



MRMI STUDENT MANUAL



MRMI Student Manual

- 1. MACSIM student manual**
- 2. Anyland, resources & organization**
- 3. Disaster plan MRMI-model**
- 4. Action cards & guidelines for command staff**
- 5. Triage- schedules**
- 6. Aims & objectives of the MRMI-course**
- 7. Course program**
- 8. Protocols for registration of results**
- 9. Evaluation-& validation forms**
- 10. Local course information**

MACSIM

Simulation System

B MACSIM®		POSITION		A		C	
BREATHING		AIRWAY		OK		THREAT	
FAST ≥ 30		OK		THREAT		BLOCKED	
NORMAL ≥ 10 - < 30		E		COMMUNICATION INSPECTION		EXPOSURE	
SLOW > 5 - < 10		PALPATION		AUSCULTATION		CIRCULATION	
VERY SLOW ≤ 5		HEART RATE		SYSTOLIC BP		PERIPH SKIN	
NOT DETECTABLE 0		≥ 90		≥ 90 - < 120		NORMAL	
STRIDOR		YES		YES		COLD	
HEMOPTYSIS		NO		NO			
CYANOSIS		YES		YES			
NO		NO		NO			
SEX/AGE		PATIENT NR		GCS = 13 - 15		GCS = 9 - 12	
~25		01		GCS = 6 - 8		GCS = 4 - 5	
D		ALERT		INACCURATE RESPONSE TO TALK		ACCURATE RESPONSE TO PAIN	
DISABILITY		GCS = 13 - 15		GCS = 9 - 12		GCS = 6 - 8	
		GCS = 4 - 5		GCS = 3			



MANUAL FOR STUDENTS

MACSIM[®] SIMULATION SYSTEM

MANUAL FOR students

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MACSIM[®] simulation system

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Introduction

A key-stone in training of medical response to major incidents and disasters is training in decision making on all levels, from the level of command and coordination (Which resources to alert? How to use them in the most efficient way?) to the level of care of the individual patient (What to do with this patient in this particular situation, when to do it and how to do it?)

For accurate training and correct evaluation of decisions, the base on which the decisions have to be made must be (a) complete, (b) correct. ***A decision based on incomplete, and/or wrong, information can never be properly evaluated.***

This means very high demands on training for these situations. A training session (whether it is a practical field exercise or a simulation exercise) must include correct and complete information (***input-data***) on a high level of detail. This is valid both with regard to available resources and their location, and for the description of the injuries and conditions of the simulated patients.

Another pre-requisite for accurate training and evaluation of decisions is that the consequences of the decisions are clearly and correctly illustrated (***output-data***). Such data are outcome (= mortality and complications of different degrees) related to severity (=injury severity score), and also utilization of available resources.

The aim of the MACSIM[®] system is to present both input and output data fulfilling the above mentioned criteria.

Description of the system and its components

The casualty card

The key-component of the system is the casualty-card (Fig 1) which is available in two sizes: One bigger (17 x 14 cm) intended for basic training, or to use in field exercises to be attached to figurants, and one smaller (9 x 7.5 cm, magnetized) for simulation exercises.

MACSIM[®] POSITION

B BREATHING

FAST ≥ 30

NORMAL $\geq 10 - < 30$

SLOW $> 5 - < 10$

VERY SLOW ≤ 5

NOT DETECTABLE 0

A AIRWAY OK THREAT BLOCKED

C CIRCULATION

HEART RATE

< 50

50 - 100

$> 100 - < 120$

≥ 120

NOT DETECTABLE 0

E EXPOSURE

PALPATION AUSCULTATION

SYSTOLIC BP

≥ 90

$< 90 - > 75$

75 - 50

< 50

PERIPH SKIN

NORMAL

COLD

STRIDOR

YES

NO

HEMOPHYTIS

YES

NO

CYANOSIS

YES

NO

SEX/AGE

$\frac{\text{♂}}{25}$

PATIENT NR

01

DISABILITY

ALERT

ACCURATE RESPONSE TO TALK

INACCURATE RESPONSE TO TALK

ACCURATE RESPONSE TO PAIN

INACCURATE RESPONSE TO PAIN

NO RESPONSE TO PAIN

GCS = 13 - 15

GCS = 9 - 12

GCS = 6 - 8

GCS = 4 - 5

GCS = 3

Fig 1 a
The MACSIM patient card

COMMUNICATION/INSPECTION	PALPATION/AUSCULTATION	TREATMENT SYMBOLS
PAIN, MODERATE PAIN, SEVERE SCRATCH HEMATOMA, CONTUSION BURN, SUPERFICIAL BURN, DEEP WOUND WOUND, BLEEDING PENETRATING WOUND EXIT WOUND EXTENSIVE LACERATION TRAUMATIC AMPUTATION IS / HAS BEEN TRAPPED	TENDERNESS, MODERATE TENDERNESS, SEVERE FRACTURE, CLEAR FRACTURE, SUSPECT FRACTURE, DISLOCATED FRACTURE, OPEN DISLOCATED JOINT IMPAIRED ACTIVE MOVEMENT IMPAIRED SENSIBILITY REDUCED PERIPHERAL PULSE REDUCED BREATHING SOUNDS REDUCED HEARING FRONT SIDE BACK SIDE	AIRWAY A1 NASO/OROPHAR. TUBE MIN 1 A2 LARYNGEAL MASK 3 A3 TRACHEAL INTUB. FASTER WITH GCS < 8 7 A4 CRICOTHYROIDOT. 5 BREATHING B1 OXYGEN 2 B2 OXYGEN + VENTIL. SUPPORT - B3 NEEDLE THORACOTOMY 4 B4 CHEST DRAIN 7 CIRCULATION C1 INTRAVENOUS/ INTRAOSSEOUS NEEDLE 3 C2 INTRAVENOUS/ INTRAOSSEOUS NEEDLE + FLUID C1 +2 C3 ANALGESIA C1 +2 C4 BANDAGE/ TOURNIQUET 1 FRACTURE STABILIS. F1 NECK STABILIZATION 5 F2 PELVIC GIRDLE 4 F3 LIMB STABILIZATION 3 F4 TRACTION SPLINT 5
STANDING/ WALKING, SILENT STANDING/ WALKING, CALLING FOR HELP SUPINE POSITION, SILENT SUPINE POSITION, CALLING FOR HELP		

Fig 1 b
Explanation of symbols and times for different treatments, given on the backside of the big card (basic training) and during simulation exercises available on separate cards

The card shows age, sex, initial position of the patient and description of the patient's condition and injuries according to the ATLS-terminology (Airway, Breathing, Circulation, Disability and Exposure). **A B C D** is illustrated as physiological parameters with all the information needed for the different triage-systems used today. All this information can simply be changed by the instructor: On the bigger cards by movable markers, on the smaller cards by the use of a red whiteboard-pen for temporary marking of changes in physiologic parameters.

Fig 2 shows information for the instructor, given on the backside of every small card used for simulation exercises. **The prehospital trainees are not allowed to look at this side of the card during the exercise** but base their decisions exclusively on the information on the front, as in reality where this information not is available before the patient reaches the hospital.

1. Cerebral contusion with bleeding and ICP (increased intracranial pressure), GCS (initially) = 5. 2. Penetrating injury (scrapnel) right thigh, soft tissue injuries 3. Soft tissue injuries left thigh, right arm 4. Rib fractures VII, VIII, IX left, small pneumothorax 5. Splenic rupture OIS IV (organ injury scale), bleeding	
T > min:	OP (min):
(1) M: B2>30	(1) 60
Op>120	(3) 20
(4) CL: B3>B2	(5) 50
(5) M: Op>120	
R/opt L (?), F-	Vent +
Patient nr: 1	ISS: 36 RTS: 10

Fig 2

Information for the instructor, given on the backside of every simulation-card (see further the text).

This information includes:

- A complete description of injuries according to final diagnosis, also a base for calculation of injury severity score
- Times within certain treatments must be done if the patient not should die (M) or be hit by complications, life-threatening (CL) of leading to impaired function (CF). Treatments are indicated as shown in figure 1 b
- The result with regard to life (L) and function (F) if the patient should have optimal treatment (R/Opt), in order to identify preventable deaths/complications
- Times needed for surgery, if considered indicated (note that these times are only guidelines, instructor can decide the time depending on the trainees selection of surgical strategy)
- Need of ventilator (Vent +/-)
- Injury Severity Score (ISS) and Revised Trauma Score (RTS)

Patient cards for "non-disaster-patients"

At the time for an alert, the health care system is filled with varying numbers of ordinary patients (fig 3) whom have to be taken care of, and such patients with critical illness or injuries continue to arrive, adding to the need of triage.

Sets of such patients of different categories are included in the system:

- Ambulatory patients
- Patients needing immediate surgery
- Patients undergoing elective (planned) surgery at the time for alert
- Patients on ventilator

Table 1 Movable markers for treatments and investigations to be attached to the casualty cards.

Every marker is labeled with the time it takes to do the indicated procedure in reality, based on tests with medical staff.

Treatment/investigation	Time (min)
<i>Airway</i>	
Naso- or oropharyngeal tube ¹	1
Laryngeal mask	3
Tracheal intubation ⁵	7/2
Cricothyroidotomy	5
Gastric tube ²	3
<i>Breathing</i>	
Oxygen ¹	2
Ventilatory support ^{1,3}	0
Needle thoracotomy	4
Chest drain	7
<i>Circulation</i>	
Tourniquet ¹	1
Intravenous needle	3
Intraosseus needle	3
Intravenous fluid	(Needle +2)
Analgesia	(Needle +2)
Blood ^{2, 6}	-
Urinary catheter ²	4
Diagnostic Peritoneal Lavage ²	5
<i>Bandage/stabilization</i>	
Covering bandage	4
Neck stabilization	5
Pelvic girdle/wrap	4
Limb stabilization ¹	3
Traction- splint	5
Splinting of fracture ²	7
<i>X-ray</i>	
Lung X-ray ²	8
Skeletal X-ray ²	8
Computer tomography (CT) ^{2, 5}	15/45
Ultrasonography (USG FAST) ²	5

Planned surgery

Different standard procedures in trauma-surgery²

1= Only prehospital 2= Only hospital 3= Ties up one staff 4= Presumes previous i.v.needle
 5= 2 minutes for irresponsive patients, 7 minutes for patient requiring previous anesthesia
 6= 15 minutes when machine is available in Emergency department, 45 minutes when the patient has to be transferred to another department

Staff symbols

The exercises are run with real resources also with regard to staff of different categories (Fig 5). The amount of staff that will be available at different times after an alert should be prepared by the instructors (on the back side of a board or in boxes) and is on the given times delivered to the trainee to use. Medical staff, rescue service or police should not be allowed to perform any of their tasks without access to a sufficient minimal number and quality of staff.

Hospital symbols are included for all physicians, for nurses in key-functions (emergency-, OR, ICU and anaesthesiology, for chief nurses in wards, administrative and psychosocial staff). If the incident occurs in non-office hours, only physicians labelled “on duty” or “on call” should be available in the hospital and staffing of Emergency-and OR-departments should be adapted to non-office hours.

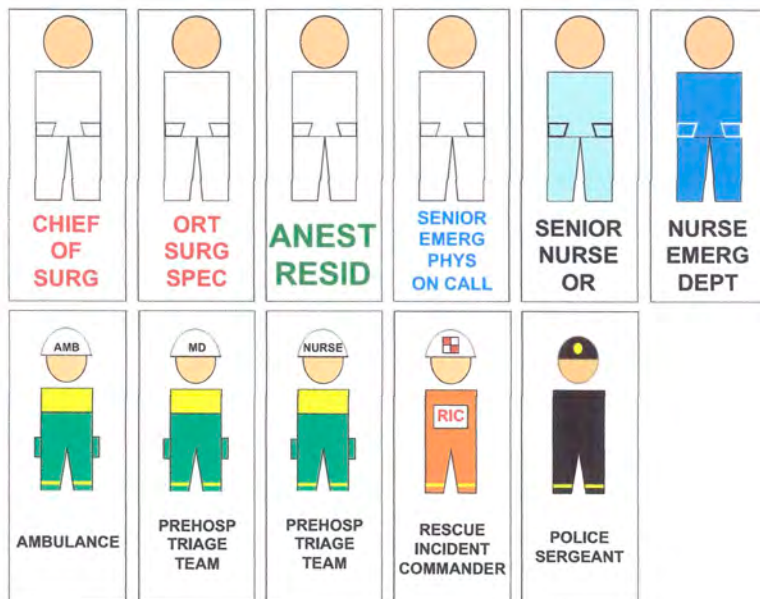


Fig 5
Examples of symbols for staff, indicating category and level of competence.

