



Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.



Major Article

Nurses' experiences of care for patients with Middle East respiratory syndrome-coronavirus in South Korea



Yujeong Kim RN, CCRN, PhD *

Department of Nursing, Hoseo University, Asan-si, Chungcheongnam-do, Republic of Korea

Key Words:

Coronavirus infection
Disease outbreak
Nurses
Qualitative research

Background: This study aimed to identify nurses' experiences of care for patients with Middle East respiratory syndrome-coronavirus (MERS-CoV). Their experiences can be useful to establish a safer healthcare system in preparation for infectious disease outbreaks.

Methods: Data were collected through in-depth individual interviews and analyzed using Colaizzi's phenomenological method. Participants were 12 nurses.

Results: Nurses' experiences of care for patients with MERS-CoV were categorized as follows: "Going into a dangerous field," "Strong pressure because of MERS-CoV," "The strength that make me endure," "Growth as a nurse," and "Remaining task."

Conclusions: It is necessary to examine the difficulties and demands of healthcare providers for establishing a safe healthcare system to respond effectively when national disasters occur. In addition, it is necessary to develop strategies to protect healthcare providers from severe physical and psychological stress.

© 2018 Association for Professionals in Infection Control and Epidemiology, Inc. Published by Elsevier Inc. All rights reserved.

BACKGROUND

Middle East respiratory syndrome (MERS) is an acute infectious disease caused by MERS-coronavirus (MERS-CoV).¹ It affects the respiratory system, including lungs and bronchial tubes, and infected patients experience fever, cough, dyspnea, vomiting, and diarrhea for a duration ranging from 2 to 14 days.¹ MERS-CoV was first reported in Saudi Arabia in September 2012 and has been reported in 27 countries since May 2017. A total of 2040 people have been infected, and 712 have died.² Compared to severe acute respiratory syndrome (SARS) and influenza A virus subtype H1N1 (H1N1), MERS-CoV has infected fewer people, but the average fatality was 35%, a rate similar to ebola.² MERS-CoV reached South Korea in May 2015 via travelers from the Middle East. It resulted in 186 infected people, 16,752 isolated targets, and 38 deaths. South Korea became the country with the second most number of MERS-CoV occurrences, after Saudi Arabia.³

MERS-CoV rapidly spread in South Korea within 1 month after the first diagnosis, due to family care, visits from family members, hospital shopping, lack of isolated rooms, and overcrowded emergency rooms.⁴ Although South Korea had experienced H1N1 in 2009, the coping system for the prevention and control of infection did not function appropriately.⁵ Because of MERS-CoV's uncertainty, inaccurate information, and late governmental confrontation, public trust weakened as the infection and mortality rates increased.⁶

Not only ordinary people but also healthcare providers were afraid of MERS-CoV. In particular, nurses who interacted closely with infected patients became afraid and anxious that MERS-CoV would affect them and their families, as they saw cases of healthcare providers becoming infected.⁷ Nurses who cared for patients with the new infectious disease seemed to be afraid due to lack of information.⁸ In addition, they felt ethical pressure because they were obligated to provide care despite the threat to their safety.⁹ During the period in 2015 when MERS-CoV was prevalent, the Korea Institute for Health and Social Affairs conducted a survey of nurses who were caring for MERS-CoV patients.¹⁰ The survey indicated that 22.2% of nurses experienced post-traumatic stress disorder. A study about the long-term effect of SARS patient care reported that healthcare providers felt high levels of post-traumatic stress even after 13-26 months.¹¹ Therefore, it is necessary to explore how South Korean nurses perceive the experience of MERS-CoV patient care 12 months after caring for MERS-CoV patients. It is further necessary to establish a safety system for healthcare providers and, by

* Address correspondence to Yujeong Kim, RN, CCRN, PhD, Department of Nursing, Hoseo University, 79-20, Hoseo-ro, Baebang-eup, Asan-si, Chungcheongnam-do 31499, Republic of Korea.

E-mail address: cybericu@naver.com (Y. Kim).

Conflicts of interest: The authors have no conflict of interest to declare.

The authors report no actual or potential conflicts of interest.

Funding: This work was supported by the Academic Research Fund of Hoseo University in 2016 [2016-0057].

examining nurses' experiences, prepare for other future infectious disease outbreaks.

