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Hospital Safety Index in Hospitals Affiliated with Alborz University of Medical Sciences in 2015

Sima Feizolahzadeh[1,2], Ahmad Elahi[3], Fariba Rahimi[4], Alireza Momeni[5], Yazdan Mohsenzadeh[2]

[1] *Department of Health in Disasters and Emergencies, School of public health, Shahid Sadoughi University of Medical Science, Yazd, Iran*
[2] *Department of Medical Emergencies, School of Nursing, Alborz University of Medical Sciences, Karaj, Iran*
[3] *Division of Breast Surgical Oncology, Department of Surgery, Alborz University of Medical Sciences, Karaj, Iran*
[4] *Clinical Research development unit, Shahid Rajaei Educational & Medical Center, Alborz University of Medical Sciences, Karaj, Iran*
[5] *Islamic Azad University Medical College Qeshm Branch, Qeshm, Karaj, Iran*

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***Corresponding author:**
Sima Feizolahzadeh

Address:
Department of Health in Disasters and Emergencies, School of Public Health, Shahid Sadoughi University of Medical Sciences, Yazd, Iran.

Email:
sfeizolahzadeh@gmail.com

Tel:
+98-02634336007

ABSTRACT

Introduction: To survive is the first concern of people after disasters. The ability to keep performing and offering services in hospitals at the same time as appropriate responding to the medical needs of disaster victims, matters tremendously. An effective element in this regard is having appropriate safety level in hospitals. The aim of this study was to specify the safety index of hospitals covered by Alborz University of Medical Sciences.

Methods: This descriptive-provisional study was conducted between 2014 and 2015 in Alborz province. Nine public hospitals, affiliated with Alborz University of Medical Sciences, were chosen by the means of census method. The data collection tool was the standard tool of hospital safety index, WHO / PAHO, through which the level of hospital safety (in three structural, non-structural and functional areas) were determined. Data were analyzed through Excel software. The outcomes were rated between zero to one, and accordingly, in terms of safety, hospitals were classified as either A, B or C.

Results: Based on the results of this study, most of the examined hospitals were at B level of safety. Although the group B hospitals can put up with disasters in time but, their vital equipment and services will be put at jeopardy.

Conclusion: Measuring the safety index of hospitals as well as determining their level of safety, it can be figured out how much a hospital can preserve its organization and function in disasters. This index will be helpful for decision makers and policymakers, when it comes to prioritizing management and civil interventions.

Keywords: Hospital Safety Index; Disasters; Structural; Non-structural.

Introduction

Human societies are always exposed to natural disasters or destructive human leanings that cause different disasters. It is estimated that just in the disasters of the last decade, about 2 million people killed, 4.2 million injured, and 33 million have become homeless, and around 3 billion people have been affected by disasters (1). Emergencies and disasters are conditions that are not possible to control with conventional methods and resources as they are so severe in terms of social, economic, emergency, casualties, and infrastructure

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degradation (2). Since these events have potential for causing injury and damage, they frequently result in massive health and medical challenges (3, 4). After the occurrence of disasters, the first concern of people is to maintain their health, and health care centers, especially hospitals, play a significant role in this regard.

One of the objectives of the Third Millennium Development Plan is protecting health facilities, especially in hospitals. Hospitals, as the main organizations involved in disasters, are considered as the vital infrastructures which should be available all the time, or rather, during and after disasters, and keep offering services. Usually, the main hospitals and health centers in each community matters more than other critical facilities and have symbolic political and social value to the community (7).

Based on various studies, hospitals are vulnerable to disasters and owing to disasters many of them lose their efficiency annually (8). Disasters can harshly affect hospitals in different ways; and inpatients, outpatients, medical staff, and visitors might suffer from losses in hospitals (9). Any damage to the functional parts of the hospital will cause delays in the treatment of disaster-related injured (10). If hospital is damaged, structurally or functionally during the disaster, and loses its ability to service the injured people, a secondary crisis will arise (11).