Command symbols for staff

Symbols indicating staff appointed to take charge at different positions in the process of alert is illustrated in Fig 6 a, b. A clear command structure facilitates the alert- process and secures that all responsibilities are taken on every position according to action cards. A very common error by the trainee is to forget to use these symbols in the initial phase of the alert and the consequences of this should be illustrated.



Fig 6 a
Command symbols for different levels on scene (gold-silver-bronze) and in hospital ((department-, section- and team-level)



Fig 6 b
Command symbols
applied to staff-symbols

Symbols for transport units

Symbols for transport units include:

- Ambulances, civilian (capacity one severely injured patient)
- Ambulances military (capacity 2 severely injured)
- Coaches for health-care transport (capacity 6 sitting or 2 stretchers)
- Buses (capacity 40 sitting, no stretchers)
- Helicopters, civilian, hospital- based (capacity 1 severely injured patient)
- Helicopters, military, small (capacity 2 severely injured)
- Helicopters, military, large (capacity 4 severely injured or 8 sitting)
- Rescue/ fire brigade units
- Disaster supply units (pre-packed with stretchers, blankets, inflatable tent, illumination, fracture-splints and bandages)
- Police units
- Catamaran for sea-transport

The transport symbols should be located in the Ambulance Dispatch Center with indication of when they can be on scene after alert and should at that time (if alerted) be delivered to the

Signs of different sizes

Laminated and magnetized signs for prehospital and hospital organizations, 3 different sizes: Small, large and “columns” = several small signs fixed to each other, vertically or horizontally, to facilitate the set- up of scene, transport and hospitals.

When the set-up is based on pre-printed magnetic films or laminated sheets, only a small number of such movable signs are needed.

Pouches for hospital wards

Even if hospital beds rarely is a limiting factor for the surge capacity of a hospital, re-distribution of patients between wards often has to be done to optimize utilization of bed capacity. The wards are in this system illustrated by magnetized, transparent plastic pouches labeled with signs indicating number of beds (total and present). Disaster patients can be dropped in these pouches depending on space (Fig 7).



Fig 7
Magnetized and labeled, transparent plastic pouches representing hospital wards. Figures on total and available beds should be filled in by instructors with white-board pen when setting up the boards

Tabards, helmets and arm-badges

Trainee/test-persons with prehospital functions are labeled with tabards indicating their function (markings front and back, Fig 8). Command staff on scene has helmets labeled with function. Trainees with functions in hospitals or command centers have, as the instructors, arm-badges indicating their function.



Fig 8 a



Fig 8 b

Fig 8 (a) Examples on tabards for prehospital staff: Rescue, Police and Medical Incident Commanders, labeled on front and back and fluorescent. Similar tabards are available for Triage Officer (TRO), Ambulance Loading Officer (ALO), Ambulance crew (AMB) and Prehospital Teams MD and Nurse.

(b) Example on arm-badge used by instructors and also by all trainee in hospitals and coordinating units in different colors indicating their functions.

Prepared folders for different functions

The MACSIM set for the MRMI-courses includes the following folders for different functions including documents, maps, plans, schedules, action-cards or priority- and treatment symbols:

- Manual for setting up the system
- Instructor manual
- Student manual
- Triage teams (6)
- Ambulance teams (2)
- Hospitals (3)
- Hospital disaster plans (3)
- Hospital command groups (3)
- Medical Incident Commander
- Triage Officer
- Ambulance loading officer
- Rescue Incident Commander

- Police Incident Commander
- Regional Medical Command Center
- Ambulance Dispatch Center/ Alarm Center
- Rescue Command Center
- Police Command Center

It is important that trainees before the simulation exercises devote, and are given, sufficient time to read through and learn the instructions in the folders relevant for their function under guidance of instructors.

The course-venue

As an example, the standard venue of a basic MRMI-course is lustrated below in fig 9.

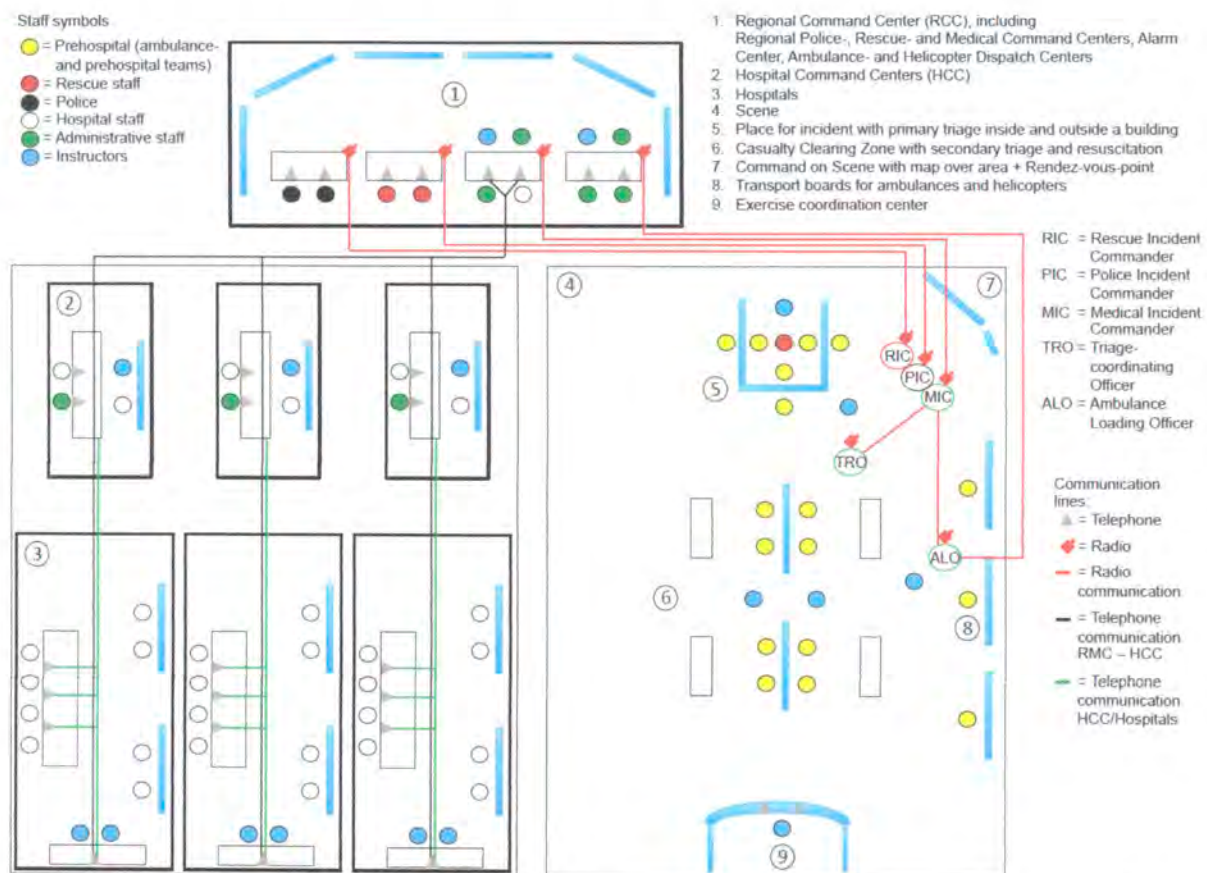


Fig 9 Design of an advanced course for simultaneous training of the whole chain of response (see further the text)

The left part of the figure represents the prehospital part of the venue which requires a bigger room with space for 10 boards 2 x 1 m. The injury-site (=the place where the casualties are when the incident occurs) is illustrated by 3 boards, magnetic on both sides, showing the external appearance (of for example a building) on the fronts, and the interior appearance (to which the trainees not have immediate access) on the back-sides (see also figures 12 and 13 below). To the left of these boards is a board with a map of the area around the injury-site where the trainee have to organize the scene (fig 10, 11 below). There is also a smaller board indicating the rendezvous-point (= temporary parking of incoming units).

In the center of this prehospital area are two parallel triage-lines where the trainees work with secondary triage and, when urgently needed, resuscitation and primary medical treatment. On the right side is the line for severely injured (fig 14 and 15 below) and on the left side the line for less severely injured (fig 17 below).

In the MRMI course, 3 boards are used to illustrate the transports, 2 for ambulances and 1 for helicopters and buses (fig 19 below).

To the left, often on distance from the scene, are located the rooms for hospitals (see also figures 20-25 below). In the standard MRMI course 3 hospitals are trained simultaneously, but the exercise can be run with an unlimited number, and unlimited sizes, of hospitals (however, a minimum of 2 hospitals is recommended to train inter-hospital coordination).

On varying distance from hospital-rooms are located the Hospital Command Centers, the rooms where the hospital command groups (HCG) are in action on a major incident alert. These rooms are equipped with prepared boards for visualization and documentation of all incoming information.

Also on varying distance is the area for the Regional Command Center, here illustrated in the upper part of figure 26. In accordance with the MRMI-concept, this includes the Regional Medical Command Center, the Ambulance Dispatch/ Alarm Center and the Rescue- and Police Command Centers, all located together. It is of course also possible to locate these units in different rooms.

As in reality, communication from the scene to RCC is done by radio (red lines in figure 9). Other communication is done by telephone (black lines, illustrating the need of a sufficient number of telephones which can be done with wireless equipment). Accurate technique for communication (accurate management of the equipment and short and clear messages) is an important part of the training.

Running a simulation exercise

General principles

Different to the preparative training, the instructors will now avoid interfering with the trainee's performance and decisions, and instead make notes and give feedback at the evaluation. Exceptions are:

- Apparent misunderstandings of symbols and signs (including patient cards)
- Mistakes that seriously influence the rest of the management chain so that the outcome will be very bad in spite of good work from the other trainees

Before the exercise starts

Before the exercise starts, the instructors will:

- Collect all trainees for final orientation
- Give the exact time and check that all trainees coordinate their clocks (this is also valid for wall-clocks in the rooms if available). If non-office time is simulated during day time, the time may be moved 12 hours –i.e. 08 00 am to 08 00 pm (20 00)
- Inform about the climatic situation: Outdoor temperature, rain or clear sky, wind speed
- Distribute the trainees as follows:
 - Prehospital staff in a room outside the scene, with an instructor showing the teams in at the calculated time for arrival
 - Hospital staff in the hospitals (including HCG: s which primarily are recruited from staff on duty/on call)
 - ADC staff in RCC
 - Rescue – and police staff in RCC
 - RMC- staff in a room with telephone from which they are called to RMC by the ADC-staff

The alert

An instructor starts the exercise by making the first alarm call to the alarm center. The ADC is filling the function of the alarm center (SOS) in the alert-phase. The information can be rather

rudimentary (“an explosion of some kind in –name and location of building- a lot of shocked and bleeding people coming out, hurry ...”).

After this first alarm, the continued action should be managed exclusively by the trainees. The SOS/ADC alerts itself and also the officer on call in RMC, located on a telephone number given to ADC before the exercise. This officer should alert other RMC members and go to the RMC.

The SOS/ADC, as in reality, follows the action card for this type of alarm (see folder) and alerts the nearest units. The symbols for these first units (nearest ambulances, rescue service, police) are automatically delivered to the scene by the instructors at given times after the alarm and simultaneously, the corresponding staff is told to enter the scene.