In such cases, when a deep understanding of a specific phenomenon is required, qualitative research is recommended. Qualitative research clarifies participants' awareness of the phenomenon, allows comprehension, and offers insights about how awareness affects their actions.¹² Additionally, a phenomenological study is appropriate to deeply understand the essence and meaning of human experiences in a situational context that exist in individuals' consciousness.¹²

Literature review of studies examining the experience of nurses who treated a new infectious disease indicated that nurses who cared for SARS and H1N1 patients lacked exact information, guidelines for patient care, and individual protection equipment. Thus, they experienced a high level of stress.^{13,14} In addition, they experienced extreme stress after infectious disease patients passed away.¹⁵ Nurses who cared for MERS-CoV patients in Saudi Arabia also experienced fear from lack of information about MERS-CoV and psychological trauma owing to the infection of their colleagues and deaths of their patients.¹³ However, there are differences in nurses' experiences across countries because nursing resources, health-care systems, and cultural backgrounds differ. After MERS-CoV outbreaks, studies on topics such as recognition of the danger of MERS-CoV, effectiveness of personal protection equipment (PPE), and ethical problems were conducted in South Korea.^{4,5,16,17} One study examined post-traumatic stress and influencing factors for nurses who cared for MERS-CoV patients.¹⁰ However, the survey was conducted immediately after the MERS-CoV outbreak and addressed only stress or negative experiences. It is necessary to identify whether nurses continue to experience negative emotions such as post-traumatic stress after a certain amount of time has passed. Particularly, a study of the overall, holistic experience including not only the negative but also the positive experiences and support factors is needed.

Therefore, our study aimed to identify psychological stress in nurses who cared for MERS-CoV patients and to identify systemic problems of the Korean healthcare system using a phenomenological approach to deeply understand the meaning and essence of nurses' experiences. This research will be a basic resource to establish a safer healthcare system that can protect both patients and healthcare providers and respond quickly and systematically to similar situations in the future.

MATERIAL AND METHODS

Study design

This qualitative study used the phenomenological method of Colaizzi¹² to explore the following research question: "What were the nurses' experiences of caring for MERS-CoV patients?" Colaizzi's method of analysis focuses on understanding the essential structure and meaning of human experiences.¹² It focuses on deriving the common attributes of overall participants rather than individual characteristics. Therefore, it is also useful for analyzing participants' experiences without distortion. This method was selected because it was appropriate for understanding the meanings of nurses' experience in caring for MERS-CoV patients.

Participant selection and researcher preparation

Participants were nurses with experience caring for MERS-CoV patients and who were able to fully articulate their experiences. The researcher explained the study's purpose and methods by phone, and the nurses decided whether they wanted to participate. Snowball sampling was used to recruit participants, with participants recommending other participants.

Table 1
Characteristics of participants (N = 12)

Characteristics	n or mean ± SD	
Sex	Men	4
	Women	8
Age (years)		31.83 ± 6.73
Clinical career (years)		6.88 ± 6.05
Education	Bachelor's degree	11
	Associate's degree	1
Marital status	Married	6
	Unmarried	6
Position	General nurse	10
	Head nurse	2
Work setting	Ward	9
	Intensive care unit	3

Participants were added until theoretical saturation was reached and no more new essential meaning could be derived from participants' statements. Participants were 12 nurses working at general hospitals, and they were recruited from 4 hospitals; there were 8 female and 4 male participants. The average age was 31.83, and the average clinical career had a duration of 6.88 years. In terms of education level, 11 participants had bachelor's degrees, and 1 had an associate's degree; 6 participants were married, and 2 were head nurses. Nine participants worked in wards, and 3 worked in intensive care units (Table 1).

The researcher, who had significant experience with other qualitative studies, was an important part of the qualitative research. The researcher had been working for more than 10 years at a department of quality improvement that handled infection control and patient safety. Since the research funds were provided as a one researcher's task, the researcher conducted the study alone. The researcher also attempted to reflect the participants' experiences and thoughts without distorting them with opinions and prejudices, by maintaining a neutral perspective that did not affect the study results.

Ethical consideration

The study was approved by the Institutional Review Board of the researcher's university (No.1041231-160705- HR-043-02). Ethical issues, including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancy were monitored by the author.

Data collection

Data were collected using individual in-depth interviews conducted from December 15, 2016, to March 20, 2017. The researcher met each participant once or twice, and each interview lasted 50-130 minutes. Interviews were conducted by a researcher with significant experience interviewing healthcare providers. The researcher explained the purpose of study, agreement, and progress method before starting the interview. The main questions were as follows: "What kind of experience did you have while caring for MERS-CoV patients?" "What kind of experience did you have after caring for MERS-CoV patients?" "What would you like to suggest for infected patient care?" Interviews were recorded with participant agreement. The interviews were transcribed, including non-verbal utterances such as laughter, silence, and sighs.

