

# Research Paper: Assessing the Preparedness of Hospitals in Ardabil Province During COVID-19 Pandemic



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## ABSTRACT

**Background:** Hospitals, as the most important medical institutions, must be adequately prepared before accidents to cope with emergencies and provide rapid response to disasters. This study aimed to determine the preparedness of hospitals in Ardabil Province during the COVID-19 pandemic.

**Materials and Methods:** The present study is a cross-sectional study, and the study population included all hospitals in Ardabil Province, Iran (17 hospitals in total). The data collection tool was a standard checklist of 92 questions for COVID-19 Crisis Preparedness issued by the Iran Ministry of Health and Medical Education. The obtained data were analyzed using descriptive and inferential statistics (the Pearson correlation analysis) in SPSS software v. 22.

**Results:** The mean relative score of preparation for the COVID-19 pandemic was 80.27% among the hospitals in the province. In the studied hospitals, the relative scores of preparedness were as follows: leadership and coordination, 92.64%, resource management, 94.36%; information management, 79.90%; communications, 77.94%; human resources, 77.69%; surge-capacity, 86.55%; rapid identification, 57.18%; diagnosis, 71.32%; isolation and patient management, 81.09%; and infection prevention and control, 84.05%.

**Conclusion:** The level of hospital preparedness in most dimensions (9 out of 10 dimensions) was good, and only in the area of rapid identification was at a moderate level. However, further evaluation is needed at different stages of an epidemic.

## Keywords:

Preparedness, Hospital, Pandemic, COVID-19

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## 1. Introduction

Unexpected events and disasters are often out of control. They always occur in different parts of the world, including Iran, and the possibility of their occurrence is recognized with varying intensities in various societies [1]. In these disasters, many injured people go to hospitals to receive health facilities. This condition increases the importance of hospital preparedness for disasters [2]. Obviously, unexpected events, based on the magnitude, number, and population density in the affected area, can turn into small or large disasters; returning the situation to its original state becomes difficult and exhausting [3, 4]. Disasters always have a negative impact on the public health and well-being of the affected population; health care is a critical factor of survival in these crises. Therefore, if the healthcare centers have problems dealing with disasters due to a lack of planning and organization, the entire crisis-stricken population will suffer [5]. Indeed, among the various components of disaster management in emergencies, hospitals and healthcare centers play the most important part [4]. In critical situations, hospital complex preparedness, low vulnerability to accidents, staff awareness and familiarity with potential risks, and crisis management are essential features of hospital preparedness for disasters [6].

Comprehensive assessment of hospital preparedness determines the efficiency of the hospital before and during an accident. This assessment is beneficial for planning and organizing facilities, workforce, resources, and preventive measures [7, 8]. Being prepared for an epidemic is absolutely necessary to ensure the proper and continuous function of other systems. This plan requires frequent system evaluation to improve organizational processes [9]. Frequent assessment and monitoring to identify weak points and proper planning help improve the hospital's safety and ultimately increase the quality of hospital services [10]. The Joint American Health Centers Accreditation Committee defines hospital preparedness as the activities that a hospital is required to perform in order to increase its response capacity [6]. The purpose of preparing hospitals is to provide emergency response systems, staff training, purchase of equipment and items needed to manage the current patient care, protect their staff, and ultimately, meet the needs posed by accidents and disasters. Therefore, to increase hospitals' preparedness and deal with accidents and disasters, the focus should be on internal planning and, if necessary, on the possibility of its expansion [11].

One of the disasters that have afflicted medical centers over the past year is the COVID-19 pandemic. The World Health Organization (WHO) issued a statement on January 30, 2020, declaring the new coronavirus as the sixth leading cause of public health emergencies worldwide [12]. The sudden outbreak of COVID-19 shocked the international community, especially health policymakers. The outbreak quickly became a health, economic, and political challenge, causing a severe community crisis [13]. One of the most critical challenges posed by the COVID-19 pandemic was its unpredictable nature and high infectivity, which affected many people and caused frequent visits of patients to medical centers [14, 15]. Frequent patient visits, increased demand for medical services, limited time to coordinate and communicate with other organizations, and lack of proper preparedness to respond to crises can challenge disaster management in medical centers [11, 16, 17]. Therefore, during the disease epidemic, the level of hospital preparedness, knowledge of medical staff, motivation and willingness of staff to perform clinical care, and a proper hospital preparedness program for disasters are the basic components of the crisis response phase [18].