The first units on scene

The first ambulance(s), police- and fire brigade may arrive simultaneously or within a very short time-span. The trainees in these first units should, as in reality, bring with them tabards and folders, including action cards, and radios for those who have access to radios. Additional folders for triage teams are supplied by the instructors.

Instructors hand over to the trainees staff symbols corresponding to the staff being on scene at the present moment.

In accordance with the MRMI-concept, the first ambulance crew on scene automatically takes the roles as Medical Incident Commander (MIC), responsible for coordination of the medical work on scene, and Triage Officer (TRO), responsible for starting the triage on scene, distribution of incoming triage-teams according to needs and coordination of the continued triage. Action cards for these functions are included in Attachment 4. The MIC usually keeps this position throughout the response but can also be replaced by a more senior officer and, if so, continues to support the medical command function on scene.

The officers in charge in the first arriving Rescue and Police units take the role as Rescue Incident Commander (RIC) and Police Incident Commander (PIC). Action cards for these functions are included in Attachment 4.

RIC, MIC and PIC constitute the Command Group on Scene and select a Command Place which should be indicated at the map over the incident area (Board 7, fig 9). In the exercise, the Command Group is located close to this board, using the board to organize the scene and establishing continuous radio- communication with RCC (fig 10, 11).



Fig 10

Rescue, Police and Medical Incident commanders at the Command Place.



Fig 11
The magnetic map at the Command Place is used to organize the scene: Cordoning off security zones, traffic control, location of strategic points for the response. Similar maps are available in the RCC to facilitate communication with the Central Command Units.

RIC and PIC decide the extent of the security zones, RIC with regard to fire/smoke or risk for collapse of building and PIC with regard to remaining risk for terrorist-, hostile or criminal activities.

Instructors will register specifically:

- Times for primary (“window”) and secondary report
- Efficiency in communication
- Leadership and organization on scene
- Efficiency in dispatching staff to different tasks (no “conference groups” on scene when casualties are waiting, dispatch staff to work!)
- The balance between keeping ambulance staff on scene and starting transport
- Times for depart of the first ambulance transport
- Efficiency in ambulance utilization (waiting times for staffed ambulances /helicopters)

Primary triage at the injury-site

Fig 12 illustrates the primary triage outside the building where the incident has occurred (in this case multiple bomb-explosions in a conference hotel). According to the MRMI- concept, Triage Sieve is used for primary triage, a rapid method to primarily discriminate between severely and less severely injured casualties. This method however requires a secondary triage before transport, why patients from this zone are transferred to the area for secondary triage.

Fig 13 illustrates the primary triage inside building to which the medical staff not gets access until it has been declared to be secure by the Rescue and Police Incident Commanders. The step-wise access to the inside of the building can be illustrated by magnetic sheets covering the so far closed areas.

Note that severely injured casualties not can be extricated and evacuated without sufficient access to rescue staff.



Fig 12

Primary triage has started outside the building where casualties are flooding out from all sides of the hotel. A very simple triage method has to be used at this stage to get the patients quickly transferred to the zone for secondary triage where a more thorough survey, and also more advanced resuscitation, can be performed.

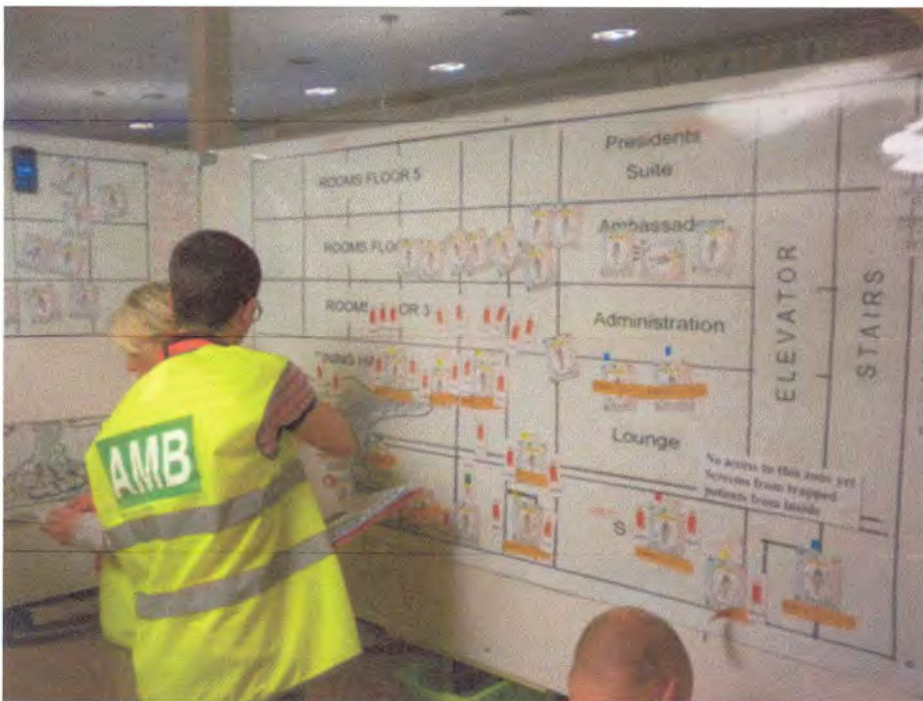


Fig 13

Primary triage inside the building. Trapped patients are indicated by magnetic orange strips, giving the time requested for extrication. Medical during this time may be needed to avoid mortality or complications. This requires extended access to staff.

Secondary triage and resuscitation on scene

Fig 14 illustrates the area for *secondary triage of severely injured casualties* (red and yellow at primary triage). The patients are coming in from the right and are by a coordinating triage-officer directed either:

- To an available triage team or a waiting zone for such a team (= in cases where resuscitation/treatment is considered necessary before transport, or when there is a congestion to transport- resources)
- Immediately to the transport zone (= when there are staffed ambulances available and no advanced resuscitation before transport is considered indicated)

The triage teams can be either ambulance crews kept on scene or prehospital teams, for example from hospitals, transferred to scene by incoming helicopters or ambulances.

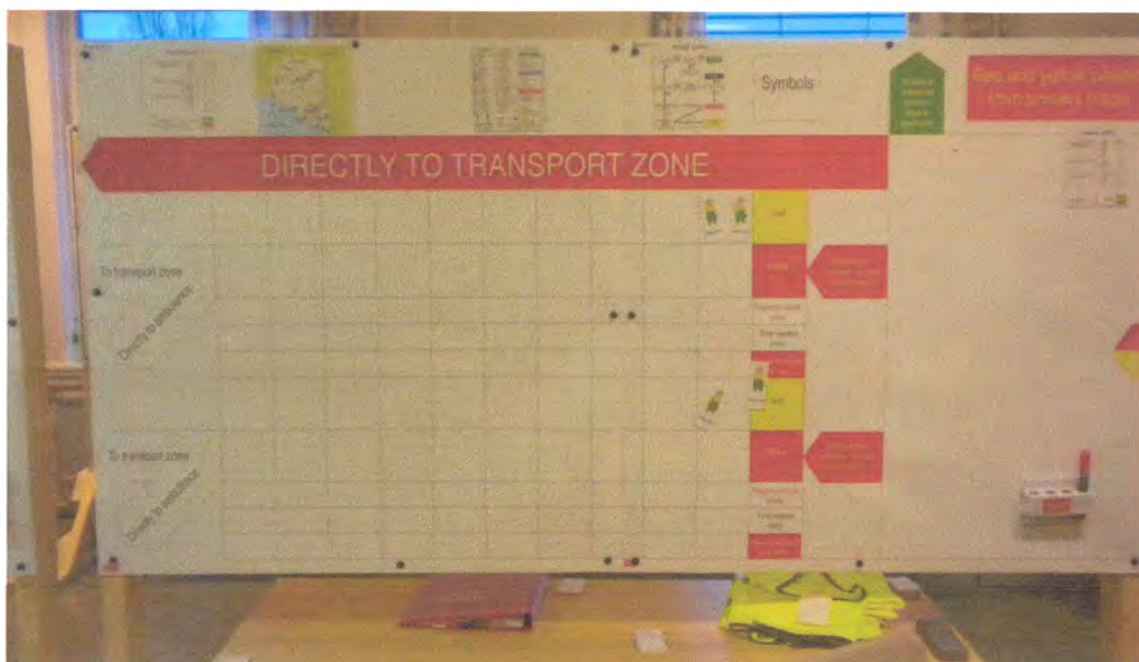


Fig 14 The board used for illustrating secondary triage. This set-up gives space for $2 \times 10 = 20$ triage teams working simultaneously. If the team is a crew from an arrived ambulance, they can select to bring the patient directly to their ambulance after survey/ resuscitation, without passing the transport zone. All treatments are done with real time according to the times given on the treatment tags. **No treatment will be approved without staff** = minimum 1, preferably 2 per patient. Time for treatment calculated based on the times on the treatment tags with addition of 3 min for the additional time it takes to survey a real patient.

Fig 15 illustrates the potential pressure on this area, emphasizing the need of a sufficient number of triage-teams on scene



Fig 15

When the number of casualties is extensive, it may rapidly become a congestion for secondary triage. To cope with this requires:

- Rapid deployment of available triage teams to this area
- Mobilization of additional triage teams so that not too many ambulance crews have to be kept on scene, reducing transport capacity
- Efficient work by these teams, finding the balance between what is mandatory to do before transport to save life, and what can wait until in the ambulance, or in hospital

The tasks of the triage-teams on these positions are to:

- Re-evaluate priority and indicate new priority on the patient cards. In the MRMI courses Triage Sort is usually applied at this stage.
- Make decisions with regard to treatment before transport and indicate the treatment with treatment tags on the cards. If a treatment is indicated, the patient is not allowed to be moved further until the real time for that treatment has passed.

The patient's condition after a severe trauma is not static but dynamic and changes with the time passed after injury, sometimes rapidly. The instructors have access to the complete description of the injuries and thereby also the potential clinical course related to time.

These changes in physiological parameters are by the instructors indicated with a red whiteboard-pen on the card (fig 16), with consideration of the time passed since the injury and treatments performed /not performed.

It is important that the trainees continuously re- survey the patients and look for such changes, otherwise the deterioration of the patient's condition may (as in reality) continue without being discovered. This may lead to that the instructor declares the patient as dead and this death is classified as preventable if the patient had been possible to save with access to medical staff.

Patients with the classification as preventable deaths will be put on a board for discussion at the evaluation after each training session. Preventable deaths related to trauma-score is one criterion used to describe the outcome of the response.

The image shows a patient triage card with a central body diagram. A red dot is marked on the 'FAST' category under 'RESPIRATORY RATE'. The card includes sections for 'AIRWAY', 'HEART RATE', 'SYSTOLIC BP', 'PERIPHERAL SKIN', 'PATIENT AIR', and 'PAIN'. A whiteboard pen is shown pointing to the 'FAST' category.

Fig 16

Changes of the patient's condition (red dots with a whiteboard-pen) is indicated by the instructor, based on access to the complete description of the injuries and the potential clinical course of these injuries.

Insufficient attention to the *secondary triage of less severely injured patients* is a very common cause of failure in the response. In a heavy load of casualties, it may be understandable that this is given lower priority. However, it has to be remembered that the primary triage often is very rough and among those given low priority at this triage may "hide" patients with severe injuries – for example, a patient with a severe internal bleeding may be able to walk immediately after the injury and it may take time until the circulatory impairment is evident. Therefore, all casualties' triaged "green" at primary triage must be re- surveyed in a secondary triage before evacuation. Fig 17 shows the secondary triage of this category (left side of the triage-line in fig 9).



Fig 17
Secondary triage of
"green" patients from
primary triage

The *task of the Triage Officer* is at this stage to

- Identify urgent needs and distribute staff according to that
- Continuously inform the triage teams about the current situation: Expected casualty load, access to transport facilities (expected delay in transport influences decisions with regard to treatment).
- Communicate with MIC: Report need of staff and equipment, get information from the injury zone and ambulance loading zone.