Data analysis

Data were analyzed using qualitative content analysis. The participants' feelings and experiences were understood holistically by

Table 2

Nurses' experiences regarding care of patients with Middle East respiratory syndrome-coronavirus (MERS-CoV)

Theme Clusters	Themes
Going into a dangerous field	New challenge Hesitancy hoping to avoid Strong responsibility as a nurse
Strong pressure because of MERS-CoV	Inevitable fear Being alone Exhausted strength Extreme stress Stigma from society
The strength that makes me endure	Comradery The patient whom I have to care for Encouragement: changed view of society
Growth as a nurse	Constant mind control Nursing: lighting up the dark Futility of forgotten warriors
Remaining task	Building a preparation system Expectation about changed perception

reading the transcripts. Meaningful statements related to the phenomenon were extracted, and a meaning was constructed as a general statement reflecting similar contents combined in the researcher's words. Theme clusters with similar themes were then formed. To ensure that themes corresponded with the participants' original meaning, the transcripts were repeatedly checked, and a final structure was prepared in accordance with the essential structure of the phenomenon.

Trustworthiness

To identify the rigor of the phenomenological research, criteria including internal validity, external validity, reliability, and objectivity were considered. The findings of this study were assessed using the following 4 criteria: credibility, transferability, dependability, and confirmability.¹⁸ Credibility was confirmed by having the participants review the interview descriptions to ensure that the transcripts conveyed their intention. Transferability was established via thorough descriptions that described the context extensively and carefully until saturation of concepts occurred. Dependability and confirmability were supported by documenting the logic of the research process so that 2 reviewers could track the data and its source and understand the data interpretations. The procedures of the data analysis were reviewed by 2 nursing professors with experience in phenomenological studies, to ensure that the analyses were logical and the resulting descriptions were comprehensible. In addition, results were verified by 2 participants, to ensure validity and reliability in qualitative research.

RESULTS

Content analysis of data obtained through the qualitative study regarding the experiences of care for MERS-CoV patients led to the identification of 5 theme clusters and 16 themes (Table 2).

Going into a dangerous field

New challenge

Participants wanted to work in infection wards because they were tired of their original departments and because their friends and seniors recommended it. After attending a hospital lecture about MERS-CoV for nurses' recruitment, participants felt like working in the MERS-CoV ward.

I attended a lecture about MERS-CoV. I was bored with my work at that time, and wanted to engage in more new and innovative

care. As a nurse, I was eager to experience a new challenge in the form of caring for patients. (Participant 2)

I got a suggestion from a senior, and I thought I'd give it a try, because my friends had already volunteered, and the circumstances did not seem that bad. The nurses of that ward appeared not to care much for patients, and I thought I could deal with them. That's why I volunteered. (Participant 4)

Hesitancy hoping to avoid

Participants were aware that the infection ward lacked nurses, which implied that they could not easily reject a request for assistance. Their family members dissuaded them from working in the MERS-CoV patient ward. They also did not want to go there because of fear of infection, but they were compelled to go, which upset them. MERS-CoV made the participants consider resignation.

I had to participate compulsorily. I was the lowest grade in the ward. To tell you the truth, I was hesitant to go to the MERS-CoV ward and to resign from the hospital. (Participant 10)

Everyone didn't like it. The only excuse that I could say was "I don't like it," but no one was willing to go there. It was a shame to say "no" too strongly, so I said reticently, "If nobody says yes, I will go." Who would be willing to go to a dangerous place? I strongly didn't want to be involved, but no one was willing. I couldn't help it, and I was upset. (Participant 6)

Strong responsibility as a nurse

Participants considered it necessary to care for MERS-CoV patients even though the patients were carrying a very dangerous virus. They considered this task to be unavoidable as nurses and inevitable as their responsibility.

I am a just person first and then being a nurse. I have a husband and a child. My baby was 3 years old at that time. It was the time when her immunity wasn't too strong, so I had to consider it very seriously. But what else could I do? I had to be involved as a nurse unless I quit my job. (Participant 7)

Some MERS-CoV patients were in our hospital. Because of the responsibility of my position, the pressure was unavoidable for me. (Participant 11)

Strong pressure because of MERS-CoV

Inevitable fear

Participants were confused about following protocol to actually protect the patients and the medical team, because the infection control protocols changed frequently. They also could not fully trust PPE and the accuracy of infection control protocols. They were afraid of infection. Participants lacked information when they had to care for patients and were unaware of what to do in the emergency. Thus, they became confused and scared.

