

The majority of patients took the initiative to adjust themselves psychologically through cognitive adjustments, diverting attention, setting achievable goals each day, communicating with the medical staff, actively seeking the help of professional counselors, and connecting with their own morality or beliefs. P9: "I told myself that I must adapt to the current state, the ward is the safest. As we often say, 'Every cloud has a silver lining.' I tell myself this may be a good thing." P15: "I play online games, watch funny videos, or listen to crosstalk and other things to divert my attention." P14: "My (illness) is relatively mild so I set a goal to walk 10,000 steps a day and listen to 2 hours of e-books." P6: "I cooperate with the psychological counselor via telephone consultations and adjust myself". P10: "In addition, I have always been doing good and not evil. As the saying goes, 'The house of goodness will have more celebration.', and I feel relieved after thinking about this."

3.5.2. Sub-theme 2: care from medical staff

Most patients considered that the care from medical staff during hospitalization was the most important supportive factor, indicating that they provided a sense of security. A number of patients developed a reliance on these behaviors. P14: "Doctors and nurses treat me very well and care about me, I am really touched, I can't live without them (crying)." P5: "It feels good and I have peace of mind when I see them." P7: "In fact, my condition is stable, but I always expect the doctors and nurses to look at me more and talk to me more."

3.5.3. Sub-theme 3: family and social support

All patients stated that their family members were their spiritual pillars during their hospital stay. P1: "Every day I am happiest when I have video communication with my family. They care about me and encourage me every day." The support of relatives, friends, and prevention and control personnel from the government at all levels was also very important. P3: "Friends are concerned about my health, government staff are also concerned about me, and I feel that the country attaches great importance to us." Most patients believed that adequate social support was a key factor in their own fight against the epidemic. P8: "With the encouragement of my family, my mood gradually stabilized, which makes me very powerful."

3.6. Theme 5: psychological growth and outlook

3.6.1. Sub-theme 1: assessing the problem from the perspective of gratitude

Most patients expressed their gratitude to medical staff, relatives, friends, and the government during their care. P13: "I really appreciate them; my heart is filled with warmth and I used to be very thankful. Now I feel tremendously grateful to the people around me. I must make a good contribution to the country in the future." About half of the patients expressed gratitude for the illness. P3: "This illness made me learn a lot and I will never forget it. As the saying goes, 'If you don't die, you will have blessings.' Thank you for this pneumonia."

3.6.2. Sub-theme 2: cherishing life and family

The majority of patients reported how they cherished life in the face of COVID-19-related illness. P2: "Life can suddenly disappear in a moment, you have to live well today. Your fate belongs to your family and you have to live well." They reported realization of the happiness and importance of family members and changed their attitude to money and rights as examples. P10: "Family members did not abandon me or give up on me when it was my most difficult time. I am very happy. They are the most important. What is the use of money, power, and status when

you do not have life?"

3.6.3. Sub-theme 3: bravery and tenacity

Half of the interviewees believed that through the illness, they became stronger and braver, with an increased ability to resist stress. P8: "I didn't expect that I was so strong and I have sustained it for so long." In some instances, it was stated that the disease afforded them the courage to face life. P4: "I touched the nose of the devil and came back and I'm not afraid of it in the future."

4. Discussion

The present study explored the psychological experience of COVID-19 patients during hospitalization using phenomenological methods. Our findings are summarized into five themes: (1) attitude towards the disease; (2) stressors; (3) responses of mind and body; (4) factors promoting epidemic prevention; and (5) psychological growth and outlook.

The timing of psychological support led to a natural transformation of attitudes and emotions. The early fear and denial of the disease were consistent with those of Ebola patients (James et al., 2019). Despite the normal response being psychological, it can develop into fear-related behavior if not treated in a timely manner (Shultz et al., 2016), leading to the patient concealing their medical history and spreading the epidemic, hindering prevention and control efforts. The change in patients' attitudes from uncertainty of the disease and expectations and suspicion of the examination resulted in confrontation and acceptance after diagnosis, eventually leading to gratitude for the experience that reflected the patient's gradual adaptation process. Therefore, corresponding psychological intervention strategies should be formulated at different disease stages to promote physical and mental health. During diagnosis, treatment, and nursing, treatments should be consistent, complaints should be listened to and acted upon, and staff should communicate in a timely manner to maintain transparency and minimize uncertainty and fear of the disease (Xiang et al., 2020). Accurate health information may reduce stress, anxiety, depression, and the psychological impact of the illness (Wang et al., 2020a). Guiding patients' emotions at an early stage by promoting acceptance of the disease is critical. Gradual adjustments during the middle and later stages can be achieved by active encouragement and guidance, the stimulation of internal resilience, and the promotion of physical and mental recovery.