The *task of the MIC* is at this stage:

- To get an overview of the need of triage and medical care on scene, distribute (and continuously re-distribute) staff according to that and when needed, require additional staff and/or equipment from RMC. Keeping ambulances on scene in one way to temporarily increase staff on scene, but consumes transport resources.
- To make decision with regard to MI level (level 1 or 2?) and inform the staff - level 2 usually means use of blue tags.
- To require continuously updated "distribution keys" for transport from RMC, based on the capacity reports from hospitals

Patients waiting for transport

Fig 18 illustrates the waiting zone for transport, The triage team(s) dispatched to the area for survey/ re-triage/ treatment of those waiting for transport should do repeated examinations and re-evaluations of the patients in this area and make decision with regard to transport priority. For this purpose, a combination of Triage Sort and anatomical triage should be used.

**Fig 18**

Waiting zone for ambulance-transport with patients distributed between triage-categories. The transport boards to the right.

Transport

It is the task of MIC to appoint an Ambulance Loading Officer (ALO) in one of the first ambulances arriving on scene (Fig 18). This officer usually takes over the task of distributing patients between hospitals in communication with RMC/ADC. Action Card for ALO is followed.

Ambulances where the crews are kept on scene as a resource for triage/resuscitation, or for coordinating functions, are turned upside down on the transport boards and cannot be used until the staff is disposable for transport.

The action on the transport-boards for ambulances and helicopters is illustrated in fig 19.

1-2 ambulance teams with minimum 1 officer in each team should be located at the transport board with the tasks to:

- Indicate treatment that normally is done by the ambulance crew before and during transport. If time consuming treatments are done before transport, the transport should be delayed with corresponding time (use the pre-printed labels with red text). These teams should be staff normally working as ambulance crews, making the same decisions they normally do.
- At calculated arrival to hospital (see table with transport times) transfer the patient to the determined hospital and report to the emergency department, as in reality.



Fig 19 Transport boards for helicopters (left) and ambulances (right). ALO in the background. If the crew on an incoming ambulance is needed for work on scene, the ambulance is turned upside down on the board and the symbols for two ambulance officers delivered from the box at the board to the scene. When dismissed from the scene, the symbols are transferred back to the box and the ambulance can be turned back, ready for transport.

The instructor will specifically register:

- Arrival times for the ambulances after the first (automatically alerted) units
- Use of ambulance crews on scene. MIC should bring in alternative staff to be able to use as many ambulances as possible to transport.
- Waiting times for arrived and staffed ambulances to be used for transport. Number of such ambulances waiting more than 3 minutes is registered in a protocol.
- Use of, and waiting time for, helicopters
- Communication between ALO and RMC/ADC
- Coordination between MIC and ALO

Hospitals

The hospitals can be built up with all trained components (except the hospital command centers) in one room as in fig 20, but these components (Emergency Department, Surgery, Postoperative Unit, ICU, Wards) can also be located in different room..

Hospital alert

When the exercise starts, the hospital is designed for “normal” activity, office hours or non-office hours and this is prepared by the instructors.

When the hospital is alerted - usually by RMC- the responsible for the Emergency Department (ED) should take the call and receive/require information according to the disaster plan. The alert is then forwarded to the senior physician on call that should take the role as MOC (Medical Officer in Command) and who geographically is located in the hospital at this time. He/she should immediately go to the Hospital Command Center together with the colleagues that should staff the Hospital Command Group (HCG, see below), make decision with regard to level of alert and then follow the action card in the disaster plan. The administrative officer on call should also be called in to take the role as AOC (Administrative Officer in Command).

The action cards in the disaster plan should then be followed. Among the very first –and very important – tasks is to deliver a capacity report to the HCG. It can be short (available theatres and ventilators, immediately and within the nearest hour) but it has to be fast, since it is the base for the distribution of casualties between hospitals.

On decision of yellow or red alert, the hospital has to be re-designed the for major incident response, using the signs for that, delivered by the instructors. Also, staff has to be appointed to take command in different positions, using the command symbols in the folders.

Staff which is called in is delivered to the hospital staff by the instructor according to a prepared protocol, saying who will arrive when.

Instructors will register specifically:

- Time for alert
- Time from alert to decision with regard to level of alert
- Primary level of alert
- Time from alert to capacity report to RMC
- Your ability to prepare the hospital: Emergency department, surgery, ICU, wards, receiving of alerted staff
- Your use of command symbols
- Time from alert to preparedness to receive casualties at Emergency Department
- Time from alert to preparedness to start surgery



Fig 20

A hospital is built up with, from the left to the right: Arrival and primary triage zone, Emergency Department (Blue), Surgery (Red) and ICU (Green).

Emergency department

If the hospital is close to the scene, it will normally receive patients coming there by private cars, taxis, police cars or just walking (“spontaneous evacuation”). These patients arrive without any previous registration, triage or treatment and are in the exercise delivered by the instructors.

When the transport starts, patients will be delivered to the hospital by the ambulance teams with simultaneous medical report.

All these patients should be taken care of in a prepared **triage area**. Triage should be done by qualified persons and anatomical triage is recommended at this stage. All priorities should be re-evaluated.

In the primary sorting, patients evaluated as potential ambulatory cases, of with injuries that can wait without immediate risk for health, are taken to a zone for less severely injured where several teams can work parallel. For these teams can be used also doctors and nurses with limited experience of trauma, but with access to trauma-competence.

Patients with potential need of resuscitation, or immediate surgery or intensive care, are transferred to a waiting zone for Major Incident Resuscitation Teams (MIR). These teams are “modified trauma-teams” and should be staffed with minimum 4 persons, 2 doctors and 2 nurses, one of each with clinical trauma-experience. Resuscitation cannot be done without sufficient staff.

Planned immediate surgery should be indicated by the red labels in the hospital folders. Patients who are evaluated to need immediate surgery should be transferred to the preoperative zone (see below). Patients can also be transferred from the MIR-teams to ICU or wards.

Patients sent to the “green zone” can be dismissed, sent to the psychosocial management groups or to the wards. They can also be given a higher priority and be transferred to the MIR-teams. Patients dead on arrival should be taken to the zone for this, usually a department of pathology, which must be staffed also by psychosocial support teams.

Instructors will register specifically:

- The organization of the Emergency Department
- The staffing of the different zones. A common error in insufficient staffing of the MIR-teams. Instructors will in such cases stop treatment until staffing is accurate.

- The accuracy of re-evaluation and re-triage in the “green zone”
- Accurate restrictiveness in advanced examinations, for example CT.

EMERGENCY DEPARTMENT							
	EMERGENCY ROOM	EMERGENCY ROOM	EMERGENCY ROOM	EMERGENCY ROOM	EMERGENCY ROOM	EMERGENCY ROOM	EMERGENCY ROOM
NURSES	 NURSE EMERG DEPT	 NURSE ANEST	 NURSE EMERG DEPT	 NURSE ANEST	 NURSE EMERG DEPT	 NURSE ANEST	 NURSE EMERG DEPT
PHYSICIANS	 SURG	 ANEST	 SURG	 ANEST	 SURG	 ANEST	 SURG
PATIENT							
PATIENT ARRIVES	11.05	11.05	11.08	11.08	11.10	11.12	11.14
PATIENT DEPARTS	11.18	11.20	11.23	11.18	11.30	11.28	11.34

Fig 21

Severely injured casualties processed through the Major Incident Resuscitation teams (MIR). **No treatment is allowed without sufficient staff** (requests for MIR-teams see above). The time needed for treatment is calculated based on the times on the treatment tags, taking into consideration things that can be done parallel. A standard time of 3 min is added for the additional time the survey takes on a real patient.

If it is decided to perform an X-ray, the X-ray labels in the folders should be used. In major incidents, only a limited number of X-rays are done in the emergency room, many can be done later in the preoperative area, in the Intensive Care Unit (ICU) or in wards. For Computer Tomography (CT) the time depends on if the machine is localized in the emergency departments or on a separate floor where it consumes much longer time for the patient and the MIR-team. The triangular yellow symbols in the hospital represent the number of machines for CT and USG and more examinations than the number of machines cannot be done simultaneously.



Fig 22

If the trainee orders an X-ray, the finding on that X-ray can be presented on the computer screen by the instructor, as a base for decision with regard to treatment. This is valid for all patients where skeletal- or pulmonary X-ray, computer tomography or ultrasonography may be indicated (this component of the system is so far only available in a limited number of MRMI-centers)

Surgery

Patients evaluated to need immediate or urgent surgery should be transferred to a preoperative zone, which usually is the normal postoperative area. Here should be a surgeon and an anesthesiologist in charge (indicated by staff symbols) for reevaluation of priority to theatres.

Those not needing immediate surgery can be transferred to wards with a pre-printed label with planned surgery and /or additional diagnostic and therapeutic measures.

In lack of regular theatres in a situation with a heavy load of casualties, an alternative is to perform minor surgical procedures not requiring general anesthesia in rooms in the Emergency Department, or in out-patient clinics. Magnetic signs for “Minor surgery-theatres” are available if the trainees take such initiatives.

When surgery is started, the instructor can on the computer screen present the surgical findings illustrated as schematic drawing as a base for decision of surgical strategy (fig 23 below).

The instructor sets the time requested for surgery based on the decision with regard to surgical procedure, also paying attention to the staffing of the theater used. The instructor also has the alternative to use the standard times for surgery at the back-side of the casualty cards which may be relevant if the trainees on the course have limited experience of trauma-surgery.

For every operation performed, a pre-printed label should be attached to the casualty card indicating which surgical procedure(s) that have been performed, the times for start and end of surgery and the need of postoperative ventilator treatment.

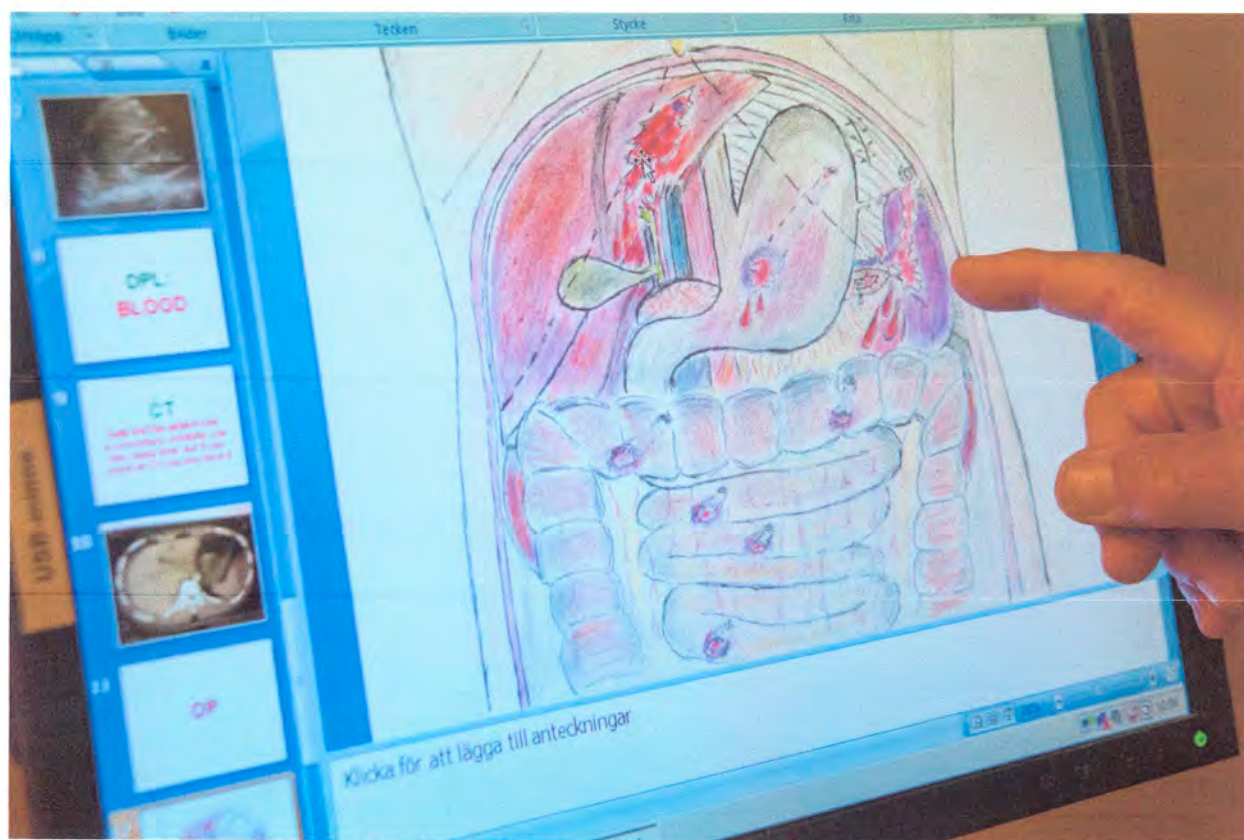


Fig 23 When surgery is started, the instructor can on the computer screen illustrate the surgical finding with schematic drawings as a base for decision with regard to surgical strategy. In this patient exposed to penetrating fragments after an explosion, how to deal with the bleeding liver injury (packing or resection?), the splenic injury (splenectomy or preservation?), the pancreatic injury (drainage or resection?) and the high-energy penetrations of the bowels and stomach? The instructor sets the time according to the decisions made. This component of the system is so far only available in a limited number of MRMI-centers.

