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Challenges nurses experienced in caring for patients with COVID-19 admitted to the Intensive Care Units: A Qualitative Study

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Abstract

Background: Nurses working in intensive care units (ICU) have experienced numerous challenges while caring for patients with COVID-19.

Objectives: The aim of this study was to explore ICU nurses' experiences of caring for patients with COVID-19.

Methods: This research presents part of a qualitative study conducted using a grounded theory approach. Participants consisted of nurses and physicians from the selected hospitals in Sabzevar, Neishabour, and Mashhad, Iran. Data collection was performed using semi-structured in-depth interviews. Participants were enrolled via purposive sampling during 2022–2023. A total of 21 participants were interviewed. The method of Corbin and Strauss (2015) was used to analyze the data. We used Guba and Lincoln's four criteria of credibility, dependability, transferability, and confirmability to ensure data trustworthiness.

Results: Four main categories emerged from the data that collectively reflect the experiences of Iranian ICU nurses in caring for COVID-19 patients. These categories included ward overcrowding, changing patterns, complexity of care, and feeling exhausted. All of these categories show that Iranian ICU nurses were under intense pressure during the COVID-19 pandemic.

Conclusion: This study showed that taking care of patients was very exhausting for nurses during the COVID-19 pandemic. Hospital authorities and nursing administrators have a responsibility to support nurses and provide them facilities to feel less stress and uncertainty, while caring for patients with COVID-19.

Keywords: Nursing care, Intensive care unit, COVID-19.

Introduction

Many patients with COVID-19 needed intensive care,[1] and nurses were at the forefront of the fight against COVID-19.[2] Nurses working in intensive care units experienced many challenges when caring for patients in the intensive care units (ICUs). They had to care for patients despite insufficient manpower and inadequate personal protective equipment.[3,4] The close care and frequent contact with patients, especially those with COVID-19, exposed nurses to health risks,[3] such as fear, anxiety, stress, fatigue, getting COVID-19 infection, and feeling unable to handle patients' conditions.[5-8] Some nurses also criticize themselves for suffering, death, and poor understanding of patients.[9,10] These physical and mental health problems, in turn, affect nurses' performance in providing quality care. On the other hand, issues such as conflicts between colleagues, heavy workload, and sensitive working conditions can affect the care nurses provide.[11,12]

A phenomenological study of Iranian nurses' experiences of caring for patients with COVID-19 categorized nurses' experiences into four categories namely, psychological, organizational, social, and professional factors.[11] However, this study involved only staff nurses and did not explore the perspectives of nurse managers and physicians. Other studies found that 64% of ICU nurses in Iran considered quitting their job because of poor working conditions or job dissatisfaction, 81% were dissatisfied

with their work environment, and reported that their work setting was highly stressful, and most of them experienced burnout symptoms.[13]

Taking care of patients under COVID-19 conditions is an interactive process and is influenced by contextual variables. However, little is known about the challenges faced by Iranian nurses during the COVID-19 pandemic. Therefore, the question remains, what experiences do Iranian ICU nurses have in caring for patients during the COVID-19 pandemic?

Objectives

The aim of this study was to explore ICU nurses' experiences of caring for patients with COVID-19.

Methods

Study design and participants

This paper presents part of a grounded theory (GT) study that was conducted using the Corbin and Strauss (2015) method. The GT is a type of field study that examines the hidden aspects of human behaviors and interactions. The setting of the study was the ICU of the selected hospitals in Sabzevar, Neishabour, and Mashhad, Iran. Participants included nurses and physicians between the ages of 25 and 45 who had at least two years of experience in the COVID-19 ICUs, were able to express their experiences in detail, and were inclined to participate in the study. The participants' unwillingness to continue the study was the only exclusion criterion. The first participant was purposively selected from those who were eligible and already known to the researcher. The next participants were chosen using theoretical sampling and based on the codes that emerged from the previous interviews. Participants were also asked to nominate eligible ones from their circle of acquaintances who might be good candidates for participating in the study. Sampling continued until the data were saturated and no new conceptual codes, properties, dimensions, or relationships emerged during analysis.[14]

