

Systematic Review

Cite this article: Azarmi S, Pishgooie AH, Sharififar S, Khankeh HR, Hejrypour SZ (2022) Challenges of hospital disaster risk management: a systematic review study. *Disaster Med Public Health Prep* **16**: 2141–2148. doi: <https://doi.org/10.1017/dmp.2021.203>.

First published online: 25 August 2021

Keywords:

disasters; hospital; risk management; risk reduction

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Challenges of Hospital Disaster Risk Management: A Systematic Review Study

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Abstract

Objective: This study aimed to investigate the challenges of hospital disaster risk management so that it can take a step to provide strategies and interventions to remove these barriers and improve the hospital disaster risk management (HDRM) through identifying and introducing them to disaster experts.

Methods: This is a systematic qualitative review study. Data sources included Persian and international databases, which were searched using the keywords of hospital, disaster, risk management, risk reduction, disaster and challenge, and the combination of them. The search period ranged from January 2010 to January 2020. Data were extracted by 2 independent examiners for qualitative thematic analysis.

Results: A total of 762 articles and documents were recovered. Finally, 12 articles entered the study, including 7 studies from Asia, 2 articles from Europe, 2 articles from the United States, and 1 article about Africa. After thematic analysis, 17 sub-themes were achieved and were classified into 4 subjects of technical-physical barriers, organizational-managerial barriers, financial barriers, and human barriers. All articles have not discussed on all categories.

Conclusions: The results of evaluating the challenges of hospital disaster risk management gained from this study can be beneficial in developing a roadmap to improve the status of HDRM.

Disasters may impair people of any community throughout the world at any time. Disasters occur at high frequency and exert wide influence, typically causing property damage, injuries, and death.¹ Sudden disasters have affected more than 1.5 billion people of the world's population in the past decade² and enforced devastating effects on health and medical infrastructure and posed significant challenges to health systems.^{3,4}

Hospitals may receive an early warning for some natural disasters, eg, hurricanes and floods, and activate their response plans before the occurrence of an event. However, there is no preventive alert for some other natural disasters, such as earthquakes, at present. Some disasters affect a small number of people: therefore, there is a demand for health systems in a short period of time. Still, some others cause large numbers of casualties, followed by the massive demand for health systems.⁵ Hospitals, as the cornerstone of any health system, play a crucial role in response to natural disasters.^{6,7} Hence, they must be necessarily prepared to respond to disaster and avoid it.⁷ Following to disasters, necessity increases for health care in the affected areas. In this regard, increasing the capabilities of local hospitals for the management of such unusual situations enjoys the highest priority for disaster mitigation measures.⁸

Hospital managers play crucial roles in managing potential capacity effectively in disasters.⁹ A disaster management program enables the hospital staff to give effective response to disaster.¹⁰ Although hospital preparedness has been emphasized in many reliable study sources, the results of multiple studies have demonstrated that lack of preparedness and high vulnerability is a significant challenge for hospitals to deal effectively with disasters.^{4,6,11,12} For example, the hospitals involved in providing relief to those injured in western Iran by the earthquake, which occurred in November 2017 in the Azgeleh-Sarpol-e-Zahab area of Kermanshah province, included many challenges for disaster response.¹³ Asefzadeh et al. in a review study examined 15 hospital preparedness surveys from 2007 to 2015. The results indicated that 80% of the studies estimated the hospitals' preparedness at a moderate level (40–60%) and 13% at a low level.¹⁴

While hospitals are exposed to internal disasters, they also play an important role during the disaster response period.¹⁵ Frequent evaluation and monitoring to identify weaknesses and proper planning can contribute to improve the hospital safety level and ultimately improve the quality of hospital services.¹⁶

Health-care system managers must learn the information required in the field of disaster management and make the necessary planning to have a proper performance in disasters.¹⁷

Maintenance of capability and performance of hospitals upon disasters is important so that they can respond to a large number of patients who encountered the disaster, when performing their ongoing tasks.¹⁸

It is essential for hospitals to address disaster risk management.¹⁹ The purpose of disaster risk management is reduction of underlying risk factors and preparedness for an immediate response to the emergency consequences.²⁰ Disaster risk management is a holistic approach to all hazards for the whole disaster cycle²¹ including prevention and mitigation, preparedness, response, and recovery.²²

Lack of planning and organization to deal with disasters, hospital unpreparedness, and lack of staff training may damage irreversibly the health-care system.²³ Hospitals may be functionally disrupted by disasters due to the high volume of referrals, over-hospitalization, inadequate training, nonstandard and insufficient education, communication system disorders, etc.²⁴

Disaster risk management reduces the adverse effects of internal and external events that detrimentally influence the organization's activity.²⁵ Paying attention to risk management-based approaches will be very influential in improving hospital safety.²⁶ Despite numerous studies carried out to assess hospital disaster risk management, the researcher did not achieve an integrated and comprehensive answer concerning the challenges of hospital disaster risk management. Hence, this study aimed to investigate the challenges of hospital disaster risk management so that it can take a step to provide strategies and interventions to remove these barriers and improve the hospital disaster risk management.

Methods

This study is a systematic literature review and thematic analysis to explore the challenges of hospital disaster risk management. In this study, a systematic review was performed on articles, documents, and reports related to objective of the research. The search time period ranged from January 2010 to January 2020. Persian and international databases included PubMed, Scopus, Web of Science, ProQuest, Google scholar, Sid, Magiran, and Irandoc.