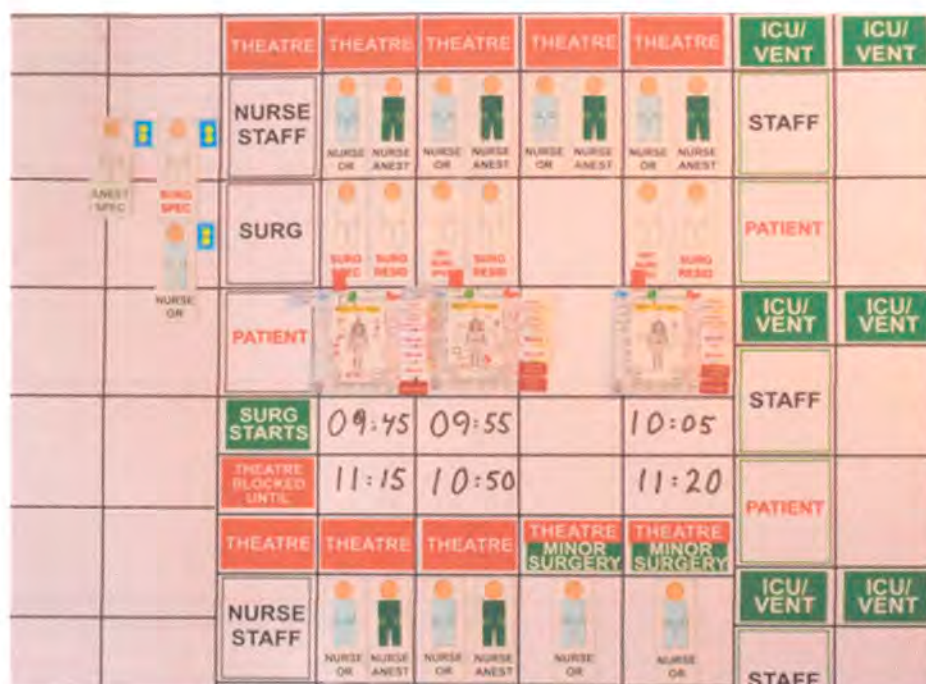


Fig 24

Optimal utilization of surgical theaters is important in situations with high loads of casualties: Accurate priority for surgery with consideration of expected inflow of casualties, application of the Damage Control concept with focus on simple procedures and later secondary surgery. Instructors supervise that staffing of theaters related to indicated procedures and set the times for surgery (see above).

Instructors will register specifically:

- The accuracy of re-triage in the preoperative zone
- Accuracy in selecting surgical strategy (if this alternative is used)
- Accuracy of staffing of theatres. Severe trauma cases require more than one surgeon and surgeons with sufficient competence. Instructors will not allow surgery with insufficient staffing.
- Use of blood and fluids (tags for this corresponding to the hospitals capacity in the folders). Request for more supplies in time.
- Use of other rooms (emergency rooms, or rooms for out-patient clinics) for simple surgical procedures not requiring general anesthesia
- Accurate use, or over- or under-use, of the surgical facilities

Intensive care

Access to ventilators is one of the most critical limiting factors for the surge capacity of a hospital in major incident response. ICU is an expensive resource and the demands on efficiency high. In most hospitals today, ICU is regularly filled with patients with only single, or no, ventilators available.

However, there are always patients that - with increased staff on wards - can be transferred to wards earlier than planned. An important step in this training is to identify such patients and make appropriate decisions. On alert, the patient-cards for such patients can be rotated as in fig 25 as a step of preparation if such action should be needed.

There are also ways to get increased access to ventilators: Ventilators can be transferred from hospitals on longer distance from the scene, which is faster and simpler than transferring patients. Magnetic symbols for extra ventilators are available to illustrate such transfers and there is often space for more ventilators in the postoperative care.

**Fig 25**

As in reality, most ventilators are blocked by non-disaster patients already under treatment. Very delicate decisions have to be done with regard which of these that can be earlier transferred back to wards. Access to ventilators is maybe the most critical limiting factor for the surge capacity of a hospital which can be clearly demonstrated in exercises like this

Instructors will specifically register:

- Triage of patients already in the ICU at time for alert
- Accurate reporting of ICU capacity, present and forecasted
- Utilization of ICU capacity- under-used or overloaded?
- Measures to get extra ventilator capacity

Hospital Command Centers

As mentioned above, the Hospital Command Centers (HCC) are primarily operated by staff being immediately available in the hospital or on call with short response- time, constituting the primary ***Hospital Command Group*** (HCG). The request according to the MRMI-concept is that the HCG should be in action within 15 minutes after the alert, with the primary tasks to

- Make decision with regard to level of alert
- Give a first capacity report to the Regional Medical Command Center (RMC) (immediately available theatres and ventilators)
- Coordinate the alert of the hospital according to the disaster plan

A disaster plan for the hospital is available both in the HCC and in the involved hospital units. In the HCC are also available overviews of the hospital facilities and a board for registration of information from, and communication with, RMC.

Instructors will use “in-plays” to the HCG increasing the realism. Numerous calls are flowing in during a major incident response and even if it not is possible in this training situation to achieve the same volume, the trainees should still get an opportunity to identify the problem with this and tricks to handle it. If you do not write a press- release to be announced to the media by the hospital operators, you may be flooded by calls from aggressive journalists until you make one.

The HCG staff is of course allowed to - as in reality - make visits at the hospital department for bilateral information and discussion, but should always be available on telephone.

For further action in the HCG, see the Disaster Plan, Attachment 3

Instructors will specifically register:

- How the work in HCG is structured (distribution of tasks between officers, handling of incoming information, breaks for debriefing)

- Staffing of the HCG and support functions using staff symbols (doctors, nurses, managers, secretaries)
- The time for the first capacity report to RMC and the relevance of it
- The communication between the HCG and the hospital (continuous updating of capacity report, active search of information)
- The communication between HCG and the hospital (Delivery of updated information from RMC, requesting continuous capacity report)
- Dealing with presented problems (in-plays from instructors)

Regional Command Center

The organization in the Anyland scenario is based on a ***Regional Medical Command Center***, RMC, which is used in many, but not all European countries. To have this role requires officers available on call 24 hours a day, a medical officer (MOC) instantly responding on telephone and prepared to be on site in the command room < 20 minutes, and an administrative officer (AOC) available on call, but maybe with a little longer time to be on site. The MOC can be a senior hospital- or ambulance physician and the AOC a manager from the hospital or county. The MOC should be the operative chief, making the medical decisions, and the AOC gives support, makes economic and political decisions and also report to central administration on county- and government level. To this group should be connected additional medical and administrative officers when resources permit.

This unit can be localized alone, sometimes in a major hospital, but it can also be located in a ***Regional Command Center*** (RCC) together with collaborating agencies as the ***Ambulance Dispatch Center*** (ADC), the ***Alarm Center*** and the ***Rescue-and Police Command Centers***. This is the model generally used in the MRMI-courses.

The tasks of the ***RMC*** are (according to the Anyland organization) to:

- Declare Major Incident when justified and, when more information comes in, also define the level of Major Incident
- Alert hospitals based on the estimated need of care and on the same time
 - Inform the hospitals about expected casualty load
 - Request primary capacity reports from the hospitals (OR, ventilators)
- Inform ADC about the expected need of transport resources
- Continuously communicate with the scene (MIC + ALO) and:
 - require information about expected casualty load and need of additional medical resources on scene (staff, equipment)
 - give a continuously updated “distribution key” for patient- transport to hospitals, based on updated capacity reports from the hospitals
- Communicate with ADC with regard to use of available ambulances and helicopters (the function of ARCC is included in ADC).
- Communicate with Regional Rescue-and Police Command Centers.
- Communicate with media, give press releases and organize planned press conferences together with collaborating agencies. Media contacts have to be dealt with in addition to this.
- Contact hospitals outside the region to refer patients, or ask for transfer of patients or supplies. This has to be coordinated with ADC.
- Communicate with other authorities on county-and governmental level.
- Communicate with foreign embassies in case of involvement of foreign citizens in the incident.

Ambulance Dispatch Center

The ADC fills in the alarm-phase also the function of ***Alarm Center*** (SOS) which means that you receive the first alarm from a private person on scene, faked by an instructor. As response to this alarm, the ADC should:

- Send the units that automatically are alerted on suspicion of major incident on the location the alarm comes from (see action card). These units (symbols for ambulances, rescue- and police) should be delivered to the instructor coordinating the arrival to the scene on the time they should be there. Note that this time is short: Ambulance and police usually has a response-time on 1 minute, and the nearest units have a short distance to go.
- Inform the medical officer on call for the RMC-function. The ADC should before the alarm be given the telephone number where this trainee is located.

The ADC may also be the place to where the first arriving ambulance crew delivers the window-report since RMC may not yet be staffed at that time. If this window report indicates great need of transport facilities, ADC should initiate mobilization of transport resources, including hospital-based helicopters, and then inform RMC as soon as it is on line. RMC will then contact MIC to establish continuous communication.

The continued task of ADC is then to make decisions with regard to mobilization of additional resources, in communication with RMC and MIC. ADC has the authorization to alert ambulances and hospital-based helicopters also from outside the region.

ADC also in the exercise fills the function as ARCC with the task to request and coordinate military helicopters. In case sea-transport is required, this is also the task of ADC in the exercise.

Other military resources are requested from the military by RMC (medical staff and equipment, military ambulances) or Rescue Command Center (other military resources).



Fig 26
The Regional
Command Center.
In the center
RMC, to the right
ADC (below) and
to the left Rescue-
and Police
Command
Centers



Instructors will register specifically:

- How the work is structured (distribution of tasks between available staff, handling of incoming information, registration of information on boards, debriefing)
- When the first capacity report from hospitals is given to the scene
- How the communication is performed (short clear messages)
- Activity in requesting information that not comes in spontaneously, from hospitals and from scene
- How the support to the scene is given (offering help and advice)
- Handling the different in-plays of problems
- Media management

Closing the exercise

The exercise may be closed at the time where the scene is completely evacuated, all casualties have been transported to hospitals, and the situation in all hospitals allows conclusion with regard to outcome, i.e. if all patients can receive necessary treatment within the time frame necessary for survival. The instructor in charge makes this decision after checking the situation in all hospitals.

“Major Incident Stand-Down” should be declared properly by RMC, all HCG:s and MIC. All stations should collect their staff for debriefing and exchange of experiences and the instructors will give time for this before the evaluation.

Evaluation

At evaluation, experiences from the different stations will be reported in chronologic order: Scene, transport, hospitals, HCG-groups, RMC: What happened, how was it dealt with, was the capacity sufficient, and was it well utilized? What could have been done better? Depending on the time for disposal, this can be done by the instructors (with possibility for the trainees to address short comments or questions) or by the trainees. If done by the trainees: Use a clear structure in the reporting and consider that there are many stations that should be evaluated.

