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The effect of education and implementation of “National Hospital Disaster Preparedness Plan” on an Iranian hospital preparedness: An interventional study

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Abstract:

INTRODUCTION: Hospitals as the first place for injuries have to keep up and increase activities in emergency and disasters. Therefore, any hospital necessarily requires disasters plan to improve its preparedness. The aim of this study is to investigate the effect of education and implementation of “National Hospital Disaster Preparedness Plan (NHDPP)” on Vali Asr Hospital preparedness in Iran.

METHODOLOGY: In a pre- and post-intervention study, NHDPP educated in five sessions, and it was used as a guide in the promotion of Vali Asr Hospital preparedness in Iran. The Iranian version of “Hospital Disaster Preparedness (HDP) assessment tool” was used to measure the hospital preparedness score. Finally, the quantitative data analyzed by using IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.

RESULTS: Before intervention, the HDP score was measured in total and in the nine dimensions of preparedness. But after the intervention, it increased, 33% in command and control dimension, 33% in communication, 21% in safety and security, 26% in triage, 36% in surge capacity, 24% in the continuity of vital services, 27% in human resources, 13% in support and supplies management, and 7% in post disaster recovery dimension. Furthermore, the total HDP score increased about 24.5% after the intervention.

CONCLUSION: This study demonstrates that the “Iranian HDP plan” leads to improve the Vali Asr HDP score. Therefore, by planning and implementation of effective educational programs, it is possible to improve the hospitals’ preparedness in Iran.

Keywords:

Disaster, education, hospital, preparedness plan

Introduction

Iran, as a developing country, has always been prone to disasters.^[1] Recently, (November 12, 2017) 625 people were killed and >15,000 were injured by an earthquake on the Iraq–Iran border.^[2] With spreading emergency and disasters,

it is necessary to manage disasters for communities’ survival. Health is the first demand of so many people after disaster, and the preparedness of health system, especially hospitals’ preparedness (as one of the key elements of any “Health Systems”) is critical.^[3,4] In the meantime, the “Vali Asr Hospital disaster preparedness (HDP)” as

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an only hospital in Razan county (Razan located in the northern of Hamadan Province in Iran) is so important. Razan, due to proximity to the Avaj fault zone,^[5] is one of the critical points of earthquake risk zoning in Iran. This fault has caused devastating earthquakes in June 22, 2002.^[6] In addition, due to mountainous weather and located in the passageway of the main road of "Hamadan-Qazvin" and also due to closeness to Avaj mountain passway (an area prone to traffic road accidents), Razan has been prone to various emergencies and disasters. In Iran, the attempts to improve hospitals' preparedness, started in winter of 2009, through developing National HDP Plan (NHDPP) by Health Research Center in Disasters at the University of Welfare and Rehabilitation Sciences. This program as a national guideline, was supported by the Secretariat of Disaster Health Working Group in the Ministry of Health and was announced to all hospitals in Iran.^[7] Nevertheless, implementing Disaster Preparedness Plan in Iran Hospitals is a main challenge^[8] and after nearly 9 years of implementation of NHDPP in Iran, it was necessarily needed to investigate its effectiveness. In Iran and the other countries in the world, there are many studies that conducted to assessment of the preparedness of hospitals and hospital employers in disasters.^[9-17] Nevertheless, there are limited interventional studies to explore the effectiveness of the HDP on hospitals' preparedness. Thus, this research is conducted to investigate the effect of education and implementation of "NHDPP" on disaster preparedness of Vali Asr Hospital in Iran.

Methodology

This is a pre- and post-intervention study that was conducted in Vali Asr Hospital in 2017. Research tools of the study included: "National (Iranian) hazard analysis Tool" and Iranian version of the "HDP Assessment Tool." Since the hazard analysis is one of the first steps in disaster management planning,^[7] the first ten hazards of Vali Asr Hospital identified by the "National hazard Analysis Tool." This tool Commissioned by the Secretariat of the Health Working Group and designed and developed by Khankeh *et al.* (2013), in the "Health in Emergency and Disaster Research Center in University of Social Welfare and Rehabilitation Sciences" to extract the Universities of Medical Sciences hazard list. This tool evaluates the hazards based on the "frequency," "magnitude," "vulnerability," and "probability" factors.^[18]

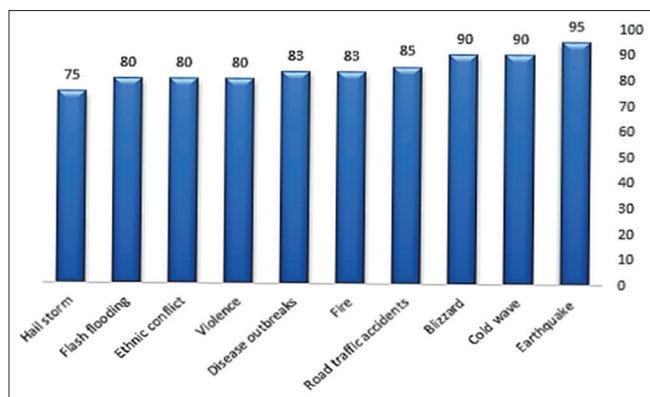
"HDP Assessment Tool" is the Iranian version of "Hospital emergency response checklist" that was introduced by the European Office of World Health Organization.^[19] Validity and reliability of Iranian version of the "HDP Assessment Tool" was verified by Karimian (2015).^[20] It measures hospitals' preparedness

