



Preparedness for Disaster in Healthcare Systems- According to Worldwide Previous Studies

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ABSTRACT

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Disasters can occur at any given moment, whether it is a natural disaster or a man-made disaster. Over the years, disasters have also been increasing in frequency and the number of victims. To prepare for disasters, hospitals should perform frequent exercises and drills, learning and training. The preparedness plan should be implemented during actual incidents.

During disasters, the emergency department team of the hospital needs to focus exclusively on patient treatment and care, which requires the presence of a care team for patients' families. This is a very essential issue that every hospital needs to take into consideration when planning for preparedness.

Hospitals need to continue providing routine healthcare services to their patients and expand their facilities to meet the immediate healthcare demands resulting from the flood disaster victims, even while their facilities are damaged or their ability to offer services has been disrupted.

KEYWORDS:

Healthcare Systems,
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Disasters can occur at any given moment, whether it is a natural disaster or a man-made disaster. Over the years, disasters have also been increasing in frequency and the number of victims. The best way to protect the population from a disaster is to design exercises for a positive response. To plan disaster preparedness, we need to implement the four phases of emergency management, which are mitigation, preparedness, response, and recovery. The mitigation phase includes previous preventive measures that aim at reducing damage. The preparation phase includes performing exercises and drills, through which the levels of risks can be assessed. The response phase is related to the management of the disaster site upon the occurrence of an emergency, and to handle and serve the injured people. The recovery phase is the phase in which an organization gets back to its normal mode of action as quickly as possible. To prepare for disasters, hospitals should perform frequent exercises and drills, learning and training. The preparedness plan should be implemented during actual incidents [1].

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According to a national survey conducted in Switzerland between 2006 and 2016, there has been a significant change in the hospitals' preparedness levels in ten years. The healthcare system in Switzerland is fragmented and highly decentralized. The main objective of the survey was to compare the proportion of hospitals with a disaster plan in 2016 with the proportion in 2006. In 2006, 82% hospitals had a disaster plan in case of a mass casualty incident. This increased to 92% in 2016. Half of the hospitals performed at least one simulation drill per year, whereas all hospitals organized at least one exercise every three years. Most Swiss hospitals do not have a disaster plan for particular segments of patients (elderly, children, migrants). Children are often involved in disasters and they should be given primary transport to pediatric centers. If such a solution is not possible, the hospital should have a plan for how to take care of sick children by pediatric exercises.

During disasters, the emergency department team of the hospital needs to focus exclusively on patient treatment and care, which requires the presence of a care team for patients' families. This is a very essential issue that every hospital needs to take into consideration when planning for preparedness. Most hospitals in Switzerland report the unavailability of such resources.

According to a report issued by The Swiss Federal Office for Civil Protection (FOCP), severe chemical or biological

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accidents may occur more than once every 100 years, and nuclear accidents once every 30,000 years. For such disasters, hospitals must have a decontamination area that can decontaminate the spread of toxic agents in the hospital, thereby, preventing contamination of both patients and staff. In Switzerland, only half of the hospitals have a decontamination area [2].

In Ireland, the office of emergency planning provides support to the government task force on emergency planning. To investigate Ireland's emergency healthcare workforce readiness for a mass casualty event, a cross-sectional study using a purposive sample of Ireland's emergency responders was conducted over three months in the spring of 2017. The study included a total of 385 respondents; registered nurses (43.4%), paramedics (37.9%), medical doctors (10.1%), and administrators/managers (8.6%), who participated in the study. The results demonstrate that serious deficits exist in healthcare providers' knowledge, skills, and self-perceived abilities to participate in a large-scale mass casualty event. Results also suggest a poor knowledge base of existing major emergency response plans [3].

Yamen is vulnerable to natural disasters. Most of the western and southern regions of the country are on the sea line and at an active seismic zone. In November 2011, two tropical cyclones hit most of the coastal areas of the Gulf of Aden and caused many deaths due to flooding. According to a health facility-based report on casualties recorded between March and October 2015, there were 26,703 injuries and 5,604 deaths.

To evaluate the preparedness of Aden's healthcare facilities for emergency cases, a study was conducted in June 2016, the sample included all facilities that had functional emergency departments operating 24\7 and inpatient care facilities functioning based on the standards of the Ministry of Public Health and Population in the city of Aden. The evaluation tool used was a valid checklist developed by the WHO Regional Office for Europe; the hospital emergency response checklist of all hazards 2011. The study revealed that the hospitals of Aden city are grossly unprepared for disasters and that most enquired checklist keys were in due for review stage [4].

On April 14, 2016, at 21:26, an earthquake measuring 6.5 on Richter Scale struck Kumamoto city in Japan. Nine people were killed, and more than 100 were wounded, including 70 major injuries, and over 2800 people were evacuated to shelters. Twenty-eight hours after the earthquake, another earthquake measuring 7.3 on Richter Scale struck and affected a wide area of Kumamoto.

Kumamoto hospitals and other hospitals near the city were damaged and could no longer function, the hospitals' water and power supplies become unreliable as a result of the earthquake.

The government of Japan made important changes in disaster planning after Hanshin Earthquake (1995) and the Great East Japan Earthquake (2011). Despite these changes, the events

in Kumamoto revealed that there is yet much work to be done, especially to facilitate communication among facilities in the immediate aftermath of a disaster and to improve multi-agency coordination [5].

Between the years 2005 and 2014, flood disasters were the most frequently reported types of natural disasters around the world, with around 59,092 people killed. The occurrence of flood disasters around the world has increased in severity and economic cost.

In Thailand, the worst flood disaster occurred in 2011 resulting in a total of 1085 deaths. Flood disasters have an impact on the structure and function of hospitals, severe damage to hospitals was reported following the flood disaster in Thailand in 2011, most of the affected hospitals were located in the central part of Thailand.