Because of the fear of MERS-CoV, doubts about the safety of gowns and masks began to increase. Patients became infected because they were unfortunate, and the same situation could happen to me. Even though I was a healthcare provider, it was hard to trust the infection control protocol when it wasn't consistent. It would say "Do A" one day, which would be changed to "No! Do B" the next day. That made me frustrated because it could imply that method A wasn't safe. (Participant 11)

MERS-CoV was an unfamiliar disease. I had not learned about it. We were frightened and scared. The number of deaths was increasing, and the media reported that we could get infected if we were in the same place. So, I was worried about what should

we do if we faced a cardiopulmonary resuscitation situation. (Participant 7)

Being alone

Some participants rapidly became involved in the ward due to MERS-CoV patients' conditions requiring intensive care. They were unfamiliar with everything because it was their first time working in an infection control ward. However, immediately after they learned how to wear protection equipment, they were urgently deployed to an isolated room with the patient in it. Participants were disconcerted. Since the patient was sedated, the room was silent, and the participants felt abandoned.

It was only a patient and me in the room. The patient was sedated, and there was not much to do. So, I had to stay there for four hours without doing anything. The only sound that I heard was the machine and that of the patient breathing. I was tired, and I started to feel I was abandoned. (participant 3)

Only I was in the isolation room with a patient. I didn't know I'd be isolated as soon as I got there. I felt alone in the world, and I felt lonely. (Participant 4)

Exhausted strength

The physical strength of participants became depleted because they had to wear PPE and 2 sets of gloves every time they went into the isolated room. The PPE was full of sweat, and the glasses were replete with moisture from their own respiration. They were willing to change the PPE, but it took a significant amount of time, and they were not allowed to leave the room because of the patient's poor condition. The participants also had to clean and disinfect the room. They became exhausted from the patient care but felt more stress because they had to report the situation to senior administrators and the relevant government ministries.

I could not get out of the room due to the patient, and I had to stay in the room at least 8 hours. If I wanted to go to the wash-room, I had to take off the PPE and put them on again. So I decided not to drink and dehydrated my body. I didn't know that PPE could make me sweat so much. I was always thirsty, and it was too hard to endure. (Participant 6)

At first, only medical teams were allowed in the ward. When one patient was discharged from the ward, nurses had to clean and disinfect the room. I cleaned the room with one nurse for an hour, and we were soaked in sweat. We were cleaning because other department staff were not allowed in the ward. It was unfair. (Participant 10)

Extreme stress

Participants reported that some MERS-CoV patients experienced severe anxiety and fear while isolated and, at times, projected the stress and dissatisfaction they experienced onto the participants. Patients' family and friends at times expressed dissatisfaction to the nurses by phone as the isolation period lengthened. Some participants received treatment for insomnia and dermatitis after MERS-CoV patient care. They felt extremely stressed about having to care for the patient without others' help.

To minimize the number of people who contacted MERS-CoV patients, one nurse was assigned to taking care of them. Since it was difficult to monitor patients' condition changes using the monitoring system, I was very stressed that I might miss detecting the patient's condition. (Participant 11)

I have a very sensitive nature, and it is hard for me to sleep well. After taking care of an MERS-CoV patient, my sleep disorder worsened severely. I couldn't sleep for more than 2 hours. Short sleep

and waking cycles repeated, and this went on for more than a year. My physical examination revealed abnormal findings. In my personal opinion, I didn't think it was a trauma, but whatever the reason was, I wasn't able to sleep well. (Participant 1)

Stigma from society

The other departments' staff started to avoid the participants. They could not obtain support even in urgent situations. They received complaints from indwellers and had to live in a dormitory, which limited their contact with the outside world. The children of members of the medical team experienced discrimination from society.

When we took the MERS-CoV patient's specimen to the laboratory, the staff asked us to stay away from them. I thought that they were treating us like a dangerous virus. (Participant 9)

My child goes to kindergarten. When the kindergarten staff realized that I work at the hospital, they didn't want my kid to come. I phoned the teacher and explained that I was at the dormitory, and that it was impossible for me to come in contact with my kid in a manner that would pass the infection. I requested them to take care of my child without any worries. (Participant 7)

The strength that makes me endure

Comradery

The participants predominantly remembered the good teamwork of the medical team. They were considerate toward each other and tried their best to minimize the infection risk to other members. In addition, wholehearted support from the nursing department helped the nurses when they faced struggles. They also began to get support and feel less fear because of the participation of a medical team member who had experienced ebola outbreaks.