by an all-hazard approach. The instrument consisted of 91 three-choice questions (under investigation, in progress, and completed) based on nine key components of hospital preparedness including: command and control (6 questions), triage (10 questions), human resources (15 questions), communications (9 questions), increased capacity (13 questions), support/provisions management (10 questions), safety and security (11 questions), continuity of vital services (8 questions), and recovery after disasters (9 questions). Each question has three items included: "under investigation," "in progress," and "completed." For the scoring, the number "1" allocated for "under investigation," the number "2" for "in progress," and "3" for the "completed" item. Because the number of questions in the tool domains was not equal, the 0–100 method was used to scoring and homogenize the domains. At the end, the score obtained from each dimension and from all domains was categorized into three levels: weak (<34%), moderate (34%–67%), and strong (above 67%). Once the hospital preparedness questionnaire was completed for the hospital, the NHDPP firstly educated and then was implemented for a period of 1 year. According to NHDPP, HDP was acquired in four steps, including: (1) Preparing disaster preparedness policies, (2) Planning response to emergencies and disasters, (3) Training of employees, and (4) Monitoring and evaluation of results.

The intervention was started with educating of the NHDPP for all hospital staff (particularly clinical and managerial staff) in five sessions (each session is 4 h) and reestablishment of Disaster Risk Management Committee. The content of educational program included: hospital risk and hazard assessment, HDP program, hospital early warning system, establishment and activation of hospital incident command system (HICS), activation of hospital response plan, hospital surge capacity planning, and triage in disaster.

The secretary and members of hospital disaster risk management committee, were assigned according to hospital organization and indicators proposed in the NHDPP. In the next step, the "Vali Asr HDP program" was developed based on the NHDPP and according to the main hazards of the hospital (included the internal and external hazards of Vali Asr Hospital that was extracted by The "National hazard Analysis Tool" [Graph 1]) through monthly meetings of the Hospital Disasters Management Committee (twice a month) and continuing follow-up of committee secretary and the study researcher.

In relation to the "command and control" dimension, the original and alternate members of the HICS and also the members of hospital disasters committee were reassigned and trained. Regarding the dimension of



Graph 1: The first ten hazards of Vali Asr Hospital

“surge capacity,” it was considered a place to increase the capacity of the emergency department until five beds (the total number of active beds in emergency department was 12) and was developed an increased capacity plan for it.

The identifying potential area such as lobbies and “staff training room” to increase the patient admission (until 35 bed), signing an agreement with women gym (which is available near the Vali Asr Hospital) to convert it to a therapeutic unit in disasters, signing an agreement with emergency medical services (EMS) to help in transport of disaster casualties, and developing a plan to discharge elective patients were the other main measures to enhancing hospital preparedness in this item.

In relation to “communication,” it was assigned a person as a “public relations officer” and also was determined a specified place (in the hospital campus) to meet the media, community, and the health authorities in the disasters. Gathering employer contact information and activating short message service system for them, collecting main contact numbers such as the emergency operations center, EMS, Fire Department, Red Crescent, Municipality, Governorate, as well as developing a patients tracking plan, were the preparedness actions in this item.

The measures that conducted about the “human resource” dimension, were included: compilation of personnel recall program and list them based on the priority of call, recording of staff call numbers and their address, identification, registering and training of health volunteers to help in disasters, concluding a “memorandum of understanding” with one of the chain stores in the Razan city to ensure the supply of food and personnel requirements, and providing a place to rest of the personnel.

In relation to “triage,” in addition to the triage education for all staff, was assigned a place for “start triage” in out

of the emergency department (in the hospital campus) and was specified a place for entrance and leaving of the ambulances and patients to the hospital, also assigned experienced staff to doing triage. Developing a comprehensive plan for controlling of the hospital gates in disasters and signing an agreement with police to ensure hospital security were the activities that were conducted to improve hospital’s preparedness in “safety and security” dimension. Finally, after 12 months (a year) of the intervention, the “HDP Assessment Tool” was recompleted and the quantitative data were analyzed and compared (in before and after intervention) using IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.

Results

The Vali Asr Hospital is a general hospital with 110 active beds. Its wards are including: emergency department, operating room and intensive care unit, critical care unit, “Surgery–Internal” ward for men and for women, dialysis, and mother and infant ward. It also includes other wards such as radiology, laboratory and pathology, and clinic and administrative unit. See other demographic data in [Table 1]. In assessing the hazards of the hospital, the first ten hazards of Vali Asr Hospital were determined that the results of which are shown in Graph 1. The results of the current study showed that the applying principles of the NHDPP have increased preparedness score in all HDP dimensions. The increase in the “command and control” was 33%, in “triage” 26%, in “human resources” 27%, in “communications” 33%, in “surge capacity” 36%, in “logistics/support management” 13%, in “safety and security” 21%, in “continuation of vital services” 24%, and in the “recovery after disaster” was 7%, as detailed shown in Table 2. Through investigating the effect of intervention on the overall hospital preparedness score, the study showed that the intervention led to enhancing hospital preparedness up to 24.5% [Table 2].