Search components were "Hospital", "Risk Management", and "Disaster". Equivalent words or phrases were obtained in MeSH and Emtree search engines to find the maximum number of articles. In addition, some keywords were completed or revised through related articles or after consultation with experts. The final keywords were divided into 3 groups, as described in Table 1. Then, according to the search engine, the desired syntax was adjusted, and the search was performed (Table 2).

Inclusion criteria comprised of the types of quantitative, qualitative, and review articles published related to the subject and question of the research, publication in English and Persian, publication date from January 2010 to January 2020, and access to the full text of the articles. Exclusion criteria also included abstracts of congress articles and articles dealing with outside hospital area.

At the end of the search and after deleting duplicate copies, the 2 members of the research team screened articles, books, and documents independently according to their titles and abstracts, taking into account inclusion and exclusion criteria.

The full text of the remaining articles was reviewed by 2 researcher colleagues using a researcher-made form. Low-quality studies or invalid research methods were excluded. The extraction

Table 1. Keywords of the study

Keywords
(Hospital), (Hospitals), ("hospital performance"), ("hospital readiness"), ("hospital preparedness"), ("hospital resilience"), ("general hospital"), ("general hospitals"), ("public hospital"), ("private hospital"), ("health system"), ("health facilities"), ("non-university hospitals"), ("medical center")
("Risk management"), ("Risks management"), ("hospital risk"), ("hospital incident"), ("incident reporting"), ("incident reportings"), ("risk assessment"), ("Risk evaluation"), ("Risk mitigation"), ("Safety Management")
(Disaster), (hazard), (emergency), (emergencies), (crisis), (catastrophe), (incident), (event), (chaos), ("natural disaster"), ("natural hazard"), ("natural phenomena"), (Earthquake), (Flood), (Drought), (Storm), (Typhon), (Hurricane), (Avalanche), (Volcanic), (landslide), ("Climate change"), (Epidemic), ("casualty incident")

Table 2. Search syntax in PubMed

Syntax
(Hospital[tiab] OR Hospitals[tiab] OR Medicine[tiab] OR "hospital performance"[tiab] OR "hospital readiness"[tiab] OR "hospital preparedness"[tiab] OR "hospital function"[tiab] OR "hospital functions"[tiab] OR "hospital operation"[tiab] OR "hospital assessment"[tiab] OR "hospital resilience"[tiab] OR "general hospital"[tiab] OR "general hospitals"[tiab] OR "hospital evaluate"[tiab] OR "hospital evaluation"[tiab] OR "public hospital"[tiab] OR "private hospital"[tiab] OR "health system"[tiab] OR "health facilities"[tiab] OR "medical center"[tiab] OR ("medical centers"[tiab] OR "hospital department"[tiab] OR "hospital departments"[tiab] OR ("medical service"[tiab] OR "health-care system"[tiab]) AND ("Risk management"[tiab] OR "Risks management"[tiab] OR "hospital risk"[tiab] OR "hospital incident"[tiab] OR "incident reporting"[tiab] OR "risk assessment"[tiab] OR "Risk evaluation"[tiab] OR "Risk mitigation"[tiab] OR "Safety Management"[tiab]) AND (Disaster[tiab] OR hazard[tiab] OR emergency[tiab] OR emergencies[tiab] OR crisis[tiab] OR catastrophe[tiab] OR incident[tiab] OR event[tiab] OR chaos[tiab] OR "natural disaster"[tiab] OR "natural hazard"[tiab] OR "natural phenomena"[tiab] OR Earthquake[tiab] OR Flood[tiab] OR Drought[tiab] OR Storm[tiab] OR Typhon[tiab] OR Hurricane[tiab] OR Avalanche[tiab] OR Volcanic[tiab] OR landslide[tiab] OR "Climate change"[tiab] OR Epidemic[tiab] OR "casualty incident"[tiab]) AND (Challenge[tiab] OR difficult[tiab] OR barrier[tiab] OR problem[tiab]) AND 2010:2020[dp])

of data from the remaining articles was performed using researcher-made forms. In the event of any dispute, the paper was checked by a third peer, and the research team made the final decision. The forms (critical appraisal checklist and data extraction) were developed and processed during the study.

In addition to a descriptive evaluation in terms of study type and methodology, findings were analyzed relating to the research question and their results, and appropriately selected articles. Thematic analysis of articles was also performed at this stage.

Results

In total, 762 articles and documents were recovered. To avoid repetition, 145 articles were deleted, 414 articles and documents did not meet the objectives of the research, and 191 articles did not follow the eligibility criteria and were excluded. Finally, 12 articles were included in the study. The PRISMA diagram is displayed in Figure 1. The researchers strived to propose honest presentation of results by observance of correct procedure of source writing and intellectual property rights in excerpting the data from the studies.

