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Research

The Experiences of Operating Room Nurses During COVID-19 Pandemic: A Qualitative Study

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A B S T R A C T

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Purpose: The aim of this study was to determine the changes in the physical, mental, and social conditions of operating room nurses and their personal experiences during the COVID-19 pandemic.

Design: The study applied a qualitative research design that included the content analysis method.

Methods: Face-to-face interviews were conducted online with 26 operating room nurses. Analysis of the data was completed in six steps using the content analysis method.

Findings: Four main themes emerged from the interviews: physical effect of the COVID-19 pandemic on operating room nurses, psychological effect of the COVID-19 pandemic on operating room nurses, operating room nurses' perceptions on the training given to them during the COVID-19 pandemic, and effects of the COVID-19 pandemic on health care worker and patient safety and nursing care.

Conclusions: This study contributes new findings on the experiences of operating nurses during the COVID-19 pandemic to the relevant literature. The results of the study indicated that the nurses were negatively affected both physically and psychologically during this period, and that this directly affected patient care.

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The coronavirus first appeared in the city of Wuhan in the province of Hubei, China in late 2019 and rapidly spread throughout the world.¹ The disease was at first referred to as severe acute respiratory syndrome Coronavirus 2 (SARSCoV-2) before being later declared as COVID-19 by the World Health Organization (WHO).² The first case was reported in Turkey on March 11, 2020, the same day the WHO declared the COVID-19 disease to be a pandemic.^{3,4}

As the COVID-19 pandemic continues to spread rapidly around the world, health care professionals and researchers have sought to determine the best policies and procedures for delivering proper treatment and preventing recurrent waves. The management of patient clinics, intensive care units (ICUs), and operating rooms (ORs) has become increasingly important in the fight against the pandemic, and all health care professionals, especially nurses and physicians working in these units, have contributed and continue to contribute a significant amount of time and effort in this fight.⁵ In the early stages of the pandemic, bed capacities increased in parallel with the need for additional ICU beds for COVID-19, and more nurses were

needed to care for patients in ICU. Therefore, OR nurses were temporarily assigned to ICUs as elective surgeries were postponed.^{5,6} Staff shortages in ORs during this period due to the assignment of OR nurses to different units at the hospital and the long-term, close working conditions of nurses with the patients have made it challenging to manage the pandemic, a particularly concerning issue considering the role of OR staff play in emergency and urgent surgeries and intubation of patients who need anesthesia.⁶ In Turkey, OR nurses are responsible for all perioperative care except for administering anesthesia and other medications. Anesthesiologists administer anesthesia, and anesthesia technicians assist them during surgery.⁷ Another issue that differs from the US and European countries is the nursing education in Turkey. Until 2014, people who graduated from 4-years health vocational high schools were working in ORs by obtaining an OR nursing certificate. With legal regulation in 2014, this problem was solved. Only nurses who graduated from university bachelors' programs were allowed to work in ORs. However, high school graduate nurses who started working before 2014 continued working in ORs.⁸

OR nurses, who have been at the forefront of the fight against the COVID-19 pandemic, are tasked with managing the pandemic by identifying COVID-19 cases, informing the public about the best preventive measures to stop the spread of the virus, and providing continuity of care and treatment of patients.⁹ They also played a key role

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in reorganizing ORs during the COVID-19 pandemic so that they could be used for patients who needed intubation and contributed to the management of the pandemic process by fulfilling all their responsibilities in other areas, such as ICU's, patient care services, disease diagnosis and classification in triage areas, during the period when only urgent and mandatory surgeries were permitted.^{5,10}