Data collection

Data were collected from April 2022 to March 2023, through in-depth, semi-structured interviews. Interviews were conducted in the morning or evening shifts, depending on participants' preference, and following the personal protective protocols. Twenty-six individual interviews were conducted with 21 participants. Interviews were conducted in a quiet and private room at the participants' workplace and lasted approximately 45-60 minutes each, depending on the participants' tolerance

and willingness to share their experiences. At the beginning of the interviews, each participant was asked a general question, such as, "Please explain what you did for a patient with COVID-19 in the ICU?" Then, participants were asked, "Describe what challenges you have experienced while caring for patients with COVID-19? Please provide examples of your real experiences", "Is the care you provide to patients different from the pre-COVID era?" Other questions in each interview depended on the intended participant's answers to the main question. Probing questions such as "What did you mean?", "Explain more," "Make your point more clear," "Give an example" and "What led to this?" were also asked to encourage participant to provide more details about their experiences. In five cases, interviews were conducted in two sessions at the request of the participants or the researcher to clarify ambiguities or obtain more information. Field notes were also taken. Saturation was achieved after interviewing with nineteenth participant. However, two more interviews were conducted for sure. All interviews were recorded using an MP3 player.

Data analysis

Corbin and Strauss's method (2015) was used to analyze the data. This approach consists of the following analytical phases: 1. Open coding/identifying concepts, 2. developing concepts in terms of their properties and dimensions, 3. Analyzing data for context, 4. Bringing the process into the analysis, 5. Integrating categories.[14] Since the study continues, we report here the results of the first two steps. We collected and analyzed the data simultaneously. Thus, the analysis started after the first interview. The recorded interviews were transcribed word by word and then read several times to fully understand the content. Subsequently, the transcribed interviews were coded. Through open coding, the codes were created as the actual words of the participants or the words that the researcher understood of their speech. Through constant comparison analysis, the extracted codes were examined for their similarities and differences, and grouped into categories. The codes and categories from each interview were compared and integrated with the codes and categories from other interviews to develop the categories in terms of properties and dimensions. Categories were then labeled.[14] Data were managed using MAXQDA12 software.

Data trustworthiness

We used Guba and Lincoln's four criteria of credibility, dependability, transferability, and confirmability to ensure data trustworthiness.[15] For data credibility, the transcribed interviews, the extracted codes, and a

summary of the categorized data were returned to the relevant participants to determine whether these were true and matched their experiences. The dependability of the findings was established through peer checking. To validate the analysis process, some texts of the interviews, codes, and the emerged categories were also appraised by another person experienced in qualitative analysis. To ensure transferability, nurses and physicians of both genders, different ages, and with different professional experiences were included in the study. For confirmability, the researcher accurately documented the process and decisions made during the study so that readers can follow and comprehend the steps of the study. In addition, members of the research team met regularly to evaluate and confirm the research process.

Ethical considerations

This study received a code of ethics from the Ethics Committee of the University of Rehabilitation Sciences and Social Health (Code: IR.USWR.REC.1400.265). The purpose of the study and the data collection process were explained to the participants. Informed consents were obtained from participants before interviews were conducted. All participants were also assured that all audio files and transcripts would be kept confidential and their data would be managed anonymously. To keep the information confidential, each participant was assigned a code.

Results

A total of 21 participants were interviewed in this study [Table 1]. Finally, four categories emerged from the participants' experiences [Table 2].

Ward overcrowding

Participants repeatedly mentioned ward overcrowding and its consequences. Ward overcrowding due to the increasing number of patients admitted to the ICU, especially during the peaks of the epidemic, not only increased the workload of nursing staff, but also led to inadequate equipment, especially oxygen shortages. Regarding the oxygen shortages two participants said, *"There was a time when no oxygen existed in the hospital, the oxygenator was not working yet, and even I myself was carrying a 40-litre oxygen capsule at 2:00 a.m."* (p8). *"Unfortunately, we had a lot of casualties... There were shifts in the middle of which the oxygen was suddenly cut off, and patients struggled for oxygen for 15-20 minutes, almost suffocating, and their oxygen saturation dropped severely"* (p21).

