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Disaster & Emergency
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4th National Training Course
Disaster Health Management & Risk Reduction
DHMR-4

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MCI: Management of Pre-hospital Operations

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Disaster Health Management & Risk Reduction Training Course (DHMR)

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DHMR-4 Course is organized by:

- **Tehran University of Medical Sciences**
 - Department of Disaster Public Health at the School of Public Health
 - Department of Health in Emergencies & Disasters at the National Institute of Health Research
- **Ministry of Health & Medical Education, I.R.Iran**
 - Disaster & Emergency Management Center

Objectives

1-EMS

2-Surge capacity

3-Chain of medical care- Prehospital phase

4- Alarm, Alert and Reconnaissance

5- Advanced Medical Post

6- Evacuation process of injured , Medical evacuation center



Emergency medical services (EMS)
is an organized system designed
to transport sick or injured
patients to the hospital

[doi:10.1016/j.resuscitation.2003.11.004](https://doi.org/10.1016/j.resuscitation.2003.11.004)



Prehospital care

**to minimize the consequences
of serious injury, including
long-term morbidity or mortality**



Different system for managing EMS



Government Ambulance Service

- Funded by local, provincial or national government (UK) (US : local government : third service



Fire or Police Linked Service

- United States, Japan, France, and parts of India
- operated by the local fire or police service
- common in rural areas



Volunteer Ambulance Service

- The [Red Cross](#) provides this service across the world on a volunteer basis
- smaller organisations such as [St John Ambulance](#)
- [Order of Malta Ambulance Corps](#)
- Australia, Ireland and most importantly Germany and Austria (paid members of staff alongside volunteers to operate a full time ambulance service)



Private Ambulance Service

- contract to the local or national government
- non urgent or 'second tier' or 'Stand-by'



Combined Emergency Service

- multi-functionality
- airports or large colleges and universities
- personnel are trained: EMT, firefighter , peace officer



Charity Ambulance

- UK's 'Jumbulance' project



Company Ambulance

- large factories and other industrial centres, such as chemical plants, oil refineries,



System models

Hospital-based systems:

These systems are often the simplest to establish and maintain because they utilize the personnel, resources and infrastructure of a central or referral hospital. The hospital and its staff govern all aspects of the system.



EMS system models in the US are numerous and varied

- Governmental services are most commonly fire-based (but maybe police-based, or an entirely independent entity)
- hybrid : partnership between a municipality and a private EMS service
- Hospitals: for a single or multiple communities
- Community volunteers staff : mostly in rural areas

[doi:10.1016/j.resuscitation.2003.11.004](https://doi.org/10.1016/j.resuscitation.2003.11.004)



EMS Personnels

- **First responder**
- **Ambulance driver**
- **Ambulance care assistant**
- **Emergency medical technician:**
 - EMT-B
 - EMT-I
 - EMT-Paramedic
- **Emergency medical dispatcher**
- **Critical care paramedic**
- **Paramedic practitioner**



Tec Levels:

- First responder : 40–50 h
- EMT-basic (EMT-B): 110 h
- EMT-intermediate (EMT-I)
- EMT-paramedic (EMT-P): 1000h
(250–500 h)



Aeromedical transport

- 1969: first time in the civilian US

Mobile Intensive Care Units (MICU)

physician-staffed



Models of care

- **Franco-German** model: stay and play
physician-led
- Anglo-American : Scoop and run



EMS SYSTEM

THE COMPONENTS AND THEIR ATTRIBUTES

- Integration of the EMS with Health Services
- Policy, legislations, regulations, norms, and standards
- Communications Systems and means
- Dispatching Centre and medical regulation



Dispatching Center (DC) Medical regulation

- **Emergency phone call**
- **Possible immediate contact with the other services (police, fire, ambulances, other DC)**
- **Skilled staff for advice, decision making, immediate access to medical expertise**
- **Usually located near the ED, although often not an ED service**
- **Arrangements for use of alternate care delivery than the ED, especially cooperation with GPs**
- **Networking of the DCs**
- **Important role in MCM**
- **Inter-hospitals communications systems and interagency interoperability**