As the closed environment of ORs that use aerosol generating procedures for airway management increases the risk of transmission of infection among OR personnel, the WHO and other scientific authorities have recommended evidence-based preventive methods for infection control and optimization of OR management during the COVID-19 pandemic.¹¹ These methods can serve to prevent the spread of the COVID-19 virus through contact with contaminated ambient surfaces and aerosolization. In addition to the standard preventive measures of wearing surgical masks and caps to prevent contamination, OR nurses have taken additional protective measures, such as wearing WHO-recommended N95 masks, face shields, and protective gowns.¹² However, with these measures, OR nurses reported that they have experienced difficulties with moving during long surgeries, excessive sweating, and pressure sores from the use of the protective equipment.¹³ Tabah et al¹⁴ also stated that half of the health workers in their study complained of sweating and pressure sores, even in cases where they used their personal protective equipment for only 4 hours.¹⁴ On the other hand, other studies have reported that health care workers did not have enough PPE to use.¹⁵⁻¹⁷ Arnetz et al¹⁸ stated that nurses with insufficient equipment suffered more mental problems, reporting that most of the nurses in the study suffered from depression, anxiety, and post-traumatic stress disorder.¹⁸ As these challenges experienced by OR nurses required to prompted further exploration, the aim of this study is to determine how OR nurses' physical, mental, and social conditions changed during the COVID-19 pandemic, and to examine their personal experiences throughout the period.

Methods

Design

The content analysis method was used to analyze the qualitative data collected from the 26 OR nurses participating this study, and their socio-demographic information was also taken. Content analysis, a method used primarily for analyzing textual and visual data, follows an inductive path and primarily focuses on developing categories relevant to the research topic.¹⁹ This analysis method was selected for its capacity to directly analyze the actual thoughts the OR nurses had about their experiences during the COVID-19 pandemic. The study followed the Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines.²⁰

Sample Selection

There is no established rule for determining the sample size in qualitative studies.²¹ Since qualitative studies are based on interviews, larger and broader samples are not required, as the content from the interviews would begin to repeat itself at some point.²² In qualitative studies, the data collection procedure is stopped when no new information is found in the data when the data is repeated.²¹ The literature on this subject suggests that when data is collected through the in-depth interview method, the sample may include approximately 30 people.²³ In this study, 26 OR nurses formed the study sample. The inclusion criteria for participation were as follows: employment as an OR nurse during the COVID-19 pandemic, voluntary agreement to participate in the study, consent to perform an audio and video recording of the interviews for use in the study,

agreement to participate in an online interview, and ability to use the Zoom application. We did not have any exclusion criteria.

Data Collection

The data were collected between June 3 and June 25, 2021 interviews conducted using the free version of the web-based Zoom video conferencing application to avoid the risks associated with doing personal face-to-face interviews during the COVID-19 pandemic. Each interview lasted about half an hour (Min-max:22-38 minutes; Mean:27 minutes). The snowball sampling method was applied in this study. Researchers used their own public Instagram profiles to share a research invitation letter that included the inclusion criteria. The first participant to voluntarily agree to participate in the study communicated with the researcher via direct message on Instagram. An e-mail address was then requested to maintain communication with the participant. An informed consent form was prepared on Microsoft Forms and distributed to the participant by e-mail. Next, the Zoom invitation link was sent to the email address of the first participant to obtain their voluntary consent to the interview. Before the interview, the participant was verbally informed about the study and its aim, and verbal permission to conduct an audio and visual recording of the interview was obtained from the participant. Thus, both written and verbal consents were obtained. The interview was held on the day and at the time specified by the participant to ensure that he/she could express their thoughts comfortably and without interruption.

After the first interview was completed, the participant was asked to recommend another OR nurse for the second interview. The first participant sent the researchers' contact information to the OR nurse they recommended; the second participant then contacted the researchers. The process was repeated for the second participant from the consent stage. This cycle continued until no new information was found in the data.

All the interviews were conducted by researchers who had qualitative research experience.

Data Collection Tools and Properties

An interview guide consisting of two forms prepared in accordance with the relevant literature were used to collect the data.^{24,25} The first form was a personal information form containing six questions to identify the OR nurses' socio-demographic characteristics, such as age, gender, and work experience, while the second form was a qualitative data form containing five semi-structured open-ended questions directed at identifying the experiences of the OR nurses. The interview form was sent to three different expert researchers via e-mail to obtain their expert opinions. According to their expert review, the form required no revisions (Table 1).

