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The Effect of Teaching Principles of Hospital Preparedness According to the National Program on Preparedness of Shahid Motahari Burns Hospital of Tehran in Response to Disasters

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ABSTRACT

Background: In the event of a disaster, hospitals and health care centers are among the first response units that their efficient and timely health care provision can have a crucial and decisive role in reducing mortality and rescuing injured patients. Accidents and disasters always have a negative impact on public health and welfare of their damaged population and health care measures are the main factors for survival in this situation. Hospitals are among the first centers that are engaged in unexpected complications of accidents. These events pose unique problems, responding to which requires preparation. This study aimed to investigate the effect of teaching principles of hospital preparedness according to the national program on preparedness of Shahid Motahari Burns Hospital of Tehran in response to disasters.

Materials and Methods: This research was an interventional study of a quasi-experimental design with pretest and posttest. Tehran Shahid Motahari Burns Hospital has been purposefully selected as a research environment. Data collection instrument was the World Health Organization standard checklist comprised of 9 components and 91 questions which was used after confirming its validity and reliability. The researcher collected the relevant data by interview and observation. Training program which included 1-day workshop on hospital preparedness in accidents and disasters based on national program was taught to directors and crisis committee members. One month later, the study instrument was completed by the researcher again as the posttest. Wilcoxon test was used to analyze the data.

Results: The results showed that total score of hospital preparedness changed from 178 to 210 in the follow-up. Before the intervention, the hospital had the highest preparedness regarding components of command and control and the lowest preparedness in the post-disaster recovery. After the intervention, the highest increase of preparedness was observed in the communication component. Also with respect to safety and security, the preparedness of the hospital did not change.

Conclusion: The results indicate the positive impact of education of national program to deal with accidents and disasters in increasing the hospitals preparedness in response to disasters. To create and maintain the preparedness of hospitals, it is recommended that training and implementation of national program be included in the major programs of these institutions.

Keywords:
Hospital preparedness, National program response to disasters, Disasters, Shahid Motahari Burns Hospital

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1. Introduction

Every year, throughout the world, hundreds of hospitals and other health care facilities are destroyed or lost their efficiency, because of unpreparedness in accidents and disasters [1]. Each country's health care system plays a key role at the time of accidents and disasters and among this system structures, hospitals are the most functional part [2]. Hospitals at the time of disaster operate as an important and crucial part of health care system of the community [3].

Among the issues and problems that hospitals face are the critical situations caused by accidents and disasters [4]. These disasters due to their huge magnitude affect large population and limited response capacity of responsible agencies in a short time creates a high demand for relief, health, and treatment measures [5]. According to statistics provided by the Research Centre for Epidemiology of Disaster (RCED) in 2015, Islamic Republic of Iran was in 9th rank of the world, in terms of the number of deaths caused by disasters with 319000 deaths. The majority of these deaths were due to the earthquakes and floods. At the time of disaster, hospitals are the main units of health care providers which their timely preparation and delivery of health care services have a crucial role in reducing injuries and deaths [6].

Hospitals must have good and proper preparation before occurrence of accidents and disasters, so they can serve and respond to the greater number of referrals at the time of disasters [7]. Hospitals should continue to provide health services during disasters. So they need to be prepared [8]. The lack of prevention measures and preparedness to respond appropriately and effectively can create a terrible tragedy [9]. Preparation is among the main elements of incident management and in its simplest form it requires planning, personnel training, community education, training, and evaluation [3]. In other words, when one is prepared to deal with accidents, the incident can be stopped at the same extent of incident, but if, for any reason, there is no preparation, a crisis will ensue [10].

Key role of hospitals in treatment, care, and reduction of the severity of injuries requires them to be equipped and strengthened in order to stay safe from accidents and disasters or to minimize damage. Having a program to deal with accidents and disasters can help reducing the effects of disasters through principled and planned confrontation with them and the proper and effective use of available resources [11]. Therefore, hospitals as the first and most important organizations at the time of disasters must be prepared enough before occurrence of accidents and disasters [12].