Most documents investigated were qualitative studies. Among them, 7 articles (58.3%) were concerned with Asia, 2 articles

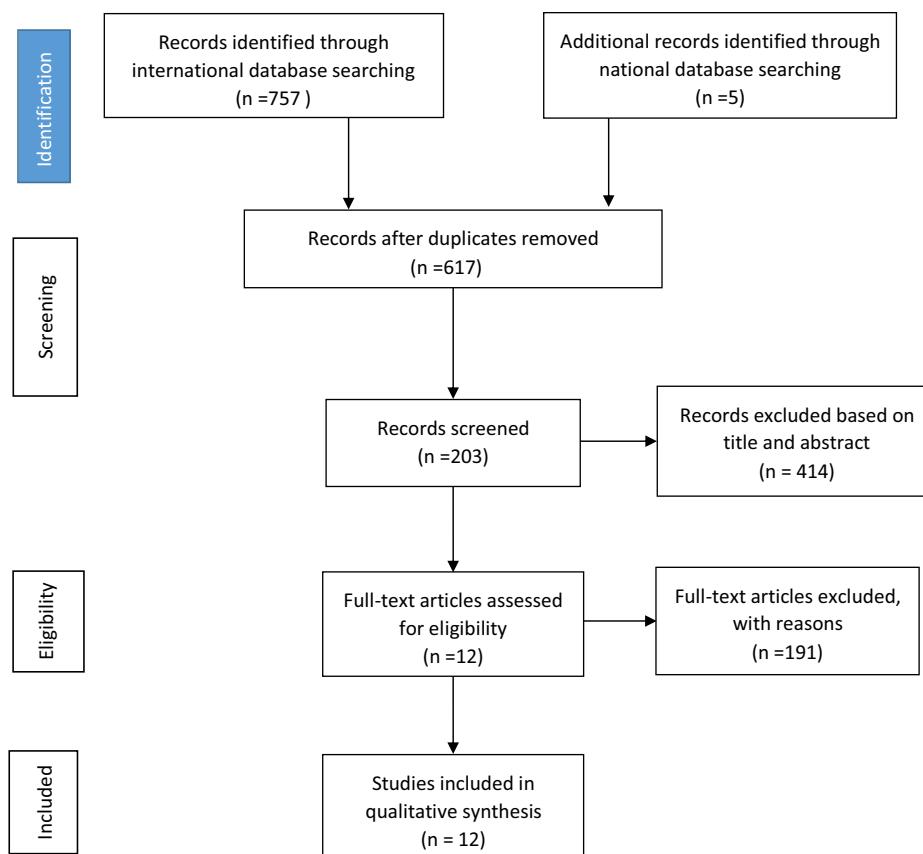


Figure 1. PRISMA diagram of studies included in the systematic review.

(16.6%) on Europe, 2 articles (16.6%) from the United States, and 1 article (8.3%) of Africa were studied. Over 75% of the documents were original articles, and 25% of them included review articles. The results derived from the systematic review are summarized in [Table 3](#).

Thematic Analysis

Based on the given findings, the sources were subjected to the thematic analysis at this phase of study, and the extracted themes were classified, focusing on the thematic variables of the research and summarized in a data table, which included the hospital disaster risk management challenges. The accuracy and perfection of extracted themes were reviewed and confirmed by other members of the research team and some disaster experts. Their results are provided in [Table 4](#).

Discussion

The hospital disaster risk management (HDRM) challenges are as follows.

Technical-Physical Challenges

Structure

Structural change and resetting of physical facilities are among the essential factors to enhance preparedness in disaster response.²⁷ The results of a study conducted by Montejano-Castillo and Moreno-Villanueva represent that, in many cases, hospitals encounter serious technical constraints imposed by the old age

of hospitals and the burnout of buildings. In this respect, it is necessary that new infrastructure to be used for retrofitting or their replacement.³⁰ For example, the response of a nonstructural element depends on the safety of the structural element in the event of an earthquake, and the safety of a structural element depends on proper maintenance and the use of seismic technology in its components. Morán-Rodríguez S and Novelo-Casanova in their study, cited the lack of seismic shock retrofitting technology and the requirements of hospitals for proper and periodic maintenance of hospital buildings as reasons for vulnerability in hospitals.³¹

Organizational-Managerial Barriers

Planning

Planning was 1 of the most critical themes extracted from this study. Senior managers' attention to preventive planning and risk preparedness is a worthwhile investment that is required to be put high on the agenda of the hospital managers.²⁸ The comprehensive hospital disaster risk management program should cover all hazards, all phases of disaster risk management, and all levels of the hospital. In addition, the necessary resources should be available to managers and employees for the implementation of the disaster risk management plan.³⁸ Absence of vulnerability assessment program,³⁴ a large number of decision-making officials,³⁷ and lack of appropriate and well-documented policies and plans to disaster response, are the reasons for the missing of proper hospital disaster risk management.^{28,29,31} For example, the lack of defining evacuation routes and safe points in the hospital for emergencies may be one of the challenges for hospital disaster risk management failures due to absence of appropriate planning.³⁰ A written plan is