Table 1
Interview Form

Interview Form
1. Are you afraid of being infected with COVID-19 or being a carrier? Could you please explain it?
2. How do you evaluate employee safety? Were the measures taken sufficient? Do you think you have adequately trained?
3. Have you been a part of the operating room team of the confirmed COVID-19 patient? What are your experiences?
4. What are the issues you experienced the most while working during the COVID-19 Pandemic? How do you feel physically, emotionally and mentally following the COVID-19 pandemic until today?
5. How has the post-COVID-19 period affected the care you are providing? How was this period reflected in the patient care?

Ethical Considerations

Before the study, ethical approval to conduct it was granted by the Non-Invasive Research Ethics Committee (Ethics Committee approval dated 25.05.2021 and numbered 11) of Bezmialem Vakif University. Each participant gave their voluntary verbal and written consent to participate in the study online. Due to the risks associated with meeting face-to-face in person during the COVID-19 pandemic, an online consent form, a documentable method whereby the participants could read and confirm their consent, was used in place of the written consent form (<https://forms.office.com/r/2YTXUGXmbS>).

Following the interviews, participants were informed that the recordings obtained through the Zoom application would only be used for the intended purposes of the study, that no one except the researchers would listen to them, and that their names would be replaced with a number (eg, N1, N2) in the research report to secure their anonymity, and their consent was obtained.

The consents, transcripts, interview notes, and e-mails associated with the study will be stored for two years on a password-protected computer. At the end of two years, the researchers shall destroy these documents used as required by Article 11 of the Regulation on the Erasure, Destruction, or Anonymization of Personal Data.²⁶

Data Analysis

The researchers transcribed the audio recordings verbatim immediately after the interviews. The qualitative content analysis method was employed to analyze the data. According to Yıldırım and Şimşek²⁷ the content analysis method includes the following steps:

1. Coding of data: At this stage, the researcher examines the information obtained, tries to divide it into meaningful parts, and finds out what each piece means conceptually. The data coding process usually requires the researcher to read the data set several times and repeatedly work on the resulting codes.
2. Finding themes: Based on the codes that emerged in the first stage, it is necessary to find themes that can explain the data at a general level and collect the codes under certain categories. First, the codes are brought together and examined and tried to find common aspects. For thematic coding, it is necessary to determine the similarities and differences of the codes and the themes that can bring together the codes that are related to each other.
3. Organizing and defining data according to codes and themes: As a result of the detailed coding in the first stage and thematic coding in the second stage, the researcher creates a system that can be organized by the data collected. In the third stage, the researcher organizes the data obtained according to this system. In this way, it may be possible to define and interpret the data according to certain findings.
4. Explanation of findings: In this last stage, the researcher establishes cause-effect relationships, draws conclusions from the findings, explains the importance of the results to give meaning to the data collected, and describes the relationships between the findings.

Based on the stated steps, the two researchers (HMA, ZZ), each of whom had qualitative research knowledge and experience, carried out the content analysis and determined the themes independent of one another. The researchers discussed and determined the themes that they thought best described the findings until they reached an agreement on the data. The ATLASTI data analysis software was used to analyze the data.

Trustworthiness of the Study/Rigor

Meticulousness communicates trustworthiness in a study, and results are considered trustworthy when they are confirmable and

transferable. Components of trustworthiness are credibility, transferability, dependability and confirmability.

The data compiled in this study are considered to have high credibility because they are not produced by the researchers but rather, represent the thoughts and experiences of the OR nurses. Some of the participants' statements were also cited under each theme to improve the credibility of the results further.²⁸

The study and data analysis process was carefully performed by the research team to ensure dependability. For this purpose, the two researchers (HMA, ZZ), each of whom had qualitative research knowledge and experience, carried out the content analysis and determined the themes independently. The researchers discussed and determined the themes that they thought best described the findings until they reached an agreement on the data. To evaluate the confirmability, two faculty members specializing in qualitative research confirmed the data analysis process.²⁹

Prior to their use in the study, the data collected from the statements made by each participant were sent back to them to confirm their statements and thereby increase the transparency of the study. Given that the participants were working as OR nurses during the COVID-19 pandemic in different regions and hospitals of Turkey, the data can be transferable to all nurses and provide insight on health care professionals in other nations.²⁸

Findings

The mean age of the participants in the study was 29.1 (min-max:21-42), 20 of the participants were female, and six were male, and four of the participants were high school graduates, four had an associate degree, 13 had a bachelor's degree, four had a master's degree, and one had a PhD. The mean total nursing experience of the participants was 7.3 years, while the mean amount of time they had been working as an OR nurse was 6.1 years. OR nurses participating in the study were working five in a private hospital, 14 in a state hospital and 7 in a university hospital. During the COVID-19 pandemic, 13 participants were temporarily reassigned to another clinic. Six of the nurses were assigned to the COVID-19 ICU's, three to polymerase chain reaction (PCR) test department, and four to the COVID-19 clinic (Table 2).

