

Evaluation of Pandemic Preparedness of Shiraz Teaching Hospitals for COVID-19 from the Perspective of Health Care Workers: A Cross-Sectional Study

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Abstract

Background: During disasters, hospitals play a key role in providing quality and appropriate medical services to increase resilience.

Objectives: This study was carried out with the aim of determining the response rate of the emergency department of Shiraz University of Medical Sciences hospitals to the Corona pandemic in 2021.

Methods: This cross-sectional descriptive research was conducted in educational-therapeutic hospitals of Shiraz University of Medical Sciences. For this purpose, 230 senior and middle managers, emergency department nurses and emergency medicine specialists participated in this study. Hospitals were placed in two categories: special centers for COVID-19 (3 hospitals) and other educational and medical centers (general and specialized centers) (8 hospitals). The information was collected by the hospital readiness assessment checklist (2020) for the management of infectious disease epidemic crisis based on the guidelines of the World Health Organization for the response of hospitals to the COVID-19. After collecting the data, it was entered into SPSS 22 and analyzed.

Results: Findings of this study showed that the readiness of hospitals is at a good level (87%). The studied hospitals performed very well in items of support and management of financial resources, communication management, human resources management, diagnosis and management of patients, but in item of rapid identification and control and prevention of infection, they performed very poorly. The centers of COVID-19 scored higher than other educational-treatment centers, continuation of services and increased capacity, rapid identification, diagnosis, prevention and control of infection, which was statistically significant ($p < 0.05$).

Conclusion: Rapid identification of patients seems to be an important challenge in Shiraz University of Medical Sciences. The allocation of special hospitals for the care of COVID-19 patients is also effective in preparing them for the pandemic.

Keywords: Evaluation, Preparedness, Emergency, Hospital, Pandemic, COVID-19, Shiraz, Educational-medical

1. Background

Healthcare systems around the world typically face numerous challenges when responding to natural disasters at local, national, and international levels. Emergencies and disasters, regardless of their causes, necessitate the preparedness of healthcare centers, as these facilities are responsible for providing essential health services to the population.

Hospitals often encounter delays in their preparedness efforts and their ability to provide an effective response to disasters.¹ These delays can be attributed to financial constraints and a lack of understanding among officials of the crucial role hospitals play in responding to accidents and disasters. In fact, hospitals are required to maintain and even intensify their operations during such events. A wealth of scientific evidence underscores the direct

correlation between hospital and healthcare center preparedness and the mortality rate resulting from accidents and disasters.^{2,3} Since natural disasters and accidents are typically not preventable, enhancing the preparedness of the healthcare system, particularly hospitals, becomes imperative in reducing the associated fatalities and injuries.

Preparedness, in general, involves establishing plans, facilities, and a trained workforce capable of delivering an efficient response when needed. Effective preparedness requires financial and managerial support, both within the hospital itself and from collaborating organizations, to engage in programs aimed at achieving a coordinated and efficient response.⁴

Hospitals play a crucial role in providing healthcare services and delivering essential medical care within the

healthcare system. This role becomes particularly significant during times of crisis. In Iran, many hospitals operate close to their maximum capacity under normal circumstances. Therefore, a sudden increase in the number of emergency patients places additional strain on their already stretched resources. The progressive spread of diseases during epidemics can lead to a large influx of patients in need of inpatient services, potentially affecting the hospital's ability to respond effectively.⁵

Since December 2019, a novel coronavirus, known as severe acute respiratory syndrome coronavirus (SARS-CoV-2), was identified in Wuhan, China, and classified as such by the International Committee on Taxonomy of Viruses. The disease quickly spread to most countries and communities worldwide, leading the World Health Organization (WHO) to declare the COVID-19 outbreak a pandemic on March 11, 2020. Consequently, hospitals experienced an influx of patients requiring hospitalization and intensive care.⁶

COVID-19 typically presents with mild acute respiratory symptoms, including fever, dry cough, and fatigue during its early stages. However, some patients rapidly progress to severe conditions such as acute respiratory distress syndrome, acute respiratory failure, multi-organ failure, and other life-threatening complications. The lack of specific treatments for this disease poses a significant challenge in pandemic control. Early detection of patients in the initial stages of the disease can aid in prevention, appropriate supportive treatment, and reduced mortality rates.⁷ Currently, COVID-19 is a global health emergency, and independent predictive factors related to fatal outcomes remain unclear.⁸

