

Assessment of the Preparedness Level of Administrators and State Hospitals of Guilan against EarthquakeDr Abolhasan Afkar^{1*}, Dr Fardin Mehrabian², Mehdi Shams³, Leila Najafi⁴¹. PhD in management of health & cure services, Guilan University of medical sciences, Iran.². Faculty member, Guilan university of medical sciences, Iran³. Environmental Health Expert, Guilan university of medical sciences, Iran.⁴. PhD student of Health Services Management, science and Research Branch, Islamic Azad University, Tehran, Iran.*Corresponding author: hasanafkar@yahoo.com, Tel: 09112369537

Abstract: Introduction & Function: one of the bitterest human memories also found in ancient books is natural disasters and unexpected events. of the obstacles and problems hospitals face with is the critical situation of the disasters. The present study is to assessment the preparedness rate of governmental hospitals of Guilan Province against earthquake in 2010. **Material & Methods:** the research has been descriptive-analytic type performed by cross-sectional study in 2010. The research community contained all educational hospitals of Guilan, and the data gathered through a questionnaire containing 37 questions and evaluating list containing 133 specialized questions through interview and the documents about the preparedness of the hospitals. To analysis the data the SPSS 17 software is used. And the findings were illustrated through diagrams and tables. **Findings:** 26% of the interviewees were the hospital directors and the 74% were the managers. The preparedness rate of the hospitals in the fields of life back-up services was 80/8%, handling the unexpected events in hospitals was 82/89%, planning health services against the earthquake in hospital was 59/86%, equipments and threatening materials safety were 65/79%, buildings danger reduction was 46/05%, evacuating the hospital and outdoors treatments were 40%, and hospital training plans against earthquake was 59/64%. By one way variance analysis between manager's awareness rate and hospital preparedness there exists a meaningful relation (P=0/001). All in all, the total hospitals of Guilan with the average of 64/31±14/21 percent were semi-prepared against earthquake. **Discussion & conclusion:** since the earthquake are really destructive and affect the health and treatment systems, and their effects remains for a long period, and by taking into account that the preparedness rate of the hospitals of the Province is middling, paying more attention to the hospitals in the field of preparedness against earthquake is mandatory.

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1. Introduction

Iran is among the top ten disaster-prone countries across the world in the table of the United Nations and according to the surveys on the occurrence of natural disasters, Iran is ranked fourth in Asia after India, Bangladesh and China. During 1986-1996, about 400,000 people have been killed in disasters and 1,560,000 people have been affected by the occurrence of these events.¹ Natural disasters are a part of the environment of humans, though in general, no single crisis is fully dependent on natural factors. Uncontrolled constructions around faults, streams, etc. increase crises and humanitarian disasters. Thus, crises depend on so many factors, including natural and human-related factors, and thereby take on a complex structure, making it practically difficult and complicated to struggle with them.² Bitter memories of Guilan and Zanzan earthquakes, flood in Mazandaran and Golestan, January earthquake in Bam and the imposed eight-year war still remain in our minds. Despite the fact that disasters rarely occur, they

are very destructive and have an impact on healthcare system by resulting in a large number of patients and injuries.³ Disasters and incidences lead to great financial and life losses⁴ and are divided into three natural, artificial and synthetic categories.⁵ One of the most bitter memories of human, which can be traced in ancient texts, is unexpected events and natural disasters.² During the occurrence of events and disasters, hospitals and health centers are among the first units whose efficient and timely health care services can have a vital and determining role in decreasing mortality and rescuing victims.⁶ One of the problems that hospitals are facing is critical conditions caused by disasters. To deal effectively with the crisis caused by disasters, hospitals should have a pre-developed operational plan. Absence of such a plan will increase chaos and confusion.⁷ Currently, having various enormous and complex resources, hospitals in Iran are one of the most important centers involved in expected and unexpected events, including those inside and outside the hospital, that would need to

