# Emergency preparedness of hospitals in Tehran and its relation with crisis management measures

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## ABSTRACT

*Hospital disaster preparedness is essential for being responsive against internal and external risks. This study tried to assess the level of emergency preparedness of Tehran hospitals and its relation with crisis management measures. The main objective of this study was to evaluate the emergency preparedness of hospitals in Tehran and its relation with crisis management measures. The present research is a descriptive-analytical and cross-sectional study that was conducted in 2015. The study population consisted of all the nurses working in selected hospitals in Tehran. Data were collected using the Emergency Preparedness Information Questionnaire (EPIQ). 80 questionnaires were distributed among nurses randomly and 56 of them returned. Moreover data related to accreditation measures were collected from the crisis management departments of the studied hospitals. Kolmogorov-Smirnov test and Pearson correlation were used for data analysis in SPSS. Based on the results of the study, emergency preparedness of the hospitals was not in a good condition (total average 3.6 from 5 in Likert scale), and among the dimensions accessing to resources took the least score and ethical issues took the highest score. Moreover total average of crisis management measures in studied hospitals was 75.5 per cent, and it`s correlation coefficient with hospitals emergency preparedness was 0.64, while this relation was not significant statistically (P value> 0.05). Implementation of risk management standards in current situation, cannot lead to improvements in disaster preparedness of hospitals.*

**Keywords:** hospital, crisis preparedness, accreditation

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## INTRODUCTION

Over the last two decades, the lives of at least 800 million people have been affected by major natural disasters in the world, and this has led to thousands of deaths and economic damages more than $ 50 billion [1-3]. Iran is a disaster-prone country and it is one of the most prone countries in the world to accidents and disasters as that it is counted of the fourth country in Asia and tenth in the world. Over the past decade, more than 180 thousand people in Iran have lost their lives solely because of the earthquake and several times of these number have injured. Earthquake, flood and drought are most frequent events in Iran. In addition, Iran is among the 10 countries of the world refugee's acceptance with about 1 million refugees. About 23 percent of Iran is prone to earthquakes; and despite that Iran is a dry country, 50% of its areas are prone to flood [2, 9-4]. One of the main goals of health systems during the incidence of disasters is providing health care in the affected area [10, 11]. Disaster always has had significant impact on hospital preparation in providing health services to the affected population [9]. Crisis Management provides a management framework for the prevention from and reduction of harmful effects using available facilities and equipment to preparation at the time of natural events [13]. According to the importance of coordination after event stage, the performance of the health scope is beyond this stage. And is necessary preparation of health care provider organizations, especially hospitals before the disaster to provide better health services and reducing losses and waste [14]. Hospital preparation against disasters locates at the top of crisis management in national and international levels, especially in disaster prone countries [15].

As the basic unit of service in the initial phase in emergencies events, the health sector, and especially hospitals play the major and most important role. Since most accidents and natural disasters cannot be prevented from, therefore deaths and injuries should be decreased with increase the readiness of the health care system, especially hospitals [12]. Hospital preparation process is a continuous, dynamic and progressive process in order to identify changes in threats and risks and also the preparation level changes.

Hospitals preparation level will increase if employees can do their task timely, coordinated and accomplish appropriate performance in emergency situations or in any other crisis situation. Formation of a team to deal with crisis that can be provided health services on time in emergency situations has been accepted as a policy in the hospitals. In a critical situation which damages the society, hospitals and particularly nurses should have the ability to provide services in shortest time and human resources should organize and support the injured [16]. Hospital preparation in the crisis means providing response policy, determine response capabilities and standard practical guide for emergency activities of hospital Disturbed sections when accidents and disasters occur and internal or external event that can affect hospital staff, patients, visitors and community [2]. Providing immediate response systems, self-staff training and ultimately respond to the needs when the disaster occurs is the purpose of hospitals preparation. To enhance the readiness of hospitals to deal with disasters, we should focus on internal programming and also, if necessary, its expansion possible [17]. Hospitals that have preparation program and practice that frequently have suffered from less damages when an unexpected event has occurred [12]. Unfortunately, in Iran, very effective measures have not been taken to prepare against crisis, such as planning to respond [18]. Lack of coordination and poor management is one of the most important barriers to provide comprehensive, continuous, and accessible services with health quality when disaster outbreak in Iran that can be cited [19]. Monitoring mortality, survival increasing and complications reducing and victims' physical and mental disabilities and relieving their injuries are the main goals of the hospital program in emergency event [17].

