

Readiness of Hospitals Affiliated to Shahid Sadoughi University of Medical Sciences against Disasters

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ABSTRACT

Introduction: Hospitals, as the most important medical institutions, should be adequately prepared before and after the incidents in order to guarantee responding quickly to incidents when confronted with crises. This study was conducted to evaluate the readiness of hospitals affiliated to Yazd University of Medical Sciences against disasters.

Methods: This descriptive cross-sectional study was conducted in 2017 to assess the readiness of 12 hospitals affiliated to Yazd University of Medical Sciences. The data were collected using a general information form for hospitals and the National Assessment Tool for Hospital Preparedness in Accidents and Disasters in 9 areas involving 91 questions which were completed by the researcher and a person responsible for crisis measures in the hospitals. To calculate the readiness level in each component, the total score of the first option (under consideration) was distracted from the sum of the third option (completed) and the final number was divided into three. The readiness level was divided into three levels of weak, moderate and strong.

Results: In total, (16.67%) of hospitals were poorly prepared, (16.67%) had an average level of readiness and (66.67%) demonstrated a strong level of readiness. The highest level of readiness at the strong level was related to the capacity building component (83.33%) and the lowest level of readiness belonged to communication, continuity of critical services and post-disaster recovery in which only (50%) of the hospitals were in a high level.

Conclusion: Considering poor and moderate preparedness of (37%) of hospitals in responding to unexpected incidents, problem centers for training and planning in order to increase the readiness level as well as identify centers capable of operating in urgent cases should be taken into consideration.

Keywords: Hospital, Preparedness, Unexpected Incident

Introduction

Unexpected events are considered as one of the threats to human life; since they suddenly occur, emergent and extraordinary measures need to be taken (1). The occurrence of these incidents create unavoidable conditions that its destructive effect causes the community not to be able to meet

its needs and health cares; this problem leads to physical and financial damage based on their severity and significance (2). According to available statistics, about 200 million people are affected by unexpected events each year, worldwide, causing about 65,000 deaths (3, 4).

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According to findings of a study, from 2000 to 2012, natural disasters caused 1.5 trillion dollars of global damage and 2.9 billion people were affected (5). Islamic Republic of Iran is exposed to a variety of natural and human-made hazards. According to the Global Assessment Report on Disaster Risk Reduction (GAR) in 2009, The Iran's level of risk, based on the death rate, only against natural hazards, for about 106000 in four decades, has been estimated 8 out of 10 (6). The occurrence of hazards, in addition to damage to the general population and infrastructures, affects service delivery systems. Structural, non-structural and functional components of health centers can be specifically affected by the occurrence of the threats or the disasters caused by them. In addition to the life consequences for the personnel and patients, as well as damage to the properties and equipment, they will lose their ability to accept injuries which consequently adds to the death toll caused by the incident. Each year, hundreds of hospitals and other types of healthcare facilities are destroyed or their effectiveness is lost worldwide as a result of a natural disaster (7). One of the most important needs of the injuries in the early hours after the disaster is being provided by the health care. Providing and equipping healthcare systems and distributing them appropriately among urban areas is regarded as one of the biggest challenges which crisis management faces. As a result, if appropriate scientific and operational management is not available in dealing with unexpected events, the human damage caused by disasters will be increased (8).

Risk analysis as a key component of planning for disaster preparedness is the first stage in the disaster management cycle, consists of two components of risk analysis and vulnerability analysis. In the risk analysis, the vulnerability of a location, an organization, or a geographic area is assessed against existing hazards (9). Continuous performance of these evaluations can provide the information needed to upgrade the system. In the United States, the direct damage to health infrastructures caused by disasters over a 15-year period has been estimated to be \$12.3 billion. In

addition, from the economic aspect, the destruction or inactivation of the hospital without alternative facilities would lead to a sense of insecurity and social instability (10). According to the report by the World Health Organization (WHO), in 2003, following the earthquake in Bam, Iran, all three public and private hospitals in Bam were destroyed and other health care centers were severely damaged (11). In a study, readiness of medical centers affiliated to Guilan and Mazandaran University of Medical Sciences in coping with unexpected disasters was evaluated in 2006, according to which most health centers were vulnerable to unexpected disasters (7, 12). Although disasters may rarely occur, they might be extremely destructive and affect the health system via the huge number of patients and the injured. In fact, the readiness of these centers can play an important role in reducing mortality and physical damage, as well as decreasing the pain of the injured (13). Given the limited information on the impact of natural disasters on primary health centers, damage to the structure and performance of health centers can have devastating effects on the society (14). Health centers should be adequately prepared before the occurrence of the incident, to the extent that existing resources allow. Healthcare managers should also have the necessary information on crisis management and perform the required planning in order to act in a wise manner when the disasters occurs. Health centers in Iran are exposed to risks of several natural disasters. Within the ten years of an investigation, about 119 natural events have been reported in 25 provinces of the country, which caused damage to 1,401 health centers, and 127 staffs of these centers were killed, injured or turned became disabled (15).

