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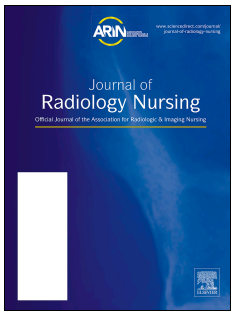

Experiences of radiology personnel about the COVID-19 crisis: A qualitative content analysis

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Experiences of radiology personnel about the COVID-19 crisis: A qualitative content analysis

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The present study approved by the Ardabil University of Medical Sciences Regional Research Ethics Committee with the code of ethics IR.ARUMS.REC.1399.470.

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Experiences of radiology personnel about the COVID-19 crisis: A qualitative content analysis

Abstracts

Background: The COVID-19 pandemic has affected all healthcare systems. During these critical times, radiology personnel and nurses have been heavily involved in the diagnosis and management of COVID-19 patients.

Purpose: This study investigates the experiences of radiology personnel about the COVID-19 crisis.

Methods: This qualitative content analysis was conducted on seven radiology personnel. In-depth semi-structured interviews were used to collect data. Purposive sampling was carried out to select the participants.

Findings: The data analysis led to the emergence of six categories, including psychological-emotional reactions, knowledge-related challenges, humaneness, workplace conditions, hopefulness, and support.

Conclusion: Learning from the experiences of radiology personnel and nurses during the COVID-19 crisis can help better manage any subsequent health crises.

Keywords: COVID-19, Diagnosis, Experience, Content Analysis, Radiology

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Experiences of radiology personnel about the COVID-19 crisis: A qualitative content analysis

COVID-19 broke out in 2019 in China (Ciotti et al., 2020), and so far, it has affected a large population of the world. According to WHO report (2021), there were approximately 260 million infections by December 2021.

Throughout the entire world, many nurses and physicians have been involved in caring for COVID-19 patients and were thus affected by high stress and heavy workload (Shahriarirad et al., 2021). Various healthcare departments are involved in the process of providing care to COVID-19 patients, including radiology departments, which are heavily involved in the provision of care. Since the beginning of the COVID-19 pandemic, the number of patients referred to the radiology department has increased substantially (Jorge & Fridell, 2021; Shoja et al., 2020). Chest CT scan and radiography constitute the most crucial and routine diagnostic methods used for COVID-19 (Dong et al., 2020). Radiographic images play a key role in the management, diagnosis, and treatment of COVID-19 patients (Kalekar et al., 2021).

Healthcare teams experience special conditions and unique challenges in providing care to this group of patients. Providing care to a COVID-19 patient is a unique experience. Radiology personnel have to deal with the risk of infection, lack of personal protective equipment (PPE), lack of contact with their family to prevent infection transmission, and patients' aggressive reactions (Cavli et al., 2021; Jorge & Fridell, 2021; Lewis & Mulla, 2021). In hospital settings, some members of the treatment team refuse to provide care to COVID-19 patients due to the risks involved, while others voluntarily care for these patients (Kollie et al., 2017). The stakeholders in this field unanimously agree on the key role of human resources in the health sector in maintaining and developing the health of the community.

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Identifying the experiences of radiology personnel and nurses can help better understand the experiences, fears, strengths, and weaknesses of care provision. It can also help plan appropriately for the mobilization of forces in future crises. This study explores the experiences of radiology personnel during the COVID-19 crisis.

Methods

Research Design

This study used a qualitative research method and the qualitative content analysis approach proposed by Elo & Kyngäs (2008)..

Setting

The study setting comprised three teaching hospitals (Imam Reza Hospital and Emam Khomeini Hospital and Trauma hospital) with 900 beds in Ardabil city, Ardabil Province, Iran. Radiology students, nursing students and medical students were present in these teaching hospitals. The aforesaid hospitals were all general hospital but since the COVID-19 pandemic, most patients with COVID-19 have been admitted to these hospitals. These three hospitals have three radiology departments with approximately 60 staffs. The participants were personnel and nurses working in radiology departments who were willing to participate in the study.

Sampling

Purposive sampling was applied to select the participants. Sampling continued until data saturation was reached seven radiology personnel participated in this study.

Data Collection

After obtaining participants' consent, in-depth semi-structured interviews in the form of dialogue were conducted to collect data. The interviews were audio recorded. At the beginning of

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the interview sessions, introductory questions were posed about participants' work experience and when they had begun working at the radiology department of the COVID-19 referral center. Then, the research problem was addressed by general questions such as "Please tell us a little about the department in which you work", and "Please discuss how you provide care to COVID-19 patients". The interviews continued with questions such as "What are your mental preoccupations?", "Please explain some of your concerns", etc., depending on how each session progressed. In this study, seven in-depth, semi-structured, face-to-face interviews were held for 20 to 50 minutes each.