Table 1. Demographic characteristics of the participants

No	Gender	Job position	Years of experience
1	Female	Nurse	14
2	Female	Nurse	13
3	Female	Nurse	15
4	Female	Nurse	10
5	Male	Nurse	15
6	Female	Nurse	18
7	Female	Head nurse	15
8	Female	Nurse	5
9	Female	Nurse	9
10	Male	Head nurse	13
11	Female	Nurse	13
12	Female	Nurse	18
13	Female	Nurse	10
14	Female	Head nurse	17
15	Female	Matron	17
16	Female	Head nurse	2
17	Female	Physician	18
18	Female	Nurse	15
19	Female	Nurse	13
20	Male	Psychologist	5
21	Female	Nurse	13

Table 2. The main categories and subcategories emerged from the ICU nurses' experiences of caring for patients with COVID-19

Categories	Subcategories	Codes
Ward overcrowding		
	- Increased workload	- Training of new recruits in ICU along with other caring
	- Inadequate equipment	- Increase in department phone calls due to the ban on meeting
	- Need for continuous monitoring	- Need for continuous monitoring of patients
		- High number of patients needing intubation during a shift
		- Inadequate equipment
		- Oxygen deficiency problems
Changing patterns		
	- Admission of high number of young people	- Change of hospitalized patients from elderly to young
	- Alertness of patients and needing more emotional support	- Change of hospitalized patients from intubation to conscious
	- Patients unresponsiveness to sedatives	- Change in the treatment routine
	- Increased ineffective resuscitations	- Patients' resistance to sedative drugs
	- Frequently changing protocols	
Complexity of care		
	- Unpredictability of the course of the disease	- Hard tolerating of prone position by patients
	- Normalization of previously underrepresented care	- Physical problems following NIV mask use
	- Complications of treatment and care	- NIV care problems for nurses
		- Prone-therapy problems
		- Decreased saturation with patient intubation
Feeling exhausted		
	- Work pressure	- Hard and time-consuming care
	- Frequent confrontation with patient's death	- Strange and unusual mortality of patients
	- Working while wearing protective clothing	- PPE problems

High workload manifested itself with patients needing continuous monitoring, more cases requiring tracheal intubation, more frequent medical consultations, more calls to the department, excessive staff turnover, and the need to train and supervise new personnel. One of the participants described the need for continuous patient monitoring and care: *"Patients couldn't be left alone. They needed constant monitoring and support. We had to reposition the patient on NIV regularly, and when we put them in the prone position, their SPO_2 dropped, and we had to do something"* (p6). Other participants also noted the fact that patients' sensitive and unstable conditions required constant monitoring by physicians, nurses, and other caregivers: *"We had patients who were pregnant or had other medical conditions. They had daily visits from an anesthesiologist, an infectious disease physician, a pulmonologist, a nephrologist, and even a midwife, and all of this had to be repeated every day"* (p8).

Another nurse noted more cases requiring tracheal intubation, stating, *"In a 7-8-hour shift, 3-4 patients had to be resuscitated and intubated"* (p19). Families were also stressed, making numerous calls to the ward, and nurses had to answer those calls 24 hours a day. In addition, because of staff shortages in the ICU, nurses from other departments were often transferred there and also needed rapid training and supervision by experienced ICU nurses, which also increased the ICU nurses' workload. One nurse commented on this issue as follows: *"The new staff were good nurses, but they had no ICU experience; they did not know the ICU equipment. We had to teach them everything and help them regularly; this also increased our workload"* (p11).

Changing patterns

Based on participants' experiences, many patterns in ICUs had changed during the pandemic. Traditionally, most ICU patients were older adults and had low levels of consciousness, but during the COVID-19 pandemic, many young people were also admitted to ICUs in dire condition. Many patients were also conscious, which increased their need for psychological support. Due to the nature of the disease, some patients were also resistant to

sedatives. In this regard, two participants said, *"In general, before the pandemic, most patients who came to the ICU were old and unconscious; however, during the pandemic, many patients were young and conscious"* (p15). *"I had a pregnant mother. She was 19 years old, with a 6-month-old fetus in her womb. We didn't have many young people in the ICU before"* (p7). Another nurse referred to the patients' alertness and their need for more support and interaction, *"Because most of them were alert, they needed more interaction. We were very close to the patients, we gave them food, we were very close to them emotionally, and this was both more difficult and more traumatic for us, especially when the patient died"* (p13).

Due to the nature of the disease, cases of cardiorespiratory arrest had increased, while the number of successful resuscitations decreased sharply. In addition, processes and protocols were changing frequently, making working conditions and the nature of care more challenging and difficult for nurses. One participant noted an increase in the number of cardiopulmonary arrests, *"A patient was thirsty and requested some water. Within 15 seconds, when I went to bring him water, I noticed he was in asystole"* (p13). Regarding changes in routine treatment and care, one nurse said, *"We used NIV before, but not all patients needed NIV and 100% oxygen. Before the pandemic, patients received 100% oxygen for 1 hour, however during the pandemic, in some cases, patients were allowed to receive 100% oxygen for even 10 hours"* (p17). Some participants also noted changes in treatment regimens and in how COVID-19 patients respond to medications. One participant said, *"The routines and process of care were constantly changing ... We used strong sedatives such as fentanyl and remifentanil during COVID-19, but patients were resistant to these drugs, and most of them remained conscious despite injections of these medications"* (p16).

