

## Original Research Article

# Critical analysis of disaster management plan in a tertiary care hospital

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### ABSTRACT

**Background:** Disaster in hospital is when the resources of the hospitals (infrastructure, trained manpower and organization) are over-whelmed beyond its normal capacity and additional contingency measures are required to control the event. The calculation of hospital treatment capacity provides a baseline for Hospital Administration to plan accordingly. Critical analysis of the disaster management strategies as per the hospital emergency response checklist – an all hazards tool for hospital administrators and emergency managers helps in identifying the gaps and strengthening the disaster management plan.

**Methods:** The study is a retrospective analysis of the response of a tertiary care hospital vis a vis hospital emergency response checklist.

**Results:** The disaster preparedness was analyzed according to the hospital emergency response checklist and gaps were identified.

**Conclusions:** The need for a comprehensive and easily deployable disaster management plan cannot be emphasized enough. The tools of continuous quality improvement can be used and analysis may be used to further strengthen the plan.

**Keywords:** Disaster, Disaster management committee, Hospital administrators, Hospital treatment capacity

### INTRODUCTION

Indian subcontinent is vulnerable, in varying degrees, to a large number of disasters.<sup>1</sup> Neither the occurrence nor severity of disasters (man-made or natural) can be anticipated. The unique, peculiar threats posed by each kind of disaster are also unpredictable. Thus, preparing a management plan can be a daunting task. Hospitals play an important part in disaster management and a well-managed response be desirable to alleviate suffering. Whenever a hospital or a health care facility is confronted by a situation where it has to provide care to a large number of patients in limited time, which is beyond its normal capacity, constitute a disaster for the said hospital. In other words, when the resources of the hospitals (infrastructure, trained manpower and organization) are over-whelmed beyond its normal capacity and additional

contingency measure are required to control the event, the hospital can be said to be in a disaster situation.<sup>2</sup> Hospital treatment capacity is usually calculated as 3% of total number of beds and it provides a baseline for hospital administration to plan accordingly. However, it varies with the type of hospitals.<sup>3</sup>

Disaster preparedness in hospitals is not a statutory requirement in most countries. Empirical evidence suggests that in countries where such plans are not mandatory, lack preparedness in contrast to countries like United States where accreditation bodies requires all hospitals to prepare and practice contingency plans.<sup>4,5</sup> Although the hospital disaster preparedness in our country got some impetus, the guidelines for disaster preparedness are in still in an infancy stage. In order to further develop

such plans, evaluation of the existing plans and identifying gaps is of paramount importance.

The present study is based on the authors' own experience of managing external disasters in a multispecialty tertiary care hospital. A series of disasters dealt with led to certain steps taken by the department of hospital administration to strengthen the preparedness.

This study was undertaken to critically analyze the disaster management strategies of a tertiary care hospital as per the hospital emergency response checklist – an all hazards tool for hospital administrators and emergency managers.<sup>6</sup> The steps taken to strengthen the disaster management plan and the gaps as per the checklist are also enumerated.

## METHODS

The study is a retrospective analysis of the three different kinds of external disasters in a span of 45 days from July 2017 to October 2017, the patients of which were received in Government Medical College Hospital, Chandigarh and the response of this tertiary care hospital vis a vis hospital emergency response checklist – an all hazards tool for hospital administrators and emergency managers.<sup>6</sup> Data for number of injured patients reporting to the emergency per hour, demographic details and outcome was obtained by the review of hospital records and were recorded in excel sheet. Data for use of resources, patient flow and nine components of the checklist was obtained by review of documentation and minutes of meeting of disaster management committee. The steps taken for improvement were enumerated through observation and by the review of the minutes of disaster management committee.

## RESULTS

The hospital witnessed a series of three different kinds of external disasters in a span of 45 days from July 2017 to October 2017.

The incidents were - incident 1: riots in the city as a result of clash of the supporters of a self-proclaimed spiritual leader and the local police on 25.08.2017; incident 2: fire outbreak in a local factory on 06.10.2017; and incident 3: hot air balloon blast on 08.10.2017.