Table 3. Summary of systematic review results

	Author	Year	Research design	Setting	Analyzed measures
1.	Aghapour, et al	2019	Qualitative	Iran- Asia	Discordance of speed and accuracy in planning to surge capacity for disaster recovery. ²⁷
2.	Faghisolouk, et al	2018	Cross-section	Iran- Asia	Lack of appropriate policies and programs because of insufficient knowledge in managers. ²⁸
3.	Hendricks, et al	2016	Qualitative	Belgium-Europe	Lack of coordination, absence of resources, wide variety of terms and methods. ¹⁵
4.	Krishnan, et al	2020	Review	India- Asia	Lack of well-documented disaster management program, lack of law to regulate and standardize hospital disaster response programs. ²⁹
5.	Montejano-Castillo, et al	2018	Mixed method	Mexican- USA	Inadequate financial resources, lack of risk reduction culture, serious technical limitations due to the lifetime of the buildings. ³⁰
6.	Morán-Rodríguez, et al	2018	Qualitative	Mexician- USA	Lack of seismic shock retrofitting technology, absence of developing or updating disaster response plans, lack of proper and periodic maintenance of hospital buildings, insufficient financial resources for vulnerability reduction projects and hospital autonomy granting operations within 3-5 r after the occurrence of a disaster. ³¹
7.	Munasinghe and Matsui	2019	Mixed method	Sri Lanka- Asia	Inadequate education and exercise, absence of support communication facilities, insufficient personal protective equipment (PPE), inadequate fire protection equipment, insufficient means of transportation, cold storage capacity constraints. ³²
8.	Olu, O, et al	2016	Mixed method	Africa	Insufficient political will and commitment, poor provision of funds for the health sector, poor health systems, lack of scientific evidence on mainstream risk management, and disaster risk reduction in long-term healthcare system development plans. ³³
9.	Radovic, et al	2012	Review	(Croatia and Serbia)- Europe	Absence of scientific and academic programs on disaster management, lack of vulnerability assessment program. ³⁴
10.	Sammy, et al	2013	Review	India- Asia	Underdeveloped culture, inadequate information gathering, poor incentives for promotion, high external pressures, shortages of employees, overcrowding in department, lack of public empowerment. ³⁵
11.	Shi, et al	2018	Mixed method	China- Asia	Unfavorable political atmosphere, inadequate management of volunteers. ³⁶
12.	Yarmohammadian, et al	2013	Qualitative	Iran- Asia	Internal and external barriers against deployment of hospital emergency incident command system (HEICS), high costs for implementation, lack of motivation in among managers and employees of the hospital, absence of common language, absence of competitive environment for progress, involvement of administrative managers in daily activities, missing empowerment, lack of sense of necessity for crisis management, lack of knowledge in managers, missing support by authorities, lack of commitment of managers, absence of experienced executives, lack of legal regulations, large number of decision-maker officials, lack of culture, poor communication and coordination in the crisis team, constant change in regulations and lack of emergency incident command system in the country. ³⁷

required for preparation but should not lead to “paper plan syndrome” in the hospital. Reviewing and reevaluating disaster plans still remains as significant concern (P7). The absence of a system for monitoring and evaluating the program is one of the most important reasons for the failure of organizational planning.³⁹

Surge Capacity

Surge capacity is defined as the ability of an organization for rapid expansion and enhancement of services in response to one or more disasters.⁴⁰ A fundamental challenge for planning to surge capacity for disaster recovery is the balance of speed and accuracy.²⁷ The high pressure outside the hospital,³⁵ poor health systems,³³ mismanagement of volunteers (related to volunteer recruitment,

education, protection mechanisms such as insurance coverage, increased volunteer willingness using incentive mechanisms such as reward systems),³⁶ insufficient space to expand emergency activities, shortage of beds for emergency situations, lack of access to hospital in emergencies,³⁰ inadequate fire protection equipment, lack of morgue capacity, lack of backup communication facilities, and insufficient means of transport³² are among the other challenges posed in the studies associated with surging capacity in hospital disaster risk management.

Communication & Coordination

Many problems of hospital disaster risk management are due to lack of coordination rather than lack of resources.¹⁵

Table 4. Extracted themes and subthemes as hospital disaster risk management challenges

Main themes	Subthemes	Important codes	Resources
Technical-physical barriers	Structure	Existing technical limitations Building burnout Absence of retrofitting technology Lack of proper and periodic maintenance of the building	30,31
Organizational-managerial barriers	Planning	Missing appropriate policies and programs Absence of vulnerability assessment program Lack of documented hospital disaster risk management program Paper program syndrome, large number of decision making officials Lack of developing or updating disaster response plans Absence of specific resources for hospital disaster risk management program	15,28–31,34,37
	Surge capacity	Absence of sufficient resources Disparity between speed and accuracy Insufficient space to surge capacity Inadequate facilities and equipment Lack of access to hospital Mismanagement of volunteers	27,30,32,33,35–37
	Communication and coordination	Absence of coordination in the crisis team Lack of emergency incident command system Missing common language in the deployment of a hospital emergency incident command system (HEICS) Insufficient support communication facilities Poor communication in the crisis team	15,32,37
	Rules and Regulations	Absence of rules and regulations for the regulation and standardization of hospital disaster response programs Constant change in regulations Presence of bureaucracy Lack of enforcement of regulations for disaster risk prevention and reduction	29–31,37
	Political will and commitment	Unfavorable political atmosphere Rapid change of officials Insufficient commitment and political will of managers	30,33,36,37
	Culture	Absence of risk reduction culture Underdeveloped risk management culture	30,35,37
	Motivation	Poor incentives to improve the situation Missing competitive environment for progress Lack of sense of need for crisis management	35,37
	Support	Lack of support by authorities	37
	Knowledge	Non-implementation of a scientific hospital risk management Shortage of scientific evidence on disaster risk management Absence of scientific and academic programs on disaster management Lack of awareness of existing vulnerability problems Inadequate data collection	28,31,33–35
	Financial barriers	Budget	Poor budgeting Scarcity of sufficient financial resources for prevention, vulnerability reduction projects, and hospital autonomy granting operations
Human barriers	Education	Lack of sufficient knowledge in managers and employees Insufficient education	28,32,35,37
	Exercise	Inadequate exercise Lack of empowerment	32,35,37
	Culture	Lack of risk reduction culture in personnel	30
	Motivation	Lack of motivation among managers and employees	30,37
	Staff shortage	Shortage of employees	35
	Commitment	Non-commitment of personnel	30