Hospitals should keep servicing and operating during disasters and when there is sever need for their services. Also, the disaster management of hospitals should be in a way that the safety of all people over there is guaranteed. The various levels of safety and protection against disasters in hospitals are saving lives, protecting capital assets, and lastly preserving performance (7). A significant measure in hospital risk reduction strategies is determining hospitals' safety levels. By the means of the Hospital Safety Index provided by the World Health Organization, safety level of hospitals can be obtained, regarding to structural, non-structural and functional dimensions, during disasters (12, 13).

Iran, with a population nearly 80 million, is exposed to a broad spectrum of natural and man-made disasters (14, 15). Since Karaj is located along a river, adjacent to earthquake prone areas (Qazvin and Tehran province), has poor urbanization on the suburbs and affected to high road traffic injuries, is one of the provinces exposed to abundant natural and man-made disasters (16). This province locates at 20 kilometers west of Tehran with six cities and hosts a population around 2,500,000. Although determining the safety level of hospitals is significant during disasters, there are no studies conducted in Alborz hospitals so far. Therefore, this study was designed and carried out to assess the hospitals safety index in order to prioritize the universities' hospitals in the province regarding their corrective planning needs

Materials and Methods

This study was carried out in descriptive-provisional way between 2014 and 2015 in Alborz province. The study population was educational hospitals of Alborz University of Medical Sciences.. All 9 hospitals of the university were studied and, the sample in this study was done in census. In order to evaluate hospital safety status, the Hospital Safety Index Questionnaire(the first version), provided by World Health Organization and localized by Ardalan et al. was utilized; its reliability and validity were measured in a study entitled "Development of a local model to hospital disaster risk assessment" (18). This tool contained 145 indices in the areas of functional, nonstructural and structural. After initial training of the evaluation team and through presence in hospitals of Alborz University of Medical Sciences and participation of crisis committee members of each hospital, the study data were collected through observation, visits and interviews. Since the easiness of assessment is one of the features of hospital safety index and there is no need for high technical expertise, the evaluation of structural elements as well as some non-structural was conducted with the help of the facility manager of each center.

According to the instructions of hospital safety index questionnaire, the extracted data of each hospital were analyzed. Based on the guidelines of completing the hospital safety index, structural safety accounted for 50%, non-

structural safety 30% and functional safety 20% of the total safety index mark (19). Predicated on the guideline, the researchers identified the importance degree of each question in the areas of structural, non-structural, and functional safety. Hence, a degree of importance was assigned to each question ranging from 1 to 100. Also, during the hospital visit and based on the action, a score of zero meaning partial, 1 meaning the average, and 2 meaning the full was assigned to each of the questions. Ultimately, the scores of each question were inputted to Excel software and based on the degree of significance, the safety index was determined in the three areas. Accordingly, the safety index of each hospital is determined at three levels. The definitions of hospital safety index levels are displayed on **Table 1**, according to the World Health Organization guidelines.

Table 1. Definition of hospital safety indices levels based on WHO guidelines

Safety index	Group	Safety status of hospitals
0 – 0.35	C	Hospitals, whose residents and occupants lives and safety is at risk during the crisis. Urgent action is desired to protect the lives of patients and staff.
0.36 – 0.65	B	Hospitals which can put up with a crisis although whose critical equipment and services are at risk. There is a need for short-term action to reduce losses.
0.66 – 1.00	A	Hospitals that are apparently capable to keep their residents safe and their operations continuing in times of crisis. They need such preventive measures to improve safety.

Result

Generally, in this study, 9 hospitals, affiliated with Alborz University of Medical Sciences were worked on. The hospitals included Shahid Rajaie, Shahid Madani, Shahid Bahonar, Dr. Shariati, Al-Zahra, Imam Jafar Sadegh, Kamali, Sarallah and Imam Hassan Mojtaba. In the area of structural safety, Al-Zahra Hospital got the lowest score, and the highest level of safety was assigned to Shahid Rajai and Imam Hassan Mojtaba hospitals. **Table 2** demonstrates the obtained scores in the structural area of hospitals.