Operational organization of hospital should be possible when disasters operate with the same staffs working in the hospital in normal time. In this regard, evaluating readiness of hospitals in accidents and disasters and done practices, helps to identify necessary changes to improve preparation [2]. Since hospitals for emergency services are accounted as vital centers for the diagnosis, treatment activities and follow-up provided care by physicians and health care practitioners, therefore, hospital preparation is absolutely necessary for effective response to internal and external risks and an exercise program [12]. Hospitals' accreditation that is in regard of ensuring of healthcare quality, safe services presentation based on daily scientific evidence has various dimensions and requires standards in 9 categories in management and leadership. The seventh case of these categories is in the management dimension and leadership the case of crisis management and disaster [20].

Accordingly, for some years that measure of accreditation are ranked and rated in case of crisis management and disaster in all hospitals as measurement periodic inspections and based on the hospitals obtained scores. The main goals of this study are to evaluate the readiness of Tehran's hospitals in emergency and their relationship with crisis management measures.

## MATERIALS AND METHODS

This is a descriptive, analytical and cross-sectional study in terms of time. Its data was collected by using questionnaire filled by nurses in Tehran's selected hospitals. The rate of hospital preparation against crisis is the study variable. Thai is determined by using preparation information questionnaire in emergency (EPIQ).

Terms and activities related to the emergency situation is familiarity rate of the Incident Command System, familiarity rate of ethical issues in triage, familiarity rate of the epidemiology and care, familiarity rate of isolation / quarantine, familiarity rate of sterilization, familiarity with communication, familiarity rate of psychological issues, familiarity rate of particular populations, familiarity rate of access to critical resources and familiarity rate of emergency situations generally [21]. The Likert scale is used in the questionnaire, and each of the questions in a 1 to 5 range (1 = I do not know at all, 5 = completely familiar) were evaluated and aggregated. The different masters' comment of the health management and crisis management field was used to determine the questionnaire validity. The final questionnaire of preparation information in emergencies by master comments was prepared and developed after collecting their comments and applying the necessary corrections. The Test-retest method was used in order to determine questionnaire's reliability and the correlation coefficient of 95% was among the questions.

Cronbach's alpha was 78 percent to measure questions internal communication and by resolution of questions correlation coefficient before and after the test was between 1 to 54%; the total number of questions was firstly 13 questions that two questions had low correlation and by professors and experts modification and two questions that seemed irrelevant was deleted. Finally, questionnaire was completed with 11 questions by the target group.

Communicated Standards by Health Ministry in the form of accreditation of crisis management measures (version two) in this field was used to survey establishment of crisis management in hospitals.

Accreditation standards in hospitals that are based on the accreditation standards book of the Health Ministry and Medical Education. And as measures are used to survey hospitals accreditation [20], the scores of university inspectors in 2015 had been done with coordination with the hospitals' presidents of quality improvement unit and were compared the obtained results in this study with hospital preparation rate.

In this study, 10 public hospitals in Tehran were selected for example by using simple random sampling. The samples were selected to complete related questionnaire to rate of hospitals preparation in emergencies by each hospital nurse and also the simple random sampling, and regarding to the total number of nurses per hospital. Following formula was used to calculate the sample volume:

$$n = \left( \frac{z_{1-\alpha/2} \times \delta}{d} \right)^2$$

$$n = \left( \frac{1.96 \times 14}{3} \right)^2 = 84$$

So, the research's data collection was done in relation to the hospitals preparation rate in disaster through completing EPIQ questionnaire by the samples (84 N) in selected hospitals in Tehran that were randomly selected in each hospital. The research data analysis was done in two parts in the form of descriptive and inferential statistics. By using descriptive statistic indexes the collected data were summarized and classified in descriptive section. Kolmogorov-Smirnov test was used to determine the normality of the research community and to analyze the correlation between the variables (disaster preparation and accreditation measures). Pearson correlation coefficient using SPSS software version 21 was also used.