Discussion

This study examined the effect of intervention on Vali Asr Hospital preparedness in total score and in nine dimensions include: command and control, triage, human resources, communications, surge capacity, support/logistics management, safety and security, continuity of vital services, and recovery after the disasters. Based on the results [Table 2], the Vali Asr Hospital preparedness before intervention was close to low level (in total and in the dimension levels). The results of this study are consistent with many national studies conducted such as Ghafari *et al.*^[21] and Ardalan *et al.* (2014).^[22] In all of them, the hospital preparedness was in low level. Regarding the effect of intervention on

the hospital preparedness, the current study showed that educating and implementation of NHDPP has promoted the preparedness of Vali Asr Hospital in all dimensions. As seen in Table 2, the most increase in the preparedness score is related to the “surge capacity,” “command and control,” and “communication.” According to the study of Nekoie-Moghadam *et al.*, the “command and control” and “communication” were the main elements of HDP.^[3] Furthermore, the results of this study are consistent with the results of the study of Delshad *et al.*^[23] and Karimian *et al.* (2015).^[20]

The results showed that the intervention had an increasing effect on the dimensions of “triage,” “human resource,” “safety and security,” and “service continuity.” In this regard, the study of Pouraghaei *et al.* showed that the education of “triage in disaster,” has positive effects on the knowledge and performance of EMS technicians.^[24] As well as in the study of Rahmati *et al.* education of triage improves the qualitative indices of emergency department.^[25] In the study that conducted by Delshad *et al.*, activities such as allocating a place for triage in outside of hospital, as well as developing a plan for cancelation of elective surgery operations improved hospital preparedness score.^[23,26] Despite the

positive results of the study about “safety and security,” lack of introducing the rules necessary for volunteers’ attendance during disasters, absence of a valid method to identify hospital personnel, and patients and visitors at the time of disasters were the factors in reducing the preparedness score in this item.

In general, although NHDPP has increased the hospital preparedness in all dimensions, this increase was minimal in the “recovery” dimension. Time constraint caused the least change in the “recovery” preparedness and perhaps increasing the duration of the study and carrying out the necessary interventions in this area can increase the preparedness in this dimension. Lack of disaster recovery plan, lack of necessary criteria and processes of controlling disaster and the recovery system, lack of team organization of hospital staff for checking hospital inventory after the disaster, lack of considering people to provide reports to hospital administrators after the disasters, absence of defined responsibilities for employees, volunteers, and foreign workers in response to natural disasters and recovery phases, were the weaknesses of the hospital in this area, and it indicates the need for more action in this regard.

Through investigating the effect of intervention on overall hospital preparedness, the total preparedness score improved from 104.5 in pre intervention to 171.4 in post intervention. The results of this study are consistent with findings of Rajabi *et al.*^[27] and Karimian *et al.*^[20] In these studies, the hospital preparedness level increased following intervention. In the study conducted by Rajabi *et al.*, hospital overall preparedness score increased from poor-to-moderate level. In the study conducted by Karimian *et al.*^[20], the overall preparedness of the hospital increased from 178 to 210 following teaching principles of hospital preparedness national program.

Conclusion

This study demonstrates that education and implementation of the “Iranian HDP plan” lead to

Table 1: Vali Asr Hospital demographic characteristics

Type	General
Population covered	116,000
Number of employees	
Administrative unit	23
Clinical	107
Paraclinical	21
Service unit	40
Others	5
Number of bed	
Approved	80
Active	110
Bed occupancy rate in normal circumstances (%)	85
Distance to the nearest hospital (km)	44
Distance to the province center (Hamadan) (km)	80

Table 2: Hospital disaster preparedness scores in before and after intervention

Dimension	Before intervention		After intervention		Change rate (%)
	Mean	Percent	Mean	Percent	
Command and control	7.9	44	13.86	77	+33
Triage	12	40	19.8	66	+26
Human resources	15.18	46	24.09	73	+27
Communication	8.91	33	17.82	66	+33
Surge capacity	12.87	33	26.91	69	+36
Logistics/support management	12	50	14.4	63	+13
Safety and security	14.85	33	24.3	54	+21
Continuity of vital services	10.2	34	17.4	58	+24
Recovery	8.91	33	10.8	40	+7
Total hospital preparedness scores	104.55	38.3	171.4	62.8	+24.5

improve the Vali Asr HDP score. Therefore, it is recommended to Iranian hospital officials, by planning and implementation of effective educational programs, to facilitate the running of NHDPP and improves the hospitals' disaster preparedness.

Limitation

One of the limitations of this study was the time limit. It would be better to improve hospitals' preparedness, especially in disasters' recovery phases, if it was done in a longer time.

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Conflicts of interest

There are no conflicts of interest.

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