This preparation needs scientific process based on the world history-proven models. The national program response to disasters has been developed and revised several times, according to up-to-date information (extensive review of available resources), experts opinions (group and individual meetings as individual semi-structured interview, focus group interview, and a panel of experts), and review of studies in relation to health in accidents and disasters [3]. In this study, the effect of national comprehensive training program on hospital preparedness in disasters by Dr Khankeh et al. has been investigated, in particular on the preparedness of Tehran Shahid Motahari Burns Hospital in 2014. The outcome was determined using standard checklist by the World Health Organization.

2. Materials and Methods

This interventional study has a quasi-experimental method with pretest and posttest design. The study was conducted to determine the effects of teaching principles of hospital preparedness according to the national program on the level of responsiveness preparedness of Shahid Motahari Burns Hospital of Tehran to disasters. The outcome of training was determined using standard checklist by the World Health Organization.

In this study, Shahid Motahari Burns Hospital of Tehran was purposefully selected among the Tehran hospitals, because of its important position during disasters and also its appropriate study environment. Given that the provided trainings were generally administrative, only supervisors and executives of the hospitals were non-randomly selected to participate in research (convenience sampling method). After receiving the list of hospital staff and consultation with chairman of the Crisis Committee of the Hospital, 30 people were selected and invited to participate in training workshop. These people included 8 supervisors, 5 head nurses, 6 members of the crisis committee of the hospital, 1 matron, 1 social worker, 1 person in charge of radiology, 1 person in charge of medical records, 1 person in charge of physiotherapy, 1 person in charge of medical equipment, 1 person in charge of environmental health, 1 secretariat, 1 person in charge of logistics, 1 person in charge of rehabilitation, and 1 rehabilitation counselor. All of them had management positions and important roles at the time of accidents and disasters.

Data were collected using demographic information form and standardized checklist of the World Health

Organization. Demographic information form checks gender, age, last educational certificate, working department, job experience, management position, history of aiding victims of the disasters, experience of attending similar training classes and membership in the crisis committee of hospital. The standardized WHO checklist was presented to evaluate hospital emergency rooms by the World Health Organization's Regional Office in Europe. It helps hospital staff and emergency managers in providing an effective response to the most likely scenarios in emergency events.

This instrument has been used for the first time in Iran in this research and includes 9 key components of command and control, communication, safety and security, triage, surge capacity, continuity of essential services, human resources, logistics and support management, and post-disaster recovery. Each item of the instrument has three options of "due for review," "in progress," and "completed." According to the experts' opinions, the first option has the score of 1, second option score 2, and the third option score of 3 which totally accounts to 273. To evaluate the degree of preparedness, scores 91-136 indicate poor preparedness, scores 137-182 average preparedness, and score 183-228 showed high preparedness.

After the translation of the instrument into Farsi and back translation, Lawshe method was used to determine the validity of the instrument. To evaluate content validity ratio (CVR), this instrument was presented to 7 experts in health care field in disasters and at the end the ratio was found as 0.99 which had good content validity according to the Lawshe test table. In order to calculate the amount of content validity index (CVI), this instrument was put at disposal of 5 doctoral students in Disaster Health at University of Social Welfare and Rehabilitation. At the end, value of CVI was calculated as 0.86 which is acceptable as it is higher than 0.79. To check instrument reliability, questions of the instrument were asked from 6 managers of Shahid Motahari Burns Hospital and the instrument were completed. After a month, the same questions were asked again from these 6 people and the calculated Cronbach α value using SPSS was equal to 0.83 which shows more than 80% of confidence.

The researcher completed pretest form by observation and interview three days before the intervention in collaboration with the members of accidents and disasters committee of the hospital.

Intervention has been conducted in a 1-day workshop entitled «Promoting hospital preparedness in accidents and disasters» on November 17, 2013 held in Shahid Motahari Burns Hospital. Hospital preparedness includes preventive measures taken to provide effective and efficient response to possible disasters in the form of a comprehensive planning. The workshop was held with the aim of acquiring knowledge in the field of disaster management and risk assessment and also planning to deal with these risks. Educational materials provided in this workshop have been compiled from the book «hospital preparedness for emergency events: national program» by Dr Khankeh et al. working in the health workgroup of accidents and disasters at University of Social Welfare and Rehabilitation Sciences under direct support of the Ministry of Health, Treatment, and Medical Education. In this workshop, a single model was presented to increase the level of preparedness of hospitals against accidents and disasters.