From the assessment of the experiences of the OR nurses during the COVID-19 pandemic, four main themes were identified (Table 3). The nurses stated that the pandemic had physically and mentally affected them, made it impossible to establish and maintain the safety of health care workers and patients, and made them feel inadequate in providing patient care, and that the trainings given during the pandemic were not clear and easy to follow.

Theme 1: The Physical Effects of the COVID-19 Pandemic on OR Nurses

All 26 participants contributed to this theme. Some nurses had such tight and tiring schedules that they had to postpone the interviews or had to participate in the interviews during their breaks between surgeries. Participants stated that they were tired even if there was no change in their shifts. The OR nurses expressed that among the various problems they experienced during this period, the usage of personal protective equipment (PPE) was the primary cause of their physical issues, tiredness, and stress, which included sweating induced by the protective gowns, pressure sores from the use of masks, headaches caused by the face shields, movement constraints caused by the equipment, and difficulty seeing during surgery due to their goggles fogging up. The steaming of the glasses narrowed the field of vision. This might endanger the life of the patient. Although the work of the OR nurses was the same, the use of extra PPE brought difficulties. Therefore, nurses had to work more carefully under more challenging conditions.

Table 2
Descriptive Characteristics of the Participants (N = 26)

Characteristics	Mean	Min-Max
Age		
Age in years	29.1	21–42
Experience		
Total nursing experience	7.3	1–21
OR nursing experience	6.1	1–21
n		
Gender		
Female	20	
Male	6	
Educational background		
High school	4	
Associate degree	4	
Bachelor's degree	13	
Master's degree	4	
Doctorate degree	1	
Type of hospital where nurses work		
State hospital	14	
University hospital	7	
Private hospital	5	
Reassigned nurses to another clinic		
Yes	13	
No	13	
New place of assignment		
ICU's of patient with COVID-19	6	
Clinic of patient with COVID-19	4	
PCR test department	3	
Not assigned to anywhere	13	
Total	26	

ICU, intensive care unit; OR, operating room; PCR, polymerase chain reaction.

N19: "While wearing the protective gowns, the health care workers have to exert more effort than normal. The shields cause headaches. I couldn't even hear the doctor's questions during the surgery because of my headache. I couldn't focus."

N22: "The backside of our ears definitely hurt. I have had more headaches, anxiety, and stress, and, as I said before, I have suffered hair loss. The use of PPE exhausts us, but we are at war and have to fight."

N16: "I recall there being times when there was no place in my underwear that was dry."

N14: "... I am a skinny person. When I wear the heavy PPE, I wobble when I walk."

N26: "The equipment makes you sweat, the goggles give you a headache, and you cannot breathe with that shield. The layers of PPE, like masks, etc., obstruct our movement in the workspace, and despite all the equipment, you are still trying not to contaminate the sterile area. Although we have had success in performing operations, we have had difficulty seeing at times during operations because our goggles fog up."

N21: "I have felt extra tired physically. I have had pressure sores on my nose and cheeks due to the masks."

Theme 2: The Physiological Effects of the COVID-19 Pandemic on the OR Nurses

The Effects of Maintaining Social Distancing

All 26 participants contributed to this theme. The OR nurses stated that, in addition to being physically impacted by the COVID-19 pandemic, they were also mentally affected. Save for cases of surgeries; nurses must not get too close to one another as a result of having to maintain social distance. To support this, the employees did not come together between the cases and did not eat together. This had hurt the communication of the operating room team and, therefore the workflow. Social exclusion has been another issue that OR nurses had experienced, especially in the first months of the pandemic, as

the people that the OR nurses encountered in their social life knew that they were working in the hospital and participating in the treatment and care of COVID-19 patients. Social exclusion accelerated the exhaustion of nurses. That's why nurses feel depressed and reluctant.

