

Preparedness of Iranian Hospitals Against Disasters

Saeed Asefzadeh,¹ Roya Rajaei,^{2,3} Fatemeh Ghamari,⁴ Rohollah Kalhor,⁴ and Soheyla Gholami^{5,*}

¹Qazvin University of Medical Sciences, Qazvin, IR Iran

²School of Public Health, Shahid Beheshti University of Medical Sciences, Tehran, IR Iran

³Alborz University of Medical Sciences, Karaj, IR Iran

⁴Social Determinants of Health Research Center, Qazvin University of Medical Sciences, Qazvin, IR Iran

⁵Health Information Management Research Center, Hormozgan University of Medical Sciences, Bandar Abbas, IR Iran

*Corresponding author: Soheyla Gholami, Health Information Management Research Center, Hormozgan University of Medical Sciences, Bandar Abbas, IR Iran. Tel: +98-9371818640, E-mail: sohailagholami@yahoo.com

Received 2015 December 17; Revised 2016 June 29; Accepted 2016 June 30.

Abstract

Context: Over the past decade the number of accidents and disasters has been growing around the world. In addition to damaging communities and infrastructures, unexpected disasters also affect service providers. This study aimed to evaluate the readiness of hospitals when confronted with unexpected disasters.

Evidence Acquisition: The present study was a simple review article, which was conducted via searching different sites, such as: Web of Science, Scopus, Science Direct and PubMed, using different key words such as: Disasters, Crisis, Hospital and preparedness. The relationship between the articles found in relation to our subject was investigated through the title and abstract of articles. The relationship between the articles, which were found in relation to our subject, was investigated through the title and abstract of the articles. Our search included papers published during the period between 2007 and 2015 and we only considered studies that measured the preparedness of hospitals in critical conditions. Among the 30 articles, which were found, 17 were excluded from the study due to lack of relevant data. Hence, 15 papers, which were of proper design and robust data analysis, were included in the current study.

Results: Hospital preparedness in disaster was evaluated in three dimensions: structural, non-structural factors and vulnerability management performance. A total of readiness of hospitals in three dimensions was mediocre.

Conclusions: Overall, the results derived from these studies indicated that hospital safety levels in most of the surveyed hospitals were moderate. Although the situation in hospitals is not critical, there is a need to plan and take appropriate measures to improve the safety level of the hospitals.

Keywords: Disasters, Risk Assessment, Hospital Preparedness, Iranian Hospitals

1. Context

In the last decade, incidents of unexpected disasters have increased around the world in such a way that the rate of mortality has been about 106000 people per year (1). In almost all countries, there is a high probability of disasters such as hurricanes, flood, earthquake, fire, famine, terrorist attacks, volcanic eruptions, chemical disasters and diseases incidence. Natural disasters may initiate quickly or gradually. In any case, they will have reverse effects on the health of residents, society and the economy (2).

Generally, Iran stands among the 10 most disastrous areas in the world, where 90% of the population is potentially prone to risk of earthquakes and floods. Statistics indicate that Iran stands 6th in the world for disaster occurrence (3) so that, from different types of natural disasters occurring globally, 31 types occur in Iran and it is not impossible to have one in the near future (4).

Nowadays, about 70% of different regions in the country are prone to earthquake, and due to undesirable climate as well as misuse of natural resources, approximately 50% of the land area is exposed to floods. Some examples of catastrophic events are earthquakes in Tabriz (1727), Neyshabour (1828), Tabas (1978), Gilan and Zanzan (1990), Bam (2004), and Sistan floods (1992) (5).

Experts believe that due to lack of cooperation and needed protocols among government or private sector emergency teams in Iran, management decisions and planning are made without any kind of required information in this area (6). Since most disasters are not predictable in Iran, more preparedness in healthcare systems, especially hospitals as the first line to deliver emergency services in disasters, paves the way to a nonstop work and decreases casualties of such unexpected disasters. This also promotes hospitals' preparedness and ability to take care of the injured and pacify those at shock (6-9).

In a catastrophe, a break in standard communication is potentially an obstacle on the way of hospital operations. Lack of equipment, personnel and life supplies might cause a decline in the availability of safer care. Regarding this issue, hospitals are obliged to remain prepared for unexpected events (10).