Complexity of care

The complexity of care originated from the poor prognosis and unpredictability of the course of the disease, the normalization of previously underrepresented care, and the complications of treatment. Regarding the poor prognosis and unpredictability of the disease course, one participant said, *"99% of patients died without returning after intubation"* (p13). Another participant also remembered cases where patients' oxygen saturation dropped so low despite tracheal intubation: *"In patients with severely affected lungs, blood oxygen levels did not increase but decreased despite intubation"* (p6). Regarding the increasing use of some underrepresented care

participants referred to the use of NIV and prone therapy. One of them said: *The NIV device was initially new to some of our colleagues. Patients also did not tolerate it well Patients had severe dyspnea and felt suffocated with the mask on and tried to remove it"* (p7). Other participants also noted that to the fact that although Proning was among textbook prescriptions but was rarely used before the pandemic. However, during the COVID-19 pandemic, it was widely used and posed problems for nurses. One nurse said, *"We were very bothered. … Proning was difficult in intubated patients. The head, neck, and tubes had to be supported, and this work was hard and difficult"* (p12).

Referring to the widespread use of NIV masks and the problems associated with them, participants said, *"Patients' face and nasal bridges would get sore after using the NIV masks. The patients' mouths are also constantly dry due to the high oxygen pressure, and they often ask for water. On the other hand, the mask leaks if it does not fit perfectly, and then the device constantly sounds an alarm. Then we have to make the mask fit so that it does not leak"* (p10). Another participant also mentioned the problems of caring for patients with NIV masks, stating, *" In a patient with NIV… the moment the patient is about to be fed or taken a pill, the SPO_2 drops and the patient becomes restless and demands that the mask be put back on"* (p9).

Feeling exhausted

Although feeling exhausted was somewhat related to the high workload and patients' need for time-consuming care, however, it was highly influenced by the frequent confrontation with the death of patients, and work in protective clothing that put double physical and mental pressure on nurses, leaving them exhausted. Two participants said about the effects of work pressure, and time-consuming care: *"I have to regularly walk around the patient's bed to encourage breathing, turn them from side to side, comfort them, and give them hope that they will get better and not die"* (p11). *"We had very little rest, stood most of the time, and went home with pain in our legs"* (p7). However, participants experienced decreased energy, exhaustion, and frustration, when their efforts failed and the patients died: *"We are doing everything we can to save patients. We even take the risk of getting sick. But our energy is completely depleted when a patient die, especially when a young patient passes away"* (p12).

Nurses had to monitor and care for patients while wearing personal protective clothing all the time. Working with these clothes made it difficult to care for the patients. One of the participants used the word "terrible": *"It was terrible in that hot summer to wear plastic clothes and caps,*

masks and goggles, gloves, and protective shoes. I lost 13 kilos in 6 months. I sweated profusely, the working conditions were hard, and the clothes were very uncomfortable; it was really torture" (p17). Another nurse described the difficulties of working in a protective suit, "It was very scary and stressful. We could see that the patient's SPO2 was dropping, and he had to be intubated in just 10 seconds. But that was very difficult with such a space suit. Patients were highly oxygen dependent, and any delay could induce apnea" (p10).

Discussion

Four main categories emerged from the data in this study that collectively reflect the experiences of Iranian ICU nurses in caring for COVID-19 patients. These categories included ward overcrowding, changing patterns, complexity of care, and feeling exhausted. All of these categories show that Iranian ICU nurses were under intense pressure during the COVID-19 pandemic. The first category, ward overcrowding, reflects the high number of COVID-19 patients admitted to the ICU. According to a World Health Organization report, from January 3, 2020, to July 19, 2023, there have been 7,612,728 confirmed cases of COVID-19, with 146,303 deaths.[16] An Iranian study reported that 25.7% of all hospitalized COVID-19 patients were treated in the ICU during hospitalization.[17] Such high ICU admission rates confirm that all ICUs were overcrowded during the COVID-19 pandemic. Such overcrowding inevitably puts pressure on the ICU nurses. At the same time, many hospitals in Iran, especially many intensive care units, lack adequate resources such as specialists, nurses, anesthesiologists and infectious disease. specialists.[18] A phenomenological study also reported that ICU nurses in Iran complained of improper planning, staff shortages, ambiguous protocols and guidelines, lack of transparency in data and statistics, poor communication, and lack of personal protective equipment during the COVID-19 pandemic.[11] All of these problems can be exacerbated by ward overcrowding, which in turn can exacerbate all of the aforementioned problems.