Recent studies conducted in Iran also demonstrated that the average preparedness of hospitals in facing unexpected events. For instance, a study conducted in military hospitals via a checklist of 22 questions reported a readiness level of 55.5% (16). In another study, 24 hospitals in Shiraz, Iran were investigated, using the WHO checklist, which reported 59.5% of readiness level

(17). A study in north Iran which used the self-awareness questionnaire involving 141 questions (18) and another study carried out in 23 hospitals in Iran (19) have reported moderate levels of preparedness for unexpected events. Therefore, assessing the readiness of medical centers, specifically hospitals in Iran, is of great importance in order to identify the weaknesses and ensure the optimal performance of these centers in critical situations (20). Considering these issues and the importance of addressing the preparedness of Iranian hospitals in the face of unexpected events, the present study was conducted to evaluate the readiness of hospitals affiliated to Yazd University of Medical Sciences against disasters.

Materials and Methods

The present descriptive cross-sectional study was conducted in 2017 to determine the readiness of hospitals affiliated to Yazd University of Medical Sciences to deal with the unexpected events.

The population and the statistical sample included all hospitals affiliated to Yazd University of Medical Sciences; therefore, 11 hospitals were enrolled in this study. The private hospitals were excluded from the study. In order to collect the study data, the general information form for hospitals and the National Assessment Tool for Hospital Preparedness in Accidents and Disasters, developed by Khanke et al. (2013), were applied based on the WHO Hospital Assessment Standardized Checklist. These checklists were completed by crisis experts in collaboration with the supervisors of the hospitals. This tool measures the hospital readiness to provide an effective response to the incidents and medical emergencies, through an "all hazards" approach with 91 three-option questions (under consideration, ongoing and completed) which has been developed based on 9 key components including command and control (6 questions), triage (10 questions), manpower (15 questions), communications (9 questions), capacity building (13 questions), support/logistics management (10 questions), safety and security

(11 questions), continued critical services (8 questions) and post-disaster recovery (9 questions).

In order to score the options, 1, 2 and 3 were respectively taken for the options of under consideration, ongoing and completed.

In order to calculate the level of readiness in each component, at first, the score of the options was added separately and then, the length of the readiness range for each component was obtained by subtracting the sum of the score of the first option (under consideration) from the sum of the score of the third option (completed). Then the length was divided into three sections by which the hospital readiness levels were determined in each component (including weak, moderate, and strong levels). For example, for the first component (command and control), which has 6 questions, the total score of the first options, second options and third options of the component were 6, 12, and 18, respectively. The range length of the readiness score of this component was obtained 12 (18-6), via subtracting the number 6 (sum of the first options of the component) from 18 (the sum of the third options of the component) and then we divided the obtained length to three (4) to get the distance between surfaces. Then, distance of readiness levels was calculated for the related component. It should be noted that in addition to determining the readiness levels for each component separately, the total readiness levels (total of all components) were obtained once using the above method. Some questions of the questionnaire were completed through the researcher's observation. Most questions were also completed by the incumbent responsible for assessing the crisis in accrediting of each hospital.

In addition to the mentioned questionnaire to investigate the general features of hospitals, the general hospital information form was applied including such questions as the hospital name, type and organizational affiliation, address, telephone, fax and hospital's website, as well as the number of beds, bed occupancy rate and specialty of hospital head.

After approval of the research project by the research council of Shahid Sadoughi University of Medical Sciences in Yazd, an introducing letter was obtained in order to refer to the related centers and collect the study data. After justifying and satisfying the managers of hospitals, hospital preparedness was measured using the aforementioned tools. Finally, the collected data were analyzed using statistical package for social sciences (SPSS). The mean preparedness score was compared between hospitals settled in Yazd and rural areas using independent samples t-test.

Results

A total of 12 hospitals affiliated to Yazd University of Medical Sciences were studied,

among which 10 (83%) were general hospitals and 2 hospitals (17%) were single specialized (burn and psychiatric). Four (34%) hospitals were located in Yazd city and 8 (66%) hospitals were in other cities of Yazd province (rural areas). Overall, 16.67% of hospitals were poorly prepared, 16.67% had an average level of readiness and 66.67% demonstrated a strong level of readiness. As the study results showed, the highest level of readiness at the strong level was related to the capacity building component (83.33%) and the lowest level of readiness belonged to communication areas, continuity of critical services and post-disaster recovery; therefore, only 50% of hospitals in these areas were in the strong level (**Table 1**).