Hospital preparedness to manage disasters comprises an important portion of the plan to decrease casualty and damage. Indeed, the most important global concern is preparedness for unexpected catastrophes. Specifically, hospitals are part of primary plans for catastrophe management, both nationally and internationally, especially in disaster-prone areas (11).

Regarding the geographical location of Iran and the possibility of many different disasters, we conducted a study with the aim of investigating Iranian hospitals' preparedness for unexpected events.

2. Evidence Acquisition

This was a document analysis, which investigated different texts on Iranian hospitals preparedness to manage disaster and unwanted events. With an extended research of various texts, using keywords like crisis, disasters, preparedness and hospital, the present study was initiated. Related articles were obtained, studied and incorporated from databases including Web of Science, Science Direct, Pubmed, Google Scholar, Sid, and Springer. Our objective was to select studies with a relationship to the subject of this paper, from 2007 to 2015. Studies outside this time range or unrelated studies were dismissed. Finally, 15 articles were incorporated effectively, the results of which are discussed in Table 1.

Hospital disaster preparedness has been examined from three different dimensions: structural vulnerability, nonstructural factors, and operational and management vulnerability, which were categorized in three groups based on the obtained scores: high (60 and above), average (40 - 60) and low (score below 10).

3. Results

According to all the studies, preparedness in Iranian hospitals is average; some hospitals even have low preparedness to unexpected events such as floods and earthquakes. According to the results, improving preparedness level in hospitals is a very important strategy, which needs consideration of the associated managers. Amongst the fifteen articles reviewed in this study, 12 had average hospital preparedness, and two had low and one had high level of preparedness.

4. Discussion

In total, 15 studies that met the inclusion criteria were fully evaluated. In most studies, the preparedness of hospitals in Iran was average.

Studies from overseas reported a more satisfying level of preparedness in their hospitals than Iranian hospitals. Zhong et al. conducted a study on 41 Shandong high-quality hospitals in which they incorporated factor analysis to obtain four factors in hospital resilience in disasters, including ability to respond to medical needs in emergencies, management mechanisms, security infrastructures in hospitals and disaster sources. These factors indicated enough stability inside hospitals (27).

Walsh et al. in 2015 reported that one of the ways to increase disaster preparedness in disasters is to improve healthcare system coalitions, identify opportunities to improve the system as well as cooperation among involved organizations and hospitals (28). In a study in 20 European countries, Djalali et al. aimed at assessing preparedness level for disasters in hospitals. Seventy percent of the hospitals responded to the questionnaire, from which 68% of the hospitals were in the first group (acceptable), and the highest preparedness was for England, Lithuania, and Luxembourg. The highest level of preparedness relates to information component and the lowest relates to training (29).

Unfavorable preparedness was mostly found in hospitals located in western and southern disadvantaged regions. In a study, Vahedparast et al. (2013) (21) found that hospitals in Bushehr Province had preparedness levels ranging from average to low, which can be categorized in a range lower than 50%. There were a few private hospitals in these regions. Despite notifying disaster committee plans of the hospitals, these plans have not been implemented officially. There are only a few studies regarding psychological behavioral interventions during disaster in hospitals; this indicates a high need for such studies (30).

4.1. Conclusions

An entire comparison of risk taking among different sections in studied hospitals, regarding the fact that structural security in most hospitals is at an average level, they should not be expected to have a higher and more desirable performance and nonstop services in earthquakes. Because of the importance of this issue, it is suggested to renew and empower such hospitals. It is important to note that some older hospitals are delivering favorable services. However, there is no difference in service delivery between modern and ancient hospitals. As a result, these hospitals are not motivated enough to renew their structure, at least in the short run.

