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Explaining the challenges of hospitals admitting COVID-19 patients from the perspective of managers (a qualitative study)

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Abstract:

BACKGROUND: Crises are often unavoidable events that occur around the world. Hospitals play an important role in treating patients and preventing extensive injuries in times of crisis, requiring adequate preparedness. In order to design a proper planning system, it is essential to be aware of the challenges of hospitals during a crisis. The purpose of this study was to explain the challenges of hospitals admitting COVID-19 patients in the city of Mashhad, Iran, from the perspective of their managers.

MATERIALS AND METHODS: This study employed a qualitative approach, using the method of conventional content analysis and was conducted from May to July 2020. A purposive sampling method was used to recruit the senior managers of hospitals admitting COVID-19 patients in Mashhad. The interviews were conducted face to face, with open-ended questions following an interview guide based on semi-structured questions, and continued until data saturation was reached. Data were analyzed using Atlas Ti software.

RESULTS: After the implementation of the interviews, first 665 initial codes were extracted from the data, and after removing the overlapping sequences, a total of 115 codes were obtained. Three categories (organizational challenges, extra organizational challenges, and challenges related to information domain), 13 sub-categories, and 33 codes were extracted from the content analysis of the interviews. The main themes propounded in the field of challenges of COVID-19 referral hospitals in Mashhad were organizational challenges, extra organizational challenges, and information domain challenges.

DISCUSSION: The results of this study showed that the hospitals admitting COVID-19 patients in Mashhad faced many challenges. To improve the quality of services in postcrisis phase, replacing hospitals' equipment, revising curriculums at medical universities, staff retraining, recruiting skilled human resources, and creating a supportive community context are necessary.

CONCLUSION: For sure, the COVID-19 crisis will not be the last one, we have to be prepared for the bigger health crisis.

Keywords:

Challenge, COVID-19, management service organization, qualitative research

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Introduction

A crisis is an undesired event or implication, causing dysfunction and harms to individuals' resources and well-being.^[1]

In December 2019, a novel coronavirus was detected in several patients with unusual pneumonia connected to the cluster of acute respiratory illness in Wuhan City of China. At the beginning of 2020, WHO was informed of the cases of this pneumonia of

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unknown cause. The novel coronavirus was identified as the cause by Chinese authorities on 7 January 2020 and was temporarily named "2019-nCoV."^[2] COVID-19 has been creating a multitude of crises across the globe. In spite of the low case fatality rates, COVID-19 resulted in 461,715 deaths worldwide as on June 21, 2020.^[3] The outbreak of COVID-19 disease has become a main epidemic warning in the world.^[4] The incubation period of the virus was estimated to be 5 days on average, with a range of 4–7 days, according to the first studies on the patients affected by the virus.^[5] To respond properly to the epidemics, the condition and structure of hospitals, particularly the emergency department (ED), are highly important. Due to its specific nature and rapid change of conditions, the hospital's emergency ward is exposed to critically ill patients and experiences the crisis more severely and frequently. Health services providers have confirmed that EDs have the potential for emerging crisis. The crisis often happens suddenly and puts a lot of pressure on health service providers.^[6] According to the results of some studies, services providers' factors in ED appear to be disproportionate. Furthermore, the extent of emergencies' preparedness in terms of some facets such as the admission and discharge of patients is at a low level and in terms of management and human resources were at a moderate level.^[7] Deficiencies in service provision, which is another factor in the onset or spread of a crisis, should not be overlooked. One of the reasons for the constant exposure to crises may be a defect in the health system components that are essential in providing services in normal and critical situations. If human factors such as nurses and physicians and nonhuman factors such as physical structure, equipment, medicines, rules, and regulations are not adequate, they can turn normal emergencies into critical conditions. This issue will complicate the situation even more at the time of disasters, when a large number of patients are referred to the hospital's emergency.^[8]

Given the widespread outbreak of COVID-19 in China, the interim management measures failed to address the outbreak, and the shortage of medical equipment and personal protective equipment (PPE). The long-term solution needs to include a sustainable supply chain. In general, the hospital crisis management plan in West China's hospitals could alleviate the ED workload, protect health-care personnel, and control the cross-infection concerning the epidemic of COVID-19. The authorities believe that every hospital should have a contingency plan tailored to their conditions.^[9]

A study in 2018 showed that during the Ebola epidemic, health services provision collapsed in Liberia. Health-care facilities could not support effective infection prevention and control practices to prevent Ebola, and hospitals and health infrastructure were not prepared to deal with

the disease.^[10] Limited access to equipment, working under pressure, and the shortage of personnel, in addition to highly contagious pathogens, necessitate proper management of health-care human resource. Moreover, in health systems, clear measures and explicit guidelines are necessary to protect patients and staff while providing necessary medical care.^[8]