Table 1: The readiness level of the studied hospitals in the nine components

| Components | Weak Level | | Average Level | | Strong Level | |
|--------------------------------|------------|---------|---------------|---------|--------------|---------|
| | Frequency | Percent | Frequency | Percent | Frequency | Percent |
| Command and control | 1 | 8.33 | 2 | 16.67 | 9 | 75 |
| Triage | 2 | 16.67 | 2 | 16.67 | 8 | 66.67 |
| Manpower | 3 | 25 | 1 | 8.33 | 8 | 66.67 |
| Communications | 3 | 25 | 3 | 25 | 6 | 50 |
| Capacity building | 0 | 0 | 2 | 16.67 | 10 | 83.33 |
| Support / logistics management | 1 | 8.33 | 2 | 16.67 | 8 | 66.67 |
| Safety and security | 3 | 25 | 2 | 16.67 | 7 | 58.33 |
| Continued critical services | 3 | 25 | 3 | 25 | 6 | 50 |
| Post-disaster recovery | 2 | 16.67 | 4 | 33.33 | 6 | 50 |
| All areas | 2 | 16.67 | 2 | 16.67 | 8 | 66.67 |

According to the results of the present study, the total average of readiness for hospitals in the center of Yazd was 94.33 and 76.16 was reported for its subordinate counties. Based on the independent t-

test, the readiness score was significantly higher in all components as well as all areas for hospitals settled in Yazd compared to rural areas ($P < 0.05$).

Table 2: Comparison of readiness score mean for hospitals in the center and counties of Yazd province

| Components | Score out of 100 | | Significance level |
|--------------------------------|-----------------------|-----------------|--------------------|
| | Hospital of Yazd city | Rural hospitals | |
| Command and control | 100 | 83.12 | P<0.05 |
| Triage | 91.5 | 79 | |
| Manpower | 91.5 | 74.87 | |
| Communications | 91.5 | 66.37 | |
| Capacity building | 100 | 91.5 | |
| Support / logistics management | 100 | 83.12 | |
| Safety and security | 91.5 | 70.62 | |
| Continued critical services | 91.5 | 66.37 | |
| Post-disaster recovery | 91.5 | 70.5 | |
| All areas | 94.33 | 76.16 | |

Discussion

Based on the communication area, 50% of hospitals were at a high level of readiness. This level of readiness has been reported in terms of percentage. In the studies of Hojat (2008) and Sedighi (2006), 52% and 48% of high levels of readiness was reported for the hospitals (21, 22). Although it was inconsistent with the results of the Ameriyon's (2010) study, in which 66% to 82% of the hospitals were in a good level (23). Moreover, Zaboli (2006) found that only 33% of the hospitals have predicted an alternative communication system at the time of the crisis and are not at a good level, which was in line with the findings of the present study (24). Given that the first pillar in the crisis planning is communicating and giving information within organs and hospitals, equipping and developing guidelines in terms of alternative communications in emergencies is of great importance and in this area, resources and facilities should be allocated; since, poor communications can lead to a lack of coordination between organizations, and thus the resulted disorder and chaos will multiply the effects of the crisis.

Regarding the safety and security, 58.33% of hospitals were at a high level. This area coincided with Hojat's (2008) study, in which 61% of hospitals were put in the strong level (21). Security planning for accidents provides the safety of the personnel and patients in the critical situations and prevents disturbances in the health centers.

Studies have shown that one of the major issues of preparedness for accidents is the security issues in relation to personnel, hospital equipment at the time of disaster. Findings of these studies state that personnel should be familiar with security issues and instructions, and that they must constantly learn the necessary trainings (25).

In the support area, 66.67% of hospitals were in the strong level. These results were in line with the studies of Hojjat (2008) and Hosseini (26), in which 68% and 52% of hospitals demonstrated a good level in terms of support. Although the support component in hospitals had a relatively good status, since all the power of the relief forces and the injured people relies on this unit, and

considering the breadth and importance of support. The serious planning of the authorities can assist in promoting this unit.

Regarding manpower, 66.67% of hospitals were in the strong level. These results were consistent with of the studies done by Nasiri Pour (2007) (68%) (27) and Ameriyon (2010) (83%) (23). Since human resources play an important role in managing the hospital and preventing waste of resources, planning to prevent shortage of manpower in the critical situations seem to be extremely important. The crisis management team should be completely cognizant of the tasks and instructions as well as organizational charts and responsibilities.

Regarding command and control, 75% of hospitals were in a strong level, which was consistent with the results of Hosseini's (2008) study (62%) (26) and contradicted with the results of Hojat 's (2008) study (78%) (21). Given that predicting problems and crisis factors in management is very important, and accepting the predicted factors seem to be easier, the management sector can reduce the extent of the crisis via accurate and appropriate predictions.

Conclusion

As the results stated, it is essential for hospitals to prioritize the development of preparedness promotion plan. In addition to obtain the necessary information in the area of crisis management, the hospital managers should train their personnel with respect to emergency and first aid via the development of educational programs. Increasing their skills in different fields of work might result in their active participation in the incident.

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Conflict of interest

The authors reported no conflict of interest

Authors' contribution

Reza Shokouhi, completing the checklists and

entered the information into the software. Dr. Abbas Ali Dehghani Tafti analyzed the data and wrote the the first draft of the manuscript.

All authors contributed in preparing the manuscript.

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