## RESULTS

In this study, from 84 distributed questionnaires, 56 questionnaires were completed and returned. The nurses in the target hospitals have participated in this study had been 19 women (34%) and 37 men (66%) and in the age range of between 44- 25 (response rate 70 %). Most participants statistically, had been people with work experience between 16 - 20 years (41 percent), and the people with work experiences of less than 10 years (8.9%). The participants in the study had been with clinical activity of 35 patients (62.5%).

Also most of the business activities of participants statistically had been in particular section 26 (46.5 percent) people. And the least of the dominant activity had been done in the emergency department (16.1 percent) .

**Table 1: The rate of the studied hospitals' preparation in facing with crisis in Likert scale (5-1 )**

| Dimensions preparation to the crisis | Mean | Percentage | Standard deviation |
|---|---|---|---|
| familiarity with activities of emergency | 2.68 | 43 | 0.69 |
| Familiarity with Incident Command System - your role in it | 2.57 | 40 | 0.87 |
| Familiarity with ethical issues in triage | 2.94 | 47 | 0.90 |
| Understanding the epidemiology and care | 2.66 | 43 | 0.90 |
| Familiarity with isolation / quarantine | 2.66 | 43 | 0.98 |
| Familiarity with sterilization | 2.77 | 45 | 0.95 |
| Familiarity with the communications | 2.59 | 40 | 0.92 |
| Familiarity with psychological problems. | 2.74 | 43 | 1.03 |
| Familiarity with specific populations | 2.63 | 40 | 1.00 |
| Familiarity with access to critical resources | 2.13 | 27 | 0.96 |
| General familiarity with emergency situations | 2.66 | 43 | 0.92 |

Based on the obtained results of the present study nursing staff in disaster preparation do not have good condition, according to the study (total Average: 2.7 of 5 in Likert scale). In fact, preparation rate in the emergencies is 43% target in target hospitals, also among dimensions, the readiness of the participants in the access dimension to the vital resources was less familiar than the other aspects of the study with 2.1 average in Likert scale and standard

deviation of 0.96 and familiarity with ethical issues in triage was lower than average (2.9 on the Likert scale) and standard deviation of 0.90 was identified most prepared (Table 1).

Accreditation team with the check list of crisis management that contains 9 measures provided that the statement by Health Ministry have surveyed all of Tehran's hospitals in terms of preparation against crisis in 2015.

The overall compliance average with crisis management measures in the studied hospitals in Tehran have been reported equal to 13.6 (75.5%).

The preparation rate and documents presentation had been higher than average in "List of emergency response team, the recall program of emergency response team, documents of notification maneuver to employee, documentation of tasks, responsibilities and powers of team members "questions and had been lower than average in documents presentation related to questions "existence of documents related to the crisis maneuver "in the checklist of crisis management accreditation (table2).

**Table 2: The mean scores of assessment of crisis management measures by accreditation investigators in the studied hospital**

| Hospitals / Measures | Hospital 1 | Hospital 2 | Hospital 3 | Hospital 4 | Hospitals 5 | Hospital 6 | Hospital 7 | Hospital 8 | Hospital 9 | Hospital 10 | Average scores in hospitals |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Emergency Response team list | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Center list of reference and documents of prior coordination with them | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 1.6 |
| Recall Emergency Response Team program | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| documents tasks, responsibilities and powers of team members | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| documents of disaster and crisis management exercise | 2 | 0 | 0 | 2 | 2 | 2 | 0 | 2 | 2 | 0 | 1.2 |
| documents of maneuvering of crisis | 2 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 2 | 0 | 0.8 |
| documents of maneuvering fire extinguisher | 1 | 0 | 0 | 2 | 2 | 1 | 1 | 2 | 1 | 0 | 1 |
| Notification documents of maneuvers to employees | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| The annual assessment by the HSE and with announced priorities | 2 | 0 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 0 | 1 |
| Overall Score | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 |
| Achieved scores | 16 | 10 | 11 | 15 | 16 | 15 | 14 | 15 | 15 | 9 | 13.6 |
| Percentage of compliance | 89 | 56 | 61 | 83 | 89 | 83 | 78 | 83 | 83 | 50 | 75.5 |