Fatalities resulting from COVID-19 are more common among the elderly and individuals with elevated neutrophil and D-dimer levels or reduced lymphocyte counts.⁷ Studies have shown that individuals of all ages who are susceptible to SARS-CoV-2 infection can develop severe or even fatal forms of the disease. Moreover, human-to-human transmission is possible.⁹ Consequently, robust healthcare systems are quickly overwhelmed by this disease, making it one of the most challenging incidents and disasters of the century and in human history. Therefore, hospitals need strategies to manage space, personnel, and equipment to provide comprehensive patient care.¹⁰⁻¹²

In such circumstances, every country must take necessary measures to prevent healthcare system failures, slow disease transmission, and protect vulnerable populations, such as the elderly and those with underlying health conditions.¹³ These measures include risk and safety assessments, rapid patient identification, and appropriate admission in emergency departments, effective COVID-19 pandemic control, and the continued functioning of hospitals. Given the lack of specific symptoms for this disease, quick and definitive patient

identification is challenging.

As the first line of treatment, the emergency departments of hospitals play an essential role in saving the lives of victims and preventing the spread of this virus.¹⁴ This raises the question: Are the emergency departments of hospitals ready for this potential epidemic?

2. Objectives

This study aimed to determine the emergency response readiness of the state-run hospitals affiliated with Shiraz University of Medical Sciences (Iran) for the COVID-19 pandemic in 2021-2022.

3. Methods

This cross-sectional descriptive study was conducted in 2021-2022 in 11 teaching hospitals in Shiraz. All senior and middle managers, emergency nurses, and physicians who worked in the hospitals during the COVID-19 pandemic were included in the study. Exclusion criteria included the lack of cooperation from hospital officials in providing the necessary resources and information to complete the questionnaires, the unwillingness of some hospital managers to participate in the research and their lack of cooperation, and the absence of a specialist in emergency medicine. A total of 15 people from three levels (9 senior and middle managers, four emergency physicians, and two nurses) were excluded from the study due to their unwillingness to participate.

3.1. Data Collection Tools

The Hospital Preparedness Assessment Checklist for Infectious Disease Epidemic Crisis Management was used to collect the data. This checklist is based on the Centers for Disease Control and Prevention (2020 version) instructions for hospital response to the COVID-19 pandemic.¹⁵ After translation and content validity assessment by three faculty members from Sabzevar and Shiraz Universities of Medical Sciences, an 89-item questionnaire was developed based on these guidelines. The questions covered various aspects, including leadership and coordination (eight questions), operational support, procurement and resources management (12 questions), data management (six questions), communication management (12 questions), human resources management (12 questions), continuity of basic services and capacity expansion (seven questions), rapid identification (nine questions), diagnosis (four questions), patient isolation and management (seven questions), and infection prevention and control (18 questions). Respondents provided answers with three options: yes (three points), no (one point), and under action (two points). The minimum score was 89, and the maximum score was 267.

Sampling was carried out using the census method. Participants who met the inclusion criteria were identified in each hospital. After the researcher explained the

study's objectives and obtained consent, questionnaires were personally delivered to the participants. Sufficient time was given to complete the questionnaires, which were then collected during subsequent visits. The collected data were entered into SPSS v.22 software (IBM Corp., Armonk, NY, USA) for statistical analysis. Data analysis included descriptive statistics such as mean and Standard Deviation (SD), as well as inferential statistics using a *t*-test. Since the number of questions in each dimension varied, scores were converted to a range from 0 to 100. The scores within each dimension were then divided into six categories ranging from very poor to excellent, with scores below 75 being considered very poor, 75 to 79 as poor, 80 to 84 as average, 85 to 89 as good, 90 to 94 as very good and 95 to 100 as excellent.

4. Results

A total of 230 individuals from 11 teaching hospitals in Shiraz participated in this study. Of these, 45 were basic, middle and senior operational managers, 73 were physicians and 112 were emergency department nurses. The majority of participants (64.8%) were between 31 and 50 years old, and 60% of them had 6 to 20 years of work experience. The results showed that hospitals performed very well in the dimensions of support and resource management, communication management, human resource management and patient isolation and management, with scores above 90. However, they performed very poorly in the dimensions of rapid identification and infection control, with scores below 75 (Table 1).