Early, continuous, and professional psychological interventions can prevent physical and mental harm. Patients endure stress during an epidemic and may experience physical and mental reactions (Matua and Van der Wal, 2015; Mohammed et al., 2015). The stressors of the patients noted in this study were the disease itself, the treatment regimens in quarantine, and concerns regarding family health, resulting in changes in mood, diet, sleep, and behavior. The emotional experience of patients during the early stages of the disease included anger, anxiety, and concern. Quarantine also led to loneliness, anxiety, helplessness, and depression, consistent with previous reports of other epidemic diseases (James et al., 2019; Mak et al., 2009; Shultz et al., 2016; Hossain et al., 2020). This, therefore, appears to represent a general psychological stress response during epidemic disasters. Mak et al. found that 30 months after SARS, the prevalence of psychological and mental illness in survivors was 33.3%, of which 25% of patients had PTSD and 15.6% suffered from depression (Mak et al., 2009). In addition, a prolonged 4-year study demonstrated that 44.1% of SARS survivors developed PTSD and retained psychological distress disorders with weakened social function (Hong et al., 2009; Ahmed et al., 2020; Bo et al., 2020). Most clinically stable COVID-19 patients experienced PTSD prior to discharge from hospital (Bo et al., 2020). As such, timely psychological guidance is important (Kim et al., 2018; Yoon et al., 2016; Hossain et al., 2020; Holmes et al., 2020). Where psychological interventions could not be performed face-to-face due to epidemic prevention and control, online interventions were performed, surveys finding that half of the patients developed a positive attitude towards

the online crisis mental health services (Bo et al., 2020). Patients have also expressed concerns regarding recurrence, physical and mental states, and social interactions after discharge. As such, physical and mental rehabilitation, continuous care, and social support after discharge represent key factors (Nuriddin et al., 2018; Tan et al., 2020b). Personal psychoneuroimmunology precautions against COVID-19 lead to improvements in environmental health and must be taken seriously by healthcare professionals (Tan et al., 2020b).

Culture can significantly impact psychological adjustments and the social support of patients. Self-adjustment plays a significant self-help role and family and social support are key to the support of patients with infectious diseases (Huang, et al., 2018; Schwerdtle et al., 2017). A large number of patients in this study used Chinese cultural idioms while battling the disease, including “The house of goodness will have more celebration.” and “If you don't die, you will have blessings.” This indicated how traditional cultures can promote psychological adjustments. In addition, the majority of patients believed that the robust social support was related to the Chinese cultural notion of “difficulty in one party, support in all directions” and the emphasis on collective education. The concept of family in Chinese traditional culture attaches additional importance to respect for one's parents, elders, and ancestors (Park and Chesla, 2007). Ensuring patient care is a moral responsibility of family members (Wong and Pang, 2000) and promotes the social support of patients. Simultaneously, China's ethics of medical professionals highlights the treatment of each patient as a loved one (Wong and Pang, 2000). Medical staff spared no efforts when fighting the pandemic, imparting a strong sense of support and security. In a study of 1,738 respondents from 190 Chinese cities, high confidence in healthcare workers was a protective factor (Wang et al., 2020b). Conversely, cultural factors may increase the psychological burden. In a survey of 1,210 ordinary individuals from 194 Chinese cities, 75.2% were concerned about family members infected with COVID-19 (Wang et al., 2020a). In Chinese culture, interpersonal harmony is key to the maintenance of patient mental health (Hsiao et al., 2006). The failure to fulfill family responsibilities results in lower levels of self-esteem and increased stigma (Hsiao et al., 2006). As such, the influence of cultural factors on the mental health of patients during an epidemic should not be ignored.

Active guidance on a patient's psychological growth can improve physical and mental recovery. Patients not only experienced a stressful physical and mental response, they gradually obtained positive elements brought about by the pandemic, which may be related to psychological resilience (Schwerdtle et al., 2017). Disasters cause psychological stress to individuals which can affect their health. Recognizing protective factors during a disaster can improve the quality of life of the victims (Cherry et al., 2018). In the present study, patients displayed gradual positive emotions, including ease and calmness following acceptance of the disease, and happiness and excitement prior to discharge, rarely mentioned in other studies. This may be related to the interview style and conductance of interviews across various disease stages that permitted the collection of dynamic datasets. Active situation-based responses are an important determinant of resilience after a disaster (Cherry et al., 2018). The patients assessed in the present study expressed gratitude for their support, and in some cases were grateful for the disease itself. The patients cherished life and recognized their positive qualities, including courage and tenacity. Gratitude and social support can reduce PTSD and increase post-traumatic growth (PTG) (Wang et al., 2018). Gratitude may also affect PTG through conscious reflection (Zhou and Wu, 2015). The type and level of rumination and meditation also directly affects the psychological adjustments of individuals following trauma. Patients displayed rumination behavior, accompanied by fear and guilt. Studies have shown that invasive rumination mediates the effects of fear and guilt during PTSD and PTG, with active ruminant guilt influencing PTG, mediating the influence of invasive ruminants on PTG (Wang et al., 2020c). Reducing intrusive rumination through psychological interventions and promoting

deliberate rumination are significant for psychological adjustment (García, et al., 2016). Ultimately, psychological techniques can guide the self-awareness and internal growth of patients, which should be recognized and promoted in the clinic to enhance physical and mental recovery.