Because we were all trained nurses, we didn't have to care about each other's work. Everybody thought, "We are a team." We helped each other a lot. We would check the electronic medical record at the dormitory in advance so that our colleagues wouldn't reach the dormitory late. We tried to have fun at work. We became good friends and are still in touch with each other. (Participant 1)

One doctor went to Africa due to an Ebola outbreak. He took care of patients calmly and was even kind and positive during work. The way he worked encouraged us tremendously, and we tried to work like him. We became confident and motivated. With the wholehearted support from the department of nursing, volunteers started to come, and they helped us by supporting everything that they could. (Participant 5)

The patient whom I have to care for

Participants felt pity for the patients, who were fighting the fear of death in an isolated room. The patients seemed to feel anxious about spreading the infectious disease. Whenever the patients' condition worsened, the nurses became worried, similar to how a guardian would worry.

Because the patient could watch TV news, he knew that the super spreader was him. He was shocked. The news reported him like a criminal, and he asked me, "Are they really reporting about me like that?" I told him not to worry and said, "You are a victim just like the others." (Participant 1)

One patient had good personality. Every time he seemed very sick, I asked him, "Are you okay?" He always said he was fine. He seemed to endure a lot. After a few days, his breathing became

faster, and I notified the doctor. The doctor asked me to give him a midazolam. I had to wait for the medicine in an isolated room. It took a long time. It was difficult to just watch my patient suffering. I couldn't stop crying. (Participant 6)

Encouragement: Changed view of society

Although fear remained about MERS-CoV, participants were able to cooperate with other departmental staff and started to feel support. Indwellers who had hated them at first began to thank the medical team. They were consoled with the emotional support they received, such as letters from children.

At first, when we went to the laboratory, people avoided us. When they saw a red box, they said, "Stay away from here," and this hurt me a lot. However, since the consultation about safety, they changed. They even encouraged us. (Participant 4)

We received a lot of relief goods. Elementary students sent us snacks and letters saying, "We'll cheer you up!" Those things encouraged me. I attached the letters to the refrigerator to encourage myself. Indwellers and other people wrote notes on a board in the front of the hospital and sometimes put ribbons. It helped me too. (Participant 7)

Growth as a nurse

Constant mind control

The participants thought that they would be fine if they wore PPE exhaustively and perfectly followed infection control rules. They focused only on MERS-CoV patients and began to think that their ward was the safest place because it had PPE and appropriate facilities. The participants found that they were stronger after continuous autosuggestion that they could overcome the extreme situation.

I was so worried before I came here. But after I started working, I thought that maybe our ward could be the safest place. It wasn't crazily scary because of PPE. Of course, it was hard, but I kept thinking that I could handle this situation as a nurse. If the same situation re-occurred, I would volunteer again. Maybe I could do better next time because of my experiences this time. (Participant 3)

We didn't even say we're scared. I got exhausted and annoyed many times, but I didn't give up. I told myself all the time, "I have to overcome and I can do it." This made me very zealous. Now, I can work calmly and courageously in emergency situations. (Participant 5)

Nursing: Lighting up the dark

Participants gained tremendously from the experience of other healthcare providers and patients praising nurses' efforts and contributions because they were touched by the quality of nursing and the attitude and passion of the nurses. The praise from patients and other department staff became a good reward for their effort. They did their duty in a national disaster and provided high-quality nursing. This made them proud of the meaning of nursing and their job as nurses.

Everyone cooperated and particularly praised the nursing team. Even the doctors said that they were touched by nurses who cared for intensive patients without any complaints. We even did ventilator, ECMO (extracorporeal membrane oxygenation), and CRRT (continuous renal replacement therapy) on our own. Everyone praised the quality of nursing and the attitude, talent, and teamwork of the nurses at the time of crisis. (Participant 5)

Before MERS-CoV outbreaks, I didn't have enough time to talk with patients. I felt and learned many things from caring for MERS-CoV patients one-on-one. Looking after the patient carefully was a good experience for me. I've never been proud of being a nurse before. Even though I work as a nurse, I seriously worried about whether to resign because I didn't like my work. However, after caring for MERS-CoV patients, I felt proud of myself and began to take pride in being a nurse. (Participant 1)

Remaining task

Futility of forgotten warriors

Participants felt disappointed about not being rewarded adequately for their effort in dangerous situations. They were told that they would be rewarded later, but the reward was not enough. They consoled themselves with their professionalism that they had volunteered as a nurse. They thought that adequate rewards would be needed to attract healthcare provider volunteers when a similar disaster happened again.