Table 1. The Lists of Results of Articles

Researcher	Research Type	Place and Number of Studied Hospitals	Method for Collecting Information	Scopes on the Study	The Condition of General Preparedness
Asefzadeh et al., 2016 (12)	Cross sectional-descriptive	2 hospitals of Qazvin	Checklist, observations and interviews,	Functional safety, non-structural safety, and structural safety	High
Mirzaee et al., 2015 (13)	Cross sectional	4 hospitals of Ilam	Checklist, observations and interviews,	Functional safety, non-structural safety, and structural safety	Average
Vali et al., 2014 (14)	Cross sectional-descriptive	6 hospitals affiliated to Tabriz Medical Science University	Checklist	Equipment, human resources, physical space, structure and work processes, Protocols	Average
Seyedin et al., 2014(15)	Descriptive	15 hospitals in Shiraz	Checklist	Functional safety, non-structural safety, and structural safety	Average
Shams et al., 2014 (16)	Cross sectional	4 hospitals affiliated to Isfahan Medical Science University	Checklist, observations and interviews,	Management, leadership and organization, human resources affairs, policies and processes, staff training and improvement, facilities and equipment, the program of quality reassurance, safety affairs against firing, safety plans, technical facilities and construction services and also incidental and crisis plans.	Average
Rabeian et al., 2013 (17)	Cross sectional-descriptive	4 Hospitals affiliated to Tehran University of Medical Science	Checklist	Management, leadership and organizing, human resources affairs, policies and processes, staff training and improvement, facilities and equipment, the program of quality reassurance, safety affairs against firing, safety plans, technical facilities and construction services and also incidental and crisis plans.	Average
Sabzghabaie et al. (2013) (18)	Cross sectional	5 hospitals selected from those affiliated to Shahid Beheshti University of Medical Sciences	Checklist, observations and interviews	Functional safety, non-structural safety, and structural safety	Average
Amiri et al., 2013 (19)	Cross sectional	53 hospitals affiliated to universities in Northern Iran	Checklist	Management, leadership and organization, human resources affairs, policies and processes, staff training and improvement, facilities and equipment, the program of quality reassurance, safety affairs against firing, safety plans, technical facilities and construction services and also incidental and crisis plans	Average
Salari et al., 2013 (20)	Cross sectional-descriptive	9 government and 6 private hospitals of shiraz	Checklist, observations and interviews	Emergency, admission, evacuation and transfer, traffic, communication, security, education, support, human workforce	Average
Vahedparast et al., 2013 (21)	Cross sectional-descriptive	9 hospitals of Boshehr	Checklist, observations and interviews	Equipment, human resources, physical space, structure and work processes, protocols	Average
Hojat, 2012 (22)	Descriptive	2 hospitals of Jahrom	Checklist	Equipment, human resources, physical space, structure and work processes, protocols	Average
Mohammadi yeganeh, 2011 (23)	Cross sectional-descriptive	7 hospitals of Tehran	Checklist, observations and interviews	Functional safety, non-structural safety, and structural safety	Average
Hekmatkhan et al., 2011 (24)	Descriptive	5 training hospitals, 3 private hospitals, 1 social welfare hospital and 1 military hospital in Urumiah	Checklist, observations and interviews,	Management, leadership and organization, human resources affairs, policies and processes, staff training and improvement, facilities and equipment, the program of quality reassurance, safety affairs against firing, safety plans, technical facilities and construction services and also incidental and crisis plans.	Low
Amiri et al., 2011 (25)	Cross sectional	10 Tehran hospitals	Checklist, observations and interviews,	Management, leadership and organization, human resources affairs, policies and processes, staff training and improvement, facilities and equipment, the program of quality reassurance, safety affairs against firing, safety plans, technical facilities and construction services and also incidental and crisis plans.	Average
Ojaghi et al., 2009 (26)	Cross sectional-descriptive	6 hospitals affiliated to Kermanshah Medical Science University	Checklist, observations and interviews	Equipment, human resources, physical space, structure and work processes, protocols	Low

According to the results, improving the level of preparedness in hospitals as an essential strategy is a priority that requires the attention of relevant authorities.

It is suggested for the hospitals preparedness against unexpected disasters to be increased by retrofitting the hospitals and providing written plans for administrative measures when a disaster occurs to reduce the related mortality rate.

Acknowledgments

We would like to appreciate the professors who helped us with their tips.

Footnotes

Authors' Contribution: All authors make substantial contributions to acquisition of data, and analysis and interpretation of data.

Financial Disclosure: There were no financial interests related to the material of the manuscript.