Data Analysis

To carry out the qualitative content analysis (Elo & Kyngäs, 2008), three steps had to be taken: Open coding, developing the categories, and abstraction. Before the open coding stage, the transcribed interviews were reviewed several times until a general understanding was obtained. In the open coding stage, codes were assigned to the meaning units. To develop the categories, the codes were compared in terms of their similarities and differences, and those that implied the same meaning were placed in the same category. The new codes were placed under the previous subcategories after their review, and the categories were thus developed as new interviews were conducted. In the abstraction stage, the researcher assigned names to the categories and subcategories based on the codes and content. MAXQDA-10 software was used to help analyze the data.

Trustworthiness

To ensure the validity and reliability of the data, the researcher tried to have prolonged engagement with the participants for collecting the data and ensured the participants of the confidentiality of the interviews. Using peer check and member check, the researcher tried to describe all the stages of the research, including data collection and analysis, and extraction of the

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codes and categories, so that other people could base their judgments on them, and also tried to select samples with maximum diversity in gender, age, and work experience.

Findings

This study had seven participants (four males and three females) with a mean age of 30 and a standard deviation of seven years (Table 1). The data analysis led to the formation of six categories and 20 subcategories. The main categories were psychological-emotional reactions, knowledge-related challenges, humaneness, workplace conditions, hopefulness, and support (Table 2).

Psychological-emotional Reactions

Psychological-emotional reactions were the first category that was formed in connection with the main research objective. All the radiology personnel participating in the study discussed this category in their interviews. The category was made up of the five subcategories of fear of infection, shock, anxiety, facing death, and stigma.

For instance, a participant with one year of experience in the radiology department said: “Early on during the disease, we were really afraid to get ourselves or our family infected, and those were really tough times”. (M. Ajri, personal interview, 2021).

Another participant said: “The behavior of our non-medical colleagues or other people who found out we worked at a radiology department serving COVID-19 patients was really annoying. Everyone was trying to stay away from us” (M. Ajri, personal interview, 2020).

Knowledge-related Challenges

Knowledge-related challenges were another category that was formed in connection with the main research objective. In this category, radiology personnel referred to three concepts of lack

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of information on how to use personal protective equipment, lack of knowledge about the disease, and reducing the radiation dose in CT. Knowledge-related problems had mostly been experienced early during the COVID-19 pandemic. One participant said:

> In the beginning, it was difficult for us to wear PPE. We had almost no information about how to put on filtered masks. We used to wear a surgical mask underneath our filtered masks, which we have now realized was utterly wrong. (M. Ajri, personal interview, 2021).

Another participant said:

> In March 2020, when the COVID-19 pandemic started, we had almost no knowledge of the disease. I only knew that it was transmitted by the respiratory route. There was no COVID-19 PCR test for the most part. A chest CT scan was used to detect the disease. (M. Ajri, personal interview, 2021).

A participant with ten years of experience in the radiology department said about reducing the radiation dose:

> Since there were not enough PCR detection kits for COVID-19 at the beginning, CT scans of the lungs were regularly performed to detect patients. To reduce the radiation exposure of the patients and personnel, we decided to reduce the radiation dose of CT scan. (M. Ajri, personal interview, 2021).

Humaneness

Another category formed in connection with the main objective of the research was the concept of humaneness. This category was made up of the two subcategories of altruism and accountability. Most of the participants discussed this category in their statements.

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For example, one participant said: “The COVID-19 pandemic was such that it involved the whole country. It was my human duty to devote time and energy to the sick with all my heart”. (M. Ajri, personal interview, 2020).

“In fact, we have been trained for these moments. I had to be in the ward and help the patients,” said another participant regarding the subcategory of accountability. (M. Ajri, personal interview, 2021).

Workplace Conditions

Workplace conditions comprised another category that was formed in connection with the main research objective. In this category, the personnel and nurses of the radiology department described their work conditions in the radiology department during the COVID-19 pandemic. This category included the three subcategories of heavy workload, fatigue, lack of PPE, and discomfort caused by wearing PPE.

A participant with six years of work experience said: “The workload was really heavy; a chest CT scan was requested for all patients; we had never had such workload in the radiology department until then; it was really exhausting”. (M. Ajri, personal interview, 2021).