EMS SYSTEM

THE COMPONENTS AND THEIR ATTRIBUTES

- Access to the EMS System by the public and sustainability of the System
- On site activities
- Manpower – Human Resources
- Monitoring, evaluation of the system (quality improvement) and assessment of the needs



EMS SYSTEM

THE COMPONENTS AND THEIR ATTRIBUTES

- Disaster Preparedness and Mass Casualty Management
- Information system
- Maintenance and acquisition of equipment
- Medical direction



Medical direction

- license” of physicians:
- “on-line”
- “off-line”
- "hands-on" physician leadership seen in Europe



EMS System has also Public Health responsibilities

- Prevention and research
 - Injury prevention and control
 - Personnel engaged in education activities, mainly community based (Public education)
 - Contribution to surveillance for CD and outbreaks of CD
 - Sentinel and warning system for unusual events (BCRN)



SURGE CAPACITY

IN MASS CASUALTY INCIDENTS
AND IN PANDEMIC

WHO VISION



Surge capacity

The ability to provide adequate medical care during events that exceed the limits of the normal medical infrastructure of an affected community

Medical surge capacity

- Care for increased volume of patients
- Extend beyond direct patient care

Medical surge capability

- The ability to manage patients requiring unusual or very specialized / medical **care**



Surge capacity

- In many low-income countries the public health sector has very limited extra-resources to mobilize for MCI
- The existing resources are already overstretched by daily demand for services
- The development of cooperation mechanism (pre-established arrangements) with the private sector and the army can be of great help to enhance the surge capacity



Surge capacity for MCM

- No universal accepted **standard** definition of the components
- To focus of enhancing the surge capacity in MCM is to increase the **patient-care** capacity (rather than increase things such as beds, etc.)
- There are similarities between **daily surge** and disaster surge but also differences that require special plans management systems
- There is a need for **special expertise** (triage) and special equipment and the development of standardized protocols (appropriate care)



Surge capacity for MCM

- There are essential components:
 - Staff: number, trained and skilled
 - Stuff: equipment, pharmaceuticals, supplies
 - Structure: both physical structure and management systems such as Incident Management System