All patients dead on scene after arrival of medical staff will be put on a board prepared for this (this is done by instructors continuously during the exercise). The patients will be organized in line after ISS (ISS<15, ISS 15- 25, ISS 25-35, ISS 35-50 and ISS>50). The instructors will go through “avoidable deaths” related to trauma score and according to the “post it-notes” on the cards (fig 27). Could the number has been reduced, and if so how?

The percent avoidable deaths related to total number of casualties is reported as one of the parameters giving the outcome of the exercise. The protocols from the scene, the hospitals and the coordinating functions are also used as a base for the evaluation.

Pat. nr _____		ISS _____	
DEAD (time) _____			
☐ On scene			
Trapped Yes ☐		No ☐	
☐ During transport			
☐ In hospital			
Cause of death:			

Preventable Yes ☐			
No ☐			

Fig 27

On all patients declared dead, the instructors apply pre-printed post it-labels (included in the sets) with patient number, time and place for death, trapped or not, reason for death, preventable or not, and Injury Severity Score. This gives a result of the response expressed in percent preventable deaths related to trauma-score (ISS).

Literature

All knowledge needed for optimal benefit of this training is collected in a textbook written by members of the core faculty of the MRMI-courses together with international experts: "Medical Response to Major Incidents – a practical guide for all medical staff" (Springer, 2012; ISBN 978-3-642-21895-8). It is available as a printed textbook (fig 28) but single chapters are also available electronically from the publisher.

The MRMI textbook covers all types of major incidents and has 3 parts:

- **General part:** Chapters 1- 6
 - (1) Major incidents of different levels, definitions
 - (2) Summary of experiences from recent major incidents of different types
 - (3) Prehospital organization
 - (4) Triage, principles and different methods
 - (5) Hospital organization
 - (6) Management of dead
- **Medical management and triage of specific injuries:** Chapters 7 - 17; Primary treatment (prehospital and hospital) and priorities in all different kinds of scenarios (physical trauma, burns, irradiation, hazmat, infections, natural disasters, combats, terror, psychosocial)
- **Education and research:** Chapters 18 - 19

To give as much space as possible to the practical and interactive training, the traditional formal lectures in the MRMI-course are restricted to what is considered as a minimum: A short description of the terminology and principles for prehospital and hospital organization used during the simulation exercises in this course, and a short introduction to the methodology in the course. This requires previous theoretical knowledge to perform accurately during the course and get optimal benefit from it. To secure that the trainee have put effort in acquiring such knowledge, a pre-test will be performed in the beginning of the course. If you fail in this pretest, you will be given a second chance in a verbal hearing by instructors, but without guarantee to get access to the course- for the benefit of all participants, we have to require a certain level of knowledge.

Minimal recommended reading for different categories of trainees:

Prehospital staff

- For scenarios with physical trauma: Chapters 1, 3, 4; Chapter 7 page 111 – 144
- For scenarios with hazardous material : As above plus chapter 10
- For military scenarios: Chapters 1, 3,4; Chapter 7 page 111-144; Chapter 14

Hospital staff

- For scenarios with physical trauma: Chapters 1, 3, 4, 5, 7, 8, 17
- For scenarios with hazardous material: As above plus chapter 10
- For military scenarios: Chapters 1, 3, 4, 5, 7, 8, 14, 17

Staff with coordinating functions (RCC/RMC, ADC, Administrative officers in HCG)

Chapters 1, 3, 5, 15, 17

Instructor candidates

The complete book

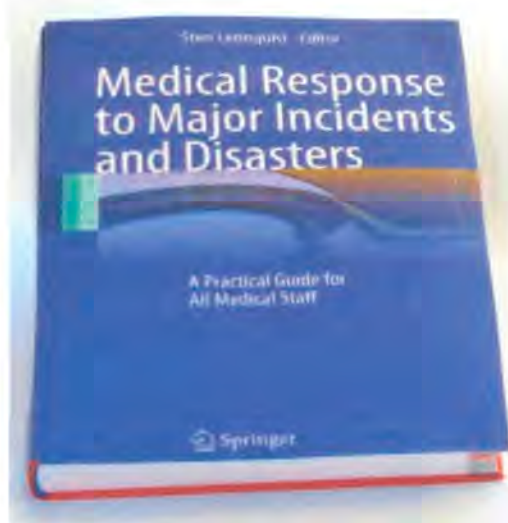


Fig 28

The MRMI-textbook is produced by members of the core faculty of the MRMI-courses. It includes 400 pages and 180 illustrations in color. The intention is that selected parts (depending on type of course and position) should be read by the trainee before the courses, followed by a pre-test to secure sufficient knowledge to get optimal benefit from the course. This also reduces the need of formal lectures and gives more time for the interactive training.

References

1. Lennquist S: Education and training in disaster medicine. *Scand J Surg* 2005; 94(4) 300 – 310
2. Lennquist Montán K, Khorram Manesh A, Örténwall P, Lennquist S: Comparative study of physiological and anatomical triage in major incidents using a new simulation model. *Am J Disaster Med* 2011; 6(5) 289-298
3. Lennquist S: Medical response to major incidents and disasters- a practical guide for all medical staff. Springer (Berlin/Heidelberg/New York) 2012
4. Lennquist S: Response to major incidents and disasters: An important part of trauma management. In Oestern HJ, Trenz O, Uraneus S (Eds): General trauma care and related aspects. *European Manual of Medicine*, Springer (Berlin /Heidelberg/New York) 2014
5. Lennquist Montán K, Hreckovski B, Dobson B, Örténwall P, Montán C, Khorram Manesh A, Lennquist S: Development and evaluation of a new simulation model for interactive training of the medical response to major incidents and disasters. *Eur J Trauma Emerg Surg* 2014; 40:429-443
6. Lennquist Montán K, Örténwall P, Lennquist S: Assessment of the accuracy of the MRMI course for interactive training of the response to major incidents and disasters. *American J Disaster Medicine*; 2015; 10(2): 93-107
7. Lennquist Montán K: Development and evaluation of a new simulation model for education, research and quality assurance in disaster medicine. Academic thesis, University of Gothenburg 2015; ISBN (e-pub) 978- 91-628- 9337-8

ANYLAND



- Regional border
- National border

Health-care resources and organization in a country anywhere, as a model for simulation of the response to a Major Incident

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ANYLAND, TERMINOLOGY

Major incident, definition and classification

Major Incident (MI)= Any situation where available resources are insufficient for the immediate need medical care to such extent that it involves risk for life and health.

MI level 1= By adjusting organization and methodology, it is possible to maintain the level of ambition for medical care and save all normally salvageable patients. **Means** activation of disaster plan and transfer to triage/primary management according to MI-principles

MI level 2= The load of casualties is so high that even with adjusting organization and methodology, it is not possible to maintain the level of ambition, i.e. all normally salvageable patients cannot be saved. **Means** upgrading of level of alert and adjusting decisions with regard to priority (as addition of triage-category blue, "expectant").

MI level 3= As in level 2, but with very large numbers of affected and/or combined with destruction of infrastructure, requiring *national assistance* from outside the affected region. **Means** activation of national disaster plan.

MI level 4= As in level 3, but affecting a country where the national infrastructure is impaired, or when national resources are insufficient are to handle the situation and *international assistance* is needed. **Means** alert of international relief organization(s).

Disaster plan, levels of alert

Green alert ("stand by")

Used when: An incident has occurred or a threat has come up, but it is yet not known th which extent the hospital will receive casualties.

Means:

- Activation of Hospital Command Group (HCG)
- Information to critical functions in the hospital, capacity reports requested
- Reporting over-all capacity to Regional Medical Command Center
- Considering "freezing" planned treatments that can wait (not used for only threats)

Yellow alert ("partial mobilization")

Used when: It has been confirmed that the hospital will receive casualties, but probably within a limit that nor requires full response.

Means:

- As in green alert, plus:
- Freezing all planned treatments that can wait
- Alert a (defined in the plan and limited) number of staff in critical functions
- Alert of extended hospital command group (HCG support-group)

Red alert ("full mobilization")

Used when: It is confirmed or suspected that the hospital will receive a large number of casualties within short time, requiring its full capacity

Means:

- As in yellow alert, plus:
- Automatic alert of all available staff within emergency- and supporting disciplines according to a prepared alarm schedule ("rings- on- the – water"- system)

Command functions at different levels

Command on scene

MIC = Medical Incident Commander. Leads and coordinates the medical work on-scene.
Primarily always Officer in first ambulance on scene.

TRO = Triage Officer. Coordinates triage and primary management of casualties.
Primarily always officer in first ambulance on scene

ALO = Ambulance Loading Officer. Coordinates transport of casualties from scene.

RIC = Rescue Incident Commander. Leads and coordinates the rescue-work on scene.
Primarily always leader of first rescue unit on scene.

PIC = Police Incident Commander. Leads the police-work on scene. Primarily always officer in first Police Unit on scene.

Command in hospital

HCG = Hospital Command Group. Primarily always senior hospital staff on duty/on call.
Shall be in function < 15 minutes after alert.

MOC/HCG = Medical Officer in Command in HCG.

AOC/HCG = Administrative officer in command in HCG (may not be immediately available)

HCG Support Group = Medical and Administrative Officers not primarily available, but called in to support HCG in Yellow and Red alert.

Regional command

RCC = Regional Command Center. Includes RMC, ADC, RescCC and PCC below, in Anyland all located together.

RMC = Regional Medical Command Center. Includes Medical Officer in Command (**MOC**, senior medical officer on special call, immediately available on telephone, shall be available in RCC <20 min), Administrative Officer in Command (**AOC**, senior manager), plus additional medical + administrative officers when available after alert. RMC has the overall responsibility for the medical response to the incident.

ADC = Ambulance Dispatch Center. In Anyland responsible not only for Ambulance Services but for all medical transports, including helicopters. Staffed 24 hours/day.

RescCC = Rescue Command Center, responsible for Fire Brigade and Rescue Services. Staffed 24 hours/day.

PCC = Police Command Center, responsible for Police Services. Staffed 24 hours/day.

Anyland

General description

Anyland (see map on front) is a small republic with 3.7 million inhabitants, located anywhere. It has two regions, North West with North City as the regional center, and South East with Major City as the regional center. It is surrounded in the South by the Blue Sea, in North East by Eastland and in North West by Westland. The political relations to Eastland are frozen, somewhat better to Westland.

There are two international airports, in North City and Major City, in Major City mainly charter flights. The main harbor is Harbor City.

The coastline is very attractive for tourists with crowded resorts during tourist season. The two biggest resorts are Paradise Resort and Sunside Resort with many big hotels, restaurants, bars and discotheques. Based on the political situation, these resorts has since long been considered a potential target for terrorist attacks.

Climate

The climate is that of Central Europe. The exact climatic conditions are, as the day and time for the incident, given with each scenario.

Geography

The South part of the country is flat coastland, whereas the North part (from North City, see map) is mountain area with narrow and slow roads, except highways.

Health care

Anyland has no private hospitals, only small private clinics that not are involved in preparedness for major incidents. There are two big University Hospitals with all specialties, including Burn Care Centers, one in North City and one in Major City. The other hospitals are community hospitals of varying size (description in detail, see below).

There are no formally established trauma centers, but in the major hospitals, trauma teams (surgeons, anesthesiologists, orthopedic surgeons) with special training can be alerted for major trauma.

Primary Care Centers have no beds and most of them are open only during office hours, but centers on distance from hospitals have staff on call that can be alerted for prehospital care and have equipment and training for this.