Another participant commented on the discomfort caused by wearing PPE: “It was really hard to work wearing this equipment. You had to wear a gown, goggles, face shields, and masks. One sweated a lot”. (M. Ajri, personal interview, 2021).

Hopefulness

Hopefulness was another category formed in connection with the main research objective. This category had two subcategories, including a vaccine revolution and new drugs. In this category, the participants stated that the introduction of various drugs for the treatment of COVID-

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19 and the development of vaccines had made them more hopeful about finally getting a way out of this crisis.

One participant said on this subject: “When we got vaccinated, we gained so much hope that the dark days of the pandemic were almost over”. (M. Ajri, personal interview, 2021).

Another participant said: “When they said that Remdesivir is effective for the disease, it was a real ray of hope”. (M. Ajri, personal interview, 2021).

Support

Support was another category formed in connection with the main objective of the study. This category included the four subcategories of colleagues’ support, family support, public support, and officials’ support. Most participants reported that the support given to medical personnel has increased during the COVID-19 pandemic.

A participant with five years of work experience said:

> Since the outbreak of COVID-19, officials have come several times from the governor general’s office and from the university, too, to say that they have our back. People really respect us when they find out we work at a COVID-19 hospital. They try to take care of our business quickly. (M. Ajri, personal interview, 2021).

Another participant said about family support

> Early during the outbreak, my father would not let me go to the hospital for work, but after I explained to my father what the disease was and what my responsibilities were toward the patients, he began to fully support my going to the hospital. (M. Ajri, personal interview, 2021).

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Discussion

The experiences of the radiology personnel and nurses about the COVID-19 crisis were classified into the six main categories of psychological-emotional reactions, knowledge-related challenges, humaneness, workplace conditions, hopefulness, and support.

According to the present findings, radiology personnel and nurses displayed psychological-emotional reactions to the COVID-19 crisis, including fear of infection, shock, anxiety, facing death, and stigma, which could reduce their ability to provide care to the patients. These findings were consistent with the results of the study by Kim (2018) among nurses. A study by Kollie et al. (2017) similarly showed that nurses and midwives demonstrated emotional psychological reactions including fear and stigma during the Ebola outbreak.

Radiology personnel had faced a variety of knowledge-related challenges during the COVID-19 crisis, including lack of information on how to use PPE, lack of knowledge about the disease, and reducing the radiation dose in CT. The radiology personnel participating in this study stated that, at the beginning of the epidemic, they had little information about how to use PPE and knew little about the disease itself. The participants in the study by Cavli et al. (2021) also discussed the lack of information about how to use PPE. One helpful measure to prevent this lack of information in future crises is to train radiology personnel on how to properly use PPE.

Another experience discussed by the radiology personnel was reducing the dose of radiation in an effort to reduce the personnel's and patients' exposure. Cavli et al. (2021) also stated that the radiology personnel had used a low dose protocol during the pandemic. Using a low dose of radiation can, on the one hand, reduce the exposure of COVID-19 patients to radiation, and on the other hand, reduce the quality of radiographs taken from the patients, and thus requires further research.

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Another experience discussed by the radiology personnel was altruism and humaneness. These human senses made the radiology personnel and nurses willing to work at COVID-19 wards and provide services to patients despite their own risk of infection. In a study by Shahmari (2020), altruism was one of the most important experiences discussed by the nurses. In a study by Sun et al. (2020), accountability was mentioned as one of the factors influencing medical personnel's presence in the hospital during the COVID-19 crisis. The study by Cavli et al. (2021) on radiology personnel identified personnel's accountability as an important motivational factor (Cavli et al., 2021). To maintain and promote this sense of altruism and accountability in healthcare systems, authorities must print the biographies and memoirs of radiology personnel and nurses involved in providing services to patients during the COVID-19 crisis.

Other experiences discussed by the radiology personnel in this study included heavy workloads, fatigue, lack of access to PPE, and discomfort while wearing PPE. In a study by Kang et al. (2018), health care personnel had reported fatigue and burnout during the Middle East Respiratory Syndrome (MERS) crisis. A study by Lewis et al. (2021) also reported on the heavy workloads in radiology departments during the COVID-19 crisis. In the present study, in the early stages of the COVID-19 crisis, chest CT scans were often used to diagnose the disease due to the lack of diagnostic kits. A little into the pandemic, after the shortage of diagnostic kits was resolved, chest CT scans were again used repeatedly to determine the severity of lung involvement in patients, which continued to increase the radiology personnel's workload and led to their fatigue. One recommendation is to recruit student workforce and volunteers to reduce the personnel's workload and fatigue during such crises.