The content principles of hospital preparedness, identifying risks threatening the hospital, principles of hospital planning and contingency plans which were taught by the researcher, two PhD students of Health in Emergencies and Disasters, and secretary of Disaster Risk Committee of the Aatieh Hospital. Trainings were presented in the form of lecture and practical work to hospital personnel. In this process, the Committee for Incidents and Disasters was established in the hospital for emergency events. Then to analyze risk, internal and external risks threatening hospital were estimated by hospital staff according to hospital information system. In the next step, contingency plans were taught to deal with these risks. Eventually, the application of contingency plans were practiced in a working group to reduce the risk and management of internal and external risks of training.

Posttest form of the instrument was completed by the researcher one month after the intervention in collaboration with members of Disasters Committee of the hospital. Wilcoxon test was used to evaluate the effect of education intervention on the components of the instrument. Wilcoxon test is among statistical nonparametric tests, which is used to compare a variable in two different conditions. The test was administered separately for each component and in general for all 9 components.

3. Results

The findings showed that before the intervention, the hospital had the highest readiness with regard to the command and control component and lowest level of preparedness in post- disaster recovery component. Total score of hospital preparedness before the workshop was 178. After intervention, this score reached to 210 which showed 32 points increase which was statistically sig-

Table 1. Components score of WHO checklist assessing hospital preparedness against disasters

Key Components	Before the Intervention	After the Intervention	Difference	Sig.
Command and control	17	18	1	0.317
Communication	14	21	7	0.020
Safety and security	19	19	0	1.00
Triage	21	23	2	0.083
Surge capacity	26	31	5	0.025
Continuity of essential services	14	18	4	0.102
Human resource	29	32	3	0.083
Logistics and support management	22	27	5	0.025
Post- disaster recovery	16	21	5	0.025
Total score of hospital preparedness	178	210	32	0.0001

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nificant (P = 0.0001). The highest increase of preparedness was related to the communication component. With regard to safety and security, the hospital preparedness remained unchanged. The increase in scores of 4 components of communication, surge capacity, logistics and support management, and post- disaster recovery was statistically significant.

4. Discussion

Before the intervention, with regard to the first key component of the instrument i.e., the command and control, the hospital had got the score of 17 out of 18 which showed high preparedness of the hospital in this area. Having an Incident Command Center in the hospital, appointing a person in charge for each key component of the instrument, registering and keeping all records related to disaster management, and having job descriptions for managers and staff to become familiar with their duties are the primary reasons for this high score. The results of this part of the research is inconsistent with findings of the Ojaghi et al. [4] who evaluated the preparedness of hospitals in Kermanshah as poor in every aspect.

The absence of Incident Command Center in these hospitals was the most important factor for this weakness. Hojjat et al. [13] also mentioned preparedness of their hospitals under study regarding command and management component as 48.17% which is in average condition. Paying special attention to the components of command and control has been suggested in this study.

With regard to the second key component of the instrument in this study i.e., the communication, our hospital received a score of 14 out of 27. In this regard, having a liaison and spokesperson at the time of the incident and disaster and clarity of duties for the hospital staff about the their roles, responsibilities, and performances were among the strengths of the hospital in this area but the lack of a draft for events occurrence for the target people (e.g., patients and personnel), lack of consideration of an appropriate method to collect and analysis of data, and lack of consideration of alternative suitable communication (e.g. satellite phone and cell phone) were among the weaknesses of the hospital in this area. Hospital score in this aspect shows average preparedness of the hospital, which was consistent with the Daneshmandi et al. [12] findings. No anticipation of alternative route for communication and communication systems, and the organizational structure at the time of crisis and no instructions on the manner of employees' connection with their families were among the major defects in communication sector of the hospitals studied by Daneshmandi et al. which was seen in this study too.

Daneshmandi et al. in a study conducted with the aim of assessing preparedness in disasters in one of the hospitals of Tehran, mentioned poor communication as the reason for lack of coordination among organizations which makes the confusion caused by the crisis several times worse. They also mentioned that allocation of resources in this area would be effective [14].