Funding/Support: This study was supported by the research committee of Qazvin University of Medical Sciences.

References

- Munich RE. Natural catastrophes 2001: analyses, assessments, positions Munich: Topics Geo; 2011. Available from: http://www.munichre.com/publications/302-07225_en.pdf.
- Guha-Sapir D, Vos F, Below R, Penserre S. Annual disaster statistical review 2011: the numbers and trends Belgium: Centre for Research on the Epidemiology of Disasters (CRED), Institute Of Health And Society(Irss), Universite Catholique De Louvain-Brussels.; 2012. Available from: <http://www.cred.be/publications>.
- Khankeh HR. Designing a Comprehensive Model for Health Disaster Management. Ph.D Dissertation [in Persian]. Iran: Iran Medical Science University; 2007.
- Mahmodzadeh A. Crisis management and crisis [in Persian]. Isfahan: Golhaye Mohammadi Publication; 2005.
- Ghafori-Ashtiyani M. Vulnerability against earthquake in Tehran. Tehran. Tehran: Proceedings of First International Conference on Natural Disasters in Urban Areas; 1992.
- Farajzadeh H. Comparative study of the health information system of natural unexpected disasters in countries of America, Japan and Iran. *Hayat J*. 2006;**12**(4):67-77.
- Powers MF. Evaluation of hospital-based disaster education. *J Emerg Nurs*. 2007;**33**(1):79-82. doi: [10.1016/j.jen.2006.10.008](https://doi.org/10.1016/j.jen.2006.10.008). [PubMed: [17258063](https://pubmed.ncbi.nlm.nih.gov/17258063/)].
- Barbera JA, Yeatts DJ, Macintyre AG. Challenge of hospital emergency preparedness: analysis and recommendations. *Disaster Med Public Health Prep*. 2009;**3**(2 Suppl):S74-82. doi: [10.1097/DMP.0b013e31819f754c](https://doi.org/10.1097/DMP.0b013e31819f754c). [PubMed: [19491592](https://pubmed.ncbi.nlm.nih.gov/19491592/)].
- Cimellaro GP, Reinhorn AM, Bruneau M. Seismic resilience of a hospital system. *Structure and Infrastructure Engineering*. 2010;**6**(1-2):127-44. doi: [10.1080/15732470802663847](https://doi.org/10.1080/15732470802663847).
- WHO. Mass casualty management systems. Strategies and guidelines for building health sector capacity Geneva: World Health Organization; 2011. Available from: http://www.who.int/hac/techguidance/MCM_guideles_inside_final.pdf.
- IFRC . Disaster preparedness training manual The International federation of Red Crescent Societies; 2009. [cited Accessed Nov 10 2008]. Available from: <http://www.ifrc.org/what/disasters/resources/publications>.
- Asefzadeh S, Varyani AS, Gholami S. Disaster Risk Assessment in Educational Hospitals of Qazvin Based on WHO Pattern in 2015. *Electron Physician*. 2016;**8**(1):1770-5. doi: [10.19082/1770](https://doi.org/10.19082/1770). [PubMed: [26955448](https://pubmed.ncbi.nlm.nih.gov/26955448/)].
- Mirzaee F, Kakaei H, Farasati F, Zamani N. . Investigation on the Safety Status and Preparedness of Ilam ` s Hospitals against Disasters in 2012. *J Ilam univ med sci*. 2015;**22**(7):14-23.
- Vali L, Masoud A, JabariBeyrami H, Yaghobian B. Readiness of hospitals affiliated with Tabriz University of Medical Sciences to Face Disasters [in Persian]. *J Health and Devel*. 2014;**3**(1).
- Seyedin H, Abasi Dolat Abadi Z, Sorani M, Naghdi S, Rajabfard Mazraeno F. Vulnerability assessment of general hospitals of Tehran University of Medical Sciences. *J Health Promotion Management*. 2014;**3**(2):65-71.
- Shams AA, Jabbari A, Niknam N, Zadeh AH, Mengelizadeh N, Mostafaie S. The study of safety management in the hospitals affiliated to Isfahan University of Medical Science in 2013. *Int J Health System Disaster Manag*. 2014;**2**(3):180.