**Table 3: analytical findings of preparation against staff crisis and its relationship with work experience of participants**

| Work experience / Dimensions preparation to the crisis | Less than 10 years old Mean ± SD | 11-15 Mean ± SD | 16-20 Mean ± SD | More than 20 years old Mean ± SD | Sum total Mean ± SD | Test result* F | Test result* P |
|---|---|---|---|---|---|---|---|
| familiarity with activities of emergency | 2.69±0.59 | 2.77±1.05 | 2.64 ±0.61 | 2.65±0.55 | 2.68±0.69 | 0.10 | 0.96 |
| Familiarity with Incident Command System - your role in it | 2.45 ±0.83 | 2.83 ± 1.19 | 2.43 ±0.81 | 2.62 ±0.75 | 2.57 ±0.88 | 0.58 | 0.62 |
| Familiarity with ethical issues in triage | 2.85±0.60 | 3.21 ±1.22 | 2.84 ±0.82 | 2.94±0.84 | 2.94±0.89 | 0.46 | 0.71 |
| Understanding the epidemiology and care | 2.50±1.16 | 3.25 ±0.94 | 2.62±0.76 | 2.34±0.81 | 2.66 ±0.89 | 2.7 | 0.05 |
| Familiarity with isolation / quarantine | 2.60± 1.19 | 2.87 ± 1.11 | 2.63±.94 | 2.56 ±.94 | 2.66 ±.98 | 0.24 | 0.86 |
| Familiarity with sterilization | 2080±0.87 | 2.94 ± 1.12 | 2.74 ±0.84 | 2.69 ± 1.02 | 2.77±0.95 | 0.46 | 0.71 |
| Familiarity with the communications | 2.80± 1.28 | 2.91 ± 1.05 | 2.91 ±0.78 | 2.49 ±0.89 | 2.59 ±0.92 | 0.78 | 0.51 |
| Familiarity with psychological problems. | 2.70 ± 1.41 | 3.12± 1.24 | 2.65 ±0.80 | 2.55 ± 1.05 | 2.74± 1.03 | 0.92 | 0.43 |
| Familiarity with specific populations | 2.50± 1.17 | 2.90± 1.19 | ٢.٥٩±0.74 | 2.5± 1.15 | 2.63 ± 1 | 0.54 | 0.65 |
| Familiarity with access to critical resources | 2.33 ±1.47 | 2.33 ±1.22 | 2.12 ±0.71 | 1.94±0.94 | 2.13 ±0.96 | 0.45 | 0.71 |
| General familiarity with emergency situations | 2.80 ± 1.48 | 3.25 ±1.06 | 2.43 ±0.66 | 2.50±0.81 | 2.66 ±0.92 | 2.5 | 0.07 |

The crisis in the emergency had equal average in preparation dimension with emergency activities in all groups, in other dimensions, it was found that preparation in people with history over 20 years was lesser. People between 15-11 years history had more preparation in all aspects, but this difference was not significant; also the overall average of familiarity level with access to vital resources was lower than the other areas (Table 3).

Based on the researches done, preparation against crisis was higher in all dimensions except familiarity with vital activities in persons with preparation rate in crisis in all dimensions except familiarity with emergency activities in person with management experience.

