Original Resear	Volume-8   Issue-3   March-2018   PRINT ISSN No 2249-555X Medical Science POINTS TO CONSIDER DURING PREPARATION OF HOSPITAL DISASTER PLAN: REVIEW
Erdal Tekin*	MD Department of Emergency, Palandoken Government Hospital, Erzurum, Turkey. *Corresponding Author
Atıf Bayramoğlu	MD Department of Emergency, Ataturk University Medical Faculty, Erzurum, Turkey.

**ABSTRACT** Disasters are sudden and unexpected ecological situations, which exceed resources and capacities of the institutions, disrupt the normal functioning, and necessitate external assistance. Different classifications of disasters are present according to their types of occurrence and origins. A short history of emergence of disaster plan will be mentioned. The properties of the hospital emergency command system and commission for preparation will be highlighted. We suggest starting with at least nine administrators at the outset of the disaster, for continuation of operations. These are as follows: president of the hospital disaster plan, public relations authority, interinstitutional coordination officer, occupational safety officer, medical /technical advisory board, chief of operation, chief of planning, chief of logistics, and chief of finance. This number may be increased according to demand, thereafter. The healthcare services that will be provided during disaster environment will be explained together with triage. To use simple triage/rapid treatment system, which provides a simple and fast treatment opportunity for patients, and color-code system recommended by the Ministry of Health seems to be more advantageous in the disaster field and its details are discussed.

KEYWORDS : Hospital Disaster Plan, Triage, First Aid and Healthcare Services during Disaster

## **General Information and Definitions**

World Health Organization (WHO) describes the disaster as sudden and unexpected ecological situations, which exceed resources and capacities of the institutions, disrupt the normal functioning, and necessitate external assistance<sup>(1,2,3)</sup>. Disasters can be classified as either natural and technological or according to their occurrence and origins (Table 1)<sup>(4)</sup>.

## Table 1: Classification of Disasters

The Formation of Origin	According to Origin
Suddenly Developing Disasters	Geological disasters
(Earthquake, floods, raw, storms,	(earthquakes, landslides, rock
nuclear, and chemical accidents,	falls etc.)
etc.)	
Slow Developing Disasters	Meteorological Disasters (floods,
(Drought and hunger, erosion,	drought, storm, global warming,
desertification, global warming,	desertification etc.)
epidemic diseases, etc.)	
	Technological disasters (Nuclear
	and chemical accidents, traffic
	accidents, industrial accidents,
	etc.)
	Human-induced disasters (fires,
	environmental pollution, terrorist
	acts, wars, etc.)

The extraordinary circumstances covers all situations, in which daily healthcare services are inadequate, and the healthcare demands of the region cannot be supplied, necessitating national and international assistance. Disaster medicine is the medical branch that intervenes to save as much disaster-victims as possible, by optimizing the use of disproportion between suddenly occurring healthcare demands during the disaster and the resources in the disaster-affected community<sup>(5)</sup>.

Disasters, emerging at unexpected places and times, create harmful effects on living creatures. The region or country, in which the disaster occurs, cannot compete with these harmful effects alone and external assistance may be unable to reach the disaster region throughout the first 24-72 hours <sup>(6)</sup>. Disaster plans at national, local, and institutional levels should be made, taking all types of disasters into consideration. Hospitals are the most referred institutions during disasters, with subsequent big commotion. Additionally, they might have been directly affected by the disaster. All-time preparedness of hospitals and other healthcare institutions will reduce the damage and chaos, when faced with such events. Therefore, to be successful in diagnosis and treatment of admitted sick and injured patients, to minimize problems that may arise in the hospital, or to intervene in an in-hospital event, affordable, easily accessible and applicable, written hospital disaster

# plan (HDP)<sup>(7,8,9)</sup>.

#### History of Formation of Disaster Plan

Disaster plan was initially developed and used in the United States by firefighters in 1970, with the name of FIRESCOPE (Firefighting Resources of California Organized for Potential Emergencies) in fires occurring in California. In 1987, Northern California Hospital and Institution Committee created the earthquake preparedness guide with the name of Incident Command System (ICS) for hospitals, by considering this system as a reference. It was revised as Hospital Emergency Incident Command System (HEICS) in 1991 by Orange City Emergency Medical System (EMS). Then, it was revised again in 1992 as HEICS-II, AND IN 1998 AS HEICS-III. In August 2006, it was introduced as Hospital Incident Command System (HICS). In March 2014, the final HICS guide was published<sup>(10,11,2)</sup>.