The shortage of disinfectants and medical equipment is a public concern. Furthermore, the common bureaucracy of government agencies to provide essential medical supplies and equipment does not have the capacity for the current situation. This has not only slowed down the provision of services but also affected the spirit of service providers, for example, their motivation and enthusiasm. However, the support of public networks, nongovernment organizations, donors, and professionals were highly helpful.^[11] Determining hospital problems based on the experiences of hospitals' managers are helpful in finding weaknesses and strengths and improving performance and quality of hospital services during subsequent crises. Qualitative studies result in deeper knowledge than quantitative studies. They are the result of people's experiences and form the perspective of decision-makers in providing better care.^[12] This study has a qualitative approach. Given the emerging COVID-19, hospitals and health systems face challenges in the light of this pandemic. To identify the different challenges of COVID-19 reception hospitals and examine these challenges from the perspective of managers who were directly involved in the management of COVID-19 crisis, this study has been conducted in Mashhad, Iran.

Materials and Methods

Study design and setting

This study was conducted using a qualitative approach based on conventional qualitative content analysis in 2020. The study was conducted in Mashhad, the capital city of Razavi khorasan province.

Study participants and sampling

The study population consisted of senior managers of the hospitals of Imam Reza, Ghaem, and Shariati in Mashhad city. The interviews were conducted between April and June 2020. The inclusion criteria were the following: (I) managers attending referral hospitals COVID-19 crisis team and (ii) managers consenting to participate in the study. Exclusion criteria were reluctance to continue the interview. The total number of the participants in the study was 12 senior managers of referral hospitals including 5 women and 7 men. The participants' ages ranged from 36 to 48 years with a mean age of 43 years. The average length of the interviews was 69 min.

Data collection tool and technique

The data were collected via face-to-face interviews based on a semi-structured open-ended interview guide. For data collection, demographic characteristics such as age, the level of education, and marital status were recorded and interviews were conducted based on the questionnaire guide the interviews began with an open question regarding (i.e., what problems and challenges you have faced when admitting patients with coronavirus?) And then, subsequent and supplementary questions were asked based on the participants' response. All interviews were recorded and, at the end of each session, the written-in responses were reviewed by the researcher with the assistance of the interviewees. The audio-recorded file of each participant and the tone of his voice and feelings were transcribed word for word immediately after each interview. The interviews continued until the saturation point was reached. The recordings of group discussions were listened several times, and their contents were implemented and then re-assessed.

The data from the interviews were analyzed via conventional content analysis using Graneheim and Lundman approach.^[13] After that, units of meaning were identified and coded. Codes were then categorized in the form of subcategories based on the similarities and differences of meanings. At the next stage, subcategories with regard to the conceptual relation and their semantic subscriptions were organized in more abstract categories. Finally, by merging the themes which covered a unit concept, the main themes were formed. According to the objectives of the study, the sampling was started purposefully and continued until data saturation and the emergence of no new codes.^[14] The saturation point was reached at 10 face-to-face semi-structured interviews. The Atlas Ti software version 6.0.15 (GMBH, Berlin) was also used to manage data. The four trustworthiness criteria of credibility, confirmability, dependability, and transferability suggested by Lincoln and Guba were used for assessing the quality of the study.^[15] The credibility of the study was evaluated as follows: the continuous presence of researchers within the various stages of the study, the implementation of recorded interviews after each interview, reading the transcribed texts several times, offering transcribed text to the participants and receiving comments from them, and finally offering extracted dimensions, components, and conceptual model formulated to the experts' panels and receiving comments from them. Moreover, the findings were verified by referring to the participants. For further assurance, the findings were tested by an expert experienced in qualitative methods. The dependability of the research was ensured by the implementation of interviews as soon as possible, accurate recording of all stages of the research, and providing the participants with equal

situations. For the transferability of the research, the continuous presence of researchers in all stages of the study, recording and implementation of interviews after each interview, long-term conflict with the data by reading the transcripts several times and also providing the text to the interviewees and receiving their comments (check by the participants) and finally presenting the dimensions and components extracted as well as the conceptual model developed to the experts and receive their opinions and agreement were among the most important measures in this regard. The verification of the findings was made possible by referring to the participants. For confirmability, the findings were provided to an external observer with experience in qualitative research.

Ethical consideration

Ethical approval was obtained from the Ethics Committee of Mashhad University of Medical Sciences (Ref. No, IR.MUMS.REC.1399.020). All participants were informed about the purpose of the study and about their right to withdraw at any time and were assured that all personal information would remain anonymous and confidential. Written consent was obtained from participants prior to interviewing and voice recording of interviews.