The second category, changing patterns, is likely a consequence of both the unknown nature of the disease and the overcrowding of the ward. Given the nature of the COVID-19 disease, an emerging disease for which no one knew the appropriate treatment and care, and the rapidly changing virus and manifestations of the disease, nurses faced several changes. Numerous young people who were usually conscious but fearful of death, unresponsive to sedatives, and in need of additional psychological support were admitted to intensive care units. In addition, as cardiopulmonary arrest occurred more frequently and treatment and care protocols changed frequently, nurses found that all patterns were constantly changing. Such changes in patterns increased nurses' uncertainty and intensified their physical and perceived mental pressures, which is evident in the two categories of care complexity care, and feeling exhausted. In a previous study by Chegini et al., ICU nurses were uncertain about the care they provided not only due to the ambiguity of existing protocols and guidelines, but also because new protocols were issued every day, sometimes contradicting the previous ones. [11] Other studies also found that Iranian nurses faced high workloads, uncertainty, feeling of unpreparedness, and ethical dilemmas during the COVID-19 pandemic. They had faced a mysterious world created by the virus and did not know clearly how to deal with such a virus.[19,20]

The complexity of care was the third category that emerged from the experiences of ICU nurses caring for COVID-19 patients. This category reflects the poor unpredictability of the course of the disease, the normalization of previously underappreciated care, such as the use of NIV and prone therapy, and the complications of treatment and care that made the situation complex for nurses. Consistent with our findings, Peng et al.[21] and Moradi et al.[22] also pointed out the difficulties in caring for patients with COVID-19. They have also reported that NIV was not much effective in patients with COVID-19, and was also associated with the spread of the virus and the increased possibility of nurses' infection, and all these made nursing care more difficult. Nurses and healthcare providers in other studies also found it difficult to take care of patients who are in the prone position. [23, 24] Such difficulties in nursing care, along with other problems reported in the other two categories, all led nurses to feel exhausted. In fact, feeling exhausted -as the fourth category emerging from the ICU nurses' experiences- can be considered the outcome of the other two categories of ward overcrowding, and changing patterns. It seems that the increase in workload, time-consuming care, patients' need for more monitoring and psychological support, frequent exposure to the death of patients, working with protective clothing, the complexity of care and the uncertainty caused by changing patterns have made nurses feel exhausted. Previous studies in Iran and abroad have also reported that nurses working in COVID-19 units feel extremely fatigued and exhausted for a variety of reasons including workloads,[19] frequent equipment alarms,[25] insomnia, sleepiness,[5] horrific

experiences,[26] lack of time to complete tasks, and working while wearing PPE.[27, 28] In Iran, there was a shortage of PPE due to the sanctions, and nurses had to wear nylon protective clothing, resulting in profuse sweating even with minimal activity, greatly reducing the ability to provide care. As most of the participants in this study were female, further studies involving more male nurses are recommended.

Conclusions

The COVID-19 pandemic had a profound impact on nursing care. The high number of patients needing intensive care has overcrowded the ICUs, and greatly increased the workload of ICU nurses. Furthermore, the unknown nature of the disease, the rapid changes in the disease manifestations, the large number of young people who were usually conscious and required additional psychological support, and the frequent changes in the treatment protocols made nursing care more difficult, and made nurses very exhausted. All of these can negatively affect the quality of care.

Hospital authorities and nursing administrators have a responsibility to regularly assess the working conditions of nurses and the challenges they face in patient care. Reducing these challenges, providing adequate staff, facilities and equipment, and reducing ambiguity in treatment and care protocols will create more stable working conditions. This will help nurses feel less stress and uncertainty, provide better care, and be more comfortable while caring for patients with COVID-19

Competing interests

The authors declare that they have no competing interests.

Abbreviations

Coronavirus disease 2019: COVID-19;
Intensive Care Units: ICU;
Grounded Theory: GT;
Non-invasive ventilation: NIV.