N7: "When I met a friend, he never took his mask off. He said that I was a super spreader. This kind of behavior is driving us out of society, which is kind of distressing."

N23: "When you do not say hello to each other in the OR, the conversation breaks down, which drives you crazy. With the breakdown of communication, we become lonely."

N2: "When you go into depression, you do not want to leave the house, go any place, or go to the hospital, and the worst part is that you do not want to provide care for the patient."

Fear of Being Infected With or Infecting Someone Else With COVID-19

All 26 participants contributed to this theme. Fear of being infected with COVID-19 or infecting others with it and depression can be listed among the significant reasons nurses are affected psychologically. Most of the nurses stated that they were afraid of infecting someone else with COVID-19 rather than getting sick. This situation caused the nurses to feel paranoid and sleep disorders. In addition, these fears caused alienation from other people and emotional exhaustion.

N5: "I'm so afraid of causing someone to get sick. I don't spend time with my friends. I take public transport less often. All of this has exhausted me emotionally."

N24: "I come home from the hospital after being on call feeling dirty, so I clean myself up and go to bed, but it takes me a long time to fall asleep. If I awake from my sleep with a cough, I cannot get back to sleep for one or two hours because I think about whether I was infected with COVID. What happens to people at home?"

N13: "We're in a state of global depression. Nobody's doing well. We are in a miserable situation."

Theme 3: The Perceptions OR Nurses Have on the Training Provided During the COVID-19 Pandemic

A total of 25 participants contributed to this theme. In this process, some OR nurses were temporarily assigned to services where patients with COVID-19 are present. Most of the OR nurses stated that the training they received on the COVID-19 pandemic was not adequate. The primary problems they reported were that the trainings were not repeated periodically, the training content was insufficient, the trainings could not be held face-to-face, and no orientation training was provided to the nurses who had been reassigned. OR nurses assigned to wards with COVID-19 patients cited a lack of further education. The nurses had a lack of knowledge about the functioning of the new workplaces and treatments. This lack of knowledge could only be eliminated with orientation training, the training given to nurses to adapt to the new workplace. According to the OR nurses, inadequate training led to mistakes in equipment use, which made them feel more anxious and stressed. In addition, the nurses stated that fighting an unknown enemy destroyed their hope.

N6: "I learned different information from the news, from Google, and my doctor friends, especially from surgical oncologists. The hospital has not provided me with any training. I had to figure it out for myself."

N9: "Not much information was given. A brochure was posted on the board, but we were not provided with thorough training."

N19: "We have had friends that wore their protective gowns wrong or did not know how to use them effectively. It would be far more effective if we were taught on a one-on-one basis on how to wear the gowns."

Table 3
Themes and Codes on the Experiences of Operating Room Nurses During the COVID-19 Pandemic

Themes	Sub-Themes	Codes
Theme 1: The physical effects of the COVID-19 pandemic on operating room nurses		Headache, skin irritation, decubitus, fogging up of goggles, unable to breathe, hair loss, sweating, fatigue
Theme 2: The physiological effects of the COVID-19 pandemic on operating room nurses	2.1. The effects of maintaining social distancing 2.2. Fear of being infected with or infecting someone else with COVID-19	Social isolation, depression, stigma, exclusion, isolation, overwhelming, longing, despair, incomprehensibility, less reputability, and communication Feeling miserable, insomnia, skepticism, feeling dirty, unrest, anxiety, fear, paranoia
Theme 3: The perceptions operating room nurses have on the training provided during the COVID-19 pandemic		Lack of knowledge and awareness, peer education, lack of training, inconsistent information, lack of training updates, lower training quality, online warnings, inadequate practical training, insufficient online training, absence of orientation, feeling inadequate, unknown, stress, anxiety, uncertainty
Theme 4: The effect of the COVID-19 pandemic on the safety of health care workers and patients and on nursing care	4.1. The pandemic's effect on the safety of health care workers 4.2. The pandemic's effect on patient safety 4.3. The pandemic's effect on nursing care	Lack of equipment, misuse of equipment, inadequate precautions, violence, PCR test, and dermatitis asepsis complications, prolonged anesthesia, and vulnerable patient Limited contact time, reduced care, less empathy, psychological preparation, nervous patient, social distancing, and patient anxiety

PCR, polymerase chain reaction.