Communication and coordination with accountable and supportive foreign organizations,^{41,42} as well as national interdisciplinary coordination, leads to correct management.⁴² Effective hospital communication and coordination with other organizations and healthcare providers is essential to achieve the best disaster response and provide the optimal healthcare services to disaster casualties.^{15,43} Ineffective communication and coordination in the crisis team for various reasons, including inadequate backup communication facilities and the lack of presence and deployment of hospital emergency incident command system (HEICS), are

among the challenges and reasons for failure in hospital disaster risk management.^{15,32,37} The successful response to the crisis requires coordination between all departments of the hospital, and cooperation and coordination with the prehospital emergency forces, the Red Crescent, Police, and the fire department, and ensuring the establishment of communication lines. HEICS provides more coordination between hospitals and other organizations involved in emergency events using a logical management structure, job description, generation of clear reporting channels, and creating a common naming system. It necessitates for

developing training courses in HEICS for hospital administrators and creating and organizing it in hospitals.³⁷

Rules and Regulations

Presence of bureaucracy,³⁰ lack of law for the regulation and standardization of hospital disaster response programs,^{29,37} the involvement of administrative managers in activities, constant changes in rules,³⁷ followed by the lack of enforcement of regulations for prevention and disaster risk reduction³¹ are the challenges concerning rules and regulations in the implementation of hospital disaster risk management. Hence, some vital measures include preparation of legal guidelines for hospitals and regulatory requirements for their implementation, removing complex and restrictive administrative processes, including emergency incidents management in the job descriptions of managers, and evaluating hospital managers related to them.³⁷

Political Will and Commitment

Rapid change in appointed officers,³⁰ lack of commitment of managers,^{33,37} and insufficient political will³³ due to unfavorable political atmosphere³⁶ are the key challenges raised upon implementation of hospital disaster risk management strategies regarding lack of commitment and political will. When senior managers of hospitals are not committed to implementing risk management programs, employees will not feel their own responsibility for the committed performance of the organization's agenda. The absence of senior executives in meetings and committees, lack of their striving to change the policies, structure, and culture of the organization indicates to the employees of the organization that there is no serious consensus among managers in the organization to implement the program.⁴⁴

Culture, Motivation

The absence of a risk reduction culture and administrative culture for crisis management^{30,37} and the lack of development of hospital risk management culture³⁵ were among the barriers to implementation of hospital disaster risk management related to culture. The lack of officials support³⁷ was one of the other challenges posed in the studies. Poor incentives³⁵ and the lack of a competitive environment to improve the status quo result in a lack of motivation and a sense of need for hospital disaster risk management.³⁷ The role of leadership in creating motivation among employees, creating of voluntary service culture, and supporting and accompanying employees are very crucial in the implementation of disaster risk management programs. The organization should have an appropriate appreciation and reward system, and employees should be appreciated and rewarded for the execution of the organizational program.⁴⁵

Knowledge

Risk management is not carried out scientifically in most hospitals in Iran.²⁸ Some organizational factors, including inadequate data collection,³⁵ cause a lack of awareness of existing vulnerability problems.³¹ The other reasons for the weakness of hospital disaster risk management include the absence of scientific and academic programs on disaster management³⁴ and the lack of scientific evidence on the flow of disaster risk management in long-term development plans.³³ It is essential that the necessary training related to the development and implementation of risk management programs to be provided for the managers so that a new attitude be created among them in this area.²⁸

Financial Barriers

Budget

Multiple studies demonstrate that a lack of financial resources is a significant barrier versus proper preparedness to deal with disasters.^{30,46} Budget allocation to preparedness and response to health emergencies should be based on gaps or needs analysis.³² The results of the study carried out by Montejano-Castillo and Moreno-Villanueva indicate that, in many cases, hospitals do not have sufficient financial resources, despite presence of a safety index and accurate assessment tools. Lack of funds (budget) makes it difficult to update some equipment or recruit more staff or build more rooms to expand the hospitals.³⁰ The absence of clear and adequate financial resources for disaster risk management^{30,33} and prevention programs, vulnerability reduction projects, and hospital autonomy granting operations within 3-5 d after the occurrence of a disaster³¹ are among the financial barriers pointed out in various studies, which can disrupt hospital disaster risk management by creating adverse consequences such as inability to deploy and implement the HEICS³⁷ and update existing equipment.³⁰

Human Barriers

Education and Exercise

Education and exercise will lead to an increase in the knowledge and skills of hospital health professionals³² and enhancement in their preparedness.⁴⁷ Lack of public empowerment,^{35,37} insufficient knowledge in managers,^{28,37} and scarcity of experienced and competent managers³⁷ are important reasons for the absence of proper hospital risk management. Thus, using specialized and trained people in the field of crisis management in various departments along with hospital preparedness³² and the appointment of qualified and competent managers³⁷ are assumed as necessary actions. Hospitals will not enjoy appropriate response capacity without effective education.⁴⁸ In this respect, Munasinghe and Matsui, in their study, considered the unpreparedness of the Sri Lankan hospital mainly due to insufficient education and exercise.³²