The hospital obtained score of 19 of 33 with regard to safety and security component. Hospital safety team

was already determined and a mechanism has been established to ensure patient and personnel safety should accidents and disasters occur. However, lack of a reliable method to identify staff and patients, not allocating a location for the sterilization of radioactive and chemical materials, reduced hospital preparedness score in this aspect. Also, little were conducted on cases such as determining areas with high vulnerability and defining the rules for attending at hospitals at the time of accidents and disasters and this was consistent with the results by Daneshmandi et al. [12] and Amiri et al. [6]. However, it was inconsistent with the results of Hojjat et al. study [13] in which they assessed security component of 13 hospitals affiliated to Medical Sciences University as good and this could be the result of taking measures, including holding training classes in these hospitals.

With regard to the triage component, score of 21 out of 30 was an indicator of good preparedness of the hospital in the field. The reason lies in appropriate operating procedures for the triage of patients at the time of events and disasters, taking into account the specific location for triage during disasters, and providing appropriate training to staff regarding triage. However, ignoring possible alternative locations for triage in an emergency situation and no guidelines for admission of patients according to their injuries was clear which was consistent with the results of Hassanpour et al. study [15]. Hospitals studied in this research had the highest preparedness with regard to triage component score of 70.5% and the reason for this level of readiness has not been mentioned in the study.

With regard to surge capacity, our hospital received a score of 26 out of 39. Estimation of the potential increased demand in an emergency and considering areas for hospitalized patients in this situation are among the strengths of the hospitals. Identifying ways to increase hospital capacity at the time of disaster, considering vehicles and the resources required for transportation of patients in these conditions and identifying other locations with the possibility of converting them to patient care units such as hospital auditorium were the works done in this area which was consistent with Kaji et al. study [16]. This study was conducted to evaluate the preparedness of Los Angeles Hospital. The results of this part of the study was consistent with Garavandi study [7] which was conducted in Razi educational and treatment center of Ahvaz in 2014. In this study, admittance capacity of the emergency department was increased by measures such as training of the personnel and making necessary changes in the physical spaces of wards and emergency room.

With regard to the continuity of emergency services, the hospitals received a score of 14 out of 24. Enlisting essential hospital services, prioritizing them at the time of disasters, and storing essential items in these situations are the measures taken by the hospital in this regard. Not enlisting basic services (i.e. those that should be at disposal at any time and any condition) and failure to investigate possible impacts of accidents on hospital equipment such as water and food are among the weaknesses of the hospital in this area which was inconsistent with the study by Hosseini Shokooh [17] which evaluated the preparedness of the hospitals high in this area. But, it was consistent with Amiri et al. study results [6].

With regard to human resources, the hospital received a score of 29 out of 45. Disregarding the needs of staff and their families at times of crisis and non-performing maneuvers may be considered weaknesses of the hospital in this regard. Complete and updated list of contact numbers of the personnel, estimating and monitoring employees' absenteeism, prioritizing personnel needs and giving proper training to staff of emergency departments and intensive care units are among the strengths of the hospital which was consistent with the study results of Salari et al. [5] and Daneshmandi et al. [12]. In these studies, the hospitals ignoring the health status of staff and their families at times of crisis was felt. Human resources always play an important role in the management of hospital services, so trained and skilled forces must be appointed as the linchpin in each section of the hospitals. In Ameriuon et al. study [10], hospitals under study were in very good condition in terms of human resources (94.25%). The presence of at least one nurse and physician at headquarters, familiarity of the personnel with the management of crisis, proper training of personnel, and so on are the most important factors for this aspect of preparedness.

With regard to logistics and support management, hospital score was 22 out of 30. Complete depot of equipment according to the notified guidelines and ensuring of their storage were the reasons for getting a high score. In this regard, the hospital was well-prepared. Hosseini Shokooh [17] in his study mentioned that 62% of hospitals under study had a good preparation in this field. The results of this part of the study are consistent with the results of Arab et al. study [18].