In Ambat et al.'s study in India on preparedness for new emerging diseases, the findings indicated that hospitals should be prepared for emerging infectious diseases. There were gaps in implementing various programs and protocols for staff training, risk communication, capacity building, laboratory capacity, and hospital infection control [16]. In the Labib et al. study, which assessed the preparedness of special hospital wards in Egypt to deal with the COVID-19 epidemic, the results showed the mean relative score of preparedness for the COVID-19 crisis in special wards of Egyptian hospitals was 54%. The lowest level of preparedness belonged to the areas of information and human resources, and the highest score belonged to the field of support and procurement management [19]. The results of the Dewi et al. study examining the level of preparedness of Indonesian hospitals for the COVID-19 pandemic showed that the level of hospital preparedness for the COVID-19 pandemic is low. Also, the level of preparedness in police hospitals was higher than in public and private hospitals [20]. In a study conducted by Singh et al. in an Indian hospital to determine the preparedness for the COVID-19 epidemic, the preparedness was found acceptable [21]. In Ezzati et al. study in Iran, the results showed that hospitals are well prepared for crises and disasters, but poor and very poor preparedness in the areas of reception and traffic can cause problems in times of disaster [22]. In the study of Rahmanian et al., the results showed that strategic planning for crisis preparedness of healthcare centers

and the cooperation of healthcare centers with each other in dealing with the crisis seem necessary [23].

Most studies conducted in disaster preparedness have been related to the case study of hospitals, while the present study has examined all hospitals in Ardabil City, Iran. The studies on assessing the preparedness of medical centers in disasters such as COVID-19 disease in Iran are few. Thus, because of the importance of the issue and the lack of studies in this field, we decided to determine the preparedness of medical centers in Ardabil Province during the COVID-19 pandemic.

## 2. Materials and Methods

The present study is a descriptive-analytical study conducted after obtaining permission from the Ethics Committee and the Vice Chancellor for Research of Ardabil University of Medical Sciences. The study population consisted of 17 hospitals affiliated with Ardabil University of Medical Sciences, including 12 government hospitals, two social security hospitals, two private hospitals, and one affiliated with the Martyr and Veterans Affairs Foundation. The sampling method was census.

The assessment of COVID-19 disease preparedness was done by the standard checklist of the Ministry of Health and Medical Education. This checklist is a customized version of the Hospital Preparedness for COVID-19 Checklist, issued by the World Health Organization's Eastern Mediterranean Regional Office. An expert panel was used to ensure the validity of the checklist. For this purpose, after arranging and separating the checklist items as questions and preparing its guideline, ten experts were asked to comment on the scientific and practical appropriateness of the checklist items and the comprehensibility of each question in 6 sessions and make the necessary changes and corrections. The checklist obtained for the experiment was then used in a pilot study on three hospitals. After the pilot phase, the checklist and its guideline were reviewed by the expert panel in two sessions, and some questions were removed, added, or merged. Finally, 92 questions were approved [24]. In the present study, the instrument's reliability was 0.88 calculated by the Cronbach  $\alpha$  method.

The checklist consists of two parts: the first part relates to the hospital profile (average number of active beds, average number of annual hospitalizations, bed occupancy rate, and average patient stay), and the second part includes 92 questions in 10 areas (leadership and coordination, 8 questions; operational support, logistics, and resource management, 12 questions; information man-

agement, 6 questions; communications, 8 questions; human resource management, 12 questions; continuity of basic services and surge-capacity, 7 questions; rapid identification, 9 questions; diagnosis, 4 questions; isolation and patient management, 7 questions; and infection prevention and control, 19 questions. The checklist questions are answered with three options (yes, ongoing, and no), and for each question, the yes answer gets 2 scores, the ongoing answer 1 score, and the no answer 0 score [24]. The percentage of the relative score for each domain was calculated as follows:

$$\text{Percentage of relative score in each area} = 100 \times \frac{\text{score earned in that area}}{\text{maximum score in that area}}$$

The questionnaires were completed by visiting the hospitals and following the protocols provided by the Anti-COVID-19 Headquarter. After completing the questionnaires, data analysis was performed in SPSS software v. 22. To observe the ethical principles, we did not mention the names of the hospitals, and they were identified with codes from 1 to 17.