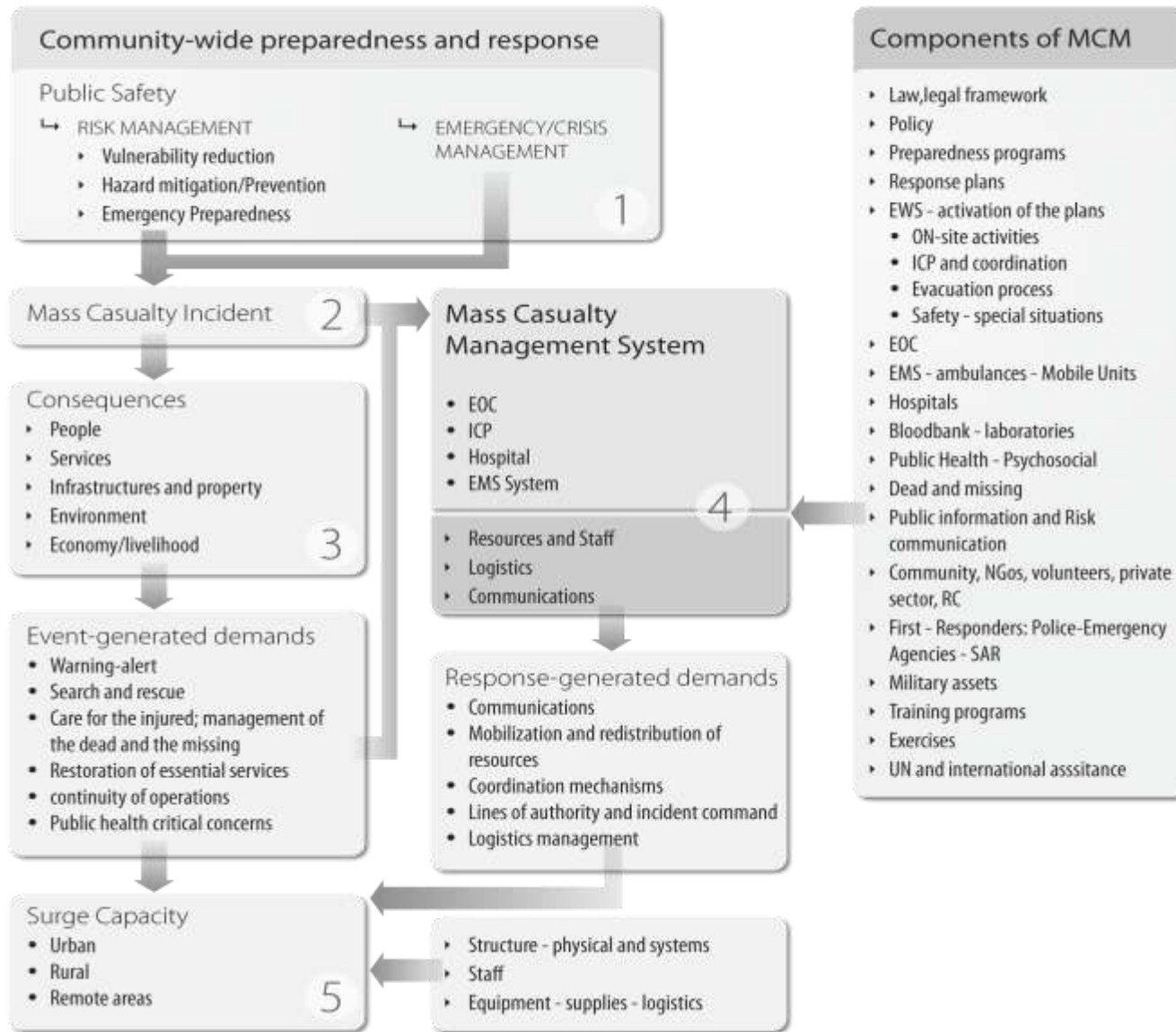


Surge capacity for MCM

- The management of these components require **plans**, procedures, systems
- Standardization is a key element for enhancing the cooperation and the coordination among the actors



Mass Casualty Management - Conceptual Framework



THE LINKS OF THE CHAIN



introduction

- ✓ **Chain of medical care definition :**
 - ✓ **three relatively close & organized systems :**
 - ✓ **on-site medical organization**
 - ✓ **evacuation (transfer & distribution)**
 - ✓ **hospitals or medical settings**
 - ✓ **two phases :**
 - ✓ **pre-hospital phase**
 - ✓ **hospital phase**



Introduction

- ✓ **disasters are complex in their very nature :**
 - ✓ **different types of disasters**
 - ✓ **different magnitude and scope of disasters**
 - ✓ **access to the disaster site(s) may vary**
 - ✓ **available resources may vary form country to country**
 - ✓ **state of preparedness / risk management policies, etc.**



**How to define a medical rescue chain compatible
with this complexity ?**

TIME AND SPACE.....

the pre-hospital chain of medical care extends :

1. in space:

- ✓ from the site (sector level) to the final hospital triage area/ reception area

2. in time :

- ✓ from the alarm (pre-alert) until the admission of the last casualty



What should you do

- ✓ **strategy** : emergency plans
- ✓ **tactic** : activation of plans
- ✓ **logistics** : human & material resources / systems

for command, coordination and control/

communication



The chain of medical care is made of 7 steps

1. alert (in some situations : warning) : activation of plans
2. reconnaissance
3. setting up front medical organization
4. triage and emergency care
5. medical care during relief and rescue operations
6. medicalised evacuations
7. hospital reception (unloading of patients)



Reliable Emergency communications

need for :

- ✓ efficient communication system
- ✓ planned procedures for processing the alarm
- ✓ alerting the different emergency services (health/ rescue/ police/ civil defence and other involved organisations according to the emergency inter-sectoral plan)



The planning process

- 1. Preparatory work & teaching and training**
- 2. Warning before impact (when applicable: mitigation)**
- 3. Alarm after impact, processing and alert**
- 4. Reconnaissance & triage activities & first-aid**
- 5. Medical organization of the pre-hospital phase**



- 6. Medical care adapted : strategy/ procedures**
- 7. First-aid and rescue: procedures/ roles & responsibilities of different categories**
- 8. Command/control/ coordination: systems, etc.**
- 9. Evacuations : coordination between hospitals/ transport capacity, etc.**
- 10. Hospital disaster plan**
- 11. Rehabilitation of medical services and facilities**