Table 1. Comparison of the Frequency and Scores of Preparedness Dimensions in the Hospitals of the COVID-19 Center with other Educational and Medical Centers

Dimensions of hospital preparation	Score of special centers for COVID-19 (percentage)	Other educational-therapeutic centers	Total standard deviation ± mean	The significance level of special centers with others
Leadership and coordination	21.10 ± 1.0 (87.91%)	21.35 ± 0.99 (88.95%)	21.28 ± 1.00 (88.66%)	0.09
Operational support, procurement and resource management	34.23 ± 1.42 (95.08%)	33.81 ± 1.56 (93.91%)	34.11 ± 1.79 (94.75%)	0.10
Data management	14.80 ± 2.02 (82.22%)	14.89 ± 2.15 (82.72%)	14.86 ± 2.11 (82.55%)	0.74
Communication management	17.22 ± 0.69 (95.66%)	17.74 ± 0.66 (98.55%)	17.73 ± 0.67 (98.5%)	0.82
Human resources management	34.75 ± 3.13 (96.53%)	34.85 ± 3.00 (96.81%)	34.82 ± 3.03 (96.72%)	0.72
Continuity of basic services and capacity increase	19.74 ± 2.10 (96.53%)	18.26 ± 1.81 (86.95%)	18.43 ± 1.81 (91.95%)	0.05
Rapid identification	23.19 ± 1.45 (85.88%)	17.72 ± 1.93 (65.63%)	19.73 ± 3.64 (73.04%)	0.03
Diagnosis	11.85 ± 0.34 (98.75%)	9.32 ± 3.44 (77.66%)	11.86 ± 0.33 (98.83%)	0.05
Patient isolation and management	20.52 ± 1.06 (97.71%)	19.89 ± 1.11 (94.71%)	20.23 ± 3.03 (96.23%)	0.07
Infection prevention and control	38.72 ± 1.80 (71.70%)	35.42 ± 3.0 (65.59%)	38.21 ± 1.84 (70.75%)	0.04

The study also found that specialized COVID-19 hospitals performed better than other teaching hospitals in terms of continuity of basic services, capacity expansion, rapid identification, diagnosis and infection prevention and control.

5. Discussion

The purpose of hospital preparedness is to establish emergency response systems, train staff, procure necessary equipment and supplies to ensure continuity of patient care, protect staff and respond to needs arising from accidents and disasters. Hospital preparedness is a critical component of an emergency plan that can significantly reduce the impact of major epidemics.

This study aimed to assess the emergency preparedness of hospitals affiliated to Shiraz University of Medical Sciences during the COVID-19 pandemic in 2021-2022. The research results showed that 87.84% of the teaching hospitals in Shiraz had a good level of emergency preparedness. The COVID-19 hospitals had a very high level of preparedness with 90.54%, while the other

hospitals had a good level of preparedness with 85.15%. Several studies that have used similar tools to measure hospital preparedness in non-epidemic periods have reported different results. This variation may be due to several factors, including study conditions that were influenced by the ongoing COVID-19 pandemic.¹⁶ Analysis of the study results shows that despite the overall good level of preparedness in Shiraz hospitals, there is a need for planning and improvement in the areas of rapid diagnosis and infection control. A study of private hospitals in India on emerging infectious diseases such as COVID-19 revealed gaps in the implementation of various programs and protocols related to staff training, communication, capacity building, laboratory capacity and infection control in hospitals. Similarly, a study conducted in Hong Kong by Vincent et al. (2019) highlighted the importance of strengthening infection control measures and transparency to improve hospital performance.¹⁵

Infection control is a key indicator of hospital performance.^{17,18} During a COVID-19 pandemic, when

the disease is spread from person to person through airborne droplets, the prevention and control of infection among patients and staff within the hospital becomes increasingly important. Focusing on improving infection control preparedness can improve the performance of medical centers. The study found that infection control scores across all hospitals averaged 56%, with specialized COVID-19 hospitals (80 ± 1.72) scoring higher in infection control compared to other teaching hospitals (42.35 ± 3.01). This suggests that the establishment of COVID-19 treatment centers has had a positive impact on infection prevention and control measures. However, further research is needed to thoroughly investigate the wider impact of COVID-19 treatment centers. Health care is one of the most critical needs for people in the event of accidents and disasters, making continuity of health services an important aspect of disaster preparedness. However, the standard score for continuity of basic services and capacity expansion in this study indicates a very low level of preparedness (57%). In particular, hospitals designated as COVID-19 hospitals achieved significantly higher average scores in this dimension than other educational and medical centers.