Authors' contributions

All authors read and approved the final manuscript. All authors take responsibility for the integrity of the data and the accuracy of the data analysis.

Availability of data and materials

The dataset in this study are not publicly available due to ethical restrictions to maintain the participants' anonymity.

Ethics approval and consent to participate

Approval to conduct the study was obtained from the Central Institutional Review Board (IRB) of University of Rehabilitation Sciences and Social Health and had a Central IRB log number of IR.USWR.REC.1400.265, dated November 9, 2021. All participants signed an informed consent form.

Consent for publication

By submitting this document, the authors declare their consent for the final accepted version of the manuscript to be considered for publication.

References

1. Khankeh H, Farrokhi M, Roudini J, Pourvakhshoori N, Ahmadi S, Abbasabadi-Arab M, *et al.* Challenges to manage pandemic of coronavirus disease (COVID-19) in Iran with a special situation: a qualitative multi-method study. BMC public health 2021;21:1-9. doi:10.1186/s12889-021-11973-5 PMid:34686165 PMCid:PMC8532398

2. Roberts NJ, Kelly CA, Lippiett KA, Ray E, Welch L. Experiences of nurses caring for respiratory patients during the first wave of the COVID-19 pandemic: an online survey study. BMJ Open Respir Res 2021;8(1):e000987. doi:10.1136/bmjresp-2021-000987 PMid:34312256 PMCid:PMC8313305

3. Arabi YM, Murthy S, Webb S. COVID-19: a novel coronavirus and a novel challenge for critical care. Intensive Care Med 2020; 46(5):833-6. doi:10.1007/s00134-020-05955-1 PMid:32125458 PMCid:PMC7080134

4. Fernández-Castillo RJ, González-Caro MD, Fernández-García E, Porcel-Gálvez AM, Garnacho-Montero J. Intensive care nurses' experiences during the COVID-19 pandemic: A qualitative study. Nurs Crit Care 2021;26(5):397-406. doi:10.1111/nicc.12589 PMid:33401340

5. Lee H, Choi S. Factors affecting fatigue among nurses during the COVID-19 pandemic. Int J Environ Res Public Health 2022;19(18):11380. doi:10.3390/ijerph191811380 PMid:36141652 PMCid:PMC9517441

6. Kackin O, Ciydem E, Aci OS, Kutlu FY. Experiences and psychosocial problems of nurses caring for patients diagnosed with COVID-19 in Turkey: A qualitative study. Int J Soc Psychiatry 2021;67(2):158-67. doi:10.1177/0020764020942788 PMid:32674644

7. Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, *et al.* Factors associated

with mental health outcomes among health care workers exposed to coronavirus disease 2019. JAMA netw open 2020;3(3):e203976-e. doi:10.1001/jamanetworkopen.2020.3976 PMid:32202646 PMCid:PMC7090843

8. Hassanvandi S, Mohammadi M, Shahyad S. Predicting the severity of COVID-19 anxiety based on sleep quality and mental health in health care workers. Novel Clin Med 2022;1:184-191. doi:10.22034/ncm.2022.344007.1048

9. Schroeder K, Norful AA, Travers J, Aliyu S. Nursing perspectives on care delivery during the early stages of the covid-19 pandemic: A qualitative study. IJNS Advances 2020;2:100006. doi:10.1016/j.ijnsa.2020.100006 PMid:32864632 PMCid:PMC7446648

10. Grasselli G, Pesenti A, Cecconi M. Critical care utilization for the COVID-19 outbreak in Lombardy, Italy: early experience and forecast during an emergency response. JAMA 2020;323(16): 1545-6. doi:10.1001/jama.2020.4031 PMid:32167538

11. Chegini Z, Arab-Zozani M, Rajabi MR, Kakemam E. Experiences of critical care nurses of fighting against COVID-19: A qualitative phenomenological study. Nurs Forum 2021;56(3):571-578. doi:10.1111/nuf.12583 PMid:33895986 PMCid:PMC8250885

12. Saedpanah D, Salehi S, Moghaddam LF. The effect of emotion regulation training on occupational stress of critical care nurses. J Clin Diagn Res 2016;10(12):VC01-VC04. doi:10.7860/JCDR/2016/23693.9042 PMid:28208981 PMCid:PMC5296554

13. Chegini Z, Asghari Jafarabadi M, Kakemam E. Occupational stress, quality of working life and turnover intention amongst nurses. Nurs Crit Care 2019;24(5):283-289. doi:10.1111/nicc.12419 PMid:30873678

14. Corbin J, Strauss A. Basics of qualitative research: Techniques and procedures for developing grounded theory. New York, Sage publications; 2014.