examine the challenges through various consultations in order to deal with the crisis. Because of patients' inability when taking shelter and escaping, existence of hazardous and dangerous substances, uncoordinated staff, and patients' dependence on vital medical equipment attached to them and the problems and challenges facing in the future, it is essential that a crisis management plan is at hand and hospitals are prepared for facing the disasters.⁸Hospitals' preparedness against disasters is a result of various complex factors, one of the most important of which is the availability of a plan for unexpected disasters in hospitals. Preparing such plan is one of the key priorities of the board and the director of each hospital, and is the first step in creating hospital preparedness against disasters.²The experience of other countries has shown that hospitals that have had preparedness plan and have repeatedly practiced this plan have suffered lower loss during the occurrence of the disaster. However, existence of a confrontation plan is not effective by itself and hospital preparedness is crucial to implement the plan.⁹According to the HealthCare Associates Credit Union, every approved hospital must be prepared fully for providing emergency care services to all disaster victims.⁴Preparedness is one of the important stages of unexpected disasters management cycle.²Preparedness includes data collection, research, planning, creating managerial-educational structures, providing exercise resources and maneuver.¹⁰Preparedness aims to mitigate side effects of potential risk of events using appropriate effective safety precautions and ensuring the organization and efficient organizing and presenting immediate emergency response to disasters.¹¹When unexpected disasters and events occur, work condition at hospitals varies completely; the intended changes include all activities and the state of hospitals will be accommodated with disaster conditions according to the predetermined plans. Hospital operations should be rearranged at the same location and with the same staff that are working at normal time of the hospital. Measures that are necessary for immunization of the hospital's operation at war period and should be taken against disasters are necessary for the safety of the hospital at normal time.¹²Preparedness against disasters includes the following elements: legal and political framework for crisis management, vulnerability data collection and analysis, management systems for preparedness against emergency conditions, public preparedness and participation, development of organizational and human resources.¹³Therefore, there must be full preparedness to confront the crisis caused by disasters. Hospital managers should learn the necessary information about crisis management to act reasonably

and play their role as it should be when an earthquake occurs.¹⁴Despite the repeated crises that occurred in the province and despite the likelihood of future repetitions, and according to the research conducted in the province on the safety of hospitals and respective issues, no research has been so far conducted to estimate the preparedness level of administrators and state hospitals of Guilan against earthquake. Therefore, the present study aims to determine the preparedness level of administrators of state hospitals of Guilan against earthquake.

2. Material & Methods

This research is a descriptive cross-sectional applied study. Study population includes all educational and medical hospitals of Guilan and their managers and data collection tool is a questionnaire consisting of 37 questions and an assessment checklist consisting of 133 questions. The questionnaires, including 7 general questions and 30 specialty questions about the preparedness of managers for dealing with the earthquake, were distributed among the managers of the studied hospitals. Checklists also included assessment checklist of hospital evacuation and field treatment planning (20 questions), assessment checklist of Environmental Health Action Plan (16 questions), assessment checklist of hospital disaster management plan (12 questions), assessment checklist of critical services support plan (17 questions), assessment checklist of hospital education plan against earthquake (18 questions), assessment checklist of hazardous equipment and materials safety plan against earthquake (26 questions), assessment checklist of Construction Risk Mitigation Plan (8 questions), assessment checklist of hospital evacuation and field treatment planning (20 questions), assessment checklist of planning medical and non-medical emergency equipment and consuming goods (16 questions). The criterion for scoring is such that in each section, if %75 of answers are positive, the hospital is fully prepared at that section and the percentage between %50-70 shows the moderate preparedness and if less than 50% of answers are positive, the hospital is not prepared enough in that part. Contents of checklists are extracted from all relevant sources, including books, articles, speeches, electronic resources, dissertations, university professors' opinions and the existing checklists, and are arranged based on the special objectives of the study.