Total numbers of patients received in the emergency of the hospital in these incidents were 83. Table 1 gives the gender wise distribution of the patients respectively in all the three incidents. Figure 1 gives the age wise distribution of the patients.

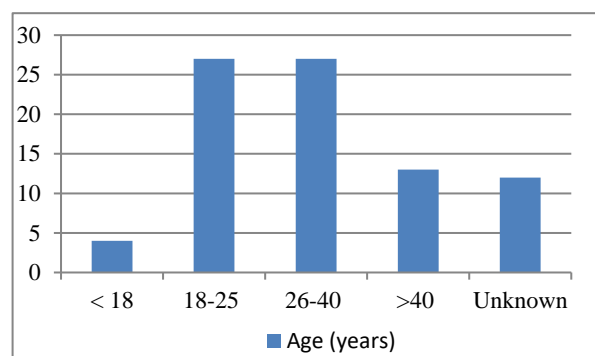
Table 2 shows the outcome of the 83 patients who reported to hospital emergency during these disasters.

Hospital treatment capacity (HTC) was calculated for 854 bedded hospital which came out to be 25 i.e. 25 casualties can be treated per hour. Among the incidents reported, the number of casualties per hour exceeded the HTC (n=28) in

the case of incident 2. Table 3 shows the inflow of patients in first hour and later in all the three events.

**Table 1: Gender-wise distribution of patients.**

Incidents	Male	Female	Total
<b>Incident 1</b>	32	6	38
<b>Incident 2</b>	4	24	28
<b>Incident 3</b>	16	1	17
<b>Total</b>	<b>52</b>	<b>31</b>	<b>83</b>



**Figure 1: Age-wise distribution of patients.**

**Table 2: Outcome of disaster patients.**

Outcome	No. of patients	Percentage (%)
<b>Treated and discharged</b>	72	86.7
<b>Absconded</b>	5	6
<b>Deaths</b>	3	3.6
<b>Brought dead</b>	2	2.4
<b>LAMA</b>	1	1.2

**Table 3: Hour wise inflow of patients in the emergency.**

Incidents	1st hour	2nd hour	3rd hour
<b>Incident 1</b>	17	12	9
<b>Incident 2</b>	28	0	0
<b>Incident 3</b>	17	0	0

The disaster preparedness was analyzed according to the hospital emergency response checklist – an all hazards tool for hospital administrators and emergency managers and the gaps were identified.

## DISCUSSION

Most of the patients affected by the disasters in our study were in age group of 18-40 years of age group. Hospital treatment capacity (HTC) for our hospital was 25 and the number of casualties per hour exceeded the HTC (n=28) in the case of incident 2. The disaster preparedness of the hospital was analyzed according to the hospital emergency response checklist which divides the plan into nine key components.

### ***Key component 1: command and control***

The command-and-control system was immediately established for disaster management. All the members of the disaster management committee were informed and the disaster plan was activated. The office of the Medical Superintendent equipped with effective means of communication was designated as the command centre to convene and coordinate disaster management activities throughout the hospital. All the stakeholders were informed and they reported to the emergency department immediately. In fact, the response was overwhelming and faculty members and staff other than those who were members of the disaster management committee also reported. The jobs and responsibilities were not defined which created lot of confusion with the sudden inflow of patients. Many patients directly reported to emergency areas without registration which led to confusion in census of patients and difficulty in demarcating the disaster victims from the patients who were admitted from before. Study by Zibulewsky also states that as many as 50% of the victims bypass the system of triage which leads maldistribution of patients.<sup>7</sup> As a result, a flow chart of direction of command and standard operating procedure (SOP) was formulated by the disaster management committee.

#### *Gaps identified*

An individual should be responsible for a particular key component and this group of individuals being the quick response team would ensure even better coordination. Their replacements should also be designated to guarantee continuity of this structure. Development of job cards enumerating role, resources, command structure along with training and sensitization of the concerned staff for the same is also required.