15. Nowell LS, Norris JM, White DE, Moules NJ. Thematic analysis: Striving to meet the trustworthiness criteria. Int J Qual Methods 2017;16(1):1609406917733847. doi:10.1177/1609406917733847

16. World Health Organization. Iran (Islamic Republic of) Situation. 2023. Available from: https://covid19.who.int/region/emro/country/ir [Last access date: 3 Jun 2023].

17. Sadeghi A, Eslami P, Dooghaie Moghadam A, Pirsalehi A, Shojaee S, Vahidi M, et al. COVID-19 and ICU admission associated predictive factors in Iranian patients. Caspian J Intern Med 2020; 11(Suppl 1):512-519. doi: 10.22088/cjim.11.0.512. PMid: 33425268. PMCid: PMC7780877

18. Jabbari A, Salahi S, Hadian M, Khakdel Z, Hosseini E, Sheikhbardsiri H. Exploring the challenges of Iranian government hospitals related to Covid-19 pandemic management: a qualitative content analysis research from the nurses perspective. BMC Nurs 2022;21(1):226. doi:10.1186/s12912-022-01008-8 PMid:35962433 PMCid:PMC9372986

19. Dadkhah-Tehrani M, Adib-Hajbaghery M. The relationship between workload and adherence to professional codes of ethics among a sample of Iranian nurses. Clin Ethics 2022;17(3):290-296. doi:10.1177/14777509211040183

20. Kalateh Sadati A, Zarei L, Shahabi S, Heydari ST, Taheri V, Jiriaei R, et al. Ebrahimzade N, Lankarani KB. Nursing experiences of COVID-19 outbreak in Iran: A qualitative study. Nurs Open 2021;

8(1):72-79. doi:10.1002/nop2.604 PMid:32904939 PMCid:PMC7461197

21. Peng PWH, Ho PL, Hota SS. Outbreak of a new coronavirus: what anaesthetists should know. Br J Anaesth 2020;124(5):497-501. doi:10.1016/j.bja.2020.02.008 PMid:32115186 PMCid:PMC7124191

22. Moradi Y, Baghaei R, Hosseingholipour K, Mollazadeh F. Challenges experienced by ICU nurses throughout the provision of care for COVID-19 patients: A qualitative study. J Nurs Manag 2021;29(5):1159-1168. doi:10.1111/jonm.13254 PMid:33480145 PMCid:PMC8014737

23. Wax RS, Christian MD. Practical recommendations for critical care and anesthesiology teams caring for novel coronavirus (2019-nCoV) patients. Can J Anaesth 2020;67(5):568-76. doi:10.1007/s12630-020-01591-x PMid:32052373 PMCid:PMC7091420

24. Sanghi P, Malik M, Hossain IT, Manzouri B. Ocular complications in the prone position in the critical care setting: the COVID-19 pandemic. J Intensive Care Med 2021;36(3):361-72. doi:10.1177/0885066620959031 PMid:32985317

25. Asadi N, Salmani F, Asgari N, Salmani M. Alarm fatigue and moral distress in ICU nurses in COVID-19 pandemic. BMC Nurs 2022;21(1):125. doi:10.1186/s12912-022-00909-y PMid:35610610 PMCid:PMC9126748

26. Remon AR, Lacanaria MGC. Compassion fatigue among nurses assigned to COVID-19 facilities: a constructivist grounded theory. Acta Med Philipp 2022. Available from: https://actamedicaphilippina.upm.edu.ph/index.php/acta/article/view/5818 [Last access date: May, 27 2023] doi:10.47895/amp.vi0.5818

27. Jin H, Liu L, Li Y, Chen C, Fu Q. Influence of different protection levels of PPE on nurses' physical fatigue during the COVID-19 pandemic. Work 2022;72(4):1143-1152. doi:10.3233/WOR-220025 PMid:35723164

28. Sharma N, Hasan Z, Velayudhan A, MA E, Mangal DK, Gupta SD. Personal protective equipment: challenges and strategies to combat COVID-19 in India: a narrative review. J Health Manag 2020;22(2):157-68. doi:10.1186/s12889-021-11973-5 PMid:34686165 PMCid:PMC8532398