The face validity of checklists has been approved by researchers and respective experts. To determine the validity of checklist and its contents, university professors, managers of the hospitals involved in the crisis as well as the crisis management scholars were asked for their opinions through several stages. In addition, checklists are in accordance with the

instructions communicated by the hospital guide to confront the earthquake to hospitals by the Ministry of Health and Medical Education, and are used in 21 educational and non-educational and private hospitals affiliated to Iran University of Medical Sciences (IUMS). Moreover, the validity and reliability of the questionnaire have been determined to be 0.911 via test-retest method.

3. Findings

Out of the 19 studied managers, 13(68%) were males and 6(32%) were females. 27% of managers were under 40 and 69% aged 40-50 and 5% of managers were above 50. 47% of managers had nursing degree, 26% had physician degree, 11% had management degree and 14% were from other fields of study. 58% of managers had less than 10 years of work experience, 37% had 10 to 20 years and 5% had higher than 20 years of work experience. Among the studied hospitals, 37% were medical-educational and 63% were medical hospitals (Table 1).

Table 1: The demographic characteristics of managers of the studied hospitals

Variable	Number (percent)
Age (years): <40	5(27)

40-50	13(68)
>50	1(5)
Field:	
Nursing	8(47)
Medicine	5(26)
Management	2(11)
Other	4(16)
Degree:	
Less than a bachelor	0(0)
bachelor	8(47)
Above a bachelor	11(53)
Experience:	
<10	11(58)
10-20	7(37)
>20	1(5)

26% of interviewees in hospitals were heads of hospitals and 74% were managers. 73% of hospital administrators had a good preparedness in the field of disaster management plan in hospitals and 58% had a good preparedness in the field of medical and non-medical emergency equipment plan, and consuming goods. Only 42% of hospital administrators had a proper preparedness in terms of the education planning to deal with earthquakes (Table 2).

Table 2: The preparedness state of the studied hospitals against earthquake

Preparation fields	Status		Moderate		Appropriate	
	Inappropriate		Number	Percent	Number	Percent
hospital education plan against earthquake	7	37	4	21	8	42
hazardous equipment and materials safety plan against earthquake	4	21	9	47	6	32
critical services support plan	1	5	5	26	13	69
environmental health action plan against earthquake	7	38	6	31	6	31
medical and non-medical emergency equipment and consuming goods plan	0	0	8	42	11	58
construction risk mitigation plan	13	68	1	5	5	27
hospital evacuation and field treatment plan	12	63	6	32	1	5
hospital disaster management plan	2	11	3	16	14	73

25% of medical hospitals had a poor preparedness and 100% of medical-educational hospitals had a moderate preparedness. Using ANOVA, a significant relationship was observed between the manager's knowledge and preparedness. That is, more knowledgeable managers were more prepared ($P=0.001$). According to t-test, no significant difference was observed between the average score of the

manager's knowledge and the type of hospital ($P=0.446$). There was a correlation between the manager's preparedness and knowledge in the field of hospital educational planning to deal with earthquakes, hazardous equipment and materials safety plan against earthquake, construction risk mitigation plan, hospital evacuation and field treatment planning and general preparedness ($P<0.05$) (Table 3).

Table 3: Examination of the correlation between knowledge and preparedness level and its components

Preparation fields	r	p.v
hospital education plan against earthquake	64%	0/003
hazardous equipment and materials safety plan against earthquake	66%	0/002
critical services support plan	43%	0/065
environmental health action plan against earthquake	43%	0/063
medical and non-medical emergency equipment and consuming goods plan	26%	0/29
construction risk mitigation plan	83%	0/01
hospital evacuation and field treatment plan	59%	0/008

hospital disaster management plan	43%	0/065
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The average percentage of managers' preparedness in the field of critical services support plan was %80.8, in the field of disaster management in hospitals %82.89, environmental health action plan to deal with earthquake %59.86, hazardous equipment and materials safety plan %65.79, construction risk mitigation plan %46.05, hospital evacuation and field treatment planning %40, and educational plan to deal with earthquake %59.64, respectively. The average score was good in the fields of disaster management

plan in the hospitals, critical services support plan and planning medical and non-medical emergency equipment and consuming goods. This was moderate in the fields of educational plan to deal with earthquake, environmental health action plan to deal with earthquake, and hazardous equipment and materials safety plan. Also, it was poor in the fields of construction risk mitigation plan, and hospital evacuation and field treatment planning (Table 4).