**Table 4: Comparison preparation rate against crisis by size and type of activity resolution**

| Type of Activity | Managerial | Clinical | Sum total | Test result | |
|---|---|---|---|---|---|
| Dimensions preparation to the crisis | Mean ± SD | Mean ± SD | Mean ± SD | F | P |
| familiarity with emergency activities | 2.77 ±0.77 | 2.59 ±0.66 | 2.68 ±0.69 | 0892 | 0.22 |
| Familiarity with Incident Command System - your role in it | 2.84±0.68 | 2.45±0.97 | 2.65±0.88 | 1.763 | 0.022 |
| Familiarity with ethical issues in triage | 3.26 ±0.72 | 2.81 ±0.96 | 3.04 ±0.89 | 1.806 | 0.245 |
| Understanding the epidemiology and care | 2.83 ±0.75 | 2.61 ±0.97 | 2.72 ±0.89 | 0.835 | 0.272 |
| Familiarity with isolation / quarantine | 2.87 ±0.89 | 2.58 ± 1.04 | 2.73±0.98 | 1.000 | 0.407 |
| Familiarity with sterilization | 2.86 ±0.93 | 2.77±0.98 | 2.82 ±0.95 | 0.329 | 0.850 |
| Familiarity with the communications | 2.82 ±0.98 | 2.51 ±0.88 | 2.66 ±0.96 | 1.180 | 0.246 |
| Familiarity with psychological problems | 3.06 ± 1.03 | 2.63 ±1.01 | 2.85 ± 1.04 | 1.516 | 0.863 |
| Familiarity with specific populations | 2.87 ±0.98 | 2.57 ± 1.01 | 2.72±0.95 | 1.047 | 0.999 |
| Familiarity with access to critical resources | 2.25 ±0.94 | 2.13 ±0.79 | 2.19 ±0.96 | 0.411 | 0.706 |
| General familiarity with emergency situations | 2.86±0.75 | 2.86± 1.02 | 2.68±0.92 | -0.006 | 0.241 |

Firstly, the population normality was studied by using Kolmogorov and Smirnov tests in order to determine the relevant statistical tests (parametric or non-parametric). As it has been provided in the table, the frequency distribution of data was normal in study population. Pearson correlation test was used to verify the research main hypothesis and according to statistical population and the results were normal. The relationship between the nursing staff preparation and accreditation measures statistically was not significant (Table 5).

**Table5: Evaluation of the relationship and correlation between the preparation dimensions against the staff crisis and amount of the compliance with the accreditation measures of the crisis management in the studied hospitals**

| | Kolmogorov and Smirnov | P | Pearson correlation coefficient | P |
|---|---|---|---|---|
| Accreditation | 0.914 | 0.374 | 0.64 | 0.08 |
| Preparation against crisis | 0.621 | 0.836 | | |

## DISCUSSION

The obtained average score is in relationship with the preparation against nurses crisis in the selected hospitals in Tehran (2.7), this score is considered in a weak and very poorly range, and does not show a good condition. The establishment rate of Accreditation in measures of crisis management in the studied hospitals had been 75.5% and the correlation coefficient between hospitals' preparation against crisis of establishment of accreditation measures was 0.64 and statistically any significant relationship was not seen (P-value <0.08).

According to conducted studies the researcher from related researches done in this field in the global results of other studies were also similar to present study. In a study that was done on Five hospital nurses' preparation in times of crisis of knowledge, attitude, practice and detection ,showed that in all these fields, nurses are in a weak level ,and paying attention to training is necessary in this field .(22) Also in a study in Jordan as nurses' perception of crisis management, with the explanation that their attitude, how much is effective in their preparation, Randomly was conduct at three hospitals of military and two academic hospitals in Jordan; the results indicated that the readiness of nurses in crisis is generally poor in this regard and this is similar to this research's results. Also this study showed that nurses' knowledge in the field of preparation against disaster is lower in comparison with nurses' clinical skills [23]. In this study also compared to dimensions of the questionnaire with their work experience shows that people with high experience of clinical work (over 20 years) have had less preparation than other people. And people with high management experience and second, people who have experience in training have reported better preparation in time of crisis; this can be the result of more companies this individuals in crisis management preparation courses compared to those who do purely clinical work and nursing.