In this study, the personnel complained about the lack of PPE supplies, which was in line with the study by Wong et al. (2020). The lack of PPE was also mentioned in the study by Jorge

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et al. (2021). The experiences gathered from healthcare workers during this crisis can be applied to adequately store PPE for any future health emergencies.

With the development of COVID-19 vaccines and new drugs, health professionals began to experience a sense of hopefulness about the crisis finally ending. Similarly, Magner et al. (2021) also discussed the hopefulness about the end of the crisis being in sight.

Other experiences discussed by the radiology personnel included colleagues' support, family support, public support, and officials' support. Kollie et al. (2017) noted the positive impact that family and government support can have on work decisions. In the study by Kang et al. (2018) during the MERS crisis, too, healthcare personnel complained about the lack of support. It appears that with the COVID-19 pandemic, the involvement of all countries throughout the world and the extensive publicity about the disease have led to the provision of sufficient support to healthcare personnel.

Shahmari et al. (2020) reported that the nurses participating in their study had received support from their family and the general public during the COVID-19 outbreak. In the study by Sun et al. (2020), nurses described the support provided by their colleagues as a positive experience during the COVID-19 outbreak. Supporting healthcare personnel is one of the important factors that must be considered in times of health crises. Adequate support from the community and the government allows nurses to continue to provide care despite fatigue, heavy workloads, and risk of infection.

Limitations

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This qualitative study was conducted with a small sample size; therefore, the results have limited generalizability, especially since the experiences of radiology personnel might change over time as the crisis continues to evolve.

Conclusion

Nurses and radiology personnel have faced many patients during the COVID-19 crisis. Radiology personnel have been overworked and faced psychological and emotional stress and knowledge-related challenges. In addition to these negative experiences, radiology personnel have also had positive experiences, such as developed sense of altruism, accountability, and hopefulness. Providing further support to healthcare personnel and training them on dealing with crises can help decrease negative experiences during future crises.

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Table 1

Demographic characteristics of participants in the study.

Number	Edacution	Role/ job	Work experience
1	MSc of Radio-Biology and Radiation Protection	Head of Radiology department	10
2	Bachelor of Radiology	RadiologyTechnologist	5
3	Bachelor of Radiology	RadiologyTechnologist	6
4	Bachelor's degree of nursing	Intravenous cannulation, injection of radiographic contrast and nursing care	13
5	Associate degree of Radiology	RadiologyTechnologist	15
6	Bachelor of Radiology	RadiologyTechnologist	2
7	Bachelor of Radiology	RadiologyTechnologist	1

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Table 2

Summary of the categories and subcategories

Category	Subcategory
Psychological-emotional reactions	Fear of infection of oneself and one's family
	Shock
	Anxiety
	Facing death
	Stigma
Knowledge-related challenges	Lack of information on how to use PPE
	Lack of knowledge about the disease
	Reducing the radiation dose in CT
Humaneness	Altruism
	Accountability
Workplace conditions	Heavy workload
	Fatigue
	Lack of access to PPE
	Discomfort while wearing PPE
Hopefulness	A vaccine revolution

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	New drugs
Support	Colleagues' support
	Family support
	Public support
	Officials' support

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Highlights

The COVID-19 pandemic has affected radiology personnel.

Radiology staff and nurses had invaluable experiences during the COVID-19 Crisis.

The management of health care systems should carefully review the experiences of radiology personnel.

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Mahmood Shamshiri prepared the conception, design of the work, analysis, interpretation of data, Drafting the work and Final approval of the version to be published, Rajab Dashti-Kalantar performed the design of the work, analysis, Drafting the work and Final approval of the version to be published, Behnam Molaei performed the design of the work, analysis, Drafting the work and Final approval of the version to be published, Sakineh Karimipoor performed the conception, design of the work, analysis, interpretation of data, Drafting the work and Final approval of the version to be published, Akram Alefbaei performed the conception, design of the work, analysis, interpretation of data, Drafting the work and Final approval of the version to be published and Mehdi Ajri-Khameslou performed the conception, design of the work, analysis, interpretation of data, Drafting the work and Final approval of the version to be published.

All the authors Agreement to be accountable for all aspects of the work.

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Dear Editor-in-Chief

The Authors declares that there is no conflict of interest

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