Results

A total of 12 senior managers of referral hospitals including Imam Reza, Shariati, and Ghaem participated in the study. The study participants included the managers from the departments of human resource management (HRM), human resource development, public relations and included hospital matrons, and supervisors. The findings of this part of the study were continued by providing the participants' demographic characteristics information [Table 1]. Following the implementation of interviews, Six hundred and sixty-five initial codes were extracted and after removing the overlap, 115 codes were obtained. A general overview of participants' perspective, as well as categories and subcategories extracted from the interviews [Table 2]. Three categories, 13 subcategories, and 33 codes were extracted from the content analysis of the interviews. The main themes propounded in the field of challenges of COVID-19 referral hospitals in Mashhad were: organizational challenges, extra organizational challenges, and information domain challenges. The main themes and subthemes derived from research, pointing to examples of dialogues, can be explained as below.

Main theme 1. Organizational challenges

Organizational challenges were related to inappropriate infrastructure, the shortage of consumer and capital equipment, and pharmaceuticals as well as workforce and issues related to the hospital's income and the budget.

Table 1: Sociodemographic characteristics (n=12)

Interviewee	Years of service	Management experience	Gender	Age	Field of study	Education level	Duration of interview (min)
P1	10	4	Male	43	Cardiologist	Specialist	60
P2	10	23	Male	48	Executive management	Master	75
P3	20	20	Male	45	Health economics	Master	70
P4	24	20	Female	48	Nursing	Master	60
P5	22	20	Male	46	Parasitology	Master	60
P6	9	7	Male	36	Health services management	PhD	90
P7	10	7	Female	39	Nursing	Bachelor	70
P8	13	21	Male	44	Community health	Master	60
P9	11	21	Female	44	Nursing	Bachelor	90
P10	18	3	Female	43	Nursing	Master	60
P11	13	4	Male	43	Health services management	PhD	60
P12	10	5s	Female	42	Nursing	Bachelor	65

Table 2: Challenges of hospitals admitting COVID-19

Category	Subcategory	Guiding codes
Organizational challenges	Infrastructural challenges	Absence of appropriate rooms
		Absence of multimedia facilities
		A lack of proprietary ventilation
	Challenges related to the physical resources	Shortage
		Inadequate quality
	Challenges related to the human resources	Shortage/lack of human resources
		Increased workload of staffs
		Staff dissatisfaction
		Staff fear
	Challenges related to the financial resources	Inappropriate planning and organizing
Inadequate budget		
Inadequate income		
Challenges related to professional ethics in the organization	Lack of cooperation	
	Excessive request of medicine	
	Excessive use of the disinfectant material	
	Referral of patients	
Extra organizational challenges	Interhospital challenges	Incomplete information of patients
		Difficulty in the interaction
	Challenges related to health centers	Lack of data
		Multiple statistics
	Challenges related to interaction with crisis headquarters	Lack of coordination
		Fear
	Community-related challenges	Lack of awareness
		Patients' care challenges
		Patients' dissatisfaction
	Patient-related challenges	Alcohol poisoning crisis
Challenges related to patients' family members		
Issues on the cooperation with donors		
Sociocultural challenges	Problems corresponding to volunteer forces	
	Lack of awareness on the disease	
	Frequent changes of protocols	
Challenges related to information domain	Global related challenges	Insufficient provision of information
		Lack of preparation
	Health center-related challenges	

Infrastructural challenges

According to the statements made by the participants, the biggest problems were related to the unpreparedness of hospitals' infrastructures for the crisis, the absence of negative pressure isolation

rooms, a lack of proprietary ventilation for each room, inappropriate structure of wards' ventilator's output, morgue capacity, and multimedia facilities. Regarding the infrastructure problems, one of the participants said:

"There was no negative pressure isolation room in the 610-bed-hospital and the Adalatian Emergency Department. Also, the emergency ventilation system was integrated, and there was no specific ventilation for each unit or ward."(p1)

Most participants mentioned the low capacity and readiness of the hospital admitting patients with COVID-19. In this regard, one participant said:

"The hospital of Shariati, due to its structural feature including having an old building, inappropriate space for respiratory diseases treatment and the absence of a negative pressure isolation room has not been enough prepared to turn into a referral hospital. Also, due to organizational problems, the rapid user change of cardiovascular subspecialty hospital to subspecialty infectious disease hospital brought structural problems to the hospital."(p4)

The majority of participants believed that the main problem was that infected and noninfected patients were not separated. The lack of morgues' space and the high rate of mortality were also cited as challenges by most of the participants. Two managers pointed out that:

"Hospital lack suitable morgue capacity for those who died at the beginning of the epidemic, which can be attributed to a high rate of mortality. Nevertheless, this issue was announced on media too."(p6)

Most of the participants pointed out that the limited equipment and facilities in the laundry unit are other problems of this crisis. In this regard, one of the participants stated:

"Laundry's facilities for this crisis are not appropriate, and the workload of laundry equipment has suddenly increased, while most of them are out-of-date. Moreover, although a new machine has been purchased, still there is a need to renovate the devices with regard to high-volume of washing."(p11)

Regarding the lack of infrastructure for admitting patients with COVID-19, one participant commented "structural standards of the general hospitals differ from infectious hospitals, and all sectors lack necessary conditions structurally and technically to hospitalize these patients."(p12)

One of the problems that most participants mentioned was the lack of social media facilities for making appropriate communication between patients and their family members.

Challenges related to the shortage of physical resources

As reported by most participants, the lack of equipment was very apparent, particularly at the beginning of the

crisis. Other problems included the shortage of oxygen supply, ventilator, medicine and imperfect PPE, as well as delayed delivery of PPE before starting each shift. Most participants noted the shortage of oxygen supply as a major problem at the beginning of the crisis. They reported that:

"The fundamental problem of the hospital at the peak of the disease was the shortage of oxygen supply, which resulted from reducing the purity of oxygen in the hospital. Hence, it took about a week to install two 20-ton tanks."(p6)

Regarding the shortage of oxygen and ventilator, another participant reported that facilities were not tailored to wards. For example, hospitals faced a shortage of oxygen and ventilator in the surgery ward, and the wards lacked intensive care unit (ICU) facilities. Furthermore, another problem was related to a shortage of medicine. One of the managers pointed out that "The shortage of medicine existed at the beginning of the crisis, and medicines were initially available only in health centers, as medicines were delivered from the health center to the hospital at the beginning of each shift. It resulted in delays to deliver medicines to patients."(p4)

Regarding the lack of protective packages, most managers reported that there was a serious shortage at the beginning of the crisis. One of the participants said: "There were serious problems regarding the supply of PPE at the beginning of the crisis. We did not have enough supply for the next day. The process of preparing the packages was time consuming; there were problems related to rotating shifts among staff because of the delayed packages. In some cases, staff noticed that their clothing was damaged, while, there was no alternative."(p6)

Challenges related to the human resources

The challenges relating to workforce included increased workload, staff dissatisfaction, and fear and professional ethics in the organization. The increased workload of staff resulting from the resignation of several nurses and calling in sick was cited as one of the main challenges of the workforce. One participant mentioned that "nurses are resigning one after another, which would result in an increased workload of nurses working at the hospital."(p11)

Regarding the increase in the workload due to the infection of a number of personnel with COVID-19, one of the managers said: "The personnel who are afflicted with coronavirus have lower ability to take care of patients."(p12)

The majority of participants cited that the staff and their family member dissatisfaction was a major problem

during the crisis. This rooted in the lack of proper plans on providing incentives, shortage and unequal distribution of PPE, inequality in employing personnel in the departments and the lack of specific rules on staff protection. Regarding the unfair distribution of PPE, one participant cited:

"I do not know who distributes PPE, yet in our hospital, all personnel who provide services to COVID-19 patients and the coronary ward use a simple mask, while PPE distributing authorities themselves use mask N95 or three-layers mask when entering the hospital." (p11)

The lack of psychological readiness also mentioned as one another major causes of staff dissatisfaction. According to manager perspectives, personnel were not prepared for this disease, and there were concerns on staff protection against the disease. The majority of participants pointed out the problems resulting from the shortage of PPE and problems related to commuting. According to the participants, one of the problems that led to dissatisfaction among staff with COVID-19 and had to call in sick was related to social insurance and sick leave payment. Regarding the lack of a specific rule on staff protection, one participant said,

"Although the staff of finance and administration departments are allowed to work out of the department or part-time, they work full-time, there is no regulation to shut-down these departments of the hospital." (p12)

Challenges related to staff fear

One of the problems of this crisis was staff fear. Staff were concerned about PPE and worried about being infected by the disease. Most of the participants mentioned nonobservance of consumption pattern resulting from the fear of being afflicted with the disease. One of the participants cited: "To protect themselves Employees overused disinfectants, masks, and gloves." (p11)

"At the beginning of the disease, disinfectants suddenly disappeared from the wards, while we had not used them before the disease. The equipment was suddenly stored in the wards by the personnel due to fear of the disease." (p12)