With regard to *disaster preparedness*, all hospitals have by law a *disaster plan*, following a uniform structure (attached to the manual). **Regional Medical Command Centers (RMC)** for health care during major incident response are located in North City and Major City. They are staffed by:

- Medical Officer in Charge, **MOC** (senior physician from a hospital) being on call 24 hours/day with a time from alert to response of maximum 15 minutes
- Administrative Officer in Charge, **AOC** (manager from the Regional Council) with a maximum response time of 2 hours

Additional managers and secretarial staff can be alerted for support. The **RMC's tasks** are to:

- Declare Major Incident when justified

- Inform and alert hospitals and other medical resources according to calculated/expected needs
- Coordinate distribution of casualties between hospitals in communication with ADC, Medical Officer in Command and Ambulance Loading Officer on scene, and involved hospitals
- Coordinate information to other agencies (rescue service, police, military), regional and national authorities, media and (when needed) foreign embassies.

The hospitals response is coordinated by a **Hospital Command Group (HCG)** in each hospital staffed by:

- Medical Officer in Command (**MOC**), initially one of the senior physicians on call (usually surgery, anesthesiology or orthopedic surgery), can be replaced by specially trained MOC when available
- Administrative Officer in Command (**AOC**), initially senior manager on call, can be replaced by Hospital Director when available
- Medical and Administrative support officers and secretaries when available.

The tasks of the HCG are to:

- Make decision with regard to the level of alert, and initiate alert
- Continuously report capacity to RMC
- Coordinate and lead the response of the hospital

The HCG is on higher levels of alert supported by the **HCG support group** with managers and officers responsible for different functions in the hospital.

Transport of ill or injured patients

The **ambulance service** is coordinated by the regional ambulance detachment centers (**ADC**). The ambulances are located in separate ambulance stations (number and location see Table 6). Every ambulance is staffed with 1 nurse (trained in Prehospital Trauma Life Support) + 1 ambulance officer and can take 1(one) patient. Ambulance staff off duty can be alerted for prehospital work as part of Major Incident Response.

Hospital based helicopters for medical transport are located at North City and Major City University hospitals, two in each hospital, one continuously on duty, and one in Harbor City, also continuously on duty. These hospitals have helipads on the roof. The helicopters are staffed by 1 physician + 1 nurse from the hospital and can take 1 (one) patient each. They are alerted and directed by the ADC in coordination with the National Flight Control.

Of the other hospitals, West City and Mountain City also have helipads but no helicopters.

RMC can also through the Regional Rescue Command Centre request support from the **military** with military **ambulances** (if and when available, see description below), which can take 2 patients each, and military **helicopters** (if and when available, see description below). There are two types of military helicopters:

- AB 412 Hp with a capacity of two patients on stretchers and
- MI 8 with capacity of 6 patients on stretchers. None of these helicopters have permanent medical staff or equipment.

The biggest military helicopters (MI 5) cannot land on helipads, but in prepared areas on some distance from hospitals, requiring ambulance transport to hospital.

Rescue service

Anyland has no civil defense organization. The fire brigade is responsible for the rescue service in major incidents and the ***Rescue Incident Commander (RIC)*** is the chief-officer on duty at the nearest major fire brigade. RIC has legal right and authorization to require any resource needed for the rescue operation.

Both regions have a regional coordination centre for fire brigade and rescue. The bigger fire brigade stations have special units for taking care of casualties (stretchers, illumination, inflatable tents and decontamination unit). In small villages there is a voluntary fire brigade with usually 15 minutes response time on 24-hour basis, with equipment only for fire fighting.

Police

Responsible for the police service in major incidents is the chief on duty in the nearest city and the police officer in charge in the first arriving unit becomes, and usually remains, the ***Police Incident Commander (PIC)***.

There are two Regional Police Centers, Major City and North City. Both have preparedness to open an ***information centre*** for recording information about victims and where they have been taken, and to which relatives to victims can call.

Regional Command Centers (RCC)

Anyland has the advantage to have the regional alarm centers, ambulance dispatch centers, regional medical command centers, rescue- and police command centers located together in two regional centers, one in Major City and one in North City.

Military

There are 3 army bases, Fort Major close to Major City, West Point close to West City and East Point close to Mountain City (see map). Close to Major City is also a military airfield with an Air-force base and the Army Helicopter School, the other bases having no helicopters in peace- time. The major naval base is located close to Harbor City and has no helicopter (helicopters from Fort Major are used for sea-rescue actions).

There are no military hospitals staffed in peacetime and no military medical staff available outside office hours (except for the need of emergency out-patient care of military personal on duty).

Voluntary organizations

In addition to voluntary fire brigades (see above), there are voluntary red-cross units in the major cities with trained volunteers and some basic equipment, but no vehicles. There are voluntary military services units in all cities with only very basic training in first aid, but useful for basic search-and-rescue.

Media

The governmentally supported TV channel is Anyland Broadcasting Corporation (ABC). In addition there are a number of more or less serious commercial channels. The main press forum for the current Governmental party is Anyland Daily News (DN). The main forum for the current opposition is the Afternoon Bulletin (AB), eager to identify political and administrative mistakes.

Anylands organization of medical care on the scene in major incidents

The ***first ambulance on scene*** reports immediately on arrival to the RMC (or ADC, if the RMC is yet not staffed) the estimated extent of the incident and the need of resources for medical care and

transport ("Window report"= what can be seen through the window of the ambulance, not waiting for any extensive investigation of the scene). A checklist for this report is carried in all ambulances.

One of the crew members in this ambulance takes the role as **Medical Incident Commander (MIC)** and the other takes the role of **Triage Officer (TRO)**. This means that the first arriving ambulance not can be used for transport.

In a major incident level I, the MIC appoints an ambulance officer in one of the next arriving ambulances as **Ambulance Loading Officer (ALO)**. ALO distributes the patients between ambulances, and ambulance crews make decision with regard to measures necessary before or during transport. ALO distributes the ambulances (and helicopters, if available) between involved hospitals in communication with the RMC, based on continuous capacity reports from hospitals. MIC reports continuously to RMC the expected need of care, and the need of additional resources on scene and for transport.

In a major incident level II or III (= more casualties needing transport than immediately available ambulances) there is a need of triage and primary medical treatment on scene, which requires an extended organization.

Triage might be needed in two steps:

(a) **Primary triage** to make decision which patients that:

- Do not need ambulance transport
- Need immediate transport and can be taken directly to a waiting ambulance (if available)
- Have to be re-triaged/ treated by an ambulance- or prehospital team before leaving the scene

The last category gets a priority for such treatment:

Red:	Immediate (life-threatening)
Yellow:	Urgent but can wait short time (1-2 hours) without risk for life
Green:	Can wait without risk for life
Black:	Apparently dead

A simple method based on physiologic criteria (for example *Triage Sieve*) can be used for this primary triage.

(b) **Secondary triage and survey**

This is done by ambulance- or prehospital teams, making a secondary evaluation as a base for decision:

- If any treatment should be given before transport to prevent the risk for mortality and severe complications
- Which priority (red, yellow, green) the patients should have for transport (after treatment as above)

This secondary triage should be based on a somewhat more extensive investigation than in the primary triage, for example *Triage Sort*, combined with an anatomical evaluation of injuries for decision with regard to treatment.

At secondary triage, a fourth category of priority can be added in very severe incidents (decision made by MIC in communication with RMC):

Blue: Expectant = severely injured patients with very small chance of survival that are given only pain relief but no therapeutic treatment, thereby increasing the chance to save those possible to save.

The treatment of casualties considered necessary is given by the ambulance- or prehospital teams, continuously keeping in mind the necessity of utilizing available ambulances and not cause unnecessary delay on scene.

These teams can be:

- Ambulance crews from arriving ambulances (= loss of transport resources, but might be necessary)
- Prehospital teams from hospitals, sent out by helicopters or returning ambulances (= should be required by MIC without delay if needed)
- Alerted ambulance crew off duty (without vehicles); also this resource should be requested by MIC without delay if needed.
- Other available medical staff on scene, for example voluntary medical staff (= MIC gives approval and has to check ID).

The MIC distributes staff to such teams and leads and coordinates this work.

In incidents with **trapped patients**, separate teams might be needed to treat on site and support during extrication, which further increases the need of medical teams.

In addition to the coordination and leading the work on scene and continuously reporting to RMC, the MIC should also communicate with the Rescue Incident Commander (RIC) and the Police Incident Commander

(PIC). These three officers constitute the Command Group on scene.

In incidents with time-consuming evacuation from the scene, the first ambulance officer initially having the role as MIC might be replaced by a more senior officer on this position when available.

The **rescue service** has the tasks to:

- Secure the scene from further damage (fire, collapsed buildings)
- Define and indicate **risk-zones** (hot zone and warm zone) where casualties and staff are exposed to danger
- Evacuate casualties from such zones as soon as possible
- Perform simple life saving measures waiting for medical staff
- Assist medical staff to get access to casualties
- Extricate trapped casualties in collaboration with medical staff

The **police** have the tasks to:

- Cordon-off the rescue area, when needed evacuate it. This cordoning should include hot and warm zones and also a traffic cordon.
- Control traffic in and out from the rescue area, establishing a checkpoint where all incoming units have to stop before entering the scene, **rendevouz-point (RVP)**.
- Take care of apparently dead victims
- Search the area for additional casualties
- Register casualties and non-injured departing from the area
- Investigate criminal activity and secure the area from criminal elements
- Investigate other reasons behind the incident
- Take care of the victims' lost property

The organization described above is the standard for Anyland and is used wherever in the country a major incident occurs.

Resources for health care, transport and rescue service (from the south to the north)

Office hours = In Anyland 08 00 – 17 00 except Saturday, Sunday and Holiday.

Small Town

Small Town has only 105 000 inhabitants but a relatively big county hospital (264 beds + geriatrics) because of the crowded seafront resorts during tourist season. For description of the hospital, see Table I.

Table I Small Town County Hospital

Specialty	Wards	Beds	Doctors total		Doctors on call	
			Specialists	Residents	In hospital	At home
Gen Surgery	2	2x24	12	4	1	1
Ort Surgery	1	28	10	4	1	1
Urology	1	18	6	2	-	1
Gyn/Obst	1	24	8	2	1	1
Otolaryngol	1	18	6	2	1	1
Ophthalm	-	-	4	1	-	1
Internal med	3	3x24	18	4	1	1
Psychiatry	1	32	12	2	1	1
Anesthesiology	-	-	12	4	1	1
Emerg Med	1	24	6	4	1	-

Emergency department: Rooms can be prepared in the emergency department for 4 Major Incident Teams if staff can be mobilized.

OR: 8 theatres to be shared between surgery, orthopedic surgery, gynecology and ENT Two of these are only equipped for minor surgery in local anesthesia.

Postoperative ward: Only staffed during office-hours. 16 beds, two of these normally equipped with ventilator.

ICU: 15 beds with ventilators.

Radiology: 1 radiologist in hospital and one on-call in non-office hours. The hospital has one CT located at the radiological department. Ultrasonography is available in Emergency department.

Helicopter: No hospital based helicopter, but helipad on the roof

Prehospital team: The hospital has equipment for 2 prehospital teams, 1 doctor + 1 nurse in each.

Primary care

One primary care centre with 6 doctors and 12 nurses, no beds. Closed during non-office hours, no staff on call.

Ambulances

Totally 8 ambulances. Of these, staffed and immediately available during office hours: 4, during non-office hours: 2

Helicopters

No hospital helicopter (see above) and no other helicopter in Small City available for transport of injured.

Rescue service

Small City Fire Brigade has 4 units immediately available for fire fighting and also a unit for major incident response with basic medical equipment (stretchers, blankets, splints, inflatable tent) with a somewhat longer alert-time (< 20 minutes). There are also 2 voluntary firebrigades with one chief and 5 firefighters in each, available < 15 minutes.

Police

Small City Police has 6 cars with staff (2) available during office-hours, during non-office hours 2 cars + 1 Chief on duty in station.

Paradise Resort**Primary care center**

The primary care center has no beds and is open during office hours + weekends 08 00 – 12 00. It is staffed by 7 doctors and 10 nurses, 1 doctor being on call 24 hours/day for emergencies in tourist hotels. The center has an alarm list for Major Incidents and equipment for 2 prehospital teams (1 doctor + 1 nurse in each team). The staff has basic training in prehospital work.