I felt that I was abandoned after my work was done. I didn't volunteer because of the reward. But it was totally different from what I heard when I volunteered. In my opinion, no one would volunteer for this much benefit when a similar situation happens next time. Many of those who work in the infection ward would quit. The reward should be clear. I thought it would be better if they gave us 1-2 weeks as reward vacation because we couldn't get enough rest while we looked after the patients. (Participant 3)

Anyway, I was rewarded. I just accepted it because they gave it to me, but it could never be a good way to attract people because the value of the reward was too small. Who would work for infectious patients for an extra 100 dollars per day? It was a voluntary service. (Participant 6)

Building a preparation system

Participants thought that problems remained even though the infection control system had been supplemented after MERS-CoV outbreaks. There are no guidelines for unknown infectious diseases. They expected that it would be difficult to respond quickly and efficiently in a similar situation because no simulations had been implemented. Participants said that they needed a preparatory system such as a facility and human resource investment, solutions for an overcrowded emergency room, and compliance with infection control protocols.

Facilities and manpower were better than before. But I think it is not enough. The simulation for MERS-CoV was late, and we still don't have protocol about unknown infectious diseases. We have a lot to do. (Participant 2)

We need a system so we can respond quickly in this kind of situation; therefore, the investment and interest of the government and hospitals are needed. The emergency room is still crowded, and the training for nurses who work with infectious diseases isn't enough. Also, the nurses of the infectious wards use their vacation and money to attend lectures on related topics. I think that these activities need to be supported. (Participant 5)

Expectation about changed perception

Participants realized that patients and their guardians did not follow the hospital rules about visiting hours, and restricting visitors was one of the most important problems for infection control. Even though comprehensive nursing services were implemented after MERS-CoV outbreaks in some medical centers, visiting hours

were still not followed. Participants felt that the people's attitudes needed to be changed.

Patients and their guardians need to follow the instructions of medical providers, but they still don't do that, especially with the visiting hours. We explained the date of discharge. But when the ward isn't full, the guardians say that they'll just stay and don't follow the instructions of medical providers. (Participant 8)

The patients and their guardians didn't follow what I said. I think it is very important that they cooperate. People should also be more cooperative with the medical team because the infection can spread to the public as well. (Participant 11)

DISCUSSION

This qualitative study used a phenomenological approach to deeply and holistically understand the meaning of MERS-CoV patient care. After analyzing interview data about the experiences of nurses who cared for MERS-CoV patients, we identified the psychological and physical difficulties they experienced, the strength with which they overcame the situation, and the process through which they matured as nurses.

MERS-CoV was a new infectious disease that spread rapidly to many people in South Korea.⁴ The participants in this study were afraid of MERS-CoV and considered MERS-CoV patient care a risky challenge. Other studies also showed that nurses who cared for patients felt the most pressure when infectious diseases were prevalent and simultaneously feared infection.⁷ However, they could not refuse the request from the hospital, because they were aware of the lack of professional resources and felt strong responsibility as nurses. This result is consistent with those of other studies indicating that nurses felt ethical pressure when they were compelled to provide care.⁹ Nurses' responsibility as healthcare providers conflicts with the demand for safety as a human, which increased their stress.¹⁴ Psychological stress experienced by medical teams who cared for infected patients was similar to that of nurses who cared for SARS patients¹¹ or medical teams who cared for MERS-CoV patients in Saudi Arabia.¹³ The nurses who cared for SARS patients exhibited high levels of anxiety and psychological trauma during and after caring for patients.¹⁵ In a study of nurses who cared for MERS-CoV patients,¹⁰ the factors identified as causing post-traumatic stress were psychological job requirements, physical job requirements, and manager support. Thus, a system is needed to help reduce physical job requirements that takes into consideration the psychological job requirements of nurses who cared for MERS patients, to manage their post-traumatic stress and provide appropriate support. In addition, a mental health and stress control program by the government and hospital for nurses who cared for patients is needed to prevent psychological trauma.