Previous studies have shown that the highest risk of COVID-19 disease occurs in those aged over 50 years with a history of chronic diseases such as hypertension, heart disease, and diabetes (Zhou et al., 2020). In the present study, 62.50% of the subjects were young and middle-aged (10\16), whilst 37.50% were old and middle-aged (6\16). Critically ill patients accounted for 12.50% (2\16). Those with a confirmed history of chronic disease accounted for 37.50% (6\16). COVID-19 related complications accounted for 25.00% (4\16) of all cases.. Following analysis of the interviews, young patients demonstrated a more positive attitude towards the disease which may be related to their absence of underlying disease and ease of access to up-to-date and accurate information (Luo et al., 2020). In contrast, older, critically ill patients and those with comorbid diseases showed greater mood fluctuations, were more pessimistic about the disease during the early and middle stages, and showed higher levels of anxiety regarding recovery in the later stages, consistent with previous studies (Luo et al., 2020). In this study, 56.25% of the patients were males and 43.75% were females. All close contacts of the patients were quarantined for medical observation, and 56.25% of the contacts were confirmed to have COVID-19 (9\16). Gender, physical symptoms, poor self-assessed health status and confirmed COVID-19 cases amongst relatives lead to high levels of stress, anxiety, and depression (Wang et al., 2020a; Vindegaard and Benros, 2020). In the present study, female patients were more likely to express emotions and anxiety. In comparison, men repressed their emotions, anger being the most prevalent response. Some male patients refused diagnosis and treatment which was accompanied by aggressive language. All patients expressed guilt and concern for their relatives, particularly those with COVID-19. As such, the personalized psychological experience of each patient with their different characteristics should be monitored during the process of clinical diagnosis and treatment.

We found that the prevention and control processes of the COVID-19 epidemic led to ethical issues, such as breaches of patients' privacy. This significantly affected patients' mental state and led to social problems (El Emam et al., 2011). In addition, problems with medical ethical issues such as the right to patient informed consent during diagnosis and treatment occurred, which cannot be ignored (Aliakbari et al., 2015). As such, ethical support and integrity during the outbreak of an epidemic must be further strengthened.

5. Advantages and limitations of this study

Through interview, analysis, and interpretation of the psychological status of COVID-19 patients, we have provided basic data for psychological studies. The results of the present study promote understanding of the language and behavior of patients with COVID, providing empathy with their psychology, and performing targeted interventions according to their needs, enhancing communication between doctors and patients, improving treatment compliance, and promoting both physical and mental recovery of the patients.

A key feature of previous studies is their cross-sectional nature that solely focuses on the negative emotions of patients. Here, we used multiple means to interview patients at different disease stages to collect comprehensive temporal data for analysis. The limitation of this study was that we only investigated patients with recent psychological experiences. The long-term psychological experience of COVID-19 sufferers requires further observation and assessment in future studies.

6. Conclusion

Patients with COVID-19 are in a state of physical and mental stress.

Under quarantine, their attitudes towards the disease gradually transformed and their emotional responses altered according to the stage of treatment. The negative emotions of patients during the early stage gradually became a mix of both positive and negative emotions. Timely psychological interventions can prevent physical and mental harm and promote the positive transformation of attitudes and emotions. Chinese culture may affect positive factors such as epidemic prevention, psychological adjustment, and sufficient social support. The majority of patients gradually practiced self-growth brought about by the disease and actively guided this growth to promote both short- and long-term physical and mental recovery.

Ethical approval and consent to participate

This study was reviewed by the Ethics Committee of the First Affiliated Hospital of Henan University of Science and Technology (Ethics Number: 2020-03-B001). All participants provided informed consent.

Consent for publication

Not applicable.

Availability of data and material

The datasets analyzed during the current study are not publicly available due to ethical and privacy reasons.

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Author contributions

Niuniu Sun, Luoqun Wei, Xinjun Hu, Xianru Wang and Mingxia Gao collected the data. All authors interpreted and analyzed the data. All authors wrote the manuscript. The final manuscript was approved by all authors.

Declaration of Competing Interest

The authors declare that they have no competing interests.

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