

Hospital Surge Capacity in Disasters in a Developing Country: Challenges and Strategies

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Abstract

Background: The basic step in planning and policy-making for hospital surge capacity in disasters is the awareness of the current situation and problems. This issue is of greater importance in hospitals of developing countries that usually face many problems in ordinary situations; this paper aimed at identifying the status of hospitals in a developing country for surge capacity and the associated challenges at the time of disasters, and strategies to solve them.

Methods: In this qualitative study, semi-structured interviews were conducted with 27 participants, who were mostly officials of hospitals and the authorities of the ministry of health in Iran. Thematic analysis was used for analyzing the data.

Results: In this study, 40 subthemes and 12 themes under 4 main categories, including space, medication/supplies, manpower, and functional structures/plans, were identified. Some of these themes included shortage of space inside the structures, weakness in providing medication/emergency medical supplies, general shortage of manpower, weakness in maintaining and recalling staff at the time of hospital surge capacity in disasters, content defect in hospitals disaster preparedness plan, and weakness in training for disasters

Conclusions: Generally, there are various challenges hospital surge capacity at the time of disasters, and hospitals are disadvantaged in this regard. However, implementing strategies recognized in this study may help resolve these challenges.

Keywords: Disasters, Hospital, Surge Capacity, Developing Country, Qualitative

1. Background

They are forced to increase their capacity in order to respond effectively to disasters and handle large numbers of victims (1-4). The first step in policy-making and planning for hospital surge capacity at the national level is to understand the present condition, and its challenges (5). Despite the available literature on hospital surge capacity at the time of disasters, most of them either focus on hospital surge capacity in a specific incidence or disaster, or only on one of the four categories of hospital surge capacity (6-9), which include space, medication/ supplies, manpower, functional structures and programs (10). Many of these studies were conducted in the developed countries, and a few in developing countries. A study by Aliyu, showed that lack of plans to increase capacity was one of the recognized weaknesses of health systems of this continent in disasters (11).

Iran is one of the most disaster prone countries in the world, where many natural and manmade disasters may leave many victims behind (12, 13).

2. Objectives

This paper aimed to assess the present conditions and challenges of hospital surge capacity in Iran.

3. Methods

3.1. Participants

The participants in this qualitative study were selected from the officials of hospitals including deans (1 participant), hospital managers (7 participants), matrons and head nurses (6 participants), and the authorities of the disaster committees in hospitals (4 participants), and senior managers of the center of emergency medical services management (CEMSM) (1 participant = head of CEMSM) and office of hospital management (OHM) (2 participants = 2 senior managers) of Iran's ministry of health, and three Universities of Medical Sciences (UMSs), including Iran (1 participant), Tehran (2 participants), and Mashhad (3 participants). Sampling in this study was criteria-based purposive method (14). The inclusion criteria were: at least 3

years of work experience in the given profession, and having the experience of working in or managing a hospital in disasters or having published scientific papers on hospital surge capacity or preparedness in disasters. The exclusion criterion was reluctance in taking part in the study. Finally, 27 individuals participated in this study.

3.2. Data Collection

To collect data, 1 of the researchers conducted face-to-face interviews with the participants through the semi-structured interview guide, developed based on the objectives of the study and an extensive literature review. The interviews were done from October 2015 to March 2016. All interviews were recorded by a digital voice recorder. After each interview, the recordings were immediately transcribed on the same day.

3.3. Data Analysis

This paper used thematic analysis to analyze the data (15). After gathering the data and before coding, the researchers studied the texts of the first 2 interviews for several times to become familiar with the depth of the contents of the data, and then provided a primary list of ideas and interesting points. Thus, primary codes were obtained, which were used in coding the rest of the interviews. During the third phase, the codes were analyzed and the basic themes were formed by combining the codes. In the fourth stage, the primary themes formed in the previous stage were refined, such that some were removed, some were merged, and some new ones were added. Next, all the obtained themes were grouped according to the theoretical principles of hospital surge capacity science. Each group of themes provided the formation of a distinct and more comprehensive theme, resulting in the formation of a network of themes and subthemes. In the fifth stage, the themes were analyzed and in the last stage, the final report was developed. In this study, no software was used for data analysis.

3.4. Trustworthiness

Considering the trustworthiness of the study, some strategies were used to meet the credibility, transferability, confirmability, and dependability. For credibility, the researchers selected individuals, who had valuable background experience in hospital surge capacity in disasters. In order to facilitate the transferability of the findings, the method of selecting the participants and their characteristics, the process of data collecting, and the method of data analysis were explained in details. For confirmability, the researchers used triangulation in collecting data. Regarding dependability, the process of the study was checked

and confirmed by the experts in qualitative research and reported in details.

The present study was approved by the research ethics committee of Iran University of Medical Sciences (registration numbers: 93/d/101/3256).