## 3. Results

The highest number of active beds (488 beds) belonged to hospital code 1, and the lowest number (26 beds) belonged to code 13. The highest mean bed occupancy rate (76.2%) belonged to code 6, and the lowest to code 9. The highest mean patient stays belonged to code 6, and the lowest to code 7. Also, the highest mean annual hospitalization belonged to code 1, and the lowest to code 9 (Table 1).

The results showed that the highest and lowest mean and standard deviation in the dimensions of COVID-19 disease preparedness were related to the dimensions of prevention and infection control and diagnosis, respectively. The highest relative score belonged to operational support, logistics, and resource management, and the lowest percentage belonged to rapid identification (Table 2).

The Pearson correlation coefficient showed the significant associations of leadership and coordination with communication area; also, there are significant associations of information management with rapid identification, diagnosis, prevention, and infection control areas. There were significant relationships between human resource management and areas of rapid identification, diagnosis, isolation, and patient management. Also, there was a significant relationship between the continuity of basic services and the surge-capacity and the diagnosis area and between the area of rapid identification and isolation with patient management. Finally, there was a significant rela-

**Table 1.** The characteristics of study hospitals

Hospital Code	Average Active Bed	Average Bed Occupancy Rate	Average Patient Stay	Average Annual Hospitalization
1	488	64.7	4.7	1941
2	115	43.4	3.1	395
3	141	46.8	4.3	460
4	197	56.7	3.3	975
5	209	69.2	3	1302
6	151	76.2	38.2	92
7	57	38.1	1	523
8	52	74.5	2.4	382
9	27	2	3	6
10	53	13.5	1.9	111
11	46	52.1	1.8	379
12	162	52	2.7	920
13	26	4.1	3.1	10
14	124	43.1	3.4	477
15	74	56.2	2	616
16	99	28.8	2.8	307
17	152	44	2.7	727

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Emergencies and Disasters Quarterly**Table 2.** Mean and relative percentage score of preparation area scores for COVID-19 disease crisis

Areas Of Preparation for the COVID-19 Disease Crisis	Mean±SD	Percentage of the Relative Score
Leadership and coordination	14.82±1.38	92.64
Operational support, logistics, and resource management	22.64±1.27	94.36
Information management	9.58±2.91	79.90
Communications	12.47±2.80	77.94
Human resources management	18.64±3.25	77.69
Continuity of basic services and surge-capacity	12.11±1.72	86.55
Rapid identification	10.29±4.10	57.18
Diagnosis	5.70±1.53	71.32
Isolation and patient management	11.35±2.47	81.09
Infection prevention and control	31.94±3.81	84.05
Average relative score		80.27

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**Table 3.** The correlation coefficient between areas of preparedness for COVID-19 disease crisis

Variables	1	2	3	4	5	6	7	8	9
1. Leadership and coordination	1								
2. Operational support, logistics	r=0.35 P=0.16	1							
3. Information management	r=0.34 P=0.17	r=0.36 P=0.15	1						
4. Communications	r=0.70** P=0.001	r=0.30 P=0.24	r=0.41 P=0.09	1					
5. Human resources management	r=0.40 P=0.10	r=0.02 P=0.93	r=0.07 P=0.76	r=0.17 P=0.50	1				
6. Continuity of basic services and surge- capacity	r=0.07 P=0.77	r=-0.03 P=0.88	r=0.06 P=0.81	r=-0.19 P=0.44	r=0.24 P=0.35	1			
7. Rapid identification	r=0.41 P=0.09	r=0.16 P=0.51	r=0.48* P=0.04	r=0.35 P=0.16	r=0.67** P=0.003	r=-0.04 P=0.86	1		
8. Diagnosis	r=0.09 P=0.72	r=-0.03 P=0.88	r=0.48* P=0.04	r=-0.06 P=0.79	r=0.51* P=0.03	r=0.56* P=0.01	r=0.47 P=0.05	1	
9. Isolation and patient management	r=0.22 P=0.38	r=0.35 P=0.16	r=0.46 P=0.06	r=0.24 P=0.35	r=0.61** P=0.008	r=0.34 P=0.17	r=0.55* P=0.02	r=0.77** P=0.0001	1
10. Infection prevention and control	r=0.47 P=0.05	r=0.43 P=0.08	r=0.71** P=0.001	r=0.29 P=0.24	r=0.37 P=0.14	r=0.19 P=0.44	r=0.43 P=0.08	r=0.47 P=0.05	r=0.55* P=0.02