**ALARM
ALERT
RECONNAISSANCE**



Basic characteristics of the alert

- 1. As quick as possible**
- 2. As precise as possible**
- 3. Informative shared with all others:**
 - ✓ it is possible that disaster medical teams are not the first to be on the spot : the first to reach the scene (ambulance crew, etc.) with “medical capacity” should start to work immediately according to their professional competence**



WARNING PHASE

- ✓ in many situations such as :
 - ✓ storms
 - ✓ floods
 - ✓ other natural disasters
- ✓ alert is preceded by a warning phase :
 - ✓ variable length
 - ✓ IT IS TIME to initiate :
 - ✓ co-ordination
 - ✓ preventive & mitigation measures



RECONNAISSANCE SYSTEMATIC PROCEDURE

First- inspection of the site :

1. Establish first **casualty report** .
 - ✓ number of injured, stretcher cases, types of injury....
2. Assessment of **the medical situation** (human and logistical needs..)
3. **Integration** of the collected information into the situation assessment
4. **No medical care** before reconnaissance process is completed



RESCUE UNITS

actions taken by the first rescue unit arriving on the scene

1. Assessment of the **overall situation**
2. **Quick** exploration
3. **Rough estimate** of the number of injured / non-injured / dead..
4. Communicate the **information** to the central rescue command post
5. Starting with survival **first aid**
6. **Fighting the hazards** and evolutive risks



FIRST ESTIMATION

- ✓ the scope and the extent of the event
 - ✓ the **nature** of the damages
 - ✓ roads / water supply/ medical facilities / buildings...
 - ✓ the **number** of victims and injured /localisation...
 - ✓ the nature of **injuries** : blast, crush, burns.....
- ✓ figures to be remembered in many disasters
 - ✓ category 1 : **10 %**
 - ✓ category 2 : **30 %**
 - ✓ category 3 . **60 %**
 - ✓ **floods and earthquakes** will kill more people than they injure



MEDICAL TEAMS & PARAMEDICAL PERSONNEL....

medical reconnaissance

- ✓ First arriving unit having a medical competence
- ✓ In cooperation with rescue units reconnaissance process
allows to define « **sectors** »
- Secondary reconnaissance : aimed at defining the needs for
a precise geographical area (building...) « sector level »



RECONNAISSANCE OF THE SITE

4 steps of the reconnaissance and first actions at the sector level

- ✓ **step 1 quick overview :**
 - ✓ identify life-threatening problems
 - ✓ only a few seconds for each patient
 - ✓ diagnosis on distance: moving, talking....

RECONNAISSANCE OF THE SITE

4 steps of the reconnaissance and first actions at the sector level

- ✓ **step 2 life-saving procedures :**
 - ✓ SAR, extrication, survival first-aid... protection of non-injured
 - ✓ drainage position
 - ✓ shock prevention
 - ✓ secure airway
 - ✓ stop major external bleeding

RECONNAISSANCE OF THE SITE

4 steps of the reconnaissance and first actions at the sector level

- ✓ **step 3 tagging of patients :**
 - ✓ indicate priority for transfer to AMP (depending on the rating scale used)

RECONNAISSANCE OF THE SITE

4 steps of the reconnaissance and first actions at the sector level

- ✓ step 4 transfer to AMP .
 - ✓ stabilize fractures
 - ✓ analgesia (i.-v.).....



ADVANCED MEDICAL POST

ALSO CALLED
FRONT MEDICAL POST

OR
FRONT MEDICAL CLEARING STATION

OR
CASUALTY ASSEMBLY AREA

OR
PATIENT TREATMENT POST



ADVANCED MEDICAL POST

the AMP is NOT a structure but a concept :

1. **All** casualties should go through when AMP is set up :
 - ✓ for registration / triage / medical care / discharge or evacuation
2. **Not all situations require a formal AMP** to be set up but the “activities” of the AMP still have to be carried out through other organizational arrangements



ADVANCED MEDICAL POST

2. the **location** of the AMP :

- ✓ should be as **close** as possible to the site
- ✓ should **not be exposed** to foreseeable developing risks
 - ✓ poisoning fumes, collapse of buildings, etc.
- ✓ should be as much as possible **accessible** to transport :
 - ✓ access in and out
 - ✓ suitable roads....