Participants suffered from ostracization. Their families were discriminated against and avoided because people thought of them as potential carriers. Other studies have reported that nurses were hurt and felt discriminated against because of the distorted view of society in which MERS-CoV was prevalent.¹⁹ The reason nurses with children did not want to volunteer could be related to this.²⁰ In this situation, the only strength was support from friends and family. Participants were close to each other and even expressed support at the time owing to comradery. Family members were originally worried about the participants' safety but later became good supporters, enabling participants to focus on patient care. Studies of SARS patient care by Chung et al.²¹ and Kim and Choi²² also indicated that the poor social support of family, friends, and bosses was significantly related to burnout in nurses caring for MERS-CoV patients. To reduce burnout and stress in nurses caused by infectious patient care, the support of superiors, friends, and family is

important. Related studies and national and cultural considerations based on the results of the present study are recommended.

Participants overcame a difficult situation by telling themselves that they could do it and finally experienced growth as nurses. They felt pride as nurses in providing high-quality care and completing their responsibilities during a national disaster. Other studies have indicated that the experience of infected patient care was a factor that can improve the responsibility and morale for patient care.^{7,23} Additionally, participant statements that they would volunteer again are consistent with the study result of Khalid et al.¹³ Nurses who had experienced disaster situations would be good supporters if the same situation occurs in the future. Therefore, healthcare providers with this kind of experience should be treated as valuable human resources and rewarded appropriately.

The problems of the national healthcare system were exposed by the MERS-CoV outbreak. In this study, the following tasks were found to be commonly experienced by participants. First, the nurses' efforts were forgotten after the end of the MERS-CoV outbreak. They participated in MERS-CoV patient care owing to their sense of responsibility and vocational ethics. However, they nevertheless experienced a significant amount of psychological and physical pain. To recruit healthcare provider volunteers when similar situations occur in the future, the government must appropriately reward them. Second, a preparatory system must be established that could work anytime to prevent diffusion of infectious disease. It is desirable that people begin to take infection control seriously owing to the MERS-CoV outbreak, but the government's and hospitals' continuous support and investment are needed to retain the public's interest. Healthcare providers in South Korea must establish a preparatory system to respond instantaneously to outbreaks. Third, nurses noted that a change in the mindset of the patients and their guardians is needed along with improvement of the healthcare system. As comprehensive nursing services were begun recently in South Korea after the MERS-CoV outbreak, hospital visiting was limited. However, patients' and their guardians' knowledge of this system was inadequate, and it was reported that this system could be a factor that prompted the nurses' desire to change the department they were working in or to quit their job.²⁴ A strategy for retaining resources and a systematic preparatory system that could protect the healthcare providers and ensure the readiness of the infection care system thoroughly in case of an unpredictable disaster is required.

The experiences of nurses who cared for MERS-CoV patients in Korea were also studied by other researchers. Im et al.²⁵ interviewed 8 intensive care unit nurses who cared for MERS-CoV patients in Korea and identified 3 relevant factors: "feeling hopeless and cut off," "feeling shame and overworked," and "feeling the pride of fulfilling a duty." In addition, when compared to the experiences of nurses who cared for SARS, H1N1, and ebola patients, the experiences of patient care for emerging infectious diseases were similar in terms of nurses' physical and emotional exhaustion, frustration, and fulfillment.^{7,8,26} What distinguishes the results of this study from those of other studies is that nurses emphasized urgent improvement in the healthcare system. Social crises caused by new types of infectious diseases can always occur again. However, healthcare providers' experiences might not differ greatly for new types of infections. Therefore, it is important to establish an action plan based on the healthcare providers' valuable experiences. It should be focused on the problems that we identified based on nurses' experiences, and coping strategies and the healthcare system must be urgently improved.

CONCLUSIONS

This study identified the experiences of nurses who cared for MERS-CoV patients. The results could be used as fundamental data

for establishing a safer healthcare system that can protect healthcare providers and patients. Systemic improvement with a practical complement for patients and healthcare providers is expected in the future. This study is meaningful as a probe study defining the experiences of nurses who cared for MERS-CoV patients. It is necessary to specifically understand the problems and demands of the healthcare providers for establishing a safe healthcare system that can respond effectively in case of future national disasters.