P<0.05, \*\*P<0.01.

tionship between isolation and patient management area and infection prevention and control area (Table 3).

#### 4. Discussion

In crises and disasters, health centers are the first units whose effective and timely services can play a decisive role in reducing deaths and saving the lives of injured people [8]. Many studies have been conducted on the preparedness of hospitals in disasters. In most of these studies, low levels of preparedness have been reported. In a study conducted on Tehran University of Medical Sciences hospitals in 2013, the results showed that the level of preparedness was moderate in three hospitals, poor in one hospital, and good in one hospital [25].

In this study, the mean relative preparedness score for the COVID-19 crisis was 80.27%. In the study of Daneshmandi et al., who examined the level of preparedness for emergencies in one of the hospitals in Tehran, the level of hospital preparedness was good [4]. In the study of Ezzati et al. on social security hospitals in Kermanshah in 2016, the level of preparedness of hospitals in the face of crisis and disasters was at a good level [22]. Their results were in line with the results of the present study. Clark Wetter et al. examined the preparedness of hospitals for chemical and biological victims of terrorism in four US states; less than 20 hospitals had plans for victims of biological and chemical disasters, and in total, hospitals were not prepared for these disasters [26]. In the study of Labib et al., which examined

the preparedness of special wards in Egyptian hospitals, the mean preparedness score was 54%, which showed that the preparedness was moderate [19]. In the study by Singh et al., which examined the preparedness of a teaching hospital in northern India, the mean score in the areas of preparation against the COVID-19 pandemic was 72.96% [21].

Dewi et al.'s study on three Indonesian hospitals showed that their level of preparedness against COVID-19 was low [20]. Murphy et al. examined the level of preparedness of US hospitals in times of crisis. They found that 80% of the surveyed hospitals lacked plans to work with other hospitals, and only 22% of hospitals were prepared to deal with the crisis [27]. In the study of Mansouri et al., the degree of preparedness for the earthquake was 46.8% [10]. In the Faraji et al. study, hospital preparedness for unexpected events was moderate [2]. The results of these studies were inconsistent with the present study results. Desirable results in most areas in the current research can indicate that hospitals value the hospital management team and hospital preparedness in the face of disasters and have specific programs in the field of risk and danger management. It can also be said that the most important factor for success in crisis management is to anticipate and prepare the necessary measures and be prepared to face these crises [7].

In the present study, the highest relative score belonged to operational support, logistics, and resource management, and the lowest to rapid identification. In

the Daneshmandi et al. study, which examined the level of preparedness for dealing with unexpected events, the area of management had the highest score, and the area of traffic unit had the lowest score [4]. In the Rabeian et al. study, the highest and lowest levels of preparedness for earthquake risk belonged to the field of unexpected events plan management and construction hazard reduction planning, respectively. The level of preparedness of the studied hospitals against earthquake risk in the study of Rabeian was moderate [25]. In the Faraji Khiavi et al. study, the traffic dimension was the most prepared, and the evacuation and transfer were the least prepared areas [2]. In the study of Labib et al., the highest score in the area of preparedness belonged to support and logistics management, and the lowest score to the areas of human resources and information [19]. In the Singh et al. study, the highest preparedness score belonged to the structure of planning and decision making [21]. In the Dewi et al. study, the highest scores in the private and public hospitals belonged to the field of management in designing programs for COVID-19. In the police hospital, it belonged to equipment, consumables, health services, and surge-capacity building [20].