ADVANCED MEDICAL POST

- ✓ Possible “types” of AMP :
- ✓ existing premises (warehouse, public building..)
- ✓ an inflatable tent (many advantages in cold weather
- ✓ football stadium, etc....
- ✓ any other temporary shelter
- ✓ Whatever is the choice

the AMP should have some characteristics :

- ✓ **light, temperature, enough room** etc.



TRIAGE ACTIVITIES AT AMP LEVEL

triage activities - goal :

1. to provide the **greatest chance of survival** with preserved health to the **greatest possible number of casualties** :
 - ✓ classification
 - ✓ initiating life-saving procedures
 - ✓ organising medical evacuations :
 - ✓ category of patient
 - ✓ competence of receiving hospital
 - ✓ workload of the receiving hospital
2. triage is an evaluative process



TRIAGE ACTIVITIES AT AMP LEVEL

- ✓ at AMP level :
 - ✓ medical triage made by an experienced doctor :
 - ✓ main medical problem
 - ✓ required medical treatment
 - ✓ priority for further medical care (mainly surgical.....)

MEDICAL TEAMS

Working at

SECTOR

&

AMP

LEVEL



MEDICAL TEAMS

- ✓ Medical teams working in the pre-hospital chain should respect the following characteristics :
 1. personnel trained in **emergency care** and **advanced life support**
 2. personnel trained in **disaster** medicine
 3. personnel trained to **use equipment** and **resources**
 4. composed of **different categories** of personnel



Role of physicians

1. To organize and manage **medical care**
2. To organize **triage** and categorization of victims
3. to **monitor and treat** casualties during the evacuation
process
4. to **work** in close cooperation with rescue services



MEDICAL TEAMS CAPACITY

Front medical capacity is limited and depends on in optimal conditions :

✓ **1 surgeon + 1 anaesthetist + 2 paramedics + several rescue workers :**

- ✓ maximum : **< 10** seriously injured persons (**cat 1 &2**) per hour and for less than **8** hours non-stop work)
- ✓ better count **8** = more realistic for assessing the needs regarding the number of required medical teams
- ✓ many first-aid workers to carry out many tasks are necessary to back-up the medical teams



MEDICAL TEAMS

first-aid workers in front medical teams

- ✓ medical teams need a large number of first-aid workers :
- ✓ to carry out subordinate tasks such as :
 1. watching over the injured
 2. escorting
 3. maintaining material / equipment / communications
 4. renewing equipment, material, etc.
 5. assisting medical personnel of medical teams.....
 6. participating to the « sorting »



EVACUATION PROCESS OF INJURED & MEDICAL EVACUATION CENTER



EVACUATION PROCESS

Some basic rules :

1. **Disaster plans** should include a specific chapter on evacuations
2. The **category** of the patient must be written in the patient's chart
3. Use of **tags** is of major interest
4. The exact **destination** should be written & recorded
5. **Coordination** with the receiving hospital...
6. Type of vehicle and required care **during transport**



MEDICAL EVACUATION CENTRE

- ✓ MEC is a intermediary structure between AMP and hospitals :
 1. **not always** present (depends on circumstances...)
 2. can receive patients from several AMP
 3. **location** : access roads.....
 4. casualties can wait until definitive evacuation

(if massive destruction of hospitals, lack of transportation means...)

 - ✓ **to avoid overload of AMP**
 - ✓ when **access roads** to AMP are not practicable, etc.



- Post-Incident “Organizational Learning”



Web-based resources for disaster planning

- International Federation of Red Cross and Red Crescent Societies : <http://www.ifrc.org/what/disasters/>
- United States Federal Emergency Management Agency
<http://www.fema.gov/library/dizandemer.shtm>
- World Health Organization
<http://www.euro.who.int/eprise/main/WHO/Progs/EHA/Home>
- United Nations Disaster Management Training Programme
<http://www.undmtp.org>
- The Sphere Project : <http://www.sphereproject.org>
- International Search and Rescue Advisory Group
(intergovernmental network under the umbrella of the United Nations)
<http://ochaonline.un.org/webpage.asp?Page=549>



منابع:

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Dr Nejati's Slides