In the area of functional-safety in the studied hospitals, the highest level of safety is for Kamali Hospital and the lowest level is for Alzahra Hospital. **Table 3** displays the scores obtained in the functional area within hospitals.

Table 2. Score and Safety Level in the Structural Area

Hospital	Score	Safety score	Safety Level
Shahid Madani	19	0.38	B
Shahid Rajaee	35	0.70	A
Kamali	29	0.60	B
Dr. Shariati	26	0.52	B
Sarallah	20	0.40	B
Al-Zahra	11	0.22	C
Shahid Bahonar	23	0.46	A
Imam Hassan Mojtaba	35	0.70	A
Imam Jafar Sadegh	25	0.50	B

Table 3. Functional Score and Safety Level

Hospital	Score	Safety score	Safety Level
Shahid Madani	9	0.45	B
Shahid Rajaee	12	0.60	B
Kamali	14	0.68	A
Dr. Shariati	8	0.40	B
Sarallah	5	0.25	C
, Al-Zahra	4	0.20	C
Shahid Bahonar	8	0.40	B
Imam Hassan Mojtaba	6	0.30	C
, Imam Jafar Sadegh	9	0.45	B

In the area of non-structural safety, Al-Zahra Hospital had the lowest level of safety and Shahid Rajaee Hospital had the highest level of safety. **Table 4** demonstrates the obtained scores in the functional domain of hospitals.

Table 4. Score and Safety Level in the Non-Structural Area

Hospital	Score	Safety score	Safety Level
Shahid Madani	13	0.43	B
Shahid Rajaee	21	0.70	A
Kamali	19.2	0.64	B
Dr. Shariati	14	0.47	B
Sarallah	13	0.43	B
Al-Zahra	6	0.20	C
Shahid Bahonar	18.7	0.62	B
Imam Hassan Mojtaba	20	0.60	B
, Imam Jafar Sadegh	20	0.60	B

Evaluation of the overall safety level of hospitals shows that, based on the definition of hospital safety levels, provided by the WHO, Shahid Rajaee Hospital got the third rank in hospital safety level hospital (11% of the studied population). In other words, the hospital can protect its residents whilst disasters and keep servicing during crisis. Furthermore, seven hospitals are in the second level of safety. This means that more than half of the studied hospitals can withstand disasters, their vital equipment and services are at risk, though. In this evaluation, Al-Zahra Hospital was ranked as the first safety level hospital (11% of the study population.) This means that this hospital is not capable of providing service during the disasters. Furthermore, the lives and safety of the patients will be endangered. Figure-1 demonstrates total safety index of studied hospitals.