References

- Centers for Disease Control and Prevention. Middle East Respiratory Syndrome Coronavirus (MERS-CoV). Available from: <http://www.cdc.gov/coronavirus/mers/about/index.html>. Accessed December 27, 2016.
- World Health Organization. Middle East Respiratory Syndrome Coronavirus (MERS-CoV). Available from: <http://www.who.int/emergencies/mers-cov/en/>. Accessed June 7, 2017.
- Korea Centers for Disease Control and Prevention. Middle East Respiratory Syndrome Coronavirus guidance version 5. Available from: <http://cdc.go.kr/CDC/notice/CdcKrTogether0302.jsp?menuIds=HOME001-MNU1154-MNU0005-MNU0088&cid=75416>. Accessed May 24, 2017.
- Jeong G, Lee TR, Hwang SY, Cha WC, Shin TG, Sim MS, et al. Emergency department workers' perceptions of effectiveness and reported compliance of infection control measures after Middle East respiratory syndrome outbreaks. *J Korean Soc Emerg Med* 2016;27:328-35.
- Yang S, Cho SI. Middle East respiratory syndrome risk perception among students at a university in South Korea. *Am J Infect Control* 2017;45:e53-60.
- Choi JW, Kim KH, Moon JW, Kim MS. Public health crisis response and establishment of a crisis communication system in South Korea: lessons learned from the MERS outbreak. *J Korean Med Assoc* 2015;58:624-34.
- Lam KK, Hung SY. Perceptions emergency nurses during the human swine influenza outbreak: a qualitative study. *Int Emerg Nurs* 2013;21:240-6.
- Tiwari A, Chan S, Wong A, Tai J, Cheng K, Chan J, et al. Severe acute respiratory syndrome (SARS) in Hong Kong: patients' experiences. *Nurs Outlook* 2003;51:212-9.
- Torda A. Ethical issue in pandemic planning. *Med J Aust* 2006;185:73-6.
- Jung HJ, Kim JY, Jeong SY. Factors affected with post-traumatic stress in nurses involved in direct care for Middle East Respiratory Syndrome patients. *Health Soc Welf Rev* 2016;36:488-507.
- Maunder RG, Lancee WJ, Balderson KE, Bennett JP, Borgundvaag B, Evans S, et al. Long-term psychological and occupational effects of providing hospital healthcare during SARS outbreak. *Emerg Infect Dis* 2006;12:1924-32.
- Colaizzi PF. *Psychological research as the phenomenologist views it*. New York: Oxford University Press; 1978.
- Khalid I, Khalid TJ, Qabajah MR, Barnard AG, Qushmaq IA. Healthcare workers emotions, perceived stressors and coping strategies during MERS-CoV outbreak. *Clin Med Res* 2016;1303:1-22.
- Kim KN, Lee OC. Knowledge, attitudes and perceptions of nurses on personal protective equipment: response to the Middle East respiratory syndrome coronavirus. *J Korean Acad Fundam Nurs* 2016;23:402-10.
- Chen CS, Wu HY, Yang P, Yen CF. Psychological distress of nurses in Taiwan who worked during the outbreak of SARS. *Psychiatr Serv* 2005;56:76-9.
- Choi JS, Kim JS. Factors influencing emergency nurses' ethical problems during the outbreak of MERS-CoV. *Nurs Ethics* 2018;25:335-45.
- Choi JS, Kim JS. Factors influencing preventive behavior against Middle East Respiratory Syndrome-Coronavirus among nursing students in South Korea. *Nurse Educ Today* 2016;40:168-72.
- Guba EG, Lincoln YS. *Fourth generation evaluation*. California [USA]: SAGE Publications; 1989.
- Lee JY. Nurses' experiences of caring for patients with Middle East Respiratory Syndrome [Unpublished master's thesis]. Seoul: Sungkyunkwan University. 2016.
- 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;9:120-30.
- Chung BPM, Wong TKS, Suen ESB, Chung JWY. SARS: caring for patients in Hong Kong. *J Clin Nurs* 2005;14:510-7.
- Kim JS, Choi JS. Factors influencing emergency nurses' burnout during an outbreak of Middle East Respiratory Syndrome Coronavirus in Korea. *Asian Nurs Res* 2016;10:295-9.
- Schwartz D, Shapira S, Bar-Dayyan Y. Health care workers' knowledge and confidence in personal protective equipment during the H1N1 pandemic in Israel. *Disaster Med Public Health Prep* 2014;8:150-7.
- Lee JM. Comparative study about the clinical nurse's job stress and turnover intention between a nursing care system wards and a general wards. *J Soc Sci* 2016;33:1-48.
- Im SB, Baumann SL, Ahn M, Kim H, Youn BH, Park M, et al. The experience of Korean nurses during the Middle East Respiratory Syndrome outbreak. *Nurs Sci Q* 2018;31:72-6.
- Smith MW, Smith PW, Kratochvil CJ, Schwedhelm S. The psychosocial challenges of caring for patients with Ebola virus disease. *Health Secur* 2017;15:104-9.