In Turkey, the sensitivity for disaster increased following 1999 Marmara earthquake. Following revision of HDP in 2000, it was first implemented in 9 September University, Medical Faculty Hospital. Ever since, the Ministry of Health and medical associations tell HDP in detail. The HDP of Ministry of Health recommended for hospitals in 2007 and required for accreditation shows similarities with HICS. The fact that HDP was mentioned by the Ministry of Health in its issued circular letter in 2010 has led to the encouragement of hospital administrations in preparation of HDP. Most recently, in 2015, by issuing the regulation for implementation of hospital disaster and emergency plans, the compliance of our country with the systems used throughout the world on the disaster preparedness and disaster medicine topics was tried to be achieved<sup>(13,14,15)</sup>.

#### Hospital Emergency Incident Command System (HEICS)

HEICS organization defines the duties and responsibilities of hospital staff before, during, and after the disaster in detail. In HEICS organization, there is a reliable chain of command. Within this chain of command, "who will report to whom" is stated together with the priorities and timing. Moreover, since it is a flexible system, it can be activated according to the characteristics of the disaster or the emergency condition and it can be applied in all small or large hospitals with various capacities. This organization chart consists of president of the HDP, public relations authority, interinstitutional coordination officer, occupational safety officer, medical /technical advisory board, chief of operation, chief of planning, chief of logistics, and chief of finance (Figure 1). The number of attendants in this organization chart can be increased or reduced according to the disaster severity, and the hospital size, together with the staff's and hospital's level of being affected. However, we suggest starting with at least nine administrators at the outset of the disaster, for continuation of operations. The number of attendants in this organization chart may be increased according to demand, thereafter. All administrators in this chart work in tandem with each other, and they are directed by a single

president <sup>(11,15)</sup>. For faster and more effective activation during a disaster, the top executives of the institution should be included in the plan. These administrators should not participate in the operations, leaving their primary duties, due to lack of personnel or other reasons. Otherwise, serious problems and deficiencies may be encountered within the organization <sup>(15,16)</sup>. The individuals participating in HDP or their families might have been directly affected by the disaster. In such situations, these individuals cannot perform their duties or they perform very inefficiently. For this reason, substitutes should absolutely be determined and written in HDP.

#### Figure 1: Organizational Scheme of Hospital Disaster Plan (HDP)



A commission under the presidency of the hospital's most authoritative person is established in order to prepare HDP. HDP is than prepared/updated and sent to the provincial health authority. This plan should be updated annually and should be tested as desk-based once, and once by field exercise each year (15).

Commission for preparation of HDP<sup>(15)</sup>

- Physician in chief 1.
- 2. Deputy chief physician / physicians
- 3. Chiefnurse
- 4. Deputy chief nurse / nurses
- 5 Hospital manager
- 6. Deputy hospital manager / managers
- 7 Head of emergency service
- 8. Security manager
- Head of operating room 9.
- 10. Head of intensive care unit
- 11. Public health specialist
- 12. Head of the laboratory
- 13. Quality representative
- 14. Workplace safety expert
- 15. Civil defense expert

HDP preparation commission is responsible for preparation, followup, and organization of HDP.

#### Planning stages of HDP:

- Determination of commission which will make the planning
- Establishment of the planned commission
- Conducting hospital's risk analysis
- To determine the purposes of the plan
- Defining the management
- Determination of responsibilities
- Conducting analysis of hospital resources
- Establishment of emergency management components and system
- Writing the plan
- Implementation of the plan and testing
- Updating, testing, and revising the plan

#### The duties of the administrators in hospital emergency command system are:

- President of HDP: responsible for administration and organization of HDP
- 2. Public Relations Authority: responsible for gathering and selecting information for continuously informing community and media
- 3. Interinstitutional Coordination Officer: to investigate the severity, nature, and extent area of the disaster, to collect data on this subject and to communicate with representatives of other institutions
- Occupational Safety Officer: ensures the safety of patients, staff, and visitors; gets rid of and monitors dangerous situations. He is

authorized to stop all operations in health and life threatening emergency conditions.