Table 4: Preparedness status of hospitals of the province in terms of each field against earthquake

Preparedness field Hospital	hospital disaster management	hospital education plan against earthquake	critical services support plan	environmental health action plan against earthquake	hazardous equipment and materials safety plan against earthquake	construction risk mitigation plan	hospital evacuation and field treatment plan	medical and non-medical emergency equipment and consuming goods plan	Preparedness field
Rudbar	moderate	weak	moderate	weak	weak	weak	weak	good	weak
Velaiat-Rasht	good	moderate	weak	good	moderate	weak	weak	good	moderate
Rudsar	good	weak	good	weak	moderate	weak	weak	good	moderate
Poursina-Rasht	good	moderate	moderate	moderate	moderate	moderate	moderate	good	moderate
Imam Hassan-Fouman	good	moderate	good	good	good	weak	weak	good	moderate
Amini - Langrood	good	weak	good	weak	weak	weak	weak	moderate	weak
Manjil	good	good	good	good	good	good	moderate	moderate	good
Noorani - Talesh	moderate	weak	moderate	weak	moderate	weak	weak	good	weak
Amiralmomenin-Rasht	good	good	good	weak	good	good	weak	moderate	moderate
Alzahra- Rasht	good	good	good	moderate	moderate	weak	moderate	good	moderate
Imam Khomeini Some Sara	good	moderate	moderate	good	moderate	weak	moderate	good	moderate
Razi- Rasht	weak	weak	good	moderate	moderate	weak	weak	good	moderate
Heshmat- Rasht	good	good	moderate	moderate	moderate	weak	moderate	good	moderate
Shafa- Rasht	good	good	good	good	weak	weak	moderate	good	moderate
Astara	good	good	good	good	good	good	moderate	good	good
Lahijan	good	good	good	weak	good	good	good	good	good
Masal	moderate	weak	good	weak	moderate	good	ضعيف	moderate	moderate
Beheshti	good	good	good	good	good	good	moderate	good	good
Astane	good	moderate	good	moderate	moderate	weak	weak	moderate	moderate
Total Status	good	moderate	good	moderate	moderate	weak	weak	good	moderate

Overall, hospitals of the province with an average percentage of 64.31 ± 14.21 had a moderate level of preparedness against earthquake (Table 5).

Table 5: Average of hospital preparedness

Switch	Average	Minimum	Maximum	Standard deviation
preparedness status	64/31	38/35	86/47	14/21

4. Discussion

There is no preparedness against earthquake and emergencies in an isolated condition. Earthquake preparedness plans should match the current conditions in order to be successful. These conditions vary from one country to another and from community to community.¹³In the present study, in an overall assessment based on eight dimensions of

hazardous equipment and materials safety plan, medical and non-medical emergency equipment and consuming goods, construction risk mitigation plan, hospital evacuation and field treatment planning, hospital environmental health action plan, disaster plan management, hospital educational planning, and critical services support plan, the results show that %21 of the studied hospitals are at a good level of