4. Results

Demographic and professional characteristics of participants are shown in [Table 1](#)

Sixty-three percent ($n = 17$) of the participants were male and the remaining were female. More than half of the participants (52%) had a PhD degree and 52% of them had work experience for more than 20 years. More than 66% of the participants were the officials of the hospitals, and the others were CEMSM and OHM of Iran's ministry of health and UMSS.

In this study, 37 subthemes and 10 themes were recognized, which were grouped under 4 main categories, including space, medication/supplies, manpower, and functional structures/ plans ([Tables 2 to 5](#)).

4.1. Theme 1: Shortage of space in disasters

Most of the participants believed that at the time of disasters, hospitals will face a shortage of space.

4.2. Theme 2: Failure in Providing Basic Services

Most of the participants said that one of the main obstacles to surge hospital capacity in disasters is lack of the provision of water and electricity supplies.

4.3. Theme 3: Weakness in Providing Emergency Medical and Essential Non-Medical Supplies

Most of the participants believed that although hospitals have enough medication/ consumable medical supplies for emergency use in disasters: they will not be able to supply such items in times of disasters.

4.4. Theme 4: General Shortage of Manpower

Almost all of the participants believed that generally there will be a lack of manpower in hospitals during disasters

4.5. Theme 5: Failure to Maintain and Recall Staff at the Time of Hospital Surge Capacity in Disasters

Most participants believed that hospitals are challenged with many problems in disasters to maintain and recall staff. As it can be seen in [Table 2](#), lack of incentives is one of the known reasons in this regard. Most of the participants believed that insufficient incentives reduced the staff's willingness to stay and work in disasters. Most of them emphasized that financial incentives are effective in persuading to stay in times of disasters.

Table 1. Demographic and Professional Characteristics of Participants

Participants from: Characteristics	Hospitals	CEMSM/ OHM/ UMSS	Total
Gender			
Male	41% (n = 11)	22% (n = 6)	63% (n = 17)
Female	26% (n = 7)	11% (n = 3)	37% (n = 10)
Level of education			
Under graduate	29% (n = 8)	4% (n = 1)	33% (n = 9)
Post graduate	7.5% (n = 2)	7.5% (n = 2)	15% (n = 4)
MD, PhD	30% (n = 8)	22% (n = 6)	52% (n = 14)
Work experience			
5 - 10 years	11% (n = 3)	4% (n = 1)	15% (n = 4)
11 - 20 years	29% (n = 8)	4% (n = 1)	33% (n = 9)
+ 20 years	26% (n = 7)	26% (n = 7)	52% (n = 14)

Table 2. Identified Themes and Subthemes in the Space Dimension

Themes	Subthemes
Shortage of space in disasters	Previous exploitation of most free spaces inside hospitals
	Loss of most spaces at the time of disasters
	Limited yard spaces of some hospitals
	Limited free spaces around hospitals
Failure in providing basic services	Poor infrastructures of providing basic services in hospitals
	Shortage of emergency water supply and poor emergency power system

Table 3. Identified Themes and Subthemes in the Medication/ Supplies Dimension

Themes	Subthemes
Weakness in providing emergency medical and essential non-medical supplies	Adequate supply of medication/ consumable medical supplies for emergency uses
	Inadequate inconsumable medical supplies for emergency uses
	Weakness in oxygen supply during hospital surge capacity in disasters
	Shortage of memorandum of understanding with other institutions/ health facilities to provide supplies at the time of surge capacity in disasters
	Bed shortage
	Shortage of temporary structures (such as tent, inflatable structures)
	Shortage of reliable communication facilities

4.6. Theme 6: Low Efficiency and Effectiveness of Staff at the Time of Hospital Surge Capacity in Disasters

Most of the participants thought that a lack of knowledge and unfamiliarity of the staff with their duties is the main reason for the low efficiency and effectiveness of staff during hospital surge capacity. Most of the participants believed that the tasks and duties should be determined for the staff, and we should have plans for disasters before it

happens; everyone should know what to do; they should understand their duties.

4.7. Theme 7: Weakness in Using the Volunteers

Most of the participants said that most hospitals have no plan to use volunteers in disasters. Most of them believed that it is essential to have a specific plan to use volunteers at the time of hospital surge capacity.