N13: "Ignorance kills, not disease. An uneducated person is not a threat, but if you put a gun in their hand, then they become a threat. I was assigned to the ICU's, but no one gave me orientation training."

N5: "Everyone has experienced great panic, as if the virus had come down from space. The unknown is the most terrifying thing."

N7: "Uncertainty is something that diminishes one's hope for the future."

N4: "We have all of the necessary equipment, but we are still concerned about how we can protect ourselves."

N21: "Nurses were more anxious and stressed when they were unable to obtain proper information from the health care professionals due to early on the information on COVID-19 was constantly changing and contradictory."

Theme 4: The Effect of the COVID-19 Pandemic on the Safety of Health Care Workers and Patients and on Nursing Care

The Pandemic's Effect on the Safety of Health Care Workers

A total of 23 participants contributed to this theme. In their evaluation of the pandemic, the OR nurses stated that access to PCR testing and PPE was the most problematic issue concerning the safety of health care workers. The major threats to the safety of health care workers were lack of routine PCR testing for patients, inability to acquire or wear PPE properly, and PCR test limitations on nurses who were not showing COVID-19 symptoms. In addition, in this process, where disinfectant and hand washing increased, the nurses also stated that there were skin irritations. The OR nurses recommended that every patient who will undergo surgery be routinely PCR tested to ensure the safety of health care workers. The nurses should have a PCR test whenever they want. Nurses stated that PPE is easy to access, and they need better training to use it correctly.

N5: "It is more difficult for us to get tests done than it is for the public. We are always blocked from getting tested to prevent wasting the limited number of tests available."

N25: "The safety of the patients has been prioritized over the safety of the OR nurses."

N3: "It used to be that every patient who came down to the OR had to be tested, but the tests on the patients were stopped. There were occasions when we learned that the patient had tested positive after surgery."

N1: "Unfortunately, there was a shortage of PPE at first, which made people nervous. We could not find protective gowns or masks,

and we did not enter ORs until the masks arrived, which disrupted the OR team's relationship."

N21: "My skin is allergic to several substances, and disinfectant and hand washing have irritated my skin, from my hands up to my elbows."

The Pandemic's Effect on Patient Safety

A total of 23 participants contributed to this theme. The OR nurses reported that the PPE used in the surgeries was designed for general usage and not specialized for use in the OR. This resulted in difficulties in trying to secure surgical asepsis. Moreover, poor nursing care quality throughout the pandemic has led to conditions that have threatened patient safety. Nurses also drew attention to education on patient safety. Some of the nurses who had been reassigned to the ICU stated that they had received no orientation training and warned that it is dangerous to have untrained people in positions of authority.

N3: "When were wearing protective gowns, we were limited to washing our hands only, without being able to wash up to the elbow. This was such a disadvantage for the patient."

N7: "The PPE we have used during the period of COVID-19 is larger, heavier, and more uncomfortable than the standard equipment we used before the pandemic. I have had a hard time moving while wearing the PPE, which has occasionally caused me to have difficulty controlling surgical asepsis."

N17: "The usage of face shields during surgery causes us to contaminate our sterilized environment."

N19: "With COVID, the issue of not allowing anybody into the room until the patient has been intubated has been problematic. The length of patients' anesthetization period has been somewhat prolonged. I believe this affects the patients adversely."

The Pandemic's Effect on Nursing Care

A total of 24 participants contributed to this theme. The OR nurses stated that throughout the pandemic they had been unable to sufficiently monitor patients during the perioperative period. The quality of patient care practices had diminished due to the shortening of preoperative patient preparation times and patient stayed in postanesthesia care units and to the limited contact with patients. They also noted that nurses were not provide adequate preoperative patient care due to social distancing measures, which prevented them from preparing patients psychologically before the surgery. The OR nurses

reported that the limited communication they have been able to have with patients during the pandemic has impaired the level of care they provide.