Inappropriate planning and organizing of workforce is a challenge. With the outbreak of COVID-19, the volume of hospital patients decreased to one-third, resulting in the number of nurses working decreased to one-third. It was due to the lack of proper planning, which consequently led to severe fatigue among them. Most of the participants cited the shortage of experienced workforce in the ICU and infectious disease ward, particularly lung specialists, laboratorians, and staff afflicted with the disease. In this regard, one participant mentioned: "We had Experienced

medical staff who were unable to attend work due to personal problems and underlying illnesses. They are currently on leave. It was supposed that 10% of other hospitals' staff be allocated to our hospital, but merely 10 people were sent to the hospital out of a total of 200" (p8). Another manager mentioned that

"Personnel with underlying diseases, pregnant and lactating women were banned from working in the infectious ward, which ultimately exacerbated the shortage of personnel and increased the workload of the remaining staff" (p4).

Furthermore, most of the managers cited a shortage of skilled and experienced workforce in ICU as the main challenge. In order to provide workforce, hospitals have used other personnel working in noninfectious wards. From the viewpoint of most managers, this strategy led to the transmission of infection in the hospital. As one of the participants said:

"By identifying high-risk personnel, including pregnant women, the sick and so on and removing them from the ward, and on the other hand, the fatigue of the personnel working in wards problems arose in the supply of the human resource. Hence, the hospital had to apply the personnel of other wards, including surgical and cardiovascular departments and the departments that were not confronted with infectious diseases prior to the crisis, while the personnel were unfamiliar with the disease and the care for patients, which increased the risk of transmitting infections among these individuals" (p10).

Challenges related to the financial resources

The majority of managers pointed to budget and income problems. The problems caused by the decreased revenue of the hospital.

"Hospital revenue fell to near zero during the crisis. Since most patients belonged to low-middle-class families and their payment was insignificant; they did not contribute to the hospital's income. we estimated that if insurance organizations meet their obligations during the crisis, the hospital's revenue will increase 30 percent," (p6) A manger said.

In terms of revenues, the hospital was in a bad situation. The hospital's bed occupancy rates reduced due to the closing down of some wards including surgical wards. Since the services for COVID-19 patients, who stayed 5-6 days at hospital, were free, the hospital's revenue dropped dramatically. In addition to fixed costs and staff salaries, some costs were added to the hospital, such as the cost of diagnostic kits, and the disinfection of wards and spaces. One of the participants pointed that:

"The price of medical equipment has increased. The face masks that until last year cost a few cents is now three times as high as it used to be. The average wage of staff increased by 50% in February, while financial resources of the hospital fell sharply. The hospital had a great deal of debt, and if it had to purchase required equipment from the same company, there was a requirement to settle prior debt, otherwise, the necessary equipment was not available."(P3)

Challenges related to professional ethics in the organization

Most participants cited the lack of cooperation and organizational commitment of some personnel, including physicians and paramedics, as the main problems. They reported that:

"Some personnel did not have a justified problem no to continue working and only due to fear of the disease, they did not cooperate and took sick leave with no reason, which in turn led to apathy and feeling of injustice among the personnel."(p8)

Regarding the sequential leave requests of some personnel and putting pressure on a group of them, another manager pointed out that "some personnel worked hours and some were on leave, which resulted in fatigue in some of them."(p11)

Regarding the excessive request of some wards for medicine, one of the participants cited: "We had some problems in the supply of medicines. Medicine was available for the patient on day shift, but not on night or evening shifts. Some wards requested a lot of medicines and stored them in the ward for the latter day. It seems that we failed to follow professional ethics."(p12)

Main Theme 2. Extra organizational challenges

These challenges included problems related to interhospital, interaction with the health center, and crisis headquarter of the university and community.

Interhospital challenges

The referral of patients from other hospitals mentioned as one of the most important challenges. Most of the patients were not afflicted with COVID-19 after examining several times, which led to dissatisfaction among the patients and their family members, and also led to the wastage of medical staff's time and increased the likelihood of disease transmission among asymptomatic patients after exposure to afflicted patients. One of the participants suggested that "the incomplete information of patients referred from other hospitals took staff energy: The information related to many referral patients was incomplete. There was no

history of patients such as examinations and computed tomography (CT) scan results. Considering that this information was made available to the hospital after several weeks, lack of information resulted in the staff's fatigue."(p4)

Challenges related to health centers

A lack of coordination among health centers and missing the samples cited as one of the major problems. The city's health centers did not have access to each other's data, and it was unclear what has been done for the patient. The hospital had difficulty in acquiring information due to the lack of patients' coordination. Regarding the lack of consistency among health centers, one participant pointed out: "There was no proper statistical system at first, and there were patients who had done polymerase chain reaction (PCR) tests at several centers."(p2) Since it was unclear what happened to the samples at health centers, one of the managers mentioned, "The health centers in Mashhad were not coordinative, and many of referral patients' laboratory tests were missing before the admission at the hospital."(p7)

Challenges related to interaction with crisis headquarters

Most of the participants mentioned the parallel work and the necessity of giving information to different institutions that was very time-consuming. There was not a single center for the provision of statistics at the university's health department. The hospital had to provide multiple reports to the university, Mashhad provincial government, and different organizations which had made working difficult. Consequently, there was no possibility of a prompt response to the demands. Besides, delay in the delivery of medicine on the part of the support department was another challenge of this crisis.