Commitment, Motivation, Culture, Staff Shortage

The reactive and nonpreventive treatment in all hospitals is also one of the barriers that prevents hospital staff being involved in hospital safety works. Lack of risk reduction culture in hospitals, absence of commitment³⁰ and motivation in managers and employees,^{30,37} their willingness to carry out preventive measures immediately after the occurrence of a disaster and not before it,³⁰ and staff shortage³⁵ are among the hospital disaster risk management challenges regarding human resources that must be taken into account seriously. Motivated and committed employees are more involved in the organization and play a substantial role in achievement of the organization.⁴⁹ Given the occurrence of previous losses, educating and informing of managers at all levels is an essential point for promotion of a risk reduction culture in hospitals.³⁰

Conclusion

With regard to rising occurrences of disasters and their adverse effects on the health-care systems, especially hospitals, and the importance of implementing hospital disaster risk management, policy-makers and managers need to be aware of these challenges so that they can upgrade the hospital disaster risk management by finding strategies and solutions to implement them and eliminate

these obstacles. The challenges of HDRM were raised in the form of 4 main themes: technical-physical barriers, organizational-managerial barriers, financial barriers, and human barriers in this study. They also included 17 sub-themes (inappropriate physical structure, lack of proper planning, the inadequate capacity surging, lack of communication and coordination, inadequacy of rules and regulations, lack of commitment and political will, absence of risk reduction culture within the organization and among staff, lack of organizational motivation, insufficient knowledge, lack of budget, inadequate education and exercise, lack of motivation among staff, absence of commitment among staff, and staff shortage due to the crisis). The recognition of these challenges can help develop a roadmap to improve hospital disaster risk management. The limitation of this research was that the methodology of the studies was not similar, and the instruments used in different studies were not the same.

Suggestions for Future Research

This study was designed and performed merely to examine the challenges of hospital disaster risk management. The researchers recommend conducting further investigations aimed at exploring strategies to improve the hospital disaster risk management, examining the impact of the implementation of strategies for upgrading the hospital disaster risk management, and conducting systematic reviews of studies published after 2020.

Acknowledgments. The authors thank the distinguished referees who contributed to the quality of this study with their constructive comments.

Author Contributions. All authors participated in data analysis, preparing the initial version and revising the article. Finally, all of them approved the final version for publication.

Conflict of Interests. The authors have no conflict of interest in this work.

Ethics Approval. This study is part of the PhD thesis was approved by the Research Ethics Committee of the Aja University of Medical Sciences by obtaining the ethics code IR.AJAUMS.REC.1398.251.