- Rabeian M, Hosseini SH, Radabadi M, Taheri Mirghaed M, Bakhtiari M. Evaluation Of Effective factors on the rate of preparedness of Tehran university of medical sciences' selected hospitals in dealing with earthquake [in Persian]. *J Payavard Salamat*. 2013;**7**(3):251-61.
- Sabzghabaie A, Kondori A, Shojae M, Hatamabadi H, Amini A. Hospital safety in hospitals affiliated with Shahid Beheshti University of Medical Sciences in 2011-13 [in Persian]. *Pajoohandeh J*. 2013;**18**(2):83-7.
- Amiri M, Raei M, Nasrollahpour Shirvani SD, Mohammadi GR, Afkar A, Jahani-tiji MA, et al. preparedness of affiliated hospitals of universities in north of iran to confront disasters in the year 2011 [in Persian]. *J Hospital*. 2013;**12**(1):19-28.
- Salari H, Esfandiari A, Heidari A, Julae H, Rahimi SH. Survey of natural disasters preparedness in public and private hospitals of Islamic republic of Iran (case study of shiraz, 2011). *Int J Health System Disaster Manag*. 2013;**1**(1):26-31.
- Vahedparast H, Ravanipour M, Hajinezhad F, Kamali F, Gharibi T, Bagherzadeh R. Assessing hospital disaster preparedness of bushehr province. *ISMJ*. 2013;**16**(1):69-76.
- Hojat M. Disaster preparedness in hospitals of Jahrom University of Medical Sciences (2010) [in Persian]. *J Qazvin Univ Med Sci*. 2012;**16**(3):72-7.
- Mohammadi yeganeh S, asadi lari M, Seyedin H, Maher A. Assess the quality and quantity of equipment and the vulnerability of non-public hospitals in Tehran during an earthquake. *Scientific J Rescue and Relief*. 2011;**3**(1,2):1-9.
- Hekmatkhan A, Rahimi H, Kamali Aghdam M, Taghavi Shahri M, Sadeghifar J, Hamouzadeh P. Assessing the preparedness rate against earthquake risk in hospitals affiliated to urmia university of medical sciences 2011 [in Persian]. *J Urmia Nurs Midwif Faculty*. 2012;**10**(2):200-8.
- Amiri M, Mohammadi GR, Khosravi A, Chaman R, Arabi M, Sadeghi E, et al. Hospital preparedness of Semnan province to deal with disasters. *Knowledge and Health*. 2011;**6**(3):44-9.
- Ojaghi S, Nourizad S, Mahboobi M, Khazaei MR, Najafi G. Disaster crisis handling preparedness level of hospitals in Kermanshah [in Persian]. *J Kermanshah Univ Med Sci*. 2009;**13**(3).
- Zhong S, Clark M, Hou XY, Zang Y, FitzGerald G. Validation of a framework for measuring hospital disaster resilience using factor analysis. *Int j enviro public health*. 2014;**11**(6):6335-53.

28. Walsh L, Craddock H, Gulley K, Strauss-Riggs K, Schor KW. Building health care system capacity: training health care professionals in disaster preparedness health care coalitions. *Prehosp Disaster Med.* 2015;**30**(2):123-30. doi: [10.1017/S1049023X14001460](https://doi.org/10.1017/S1049023X14001460). [PubMed: [25659047](https://pubmed.ncbi.nlm.nih.gov/25659047/)].
29. Djalali A, Della Corte F, Foletti M, Ragazzoni L, Ripoll Gallardo A, Lupescu O, et al. Art of Disaster Preparedness in European Union: a Survey on the Health Systems. *PLoS Currents.* 2014 doi: [10.1371/currents.dis.56cfc5ctb0deae1595a48e294685d2f](https://doi.org/10.1371/currents.dis.56cfc5ctb0deae1595a48e294685d2f).
30. Terhakopian A, Benedek DM. Hospital disaster preparedness: mental and behavioral health interventions for infectious disease outbreaks and bioterrorism incidents. *Am J Disaster Med.* 2007;**2**(1):43-50. [PubMed: [18268874](https://pubmed.ncbi.nlm.nih.gov/18268874/)].