- Medical / Technical Advisory Board: consists of biological / infectious diseases, law office, clinical care, pediatric care, radiology, risk management, medical ethics, and employee in charge of medical personnel. They inform president of HDP on related subjects and take necessary precautions.
- Chief of Operation: organizes, assigns, and supervises the sources in terms of deployment, medical care, infrastructure, safety, hazardous materials, and business continuity, performs all emergency patient care services including emergency care fields, triage, treatment fields, and morgue.
- Chief of Planning: manages the collection of incident-related data, 7. analyzes taking interventions and allocated resources into consideration, develops alternatives for tactical operations, plans the meetings, and prepares the disaster action plan for all periods of the operation.
- 8 Chief of Logistics: has the authority to determine the damaged parts of the hospital, to decide whether it is safe to evacuate or not, and to make investigations on this subject.
- 9 Chief of Finance: keeps track of income and expenses with financial resources, checks the records of costs and expenses, together with expenses related to the emergency<sup>(11,</sup>

Although the usual meetings of hospital emergency command center are held in the hospital building, the meeting place should be built in a safe zone, outside the disaster area, but close to the hospital, if damage has occurred in the hospital. This zone and the areas in which the field hospital will be built should be determined beforehand. The president of HDP decides for the meeting of command center during the disaster, and calls the relevant divisions in accordance with the magnitude of the disaster. According to the needs, the personnel who are not on duty may also be called. For this reason, there should be a list involving the phone numbers and addresses of all personnel. If telephone communication is interrupted, attempts to reach the hospital personnel by the help of wireless, courier, motorized /non-motorized vehicles, satellite phone or media should be made (18,19

### Healthcare Services in the Disaster Environment

- The areas that should be built during the disaster <sup>(20)</sup>:
- Ambulance and heliport area 1.
- 2. Triage area
- 3. Admission area
- Green field 4.
- 5. Yellow field Red field 6.
- 7. Black field
- 8
- Decontamination and isolation area
- 9 Psychiatric area
- 10. Family waiting and discharge area
- 11. Voluntary application area 12. Press and public relations area
- Many disaster- victims and their relatives will pour in the hospitals during and following the disaster. Therefore, these areas should be planned before the disaster and deficiencies should be determined and corrected by making field-exercises. Disaster-victims are evaluated in the triage area, administered according to their medical needs, directed to red, yellow, and green fields, and their initial interventions are performed in these fields. Disaster-victims who have deceased and would not have benefited from medical treatment are directed to the black field, and following identification procedure, they are directed to the predetermined morgue fields. The disaster-victims, whose procedures in the morgue field have ended, are handed over to their relatives. Following triage, disaster-victims who are contaminated or who have contagious diseases are directed to the proper field and decontaminations procedures are performed with appropriate clothing and disinfectants. A psychiatric area should be established in order to evaluate psychiatric patients and disaster-victims who suffer from disaster-related psychologic imbalance during and after the disaster. Security measures should be taken and no one except the attendants should be allowed to enter the area. The relatives of disaster-victims, volunteers, and members of the press should be directed to the areas reserved for them; these areas should be isolated and located far from the emergency service, if possible. The members of the press and relatives of disaster-victims should be periodically informed by the public relations authority with the permission of HDP president. In disasters, transformation of information should be performed from a