Finally, according to Table 1, the hospital scored 16 out of 27 in post-disaster recovery section, which shows the average level of preparedness of the hospital in this aspect. Failure to determine a responsible person to monitor the post-disaster recovery operations, shortage of time and resources to restore and repair the hospital

when the evacuation is necessary, and lack of appointing an employee to help planning after the disaster and address the needs of staff and their families were among the weaknesses of the hospital in this area. In Hassanpour et al. study [15] which conducted with the aim of determining the status of Karaj City on emergency response in accidents and disasters, the worst emergency response to disasters was related to the recovery after disaster. In that study, preparing written guidelines and delivering them to hospitals was proposed to increase efficiency in this area.

Obtaining the overall score of 178 out of the total score of 273 before the intervention indicates average preparedness of Shahid Motahari Burns Hospital of Tehran in accidents and disasters. This results is in line with the result of Daneshmandi et al. study [12] which assessed the preparedness in response to the floods, fires, and storms in selected hospitals in Iran.

Hospital preparedness after the intervention in all sectors but the safety and security section increased. The highest increase of preparedness after intervention was related to the communication sector; the reason might be related to considering a place for holding press conferences and measures taken to provide a reliable alternate communication. There was a significant increase in surge capacity, logistics and support management and post-disaster recovery areas. Key component number 5 of the instrument i.e. surge capacity had 5 points increase compared to pre-intervention and increased from 26 to 31. Considering the industrial shed in the yard of the hospital (which was previously used as a warehouse) to care for increased patients at the time of accidents and disasters and concluding contracts with private ambulance agencies and neighboring hospitals like Khatam Al-Anbia Hospital increased the score of this component. However, no measure has been taken in determining admission and discharge criteria, prioritizing clinical interventions, and allocating a place as temporary mortuary compared to pre-intervention period.

With regard to logistics and support management, coordination with health authorities to continuously provide medication and other items needed at the time of accidents and disasters were among the works done by the hospital. Regarding post-disaster recovery the hospital was planning to appoint one of the hospital staff to address the needs of staff after the accident. A team of hospital staff was appointed to check inventory of the hospital after the disaster. With regard to the safety and security section, there was no variation in the preparedness of hospital and perhaps it was due to the absence of safety officer in the workshop. Finally, the overall level of preparedness of the hospital before the intervention was 178 and a month after the intervention it showed 32 points increase and reached 210.

Before the intervention, the score of the hospital was in the range of 137-182, which showed average preparedness of the hospital. After the intervention, hospital score reached 210, given that the score is in the range of 183-228, it shows high preparedness of Shahid Motahari Burns Hospital in responding to disasters. These results indicate the effectiveness of national program for disaster training on increasing responsiveness of Shahid Motahari Burns Hospital to disasters. The study results are consistent with those of Delshad et al. [9] study which was conducted to determine the effects of early warning system on preparedness of Shahid Motahari Burns Hospital. In that study, score of the hospital preparedness increased by 25 points after a 3-day workshop on deployment of early warning system. A total of 32 points score increase of Tehran Shahid Motahari Burns Hospital preparedness in this study should not overlook the fact that this hospital is considered a pilot in disaster preparedness by the Ministry of Health and Medical Education and a series of activities were carried out in it which can be effective in achieving this score by the hospital.

Our study results are consistent with those of Khanke and Borhani Nezhad [11] study which was conducted to investigate the effect of hospital Incident Command System on preparedness of the Committee for Emergency Events and nursing staff of Zarand Imam Ali (PBUH) Hospital. Results of this study indicated positive effect of training on improvement of hospital and nursing staff preparedness.

5. Conclusion

Teaching principles of hospital preparedness according to national program had a significant effect on Shahid Motahari Burns Hospital's preparedness in response to disasters. The study results indicate that preparedness of this hospital in various aspects, including command and control, communication, triage, surge capacity, continuity of essential services, human resources, logistics and support management and post-disaster recovery increased after receiving training of the national program in response to accidents and disasters. This study shows the necessity of national program training in all hospitals in the country to improve preparedness in response to disasters. National program training under similar conditions can increase significantly preparedness of hospitals in accidents and disasters in other hospitals in the country. Having a plan to deal with disasters alone is not

effective, but regular implementation and practice of the program will be effective.

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Conflict of Interest

The authors declared no conflict of interests.

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