"At the beginning of the crisis, extra-department problems were extremely great. For example, the hospital confronted problems with hydroxyl chloroquine supply and PPE, which were distributed by health staff and university, respectively. Therefore, the hospital had to come into continuous and close contact with these organizations." (p6)

Community-related challenges

Participants mentioned community's fear as a factor in increasing hospital challenges during the crisis. Regarding the consequences of this issue, one of the participants pointed out that:

"The whole city was in a panic, so that taxi drivers refused to take passengers to the requested destination, especially when they were noticed that their passenger was a staff member of the referral hospital." (p2)

Patient-related challenges

These challenges included the problems related to caring for patients, their dissatisfaction, increased number of patients with alcohol poisoning, and problems related to patients' family members and patients' diagnostic processes. Challenges related to patients' care involved disruption in the care process during their transition to other hospitals, patients' dissatisfaction with the immediate transition to other hospitals, and inappropriate care and environmental noise.

"At the beginning of the crisis, patients complained about the lack of care and attention; the nurses were worried about their own lives, gathering in their poststation and did not provide adequate services to the patients." (p8)

From most participants' point of view, staff fear was one of the main factors causing inadequate attention to patients at the beginning of the crisis. Besides, environmental noise cited as one of the reasons for patients' dissatisfaction.

"The patients complain about the noise and not getting to sleep on night shifts due to the loud noise of medical staff, which was related to wearing face mask layering and PPE that the personnel were using." (p4)

Most managers at a studied referral hospital cited the increase in the number of alcohol poisoned patients as the main challenge. One of the participants said:

"The reason for a large number of patients referring to the poison care ward was people's misinformation about the use of alcohol and drinking it to prevent COVID-19." (p6)

The crisis of alcohol poisoning took an alarming both due to an increase in the number of patients and the occupancy of beds in ICU and because of the concern on the likelihood of being infected to COVID-19. These challenges included the absence of patients' families accompanying the patients, their denial on the cause of death (COVID-19), requesting to bury the deceased in the desired symmetry, and uncertain response to patients' families due to the delay in diagnostic test results and false-negative cases. Although a physician confirmed the clinical symptoms of patients, the result of the diagnostic test was negative. There were difficulties in burying the dead body and convincing the patient's relatives. Difficulties still exist in PCR test results and the answers are delayed. Regarding the impossibility of patient's family visits and its consequence, one participant cited that "at the beginning of the disease, we had difficulties with patients' relatives because of cancelling the visits, which led to depression and disappointment in patients and their families." (p7)

Most of the participants mentioned the incomplete information about the identity of some patients while their families accompany the patient because of the fear of infection: "We had problems with patients' identity information; the information of some referred patients was incomplete. Besides, some families did not take responsibility for their patient." (p9)

Challenges related to patient care included long sampling intervals, delay in diagnosis and treatment process, and problems related to the CT scan unit. The majority of the participants mentioned using a CT scan and a CT room would increase the likelihood of virus transmission from patients to healthy people. Sociocultural challenges included problems related to donors and volunteers. There was not enough awareness about hospitals' needs on the part of donors at the beginning of the disease. One of the participants said:

"We had problems regarding donations. There was not proper management at first, and we faced a huge amount of donations. The needs of the hospital were assessed and the Information was given to donors through mass media." (p1)

Most of the participants said the rate of donations was much higher at the beginning of the crisis, but this rate gradually decreased. A manager said that:

"At the beginning of the disease onset and the epidemic crisis, donors were more keen to help and continued the donations until the end of April (2020). But it's very little now, so that even to buy some items such as mineral water, we had to use the hospital's resources." (p7)

Due to the lack of awareness about the safety of donated food to the hospital, one of the participants cited: "The way in which aid was distributed, especially food, was inappropriate. These items themselves could be dangerous." (p11) Most participants did not like the presence of volunteers at hospital. They pointed that many people from various organizations such as media and military forces were referred to the hospital without prior permission, which caused more problems