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# **Disaster Triage**

The rapid selection and coding procedure with the aim of determining disaster-victims who require prioritized treatment and transport, performed on site or in every health institution to which these victims are transferred is called triage <sup>(1,21)</sup>. In these situations, triage should be made at the entrance of the hospital, no treatment should be given at the triage area, and no patient should be let in the intervention area without being checked and permitted by the triage attendant, in order to reduce or to avoid turmoil. Non-emergency minor cuts, bruises, simple fractures, and sprains are discharged to follow-up with temporary dressings or splints. In this way, it is possible to reserve more place, materials, and staff for patients with major trauma. Since almost all of the state, public, or private institutions, which function in patient transport and first aid, serve with personnel lacking triage training, and because of lack of interinstitutional planning, together with communication deficiency between the field and hospital, appropriate triage cannot be performed <sup>(22, 23)</sup>. Additionally, the registration of disaster-victims should be immediately made in the triage area. If the infrastructure of the hospital has been affected, the registrations should be made by using standard triage cards (Figure 2), which were prepared by the Ministry of Health, and the registry ledger (24,25). Triage scoring systems such as The Manchester Triage System (MTS), Australia Triage Scale (ATS), The Canadian Triage and Acuity Scale (CTAS), and The Emergency Severity Index (ESI) can be used. ESI not only determines whether the disaster-victim has health risks and needs emergency intervention or not, but also the triage category according to the source estimation (26). In our country, in order to present effective health care in emergency services, color-coding is used. For triage, red, yellow, and green colors are used in the order of priority for examination, investigation, treatment, together with medical and surgical interventions (Table 2)<sup>(20)</sup>.

# Figure 2: Triage Card





#### Table 2: Colors and Meanings Used in the Triage Category

Priority	Color	Triage Category	Description
1st	RED	Immediate	There is need for urgent intervention to
degree			rescue the life or limb.
2nd	YELLOW	Delayed	The patient needs urgent care, but there is
degree			no life threatening.
3rd	GREEN	Minimal	The very slight injury to people, they can
degree			go themselves.
4th	BLACK	Expectant	Patients will lose their lives despite all
degree			kinds of interventions; Or is not
_			receiving vital signs.

For classification of triage, various classifications such as simple triage and rapid treatment (START) (Figure 3), JUMPSTART, sieve triage, discriminating triage, and Care Flight may be used. Since it enables simple triage and rapid treatment in the disaster area, using START system together with the color-coding system, which is recommended by the Ministry of Health, will be more advantageous<sup>(2),27)</sup>. The first and easiest thing to do with the START method in triage is to separate the

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disaster-victims who are able to walk from those having more serious injuries. Every disaster-victim who is able to walk is ordered to go to the specified green field. Three important parameters, which are breathing, circulation, and state of consciousness, are examined in the triage of the remaining disaster-victims. Each disaster-victim should be evaluated within 30 seconds, and colored triage code is used according to the vital functions, in order to determine the priority for intervention. Initially, breathing is checked and if the patient is not breathing, airway is opened and then the patient is reassessed. If the patient is still not breathing, he is classified as black and continued. If breathing is present, the respiratory rate is counted; if it is >30/min or <8/min, the patient is classified as red. Triage physician should not interrupt triage for ventilating the disaster-victim and should get help from nearby people and facilities. Following breathing, radial pulse is checked without not paying attention to the pulse rate. If breathing of the disaster-victim is present but radial pulse cannot be felt, or capillary refilling is over two seconds, it is marked as red. Presence of major bleeding is checked and only these are treated in the triage. Patients in green field are asked to apply pressure to the bleeding site with the cleanest material available. Following pulse, the consciousness state is checked; if the patient is unconscious or does not comply with simple commands, it is classified as red and the triage personnel moves to the other patient. Patients who can comply with commands are marked as yellow  $^{\scriptscriptstyle{(22,28,29)}}$  .

#### Figure 3: START Triage Algorithm



Since hospitals and particularly emergency services are faced with an extreme overcrowdedness during and after disaster, they should be designed appropriately for disaster conditions and when necessary, their capacities for patient admission should be increased. Beds, laboratories, radiological investigations, private rooms, supplies, and drug stocks should be prepared as if disaster may happen any moment. An inventory of supply and drug stock in the hospital should be made; if there are any deficiencies, they should be corrected. Protocols should be signed with related organizations, institutions, and warehouses in terms of non-storable supplies and the contributions that they can provide should take place in the HDP<sup>(30,31)</sup>.

**Since disaster-** victims with unidentified identity will lead to legal and social problems in the post-disaster period, precautions should be taken by forensic medicine unit to facilitate identity determination. Necessary measures should be taken to prevent the corpses from decaying and smelling. Support can be obtained from all official and private institutions with cooling systems, and protocols should be signed with relevant institutions. Corpses should be decontaminated first or if this is not possible, with the direction of HDP president's decision, they can be disposed of properly, following registration<sup>(22,33)</sup>.

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