Research has consistently shown that larger hospitals tend to be more resilient and provide higher quality care than small and medium-sized hospitals. This phenomenon may be due to greater physical capacity and the use of a wider range of medical technology and services to meet different healthcare needs.¹⁹ Increasing hospital capacity, including human and material resources such as the number of staff (especially doctors and nurses) and the availability of beds, has a direct positive impact on the quality of hospital services. Increasing hospital capacity and the ability to admit patients are crucial factors in assessing the quality of hospital services.²⁰

Numerous studies have highlighted the critical role of worker safety during epidemics, underscoring its impact on the quality of care and the mental well-being of healthcare workers.^{21,23,24} The results of this study show that teaching hospitals in Shiraz are best prepared in terms of operational support, procurement and resource management. Notably, there was no significant difference between COVID-19 hospitals and other healthcare facilities in this regard.

Communication is a major challenge during a pandemic, and poor communication within and between departments is a critical issue that can lead to psychological problems for staff, family problems and a decline in patient care.^{25,26} Access to accurate and timely information is critical to the success of any organization and enables informed decision making. In the context of pandemics, keeping staff informed and providing regular training on transmission methods and infection control can have a significant impact on the quality of services.²⁷ Key indicators of quality of care are therefore the preparedness

and training of staff for their roles and responsibilities.²⁶ The results of the study show that teaching hospitals achieved a score of over 70% in the information dimension. This as a result, indicates a good level of preparedness.

On the dimension of rapid diagnosis, COVID-19 hospitals (with a score of 23.19 ± 1.45) scored higher than other educational and medical centers (with a score of 17.72 ± 1.92). This difference may be due to more efficient and accessible services and better distribution of services in specialized COVID-19 hospitals. It may also reflect the greater experience and sensitivity of staff in these hospitals.²⁴

In this study, although the score for preparedness was higher for nurses than for the other studied groups, this difference did not reach statistical significance. Notably, doctors gave the lowest scores to all aspects of preparedness except human resource management and communication management (Table 2). Future research should explore this divergence of opinion between doctors and other groups (managers and nurses).

A limitation of this study is the potential conservatism of hospitals in answering questions. However, this effect was mitigated by sufficient explanation of the purpose of the study and by gaining the trust of the participants. In addition, hospitals may have had a conflict of interest in documenting their responses in order to obtain a higher rating. The different types of hospitals (both general and specialist) presented challenges in completing certain sections of the questionnaire. To address this issue, the researcher assisted participants by providing further clarification on ambiguous items.

6. Conclusion

The results of the study indicate that the establishment of dedicated COVID-19 hospitals has improved hospital preparedness in all dimensions. However, more attention needs to be paid to rapid diagnosis and infection prevention and control. It is therefore imperative that authorities address these areas and develop effective and timely solutions to improve these aspects, ultimately reducing casualties and minimizing societal damage.

6.1. Recommendations

Based on the study's findings, it is recommended that authorities take prompt and decisive action to improve infection control and rapid diagnosis, thereby reducing harm to staff and society. Hospital managers and officials should formulate policies that focus on resource integration, social mobilization, financial resource allocation, drug supply and vaccine development. Establishing a highly responsive, versatile and efficient emergency management system will facilitate an effective and well-prepared response to disasters.

Research Highlights

What Is Already Known?

- During disasters, hospitals play a key role in providing quality and appropriate medical services to increase resilience.
- The hospitals of the special center for COVID-19 scored higher than other educational-medical centers in items of continuity of basic services and capacity increase, rapid identification, diagnosis, and infection prevention and control.
- Increasing hospital capacity and human and equipment resources (number of personnel, especially physicians and nurses, and number of beds) improves the quality of hospital services.

What Does This Study Add?

- The results of this study showed that the readiness of hospitals is at a good level (87%).
- The studied hospitals performed very well in items of support and management of financial resources, communication management, human resources management, diagnosis and management of patients, but in item of rapid identification and control and prevention of infection, they performed extremely poorly.

Author Contributions

Authors contributed equally to this work.

Conflict of Interest Disclosures

All authors declared that they have no conflict of interest.

Ethical Approval

The study protocol received approval from the regional ethics committee of Sabzevar University of Medical Sciences, assigned with the code number IR.MEDSAB.REC.1400.058.

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