Main theme 3. Challenges related to information domain

These challenges included lack of knowledge, insufficient provision of information, and frequent changes of protocols. Most participants pointed lack of readiness, insufficient available information, and the change of protocols as major problems in the information domain. Regarding the change of protocols, one of the participants mentioned:

"Personal protection guidelines were constantly changing and did not gain recognition; whoever everyone gave his own opinion." (p1)

Regarding the lack of awareness and unfamiliarity with such crises, one of the participants mentioned:

“At the 1st days of the epidemic, about 70–80 patients were hospitalized, and the number of people referring to the hospital was very high. We were unfamiliar with the disease, and we didn’t know what to do. It was like wartime, and fear of the disease affected all units’ personnel.”(p6)

Most participants mentioned that infection control was difficult because the disease was unknown. Infection control in the hospital during the coronavirus crisis was the most important challenge. The disease was unknown, and like other infections, it was not easy to allocate appropriate space for patients. Concerning education deficit and the inability of the crisis committee, one participant mentioned that:

“This epidemic showed that the training provided to crisis committee has not had the required efficiency because in practice, everyone was confused. The crisis committee was not as efficient as expected, and the members of the committee were not aware of their duties.”(p11)

Discussion

This qualitative study aimed to explain the challenges of hospitals during COVID-19 crisis in Mashhad from the perspective of managers. These challenges were discussed for the first time in the related literature in Iran via this qualitative study. Organizational challenges, extra organizational challenges, and information domain challenges were main categories in this subject [Table 2].

The preparedness of the health-care sector, as a provider of health-care services, is of paramount importance in reducing mortality and injuries caused by disasters. Besides, organizing and efficient managing of hospitals play crucial roles in optimal performance of this institution during the crisis.^[16] Lack of appropriate infrastructure, workforce supply, and equipment during COVID-19 crisis was the problem mentioned by the managers. The study by Ghaffari *et al.* has highlighted the necessity of planning and implementing practical measures such as equipping the hospitals in terms of structure and instrument and providing financial and human resources to control the crises as quickly and accurately possible.^[17] Their results are in line with our study results. The results of this study showed that one of the biggest challenges during COVID-19 crisis was that the hospital personnel experienced high pressure and lots of fear. Besides, the lack of effective collaboration among some employees and their absentees due to personal issues caused dissatisfaction in others.

The study by Bahrami *et al.* showed that one of the competences required for nurses to effectively deliver health services in disaster relief has teamwork skill. The participants demonstrated that teamwork is important to achieve favorable results, and it is necessary for nurses to have the ability and willingness to work in a team in disaster situations.^[18] Our study showed the same results. Working in critical situations, facing patient’s in critical situations, their family members expectations, and fear of being considered incompetence in saving the life of dying patients cause tension among personnel, which will affect their personal life and its quality.^[19] A study by Chua *et al.* demonstrated that measures such as scheduled shift breaks, rotating staff in the crowded parts of the ED, providing rest areas, and a 24-h peer support hotline could be helpful in reducing personnel’s fatigue and stress.^[20] Another study by Bahrami showed that the unity of command is an essential aspect of the crisis management team. Coordination and cooperation with the leader and other team members are needed to maintain the unity of command.

In some studies, these skills have been considered as the professional competencies of a health team in providing services in different situations, including crisis. It is necessary for preventing parallel work during a crisis. In contrast, in the present study, managers pointing the lack of unity of command and coordination at the university level mentioned that parallel work in providing statistic and information is the reason for fatigue in hospital personnel.

A study by Mohammadi *et al.* indicated that one of the main challenges of pre-hospital emergency personnel is to meet the basic needs such as rest, break, and safety. They showed that personnel’s physical function and capacity decreased by fatigue, which increases the possibility of working error. In this study, most managers stated that personnel’s fatigue and dissatisfaction are the challenges that need to be addressed. The severity of stress and fatigue can be alleviated partly by providing PPE and rest facilities. A study by Ebrahimian *et al.* showed that prehospital emergency personnel are exposed to physical and mental harm due to a large number of working shifts, diversity of prehospital emergency services, and the shortage of workforce, which, in turn, affect their family life.^[21] These findings are in line with the results of our study. The first step in crisis management is communication between organizations and people. Shortages and defects of communication technologies and equipment particularly in health centers lead to performance’s inconsistency among organizations. This factor plays an important role in crisis results and increases the implications. According to this study, effective communication with other organizations is needed to control the crisis.