References

- Hou S-K, Lv Q, Ding H, *et al.* Disaster medicine in China: present and future. *Disaster Med Public Health Prep.* 2018;12:157-165. doi: [10.1017/dmp.2016.71](https://doi.org/10.1017/dmp.2016.71)
- McDermott KM, Hardstaff RM, Alpen S, *et al.* Management of diabetic surgical patients in a deployed field hospital: a model for acute non-communicable disease care in disaster. *Prehosp Disaster Med.* 2017;32:657-661. doi: [10.1017/S1049023X17006707](https://doi.org/10.1017/S1049023X17006707)
- Giri S, Risnes K, Uleberg O, *et al.* Impact of 2015 earthquakes on a local hospital in Nepal: a prospective hospital-based study. *PLoS One.* 2018;13:e0192076. doi: [10.1371/journal.pone.0192076](https://doi.org/10.1371/journal.pone.0192076)
- Bambarén C, Uyen A, Rodríguez M. Estimation of the demand for hospital care after a possible high-magnitude earthquake in the city of Lima, Peru. *Prehosp Disaster Med.* 2017;32:106-111. doi: [10.1017/S1049023X16001254](https://doi.org/10.1017/S1049023X16001254)
- Mehta S. Disaster and mass casualty management in a hospital: how well are we prepared? *J Postgrad Med.* 2006;52:89-90.
- Pouraghaei M, Jannati A, Moharamzadeh P, *et al.* Challenges of hospital response to the twin earthquakes of august 21, 2012, in East Azerbaijan, Iran. *Disaster Med Public Health Prep.* 2017;11:422-430. doi: [10.1017/dmp.2016.153](https://doi.org/10.1017/dmp.2016.153)
- Sauer LM, McCarthy ML, Knebel A, *et al.* Major influences on hospital emergency management and disaster preparedness. *Disaster Med Public Health Prep.* 2009;3:S68-S73. doi: [10.1097/DMP.0b013e31819ef060](https://doi.org/10.1097/DMP.0b013e31819ef060)
- Ochi S, Tsobokura M, Kato S, *et al.* Hospital staff shortage after the 2011 triple disaster in Fukushima, Japan-an earthquake, tsunamis, and nuclear power plant accident: a case of the Soso District. *PLoS One* 2016;11:e0164952. doi: [10.1371/journal.pone.0164952](https://doi.org/10.1371/journal.pone.0164952)
- Shabanikiya H, Gorgi HA, Seyedin H, *et al.* Assessment of hospital management and surge capacity in disasters. *Trauma Mon.* 2016;21:e30277. doi: [10.5812/traumamon.30277](https://doi.org/10.5812/traumamon.30277)
- Abd elazeem H, Adam S, Mohamed G. Awareness of hospital internal disaster management plan among health team members in a university hospital. *Life Sci J.* 2011;8:42-52. doi: [10.7537/marslsj080211.08](https://doi.org/10.7537/marslsj080211.08)
- Paganini M, Borrelli F, Cattani J, *et al.* Assessment of disaster preparedness among emergency departments in Italian hospitals: a cautious warning for disaster risk reduction and management capacity. *Scand J Trauma Resusc Emerg Med.* 2016;24(1):101. doi: [10.1186/s13049-016-0292-6](https://doi.org/10.1186/s13049-016-0292-6)
- Seyedin H, Abasi Dolat Abadi Z, Sorani M, *et al.* Vulnerability assessment of general hospitals of Tehran University of Medical Sciences. *J Health Promot Manage.* 2014;3:65-71.
- Ahmadi A, Bazargan-Hejazi S. 2017 Kermanshah earthquake; lessons learned. *J Injury Violence Res.* 2018;10(1):1-2. doi: [10.5249/jivr.v10i1.1049](https://doi.org/10.5249/jivr.v10i1.1049)
- Asefzadeh S, Rajae R, Ghamari F, *et al.* Preparedness of Iranian hospitals against disasters. *Biotechnol Health Sci.* 2016;3:1-6. doi: [10.17795/bhs-35073](https://doi.org/10.17795/bhs-35073)
- Hendrickx C, D'Hoker S, Michiels G, *et al.* Principles of hospital disaster management: an integrated and multidisciplinary approach. *B-ENT* 2016;12:139-148.
- Etchegaray JM, Thomas EJ. Comparing two safety culture surveys: safety attitudes questionnaire and hospital survey on patient safety. *BMJ Qual Saf.* 2012;21:490-498. doi: [10.1136/bmjqs-2011-000449](https://doi.org/10.1136/bmjqs-2011-000449)
- Amiri M, Mohammadi G, Khosravi A, *et al.* Hospital preparedness of Semnan province to deal with disasters. *Knowledge Health.* 2011;6(3):44-50.
- Ardalan A, Sabzghabaei A, Najafi A, *et al.* *Disaster Risk Assessment in Hospital.* Tehran: Movafagh Publications; 2011:7-15.
- Sharifi M, Arab M, Khosravi B, *et al.* Proactive risk management assessment in selected hospitals in Tehran. *Health Inf Manag.* 2015;12(2):229-235.
- Baas S, Ramamasy S, Dey de Pryck J, *et al.* Disaster risk management systems analysis: a guide book. In: *Environment and Natural Resources Management Series (FAO).* Rome: Food and Agriculture Organization of the United Nations; 2008.
- Ciottone GR, Biddinger PD, Darling RG, *et al.* *Ciottone's Disaster Medicine.* Amsterdam: Elsevier Health Sciences; 2015.
- Schipper L, Pelling M. Disaster risk, climate change and international development: scope for, and challenges to, integration. *Disasters.* 2006;30:19-38. doi: [10.1111/j.1467-9523.2006.00304.x](https://doi.org/10.1111/j.1467-9523.2006.00304.x)
- Ojaghi SH, Nourizadeh S, Mahboubi M, *et al.* Disaster crisis handling preparedness level of hospitals in Kermanshah. *J Kermanshah Univ Med Sci (Behbood).* 2009;267-274.
- Ardalan A, Najafi A, Sabzghabaie A, *et al.* A pilot study: development of a local model to hospital disaster risk assessment. *Hosp J.* 2011;9:7-15.
- Zarezade M, Abolhasani MS, Eslami S, *et al.* Evaluation of risk management from the perspective of hospital nurses in Shahid Rahmehon Hospital. *Occup Med Q J.* 2013;5:88-94.
- Pretagostini R, Gabbrielli F, Fiaschetti P, *et al.* Risk management systems for health care and safety development on transplantation: a review and a proposal. *Transplant Proc.* 2010;42(4):1014-1016.
- Aghapour AH, Yazdani M, Jolai F, *et al.* Capacity planning and reconfiguration for disaster-resilient health infrastructure. *J Build Eng.* 2019;26:100853. doi: [10.1016/j.job.2019.100853](https://doi.org/10.1016/j.job.2019.100853)
- Faghisolouk F, Jazani RK, Sohrabizadeh S. Hospital disaster risk management: the case of urmia hospitals. *Hospital.* 2018;11:447-450. doi: [10.22159/ajpcr.2018.v11i3.23625](https://doi.org/10.22159/ajpcr.2018.v11i3.23625)
- Krishnan S, Patnaik I. Health and disaster risk management in India. In: *Public Health and Disasters.* Berlin: Springer; 2020:155-184.
- Montejano-Castillo M, Moreno-Villanueva M. Hospitals safe from disasters: a glimpse into the Mexican coastal zones. *Int J Saf Secur Eng.* 2018;8:329-341. doi: [10.2495/SAFE-V8-N2-329-341](https://doi.org/10.2495/SAFE-V8-N2-329-341)