Table 4. Identified Themes and Subthemes in the Manpower Dimension

Themes	Subthemes
General shortage of manpower	
Failure to maintain and recall staff at the time of hospital surge capacity in disasters	Materialism and low commitment among majority of staff
	Lack of work culture in disasters
	Leaving work in disasters
	Lack of safe transportation in disasters
	Additional family troubles of the staff
	Dual/multi-job of the staff (shifts for different jobs)
	Constant fatigue of the staff
	Lack of incentives
Low efficiency and effectiveness of the staff at the time of hospital surge capacity in disasters	Lack of definition and poor knowledge of the staff about their duties at the time of surge capacity in disasters
	Young and inexperienced staff
Weakness in using the volunteers	Lack of planning for the use of volunteers in most hospitals
	Security barriers in the use of volunteers

Table 5. Identified Themes and Subthemes in the Functional Structures/ Plans Dimension

Themes	Subthemes
Fundamental weaknesses in hospital's preparedness plans	Neglecting disaster issue by authorities in hospitals
	Lack of continuity of preparedness activities against disasters
	Poor supports for implementing hospitals preparedness plans
Content defect in hospitals preparedness plan	Lack of strategies or plans for using resources (space, supplies, and manpower) outside the hospitals at the time of disasters
	Shortage of disaster early warning system
	Lack of classification in hospital surge capacity
	Lack of defining most work processes of hospitals at the time of surge capacity
	Weakness in hospital incident command system (HICS)
	Lack of reverse triage protocol
Weakness in trainings and exercises on hospital surge capacity	Holding a few trainings and exercises of hospital surge capacity
	Low effectiveness of trainings and exercises

4.8. Theme 8: Fundamental Weaknesses in Hospitals' Preparedness Plans

Most of the participants believed that generally the preparedness plans of the hospitals against disasters, including the plan for hospital surge capacity as the main element, is challenged with fundamental weaknesses and obstacles.

4.9. Theme 9: Content Defect in Hospital Surge Capacity Plan

Most of the participants believed that the present plans for hospital capacity are weak and have defects in

terms of content. They stated that these plans lack all the required components: plans for using these places (schools, stadiums, and parks, and, the spaces around the hospital) in disasters (for hospital surge capacity) should be coordinated in advance; yet such plans can rarely be found in hospital policies (P23).

4.10. Theme 10: Weakness in Trainings on Hospital Surge Capacity

Most of the participants stated that there are a few exercises specific for hospital surge capacity in disasters: most

of them believed that even those few exercises on this issue were not efficient enough.

5. Discussion

This paper aimed to assess the present condition of hospital surge capacity in Iran as a developing country, as well as the challenges and strategies on this matter, which resulted in identifying 12 themes, under 4 main categories. One of the themes in this study was shortage of space inside the hospital structure. In this regard, the results of this study are consistent with the results of two other studies on this matter (16, 17). In one of these studies, Chim et al. analyzed the lessons learned by Indonesia's health sector from terrorist bombings in the past 2 decades in this country. The results showed that one of the main obstacles to respond to the surge of victims of disasters was lack of enough space to place extra beds in hospitals (16). The other identified theme in this study was shortage of space outside the hospital.

According to the results, provision of basic services in the hospitals during disasters is weak. The other theme in this study, weakness in providing medication/emergency medical supplies, is consistent with the results of a study by Hekmatkhah et al. The results of this study showed that the safety of medical equipment of hospitals in disasters was poor (18).

One of the recognized themes was general shortage in hospital manpower. The results of this study confirmed the reports of the health ministry that reflect the acute shortage of manpower in hospitals throughout Iran (19, 20).

Failure to maintain and recall staff in disasters is one of the other challenges recognized in this study. The results of a study by Davidson et al. showed that the hospitals failed to maintain and recall their staff in disasters, and in such circumstances, the absence of employees would increase to 17 times more than in normal conditions (21). They emphasized that surge capacity and proper functioning and effectiveness of health facilities in a disaster depends on having experienced staff.

The issue of neglecting disasters by authorities in hospitals was one of the subthemes identified in this study, which is consistent with the study by Arab et al. (22). The findings showed that the knowledge and awareness of the managers on preparedness for disasters are very low, which shows that they neglect such an important issue. One of the other subthemes recognized in this study was weakness in HICS. The results by Shams et al. are consistent with the results of the current study on this matter. They indicated that there are problems on establishing HICS in hospitals (23).

According to the results of this study, trainings on surge capacity during disasters in the hospitals are deficient in terms of numbers and irregularity, and the low efficiency of courses. However, it seems that this problem is not unique to developing countries. King et al. studied the experiences and lessons learned in health facilities of the United States from sandy hurricane and showed that the staff of the health facilities had not participated in any exercises related to surge capacity, at least 2 years before the disaster (24).

In this study, the researchers tried to perform an extensive and in-depth data collection and analysis for addressing and identifying all roots and aspects of obstacles and strategies for surge capacity.

Many weaknesses and challenges in hospital surge capacity in disasters were recognized, reflecting the poor conditions of hospitals on this issue.

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Footnotes

Authors' Contribution: HSh, MJ, HS, and HAG equally contributed to the study and design as well as developed the methods. HSh, AV-N, and AR drafted the manuscript. All of the authors contributed to the revision of the manuscript and have read and approved the final version.

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