Furthermore, inadequate knowledge of the community on the novel coronavirus is one of the main challenges. A study conducted on Ebola pandemic between 2014 and 2016 showed that the biggest challenges were related to PPE, and hospital infrastructure and resources, which resulted in health-care workers fear in managing Ebola patients, and decreasing their willingness to care the patients.^[22] The results are consistent with the challenges driven from our study. A study aimed to explore the technical challenges of COVID-19 conducted in 2020 showed the weakness of the health systems throughout Latin America and the Caribbean region in giving an effective response to emergency cases. Moreover, the quality of care is among the most important factors in increasing the mortality of COVID-19 and the low performance of health systems. The availability of essential medical equipment to support patients affected by COVID-19 is globally limited. Medical equipment should be standardized to provide fast and reliable access to essential services for patients.^[23] The findings of the study are consistent with the present study. In our study, the main problems during COVID-19 crisis were a lack of medical equipment and facilities mainly in ICU for all patients. Health-care personnel should be trained on wearing suitable clothes and proper use of PPE, including face masks and N95 masks, as well as on the principles of infection prevention, such as hand hygiene. To ensure adequate PPE supply for staff exposed to risk, hospitals should monitor how the equipment are used, and also should prevent the risk of equipment theft and hoarding. To limit the number of personnel involved in patient care, hospitals should compensate the workload and extended working hours with appropriate incentives. Besides, detailed plans and guidelines regarding staff management, especially work limitations and quarantine, should be developed. Finally, even if a subset of providers provide care for patients with COVID-19, it is important to meet the needs of their family members and other staff. Support is crucial to the morale and well-being of the workforce. During crises, health-care resources should be allocated in an ethical, rational, and structured manner to maximize the benefits to the greatest number of patients. Hospitals and health systems need to move away from their usual “business as a mindset” and focus on how to accommodate the patients to likely benefit the most from care.^[24] As coronavirus 2019 spreads worldwide, ICUs need to be prepared for the challenges associated with the disease. Simplifying the workflows for rapid diagnosis and isolation, clinical management and infection prevention are important not only for patients with COVID-19 but also for health-care workers (HCW) and other patients at the risk of virus transmission. ICU physicians and specialists, hospital managers, governments, and policymakers need to focus on infrastructure and resources and staff management and training to increase

the capacity of ICUs significantly during crises. A study by Tang *et al.* indicated that COVID-19 has had a major impact on clinical microbiology laboratories over the past few months. This commentary covers the current issues and challenges of the laboratory diagnosis of infections resulting from acute respiratory syndrome of coronavirus. In the preanalytical stage, it is essential to collect the proper respiratory tract specimen at the right time from the right anatomical location for a prompt and accurate diagnosis of COVID-19. Appropriate measures are needed to keep the laboratory staff safe while producing reliable test results.^[25] The findings of this study align with our results. Maintaining the safety of staff should be taken into account due to the importance of their performance during a crisis. Meena showed that it is necessary having more educational training programs for HCW awareness, improvement of knowledge about COVID 19 transmission mode or isolation protocol, and precautionary measures against COVID 19. Thereby, HCWs can participate in this fight against COVID 19 with more efficiency and confidently.^[26] This study showed lack of awareness among HCW was a huge challenge.

Limitation and recommendation

As far as the authors are aware, this qualitative study is the first to explore challenges of hospitals during COVID-19 crisis in Mashhad from the perspective of managers. It is important to be cautious when applying the conclusions beyond the sample and to evaluate whether they are transferable to other settings. As a qualitative research study, the selection of participants utilized convenience sampling and had a small number of participants.

Recommendation for health system

This study showed lack of awareness among HCW was a huge challenge; it is necessary having more educational programs about increasing knowledge about crisis management for HCW. Maintaining the safety of staff should be taken into account due to the importance of their performance during a crisis. On the other hand, HRM needs to be considered.

Conclusion

Crisis has always threatened human societies' lives. For sure, the COVID-19 crisis will not be the last one, we have to be prepared for the bigger health crisis. Future planning should be focused on renovating and equipping the hospitals. In addition, the personnel need be trained on how to deal with such crises. The medical staff of other departments should have rotating shifts throughout the year to prevent the shortage of skilled health-care workers. They need to be trained in different wards to be geared up for future crisis. Hospitals need to have a plan

on how to deal with crises and need to include programs to support caregivers. Following ethical principles and teamwork in crises are of high importance. It seems that medical universities should pay more attention to teaching ethical principles. On the other hand, as significant pressure is being exerted on health-care and medical staff during COVID-19, authorities should take this issue into account. The findings of this study can be used as a guide to enhance the related education and preparedness among health-care workers to cope with future crises, and can be seen as a basis for more studies.

Ethics approval

This study received ethical approval from the Ethics Committee on Research (IR.MUMS.REC.1399.020), Mashhad, Iran.

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Conflicts of interest

There are no conflicts of interest.

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