Hospitals need to continue providing routine healthcare services to their patients and expand their facilities to meet the immediate healthcare demands resulting from the flood disaster victims, even while their facilities are damaged or their ability to offer services has been disrupted. The study used a descriptive design to survey hospitals in the central region of Thailand, all 27 hospitals in the central region of Thailand were included. The questionnaire was modified by the researcher based on applying the preparedness cycle of FEMA. The study demonstrated that levels of preparation for flood disaster management among hospitals in the central region of Thailand were inadequate for effective flood disaster response [6].

Recently, terrorist organizations have become much more common internationally and are supported even by certain governments. Types of weapons are becoming more aggressive and diverse. All these events can cause loss of life and mass destruction, fear and panic, and major international economic disruptions. These events force hospitals to increase the level of readiness.

Terrorists can develop into the use of a "dirty bomb" which expels a radiation isotope that can spread out into air and water. This bomb can cause a huge loss of lives, depending on the condition of the geographic location impact, but it would certainly cause panic and disruption.

The preparedness for disasters has become a major task for hospitals around the world. Hospitals play an important role during emergencies. To ensure good coordination during such events as mentioned above, it is important to have cooperation with local resources, like radiation professional teams, government, and federal agencies, including the military [7].

In the case of Turkey, a study was conducted to examine the plans of the hospitals and the preparation for possible disasters. The study included 430 hospitals from all around Turkey, each of which had 100 or more beds. The study adopted a descriptive approach adopted by the Ministry of Health from all the 430 hospitals, 358 are public, 40 are university, and 32 are private institutions. The number of the

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returned completed questionnaires was 251 (58.4%) from all participating hospitals. The questionnaire consisted of five parts:

- Part 1: Descriptive information.
- Part 2: Preparedness plans of hospitals.
- Part 3: Preparedness plans of hospitals, emergency services, ambulances, and security.
- Part 4: Preparedness plans of hospitals' communications, pharmacies, and food services.
- Part 5: Preparedness plans of hospital electrical generators, chemical and radioactive accidents, and morgues.

The statistical analyses were performed using SPSS (statistical package for social sciences). A total of 233 hospitals (92.8%) had a written disaster plan. When analyzed according to the type of hospital, they were 204 public hospitals (92.8%), 19 university hospitals (86.4%), and 10 private hospitals (100%) that were found to have written disaster management plans. According to the study, 63.5% of the public hospitals, 80% of the private hospitals, and 31.8% of the university hospitals perform exercises on annual basis [8].

Massachusetts General Hospital (MGH) in Boston is a level 1 trauma teaching hospital where patients receive care for all surgical specialties. Personnel has the capacity and ability to care for large numbers of patients with varying levels of severity. On April 15, 2013, a bomb exploded at the Boston Marathon finish line (3 PM). That morning, 135 nursing team members arrived for the 7 AM shift, with more personnel scheduled to arrive for the 11 AM and 3 PM shifts, with the surgical staff all starting at 8 AM. In MGH, employees are allowed to carry personal cell phones, however, these cell phones are not to be used in the presence of patients, and they need to be kept in silent mode at all times.

After the bombing event, Boston emergency medical services triaged and transported patients to trauma centers across the city. Initially, the MGH emergency preparedness leadership team was unable to determine the number of patients or the types of injuries to expect. MGH uses an emergency notification system (ENS) for critical communications to varying levels of hospital leaders when an emergency or disaster is declared.

The disaster declaration was activated at 3:03 pm. The first MGH patient arrived in the ED at 3:04 pm. However, this information was not immediately relayed to all perioperative administrative leaders or clinical personnel. As a result of this limited information, perioperative leaders and team members relied primarily on information from social media.

Team members did not anticipate that there would be issues with communication technology; law enforcement officials in Boston decided to shut down all cell phone towers. In response, all MGH personnel began to use landline telephones to communicate with each other.

As a response, the following actions were taken:

- Determine the number of personnel available to care for incoming patients.
- Identify a list of all available nursing personnel, surgeons, anesthesia professionals, and nonclinical support.
- Determine the current status of OR availability, number of patients, and number of rooms.
- Prepare for a wide range of patients with traumatic injuries by obtaining and readying specialty supplies.

In the case of this MGH experience, many aspects of the emergency preparedness response to the bombing and the patient care and outcomes were excellent. However, the leaders identified opportunities for further improvement, which included emergency notifications, staff member identification, traffic control, communication, and the development of a new plan.

The critical lessons learned during the 2013 event reminded everyone that emergency preparedness plans need to be updated on regular basis. Every process in any environment can be improved, particularly with experience. Accordingly, MGH leaders developed an updated plan that will help team members respond to any event and situation [9].

In the events involving weapons of mass destruction (WMD), the medical health systems play a critical role in short-term and long-term wars. After the terrorist attacks on New York on September 11th, 2001, and the release of anthrax through the mail in the USA in 2001 (also known as Amerithrax from its FBI case name), the federal government provided millions of dollars to the hospital preparedness program. The federal government increased support for preparedness against WMD, which included funds to improve planning, training, and equipment for local emergency response agencies. In addition, hospitals had to take care of their staff and facility protection, patient decontamination and triage, medical therapy, and coordination with an external emergency response as a response plan.

After the 9/11 attacks, the Kentucky Hospital Association asked about hospital participation in regional bioterrorism response planning. Around 81% of hospitals updated their disaster plans, 66% of them implemented additional training, and 38% purchased new equipment [10].

SUMMARY

According to previous studies, performing drills and exercises it is the best way for emergency preparedness. We cannot prevent disasters, but with good preparedness we can minimize the damage, and we can back soon as possible to daily routine.

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