preparedness, %63 are at a moderate level of preparedness and %16 are at a poor level of preparedness. In his study, Amiri¹⁶ claimed that %30 of hospitals have a poor preparedness, which is inconsistent with the present study. In his study, Shokouh¹⁷ reported preparedness of %9.5 of the studied hospitals to be good, %28.6 poor and %61.6 to be at a moderate level, which is largely consistent with the results of the present study. In his paper, Arab¹⁸ reported the average preparedness to be 49.54% and Mohabati¹⁹ reported it %47, which is inconsistent with the present results, but consistent with the results of Baradaran¹⁵ and Amiri regarding the average preparedness of hospitals. Poor and moderate preparedness of hospitals against earthquake can be due to some factors including lack of vulnerability assessment and spreading the data related to hazards and specific emergency, lack of emergency plan in earthquakes, poor data management systems, alarm systems, special communication systems, lack of specific manual and instructions for each ward of hospital to deal with earthquakes, absence of elevators to exit the patients that are unable to walk in the courtyard of the hospital, lack of portable water filter to use in case of an earthquake. The results show that %47 of managers have nursing degree, %26 have physician degree, %11 management and %14 are in other disciplines. In their studies, Amiri has reported the percentage of managers in management field to be zero percent, Shokouh %9.5, Arab %26.7, Mohabati %27, and Tajvar²⁰ %6.3. Despite training manpower in the field of healthcare service management, the results indicate the lack of recruitment of graduates in this field in management positions in hospitals; those who have been trained in the field of disaster management in addition to the field of healthcare service management. Moreover, in most industrialized countries, medical directors have been removed from the hospital administration, and the other phenomenon that nullifies the administrative domination and management of the physician is the need to control costs, through applying specialized hospital management, observing standards of health economics, and considering priorities with cost-benefit calculations and this by no means include in the territory of the doctors' profession and is beyond his expertise. The study results also show that %11 of managers have been trained in disaster management. In his study, Amiri reported this figure to be %70, Arab %93.3, Shokouh %52.4 and Ebrahimipour²¹ %27, which is inconsistent with the results of the present study. In addition, %89 of the studied managers announced the need to hold training and CME courses in this field, which indicates the importance of understanding the issue from their

viewpoint. Training managers and employees improves their knowledge and skills and makes them take appropriate actions during emergencies and reduces human casualties and economic losses. The average percentage of preparedness in the field of hazardous equipment and materials safety plan was %65.8. In his study, Amiri stated that %64.2 of hospitals have a moderate level of preparedness that is consistent with the results of the present study. In their study, Arab and Mohabati reported it to be %40.2 and %40, respectively; a result which is inconsistent with the present results. Low levels of preparedness in this field can be due to lack of visiting emergency generators weekly, lack of fire-fighting systems, fire alarm systems, lack of reinforcement of all glasses by tape and glass frosting spray, and lack of safety measures to prevent glass dispersion during an earthquake. The average percentage of preparedness in the field of hospital evacuation and field treatment planning was %40, which can be improved by training employees on evacuation procedures in case elevators or the stairs cannot be used, planning for treatment of patients in the free space in bad climate conditions, arranging for emergency doors, prediction of suitable space for the temporary accommodation of patients, planning to determine by whom, when and where the entire or a part of the hospital will be evacuated. The average preparedness in the field of construction risk mitigation plan assessment was %46.05. In his study, Arab claimed that %45 of hospitals have a good level of preparedness in this field. Low level of preparedness in this field can be due to the lack of a contract with a constructional engineering firm, lack of identification of vulnerability of each of the hospital buildings and lack of identification of risk of each of hospital structures for public safety. In the field of hospital environmental health action plan against earthquake, %31 of hospitals have a good preparedness level, %31 have a moderate level and 38 have a poor preparedness level. In his study, Shokouh claimed that %14.3 of the hospitals in this field have a good level of preparedness and in his study; Mohabati reports the performance of %27 of hospitals in the environment improvement after the earthquake to be good. The average percentage of preparedness in the field of environmental health action plan was 59.9. Low level of preparedness in this field can be due to the lack of a specific plan for the sanitary collection of waste after earthquake, lack of a specific plan to study chemical quality of water, lack of portable water filter to disinfect water after earthquake.

5. Conclusion

Regarding the earthquake-prone nature of Guilan and its location on faults and the seismic belt and the

occurrence of several natural disasters such as the earthquake in 1990 in Rudbar and similar cases in previous years, and considering that the earthquake has been very destructive and has affected the health care system through a large number of patients and injuries and their effects continue long after the crisis period, and given that the overall preparedness of hospitals of the province is at a moderate level, it requires more attention of senior managers of the province and hospitals in the field of preparedness to deal with earthquake.

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