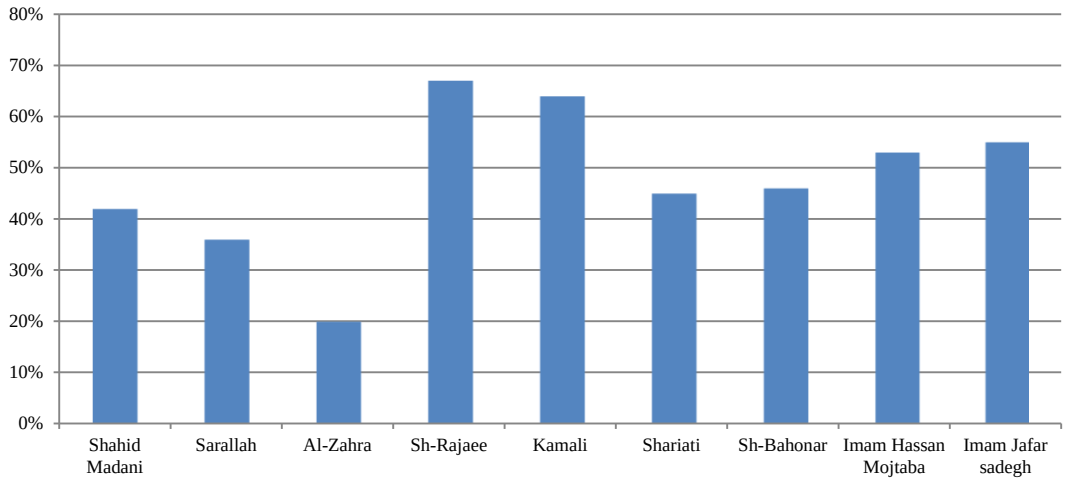

Figure 1. Total Safety Index of Studied Hospitals

Discussion

For the first time in Alborz province, the safety level of university hospitals was determined, predicated on the safety index standard provided by the World Health Organization. Looking at the results, more than 70% of hospitals in Alborz province are classified in the second level of safety, while in terms of functional safety, more than one third of hospitals are in the first level of safety. One of the significant outcomes of this study was that more than half of Alborz's hospitals are categorized as group B of safety based on WHO guidelines. Based on the preset definition, these centers are hospitals which although can withstand disasters, their vital equipment and services are at risk, and to reduce the prospective damages they need short-term actions.

In the study of Sabzqabai et al. in 2012, four hospitals out of the five selected ones covered by Shahid Beheshti University in Tehran, were classified in group B (20). In a study by Haji Nabi et al. (2013), they also examined the safety level of a social security hospital in Tehran, which was classified as the third or group C at the end. The results of this study show that hospital safety is not suitable (21). The most outstanding study to identify the safety index of hospitals in Iran conducted by Ardalan et al. Based on the results of this study, the average safety score of 224 hospitals studied in the country was 32.4; in other words, hospitals are classified in the third level of safety (22). Apparently, the reason behind the low score of most hospitals studied in Ardalan et al. was considering the hospital safety as a new subject throughout the national level that can have gradually improved over the years. Since Alborz province is exposed to multiple hazards, seven of the nine main hospitals in the province are classified in the second group of safety, which can be an alert for university officials. It is necessary to instant planning to surge the safety indices of these hospitals; in the event of disasters, it is expected that the mentioned hospitals will have their critical equipment damaged and lose their effectiveness. In fact, the hospital will not be able to carry out its vital responsibilities during disasters and casualties will not be managed.

Another result of this study was the low score of functional safety in the majority of studied hospitals. According to a 2007 WHO report, the "functional" collapse of hospitals whilst disasters is very frequent. That is the building remains stable but cannot be utilized for various preventable reasons (9). It is worth noting that, measures in this area do not require financial resources and costs as management and training planning can play a critical role in improving safety in this area, despite structural and non-structural safety. Studies have also proved that the through increasing awareness and experience of health care workers, the safety level of hospital will increase as well (23). Seyedin et al. examined the weakness of all wards of hospital of a military hospital in Tehran in their study and concluded that in order to

reduce vulnerability, hospitals need to develop comprehensive programs (24).

Conclusion

Since hospitals play a vital role in providing health care for the injured during disasters, building destruction, equipment failure, or inappropriate medical staff performance, may lead to severe problems for the affected citizens. As prevention measures, hospitals must be established in accordance with resilience standards and pay special attention to their safety. Predicated on the study findings, the level of safety in hospitals in Alborz province is average. This level needs instant actions to reduce vulnerability. On the other hand, given recent planning on conducted development and refurbishment in Alborz health centers, it seems that there is a serious need for further studies concerning the safety conditions of new hospital buildings

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Conflict of interests

The authors declared that there is no conflict of interest with respect to the research, authorship, and publication of this article.

Authors' contribution

All authors were involved in the study conception and design, data collection, data analysis, manuscript writing, its revision and editing. SE and AE were study supervisors. All authors read and approved the final manuscript.

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