Differences in the results of studies can be due to the different tools used in measuring crisis preparedness, the type of hospitals studied, the crisis management infrastructure in hospitals, the activity of the crisis and disaster committee in the hospital, adequate and appropriate training of hospital staff and management team as well as the appropriate structural and non-structural infrastructure in the hospital. One of the major crisis management problems in disaster planning is the lack of support and logistics. Providing support services for resources has an essential role in delivering these services, so special attention should be paid to this issue in crisis management planning.

In the present study, the relative score of the human resource management dimension was 77.69%. In the Amerion et al. study, the preparedness of human resource planning to deal with the crisis was 83.52%, which was higher than the present study results [1]. In the Daneshmandi et al. study, the score of human resources was 61.9% and was at a good level [4]. In the Labib et al. study, the score of the human resources area was 28%, and it was one of the areas that had the lowest score [19]. Given that human resources are one of the most important pillars of service delivery in hospitals, especially in crises, trained and skilled personnel in hospitals should be considered an essential component in crisis management. In the present study, the relative score in the field of information management was 79.90%. In the Mastaneh et al. study, the area of registration and informa-

tion was at a moderate level [5]. In the Daneshmandi et al. study, the area of communication was evaluated as moderate [4]. The key point in crisis planning is communication and information exchange between different organizations and hospitals. Over time and gaining experience in crises, hospitals have planned for equipping and formulating alternative communication policies and guidelines to improve the crisis management process. However, there are still studies that show the level of preparedness in this area is not at the desired level. It seems that this area still needs to be strengthened and improved because inefficient communication can be a new challenge for medical centers in crisis management and has led to a lack of coordination between organizations and organizations. The resulting disorder and chaos make crisis management difficult.

In the present study, the mean relative score in the field of leadership and coordination was 92.64%. In the study of Amerion et al., which was conducted to assess the preparedness of three selected border hospitals for disasters, the organization area was reported to be good [1]. In the Rabeian et al. study, the highest level of crisis preparedness belonged to the dimension of unexpected events management [25]. In the Mastaneh et al. study, the level of preparedness for crisis and disasters in management policies was 44.1% [5]. In the study of Labib et al., the score of leadership and coordination was 71% [19]. Different scores in the field of management and leadership can be related to each hospital's policies with regard to disaster response and show the importance of the management system of the center during the crisis and how the hospital management team is valued in the area of crisis management.

The lowest score in the present study was related to rapid identification. This area examines the triage system, the separation of referral spaces upon the patient's arrival at the emergency room, access to the resident physician, and training and protection in the hospital emergency room. The relative preparedness score of the province's hospitals in this area was 57.18%. The score of this dimension in the Khorsand Chobdar et al. study was 54.2% [6]. Inadequate education about COVID-19, the emergence of a new disease, low familiarity with patient admission criteria, shortage of infectious disease specialists, and weakness in diagnostic services (radiology and laboratory) can affect the present study results. Providing flowcharts for diagnosis and treatment of COVID-19 disease and holding training courses for physicians and laboratory personnel can be effective in the process of providing diagnostic and therapeutic services.

## 5. Conclusion

The preparedness of Ardabil University of Medical Sciences hospitals in the face of the COVID-19 crisis is at a good level. Since the characteristics and severity of this disease are unknown and methods to deal with it have not been experienced so far, hospital preparedness to deal with the disease is one of the main challenges. Successful management of the spread of infectious diseases requires the integration of clinical and non-clinical practices, proper planning, having preparedness programs, implementing appropriate infection control methods, and sustainable management. Promoting knowledge and applying effective strategies in managing this crisis is essential. Managing a crisis with minimal damage to normalcy requires a comprehensive pre-disaster management plan. Strategic crisis management planning for healthcare centers and their cooperation in dealing with the crisis and training before it, can be useful in improving disaster preparedness areas. Crisis management programs should be among the measures and priorities of medical centers.

## Ethical Considerations

### Compliance with ethical guidelines

This article was approved by the Student Research Committee, School of Nursing and Midwifery, Ardabil University of Medical Sciences, with the ethical number IR.ARUMS.REC.1400.050.

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### Authors' contributions

All authors equally contributed to preparing this article.

### Conflict of interest

The authors declared no conflict of interest.

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