### ***Key component 2: communication***

The director and the medical superintendent were responsible for coordinating hospital communication with the media and health authorities. A briefing of the hospital staff regarding their roles was done according to the plan. The need for reliable backup communication was identified and procurement of walkie talkie was initiated by the disaster management committee. Various studies have suggested the role of communication during disaster management.<sup>8,9</sup>

#### *Gaps identified*

A mechanism to collect the information related to patient prioritization and disseminate to concerned staff, and patient information to their relatives needs to be strengthened. A mechanism to strengthen appropriate and timely communication amongst the members of quick response team and reporting authorities will make the disaster plan efficient and effective from the initiation stage itself.

### ***Key component 3: safety and security***

The In-charge security was responsible for overall safety and security and management of the unexpected incursion of public (patient attendants, media personnel, hospital staff etc.). Due to lack of awareness about their roles among security staff, the crowd management was not done in an organized manner. Thus, the security needs were revised, continuously updated and prioritized in coordination with the officials of hospital administration. Robust and efficient security guards were posted in emergency areas. The entry points were secured and traffic control was ensured.

#### *Gaps identified*

A reliable mode of identifying hospital personnel, patients and visitors and a mechanism for directing the staff and patients to relevant areas is necessary. A detailed evacuation plan needs to be devised and displayed in case evacuation is required. A chemical, biological, radioactive nuclear event (CBRN) protocol and a plan for integrating local law enforcement needs to be devised in order to be ready for any unprecedented incident.

### ***Key component 4: triage***

Triage is one of the key principles of the effective management of major emergencies.<sup>10</sup> Bazyar et al has defined various types of triage systems in disasters.<sup>11</sup> The underlying principle of triage is prioritization to ensure greater good to greater number of patients with the available resources. As the system of triage was not in place during the first incident, the Chairman, emergency services with well-trained emergency staff were designated to overlook the triage as per the internationally accepted guidelines.

Thus, after the first incident, the areas within the emergency were demarcated and color coded and sensitization of the staff was done. The main constraint however was the space requirement. Reverse triaging was done. Already admitted stable patients were shifted to wards in order to adjust disaster patients. Also, the census of the patients and tagging was found to be inadequate for which the committee later formulated a mechanism and included in the SOP.

#### *Gaps identified*

Additional space near the emergency may be identified in case the number of patient inflow is beyond the hospital treatment capacity. Space consideration to set up a decontamination zone in case of a CBRN event should also be borne in mind. The entry and exit routes to the triage area need to be further identified to ensure smooth patient flow. An alternate waiting area also needs to be identified. The staff especially the security personnel needs to be continuously sensitized for the same.

### **Key component 5: surge capacity**

Surge capacity has been defined as encompassing “potential patient beds; available space in which patients may be triaged, managed, vaccinated, decontaminated, or simply located; available personnel of all types; necessary medications, supplies and equipment; and even the legal capacity to deliver health care under situations which exceed authorized capacity.”<sup>12</sup> However, there is no specified or single standard criterion for evaluating hospitals’ surge capacity.<sup>13</sup> In our Institute, the nursing incharge of emergency area maintains a disaster cupboard with adequate resources such as drugs, injectables, dressing materials, mortuary sheets etc. to treat at least 50 patients at the time of disaster. The hospital has adequate infrastructure and resources for patient transportation within the hospital (i.e. to different wards) and outside the hospital (referral to peripheral centers). Non-essential services are cancelled/deferred as per the requirement. An area has also been identified for a temporary morgue and the responsibility to provide adequate infrastructure has been assigned to the head of the department, forensic medicine.

#### *Gaps identified*

Maximum capacity of the hospital needs to be calculated in terms of number of beds required, availability of space, infrastructure and other resources and methods to expand capacity should be explored. Such demand may be calculated using available planning assumptions and tools.