N2: "Before, once we had the patient in the room, we would perform safe surgery. We are no longer able to do any of this. Now, we transport the patient into the room, and the anesthesiologist begins to administer anesthesia after asking their name, surname, and the type of procedure they are to undergo. We don't have the opportunity to psychologically prepare the patient for surgery first."

N9: "As we limited communication with the patients, they became more nervous. The communication between the nurse and the patient has weakened."

N7: "We cannot touch the patients because we are scared...Being afraid to touch the patient while giving care makes me feel like I am falling short of my responsibilities. I feel that my ability to communicate with patients has dwindled to the point where we cannot communicate at all. It is as though we have lost our ability to empathize."

N25: "During this period, the OR has become a neglected unit. With this neglect, the quality of care we provide to patients is greatly impaired."

N22: "Patients are always nervous and anxious because ORs are really terrifying and frightening places. When we take the extra measures imposed on us by the pandemic, they actually become even more concerned, since they can no longer communicate with us, even in the simple way of making eye contact. They get a bit more stressed."

Discussion

During the interviews, the nurses appeared to be exhausted, which was confirmed with their statements on feeling overwhelmed physically and psychologically due to the changing conditions brought about by the pandemic. Some of the participants regarded their condition as a being in a state of war and stated that they would not give up because they were warriors, while others had such tight and tiring schedules that they had to postpone the interviews or had to participate in the interviews during their breaks between surgeries.

Gao et al³⁰ in their study, reported that due to the excessive workload and heavy fatigue that the nurses have experienced during the COVID-19 pandemic, their shift hours have been shortened. In the present study, it was found that although there were no changes in the shifts of the OR nurses, the fatigue they experienced stemmed from the amount of PPE they had to wear during long surgeries. The protective gowns that the nurses have been required to wear over their uniforms during the COVID-19 pandemic, in addition to the standard garments required in the OR, restricts their movement and causes them to sweat excessively during the surgery. Furthermore, the sweat produced from the PPE causes the goggles to fog up, reducing their vision. The OR nurses also expressed that they experienced headaches from having to use face shields, and that the masks caused pressure sores on the ears, nose, and cheeks. In the study by Hoernke et al³¹ involving the participation of health care professionals, it was reported that the tight masks they have been required to wear during the pandemic caused facial pain, marks and bruises, rashes, dry skin, as well as difficulty in breathing, headaches, and irritability, and that the protective gowns were hot and caused them to sweat, which led to overheating and dehydration.

The study by Kelechi et al³² reported that health workers who wore masks, especially N95 masks, for more than six hours experienced dryness and peeling of the skin. Furthermore, the nasal bridge, cheeks, and forehead were identified in the said study as the areas most affected by PPE, as these were the spots where the wire and elastic loops of the mask and the face shield press against.

The pandemic has affected nurses not only psychologically but also physically. The OR nurses in the present study expressed their fear about being infected with COVID-19 and stated that the social distance they have had to maintain from their colleagues during this period has resulted in communication problems and loneliness. It is also likely that they have been excluded by friends who do not work at the hospital and have suffered from emotional exhaustion due to the social isolation they have been exposed to. Everson et al³³ in their study, stated that OR nurses suffered from anxiety, post-traumatic stress disorder, and social isolation, while Maqbali et al³⁴ reported in their study that one out of every three nurses have suffered from psychological disorders during the COVID-19 pandemic. In the present study, sleep disorder, being one of these psychological disorders, affected some of the participants, who stated that they woke up scared in the middle of the night. Leng et al³⁵ reported that nurses had high anxiety and post-traumatic stress disorder scores and attributed them to personal concerns, lack and misuse of protective equipment, physical and emotional fatigue, excessive workload, fear of being infected, and insufficient work experience.