In a paper that has been published by Tilman in England as nurses preparation in crisis with more important approach on education ,also it has emphasized on training for nurses  as the important members in time of crisis [13] In the present study this result is emphasize by estimating  high  preparation average of  people who  have engaged in Training areas. Also in a study that was done in the United States as surveying the knowledge preparation of emergency personnel showed that employees were better in more general dimensions such as triage and first aid. Scores were reduced when specific questions, such as the antidote to biological agents was asked [24]. Regarding to the used questionnaire dimensions in this study, familiarity dimension with emergency activities with questions regarding to the factors and biological attacks, and with 3.32 average, it shows a very low level of familiarity in this area and the lack of hospital personal adequate information in this field which is felt as the need for educational programs in relation to biological attacks and preparation in this field. A study was conducted by Shouride Zadeh and Heydari Zadeh under the title of "Survey of the observance of crisis management accreditation standards in military hospitals in Tehran", all military hospitals in Tehran selected and the rate of the preparation were analyzed according to the accreditation measures by the self-reported method. The results of this study showed that in most cases the crisis and disaster management standards in Tehran military hospitals is conducted incomplete [25]. As the results showed, the establishment rate of accreditation standards in studied hospitals had been 75%. Also in the study that was done named "Readiness of three selected border hospitals", the readiness of hospitals had more dimensions (7 after 11 onwards) was in good condition and only in terms of responding to injuries, maneuver, acceptance and transfer and release was in average condition [26] and in this research maneuver dimension has been appointed in lower level than other dimensions. Also in a research as strengths and weaknesses of crisis management was done in hospitals of Medical Sciences University of Hormozgan. Its population had included all directors, senior managers, nursing managers, office fiscal managers and three hospitals crisis committee administrators. Totally, preparations in the area of maneuvers preparation were much weaker in the studied hospitals [27]. that are similar with results of this study In terms of lack in demonstration and documents related to crisis maneuver.

As it is noted above, The lowest achieved compliance average of accreditation inspections is in the field of evidence to crisis maneuver in the studied hospitals, researches on the following studies confirm the need to plan and carry out maneuvers readiness in facing with the crisis on domestic and international patterns, to enhance the level of staffs' preparation especially nursing in the face of crisis.  For example, in a study which was done by Barnegat et al., 2013, as "Effects of the crisis management model based on coordination on preparation of hospitals in Rajaei Hospital of Shiraz, itwas concluded that the use of disaster management model based on coordination, cause to promotion of hospital preparation. Regarding to the nurses key role in crisis, this model was advised by nursing managers to be used in order to improve hospital readiness [28]. In a study done by Vafaei et al.  in designing crisis management  pattern in  Shohada Hospital of Tajrish  , has been emphasized to have pre-programmed pattern to deal with the crisis [29] and this is also indicated in Qanbari's study under the title of the impact of disaster preparation plan on preparation of nurses to respond to probable natural disasters and it showed that the knowledge, attitude and practice of nurses increased after education and exercise significantly [30]. It seems that identifying exist deficiencies in hospital crisis management plan and fix them by qualitative and quantitative improvement and to create and retain nursing staff preparation, training and programs Disaster preparation, appoint as continues education discussions for these people...

In a study was conducted by scientists in 30 Hospital of Iran. The rate of preparation against the crisis was reported average [31] that varies the situation reported in this study according to mentioned results. According to the obtained statistical results, it has been reported Poor and very poor about the level of preparation against crisis in Tehran's selected hospitals. By done compares in numerous studies is noticeable results which are different in the studied hospitals.  Also from the perspective of establishment rate of accreditation     measures of crisis management that was identified 75% in this study, in research of scientists, it was at good levels (80 percent) which had been highest preparation level related to crisis [31] and the results of this study show similar results.

## CONCLUSION

According to the obtained results of this research, generally preparation against crisis of Tehran's selected hospitals is in a weak and very weak level. The degrees declare high rate of measures establishment in all of the studied hospitals about implementing accreditation standards and measures of crisis management in Tehran's selected hospitals. These results suggest that the implementation of accreditation standards for crisis management with the current situation, does not help employee increase their preparation against crisis. For proper management of emergency situations, a systematic planning of crisis management is recommended, the necessary coordination within and outside the organization at crises, reinforcement  with  good organization and provide necessary trainings and periodic exercises and changes in accreditation inspections, moving  towards operating action not just on paper and to collect documents on the current style in hospitals.

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