### **Key component 6: continuity of essential services**

The list of essential and non-essential services has been discussed in the committee to identify the services which should be available at all times and the services which can be deferred. The committee has ensured back up arrangements for water, power, manifold gases and collection and disposal of waste in coordination with the respective departments. Also, the availability of ambulances, lab services and sterile supplies was ensured. In order to ensure continuity of care, liaisoning with hospital network, health authorities was the responsibility of the hospital administration.

#### *Gaps identified*

The special needs of critical patients and vulnerable group can be discussed and considered by the committee. A systematic and deployable evacuation plan is required.

### **Key component 7: human resources**

An updated contact list of the hospital staff is always available with the communication cell of the hospital. The availability and absenteeism of the staff is regularly monitored by the respective departments. Since, the hospital is a tertiary care teaching hospital, the credentials of the staff of all cadre is adequate to handle emergency

situations. In case of any disaster situations, the leave of the staff is restricted to ensure operational sufficiency of all departments. The staff may be redistributed from other areas depending on the requirements. Staff rotation is done by the respective heads of the department. The triage team consisting of doctor, nursing staff and social worker has been constituted which is responsible for triage and tagging of the patients and will also maintain the record of all the patients till the time of their discharge. Multidisciplinary psychological support teams with social workers have been included in the triage team. The chief dietician is entrusted with the responsibility of making refreshments available for the staff working on extended shifts and also caters to increased number of patients. Adequate isolation measures and vaccinations are routinely done for staff dealing with communicable and vaccine preventable diseases in accordance with the national policy and guidelines of the health authorities.

#### *Gaps identified*

Regular training, cross training and sensitization of all the hospital staff through drills is required for effective management. The requirement of additional staff if need arises may be anticipated and necessary steps viz liaisoning with voluntary organizations, students after addressing liability, licensing issues may be explored.

### **Key component 8: logistics and supply management**

Disaster and emergency logistics consists of processes and systems that can effectively mobilize people, resources, skills and knowledge to assist victims affected by disasters.

Disaster and emergency logistics consists of processes and systems that can effectively mobilize people, resources, skills and knowledge to assist victims affected by disasters.<sup>14</sup> For logistic and supply management at our institute many measures have been initiated. An updated disaster cupboard is maintained in the emergency with adequate inventory. Backup mechanism is also in place through pharmacy and store through local purchase to ensure continuous availability of life saving drugs and consumables. The central stores and pharmacy store have enough physical space and infrastructure for adequate storage of additional supplies. The pharmacy incharge and store officer is responsible for ensuring timely use of such stockpiled items to avoid expiry and the sister in charge emergency is responsible for inventory management of disaster cupboard.

#### *Gaps identified*

Hospital pharmacy’s role in providing drugs to patients being treated at home and/or alternative treatment sites may be clearly defined. To ensure continuity of services, a contingency transportation strategy with prehospital networks and transportation services to ensure continuous patient transport is also required.

**Key component 9: post disaster recovery**

'Post-disaster recovery' commonly refers to the period of time and activities that occur after the immediate relief and response to a disaster event.<sup>15</sup> The aftermath of a disaster often poses great challenges to communities to recover from the damages and losses.<sup>16</sup> Within the disaster theory, the aspect of 'recovery' is widely seen as the least understood.<sup>16-18</sup>

In our institute, a post recovery protocol was devised wherein department of hospital administration was responsible for overseeing hospital recovery operations and ensuring normalcy after the crisis situation.

**Gaps identified**

However, the essential criterion for deactivation needs to be defined. A debriefing meeting has to be called in a defined time frame with a mandate to assess inventory consumption and replenishment or repair if required. A post disaster employee recovery program according to staff needs would also further strengthen the disaster management especially post disaster recovery to normal functioning.

**CONCLUSION**

The need for a comprehensive and easily deployable disaster management plan cannot be emphasized enough. The tools of continuous quality improvement can be used and analysis may be used to further strengthen the plan. Apart from this practicing through mock drills is vital, so that the staff is well prepared in case of any unanticipated incident and contribute by alleviating the harm to the society by prompt action.

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