The "uncertainty" and "unknown" codes assigned to the nurses' statements stood out in the present study, with the lack of knowledge being at the root of the psychological effects experienced by nurses throughout this period. Similarly, Moradi et al³⁶ indicated that the unknown factor of the pandemic was the most significant cause of the stress experienced by nurses during this period, and that the lack of inadequacy of training aggravated the fears of health care workers by triggering a sense of "fighting against the unknown". Most of the nurses in the present study noted that the training they received at the hospital for the COVID-19 pandemic was insufficient and did not help them to feel adequately prepared to address it. The main reasons for these inadequacies include lack of face-to-face training, failure to periodically repeat the trainings, and poor assessment of the effectiveness of the training. In their study assessing the knowledge, attitudes, and practices of nurses on COVID-19, Wen et al²⁵ determined that nurses who had working experience of less than 10 years had a lower level of knowledge and suggested that to address this issue measures be taken to improve training.

In the present study, some of the nurses who had been reassigned to the ICU stated that they had received no orientation training and warned that it is dangerous to have untrained people in positions of authority. Likewise, in the study by Fagerdahl et al³⁷ involving operating room nurses who had been assigned to the ICU during the COVID-19 pandemic, the nurses reported that they experienced anxiety due to unknowns. Tan et al³⁸ in their study, highlighted that despite the nurses' lack of qualifications to work in the units to which they had been reassigned, no sufficient training was provided to them, and they had no familiarity with their new work unit. Furthermore, the nurses who were assigned to the ICU from different units noted that they did not know how to operate devices often used in ICU to treat COVID, such as ventilators.³⁸ When OR nurses do not receive adequate training, there is a stronger probability that they will make mistakes in equipment use and thereby put at risk the safety of health care workers and patients alike.

The failure to supply proper equipment to health care workers in sufficient numbers and on time, the lack of sufficient PCR testing or the failure to do PCR testing, and the misuse of PPE due to lack of training are all factors that threaten the safety of healthcare workers. Sadati et al²⁴ in their study, indicated that a sufficient amount of equipment for nurses could not be supplied at the beginning of the pandemic. The nurses in this said study also mentioned that they did not believe that everyone needed N95 masks, as they lacked sufficient knowledge about this issue and had conflicting views on it. They further added that patients were not tested and therefore were confused about whether their body temperature had risen due to hot weather or COVID-19. In the study by Gül et al³⁹ the participating

nurses reported that some of the patients who underwent surgery did not undergo PCR testing. The study by Mohammadi et al⁴⁰ found that many patients did not have PCR tests before undergoing surgery but were determined to be COVID positive after the surgery. The same study reported that even simple masks were not available for the OR nurses. The increasing incidence of dermatitis on the hands of nurses due to the use of hand sanitizers in the ORs, as well as the increased frequency of handwashing during this process, are among the notable problems that were commonly experienced by the OR nurses in the present study.

Some of the nurses in the present study expressed that the PPE threatened the ability to ensure asepsis of the OR, and that they could not practice proper surgical handwashing. Furthermore, the nurses reported that the length of time of the patients' anesthesia period was prolonged as a result of the modifications in some hospital procedures in response to the COVID-19 pandemic. They also noted that nurses were unable to provide adequate preoperative patient care due to social distancing measures, which prevented them from preparing patients psychologically before the surgery. It is likely that there have been other shortcomings in pre-and postoperative patient care during this period. In their study, Murat et al⁴¹ reported that nurses with less than five years of work experience felt inadequate in providing patient care, while Karimi et al⁴² attributed nurses' inability to provide adequate care to patients to the shortage of PPE.

Conclusion and Suggestions

From the results obtained in this study, we concluded that the COVID-19 pandemic has had an adverse physical and psychological effect on OR nurses. Insufficient PPE and lack of training not only generates anxiety in health care workers but also jeopardizes the safety of patients and health care workers. The social distancing measures practiced by nurses adversely affect patient care, insofar as it limits their communication with patients. During the COVID-19 pandemic, OR staff should have ease of access to necessary equipment, and orientation training should be given and evaluated to ensure correct and proper equipment use. In the training content, the significance of sustaining patient care by taking the necessary measures for patient safety and health care worker safety should be highlighted. It should be incumbent upon OR nurses to learn the latest safety precautions to be taken during the perioperative patient care period, not only by following the hospital orientation trainings, but also by following the current literature. Lastly, psychological support should be provided by the health care organization to OR nurses who have been identified as suffering from psychological problems during this period of COVID-19.

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