31. **Morán-Rodríguez S, Novelo-Casanova DA.** A methodology to estimate seismic vulnerability of health facilities. Case study: Mexico City, Mexico. *Nat Hazards*. 2018;90:1349-1375. doi: [10.1007/s11069-017-3101-2](https://doi.org/10.1007/s11069-017-3101-2)
32. **Munasinghe NL, Matsui K.** Examining disaster preparedness at Matara District General Hospital in Sri Lanka. *Int J Disaster Risk Reduct*. 2019;40:101154. doi: [10.1016/j.ijdrr.2019.101154](https://doi.org/10.1016/j.ijdrr.2019.101154)
33. **Olu O, Usman A, Manga L, et al.** Strengthening health disaster risk management in Africa: multi-sectoral and people-centred approaches are required in the post-Hyogo Framework of Action era. *BMC Public Health*. 2016;16:S204-S205. doi: [10.1186/s12889-016-3390-5](https://doi.org/10.1186/s12889-016-3390-5)
34. **Radovic V, Vitale K, Tchounwou PB.** Health facilities safety in natural disasters: experiences and challenges from south east Europe. *Int J Environ Res Public Health*. 2012;9:1677-1686. doi: [10.3390/ijerph9051677](https://doi.org/10.3390/ijerph9051677)
35. **Sammy IA, Paul JF, Watson H, et al.** Quality assurance in emergency medicine: a Caribbean perspective. *Clin Gov*. 2013;18:293-299. doi: [10.1108/CGIJ-04-2013-0010](https://doi.org/10.1108/CGIJ-04-2013-0010)
36. **Shi M, Xu W, Gao L, et al.** Emergency volunteering willingness and participation: a cross-sectional survey of residents in northern China. *BMJ Open*. 2018;8:e020218. doi: [10.1136/bmjopen-2017-020218](https://doi.org/10.1136/bmjopen-2017-020218)
37. **Yarmohammadian MH, Atighechian G, Haghshenas A, et al.** Establishment of Hospital Emergency Incident Command System (HEICS) in Iranian hospitals: a necessity for better response to disasters. *Iran Red Crescent Med J*. 2013;15:e3371. doi: [10.5812/ircmj.3371](https://doi.org/10.5812/ircmj.3371)
38. **The American Society for Testing and Materials (ASTM).** *ASTM E2413-04 Standard Guide for Hospital Preparedness and Response*. West Conshohocken, PA: ASTM International; 2004.
39. **Mosadeghrad AM, Isfahani P.** The challenges of strategic planning in Tehran province hospitals. *Manage Strat Health Syst*. 2018;3(3):184-200. doi: [10.18502/mshsj.v3i3.248](https://doi.org/10.18502/mshsj.v3i3.248)
40. **Alexander D.** Towards the development of a standard in emergency planning. *Disaster Prev Manage*. 2005;158-175. doi: [10.1108/09653560510595164](https://doi.org/10.1108/09653560510595164)
41. **Nekoie-Moghadam M, Kurland L, Moosazadeh M, et al.** Tools and checklists used for the evaluation of hospital disaster preparedness: a systematic review. *Disaster Med Public Health Prep*. 2016;10:781-788. doi: [10.1017/dmp.2016.30](https://doi.org/10.1017/dmp.2016.30)
42. **Avery GH, Zabriskie-Timmerman J.** The impact of federal bioterrorism funding programs on local health department preparedness activities. *Eval Health Prof*. 2009;32:95-127. doi: [10.1177/0163278709333151](https://doi.org/10.1177/0163278709333151)
43. **Adini B, Goldberg A, Laor D, et al.** Assessing levels of hospital emergency preparedness. *Prehosp Disaster Med*. 2006;21:451-457. doi: [10.1017/S1049023X00004192](https://doi.org/10.1017/S1049023X00004192)
44. **Wiesman J, Melnick A, Bright J, et al.** Lessons learned from a policy decision to coordinate a multijurisdiction H1N1 response with a single incident management team. *J Public Health Manage Pract*. 2011;17:28-35. doi: [10.1097/PHH.0b013e3181fd4cd2](https://doi.org/10.1097/PHH.0b013e3181fd4cd2)
45. **Moseley GB III.** *Managing Health Care Business Strategy*. Burlington, MA: Jones & Bartlett Learning; 2017.
46. **Mortelmans LJM, Van Boxtael S, De Cauwer HG, et al.** Preparedness of Belgian civil hospitals for chemical, biological, radiation, and nuclear incidents: are we there yet? *Eur J Emerg Med*. 2014;21:296-300. doi: [10.1097/MEJ.0000000000000072](https://doi.org/10.1097/MEJ.0000000000000072)
47. **Arab MA, Khankeh HR, Mosadeghrad AM, et al.** Developing a hospital disaster risk management evaluation model. *Risk Manage Healthc Policy*. 2019;12:287-296. doi: [10.2147/rmhp.s215444](https://doi.org/10.2147/rmhp.s215444)
48. **Reilly M, Markenson DS.** Education and training of hospital workers: who are essential personnel during a disaster? *Prehosp Disaster Med*. 2009;24:239-245. doi: [10.1017/S1049023X00006877](https://doi.org/10.1017/S1049023X00006877)
49. **Mosadeghrad AM, Ebneshahidi A, Abdolmohammadi N.** The impact of strategic planning on job satisfaction among hospital staff: a case study. *J Health Based Res*. 2017;3:99-114.