Ambulances

Small ambulance station with 3 ambulances, 1 staffed and immediately available during non - office hours

Helicopters =0**Rescue service**

Voluntary fire-brigade with 1 chief + 5 men + one vehicle, available < 15 minutes.

Police

2 cars during office hours, during non-office hours 1 car + 1 Chief on duty in station.

Bluelight Village**Primary care**

One primary care centre with 6 doctors + 12 nurses, closed during non-office hours, no beds.

The center has an alarm list for major incidents and equipment for 2 prehospital teams, 1 doctor + one nurse in each (if staff is available).

Ambulances

Ambulance station with totally 6 ambulances, 2 staffed and immediately available during non-office hours.

Rescue service

Voluntary fire brigade, 1 Chief + 5 men with one vehicle, available < 15 minutes

Harbor City

Harbor City has 210 000 inhabitants and a regional county hospital with 416 beds + geriatrics, see Table II.

Table II Harbor City County Hospital

Specialty	Wards	Beds	Doctors total		Doctors on call	
			Specialists	Residents	In hospital	At home
Gen Surgery	2	28+24	18	5	2	1
Plastic/hand	-	-	4	-	-	1
Ort Surgery	2	2+24	14	4	1	1
Urology	1	18	6	2	-	1
Gyn/Obst	1	24	10	2	1	1
Otolaryngol	1	20	8	2	1	1
Ophthalm	1	16	6	2	-	1
Internal med	3	3x24	26	6	2	1
Pulm Med	1	18	6	-	-	1
Nephrol	1	24	4	-	-	1
Pediatrics	1	24	6	2	1	1
Infect Med	1	24	12	4	1	1
Psychiatry	2	2x24	6	2	1	1
Anesthesiology	-	-	20	4	1	1
Emerg Med	1	28	8	4	1	-

Emergency department: In the Emergency department, rooms can be prepared for 7 Major Incident Teams if staff can be mobilized.

OR: 16 theatres to be shared between general surgery, orthopedic surgery, plastic/hand surgery, pediatric surgery, urology, gynecology and ENT-surgery. Two rooms in out-patient clinics can be used for minor surgery in local anesthesia. The ophthalmologic department has 2 rooms for minor eye-surgery.

Postoperative ward: Only open in office hours. Capacity: 32 beds and 4 mobile ventilators.

ICU: 27 ICU beds with ventilators

Radiology: 2 radiologists on duty during non-office hours, 1 in hospital and 1 at home. One CT located at the department of radiology. Ultrasonography is available at the Emergency Department.

Helicopter: Harbor City hospital has one hospital-based helicopter, staffed with 1 doctor + 1 nurse and immediately available 24 hours /day. Capacity: 1 patient (or 1 prehospital team). The hospital has helipad on the roof.

Prehospital teams: The hospital has equipment for 2 prehospital teams, 1 doctor and 1 nurse in each.

Primary care

Two primary care centers with 8 doctors and 12 nurses in each, no beds, only open during office hours.

Ambulances

Totally 16 ambulances. Of these, staffed and immediately available during non-office hours= 6, staff for the others can be alerted according to alarm-list.

Helicopter

The hospital has one helicopter staffed by 1 doctor + 1 nurse, available 24 hours/day (see above). No other helicopters are available in Harbor City (the Naval Base has only helicopters equipped for submarine search, and helicopters from Major City military air field are used for rescue actions at sea).

Rescue service

Harbor City fire brigade has 6 units immediately available for firefighting and 1 unit for major incident response with basic medical equipment (stretchers, blankets, splints, inflatable tent, mobile decontamination unit). There are also 3 voluntary fire brigade units with 1 chief and 5 men, available < 15 minutes.

Police

Harbor City police has 6 cars with staff (2) available during office hours, during non-office hours 3 cars.

Other resources

Harbor City harbor has a Catamaran that is included in the preparedness for major incidents, considering the crowded sea-front resorts. The chairs from lower deck can be removed and give space for transport of 16 - 20 patients on stretchers plus staff. The catamaran can have a march speed of 24 knots (if weather permits) and there is an alarm list to voluntary staff that can be alerted if available.

Major City

Major City has 1.2 million inhabitants and a University Hospital with all specialties and 700 beds, the biggest hospital in the country, for description see Table III.

Table III Major City University Hospital

Specialty	Wards	Beds	Doctors total		Doctors on call	
			Specialists	Residents	In hospital	At home
Gen Surgery	3	3x 28	32	6	2	1
Vasc Surg	1	16	4	1	-	1
Cardiac Surg	1	24	6	2	1	1
Neurosurg	1	26	7	2	1	1
Plastic/hand	1	18	3	-	-	1
Pediatr surg	1	16	4	-	-	1
Ort Surgery	2	2x24	18	4	1	1
Urology	1	20	6	2	1	1
Gyn/Obst	2	24+16	9	2	1	1
Otolaryngol	1	24	7	2	1	1
Ophtalm	1	24	7	2	1	1
Internal med	4	4x28	42	8	2	1
Pulm Med	1	24	6	1	-	1
Nephrol	1	22	5	1	-	1
Neurol	1	24	6	2	-	1
Rheumatol	1	18	4	2	-	-
Pediatr Med	1	16	8	2	-	1
Infection	2	2x24	14	3	1	1
Psychiatry	2	28+24	22	4	1	1
Anesthesiology	-	-	28	4	1	1
Emerg Med	1	32	12	5	2	-

Emergency department: 10 rooms can be prepared and equipped for Major Incident Trauma teams in Major Incident Response, if staff can be mobilized from other units.

OR: 18 theatres to be share between general, vascular, cardiac, neuro-, plastic, pediatric and orthopedic surgery + urology, gynecology and ENT-surgery. Two of these are normally only equipped for minor surgery in local anesthesia There are 2 separate rooms for Eye-surgery.

Postoperative ward: Only open during office hours (until 21 00 week-days), 32 beds and 6 mobile ventilators.

ICU: Totally 27 beds covering all specialties, all with ventilators. 4 of these belong to the Burn Care unit.

Burn Care Unit: Four beds with ventilators located together with ICU and 6 beds without ventilator in separate unit.

Radiology: During non-office hours 1 radiologist in hospital and 1 on call. 3 computer tomographs, one in the Emergency department only used for trauma and emergency cases and 2 on the department of radiology, one mainly for neurosurgery. Ultrasonography is available in the Emergency department.

Helicopters: 2 hospital based helicopters staffed with 1 doctor + 1 nurse, one of them immediately available 24 hours/day, helipad on the roof. Each helicopter can take 1 patient (or 1 prehospital team).

Prehospital teams: The hospital has equipment for 4 teams, 1 doctor and one nurse in each.

Other resources: Big department for forensic medicine with capacity to take care of dead bodies from major incidents.

Primary care

Major City has 2 primary care centers with 12 doctors and 16 nurses each, only open during office hours, no beds. In major incident response, one of them can be opened to take care of emergency outpatients (staff on alarm-list).

Ambulances

Major City ambulance stations have totally 24 ambulances, 6 immediately available during non-office hours, staff for the other can be alerted from alarm-list. The Regional Ambulance Dispatch Center (ADC) is located in Major City.

Helicopters

Helicopters available in the hospital (see above) and in Fort Major Military Base (see below). No other helicopters available.

Rescue service

Major City fire brigade has 8 units immediately available for firefighting and 1 unit for major incident response with basic medical equipment (stretchers, blankets, splints, illumination, inflatable tent, decontamination unit). In the station is located the Regional Center for the rescue service in the South East region.

Police

Major City has 3 police stations with 6 cars in each, totally 6 cars available at non-office time. The Regional Police Command Center is located in Major City.

Military

Fort Major Military Base, the major military base in the country, is located immediately outside the city. The base includes in addition to military units a Military Medical School, a helicopter school with army helicopters and a military airfield.

The Helicopter Unit has

- 4 helicopters type AB 412, which can take 2 patients on stretchers each with staff and also winch injured from the surface. One of these helicopters is on preparedness for rescue actions at sea or in the mountains and can be alerted within 15 minutes 24 hours/day. The crew includes a military paramedic with basic medical equipment. The other 3 helicopters can be used if available staff is alerted according to alarm-list.
- 2 helicopters MI 5 which can take 6 patients on stretchers with staff. None of these helicopters has permanent preparedness, but they can be used if staff can be called and is available. They have no medical equipment on board, and no medical staff in the ordinary crew.

Fort major has a permanent unit of 20 soldiers available 24 hours/day, which can be used for rescue actions if requested by the rescue leader during major incident response. Medical staff can be available depending on training programs, but is not available permanently.

East City

East City has 150 000 inhabitants but no hospital.

Primary care

One primary care centre with 10 doctors and 14 nurses, no beds, only open during office hours.

Ambulances

East City has 8 ambulances, 3 staffed and immediately available during non-office hours.

Helicopter

No other helicopter is available in East City.

Rescue service

East City fire brigade has 4 units immediately available for fire-extinguishing and 1 unit for major incident response with basic medical equipment (stretchers, blankets, splints, inflatable tent, decontamination unit). There are 2 voluntary fire brigade units with 1 chief and 5 firefighters in each, available < 15 minutes.

Police

East City Police has 6 cars with staff (2) available during office hours, during non-office hours 2 cars + 1 Chief on duty in station.

North City

North City has 400 000 inhabitants and a University Hospital with 522 beds + geriatrics.

The hospital has the same specialties as Major City University Hospital and is equally staffed, see Table III. The numbers are generally somewhat smaller than in Major City. The hospital has a **burn care unit** of the same size as Major City University Hospital (these are the only Burn Care Units in the country)

OR: The number of OR-theatres is 18

ICU: 27 ICU-beds with ventilators.

Helicopter: The hospital has 2 hospital- based helicopters with staff (one doctor+ one nurse), one of them immediately available 24 hours/day. They can take 1 patient, or 1 prehospital team. The hospital has a helipad on the roof.

Ambulance, rescue service and police have resources similar to those in Major City and are not described in detail.

West City

West City has 150 000 inhabitants and a County Hospital almost identical to Small Town, see Table I. The hospital has a helipad on the roof but no helicopter.

Ambulance, rescue service and police have resources similar to those in East City and are not described in detail.

Military

There is a small military base outside West City, no helicopters in peacetime.

Faraway City

Faraway City has 90 000 inhabitants and a very small county hospital with only 3 surgical theatres and 6 ICU beds with ventilators. No helicopter and no helipad.

Riverside City

70 000 inhabitants, a county hospital similar to Faraway, no helicopter and no helipad.

Mountain City

The city has 60 000 inhabitants and a county hospital similar to Faraway. The hospital has a helipad on the roof because of its isolated location, but no helicopter.

There is a small military base outside Mountain City similar to the one in West City, no helicopters in peacetime.

Distances and times for transport between different destinations in Anyland

The given times for **road transport** are based both on distances and the quality of the roads. When calculating the time for return of ambulances, a time for off-loading, report and refill of supplies of 15 minutes should be added to road transport times both ways.

The given times for **air transport** are based on a standard speed for all helicopters of 250 km/hour. When calculating times for return of helicopters, a time for off-loading, report and refill of supplies of 20 minutes should be added to transport times both ways.

Consider the need of ambulance transport + reloading = additional 10 minutes to hospitals when using helicopter MI5 that not can land on the hospital helipad.

Helicopters have to refill fuel for every 4:th transport, consuming additional 15 minutes.

Times are not given to hospitals without helipads, which probably not will be used as destinations.

Table V Transport times (one way) between some of the destinations in Anyland

From	To (Alphabetic order)	Ambulance (Minutes)	Helicopter Minutes)
Major City	East City	25	10
	Faraway City	140	-
	Mountain City	100	45
	North City	70	30
	Paradise Resort	48	20
	Riverside City	120	-
	Harbor City	28	15
	Small Town	45	20
	West City	90	40
Small Town	Blue light village	20	10
	East City	35	15
	Paradise Resort	10	10
Paradise resort	Blue light village	15	-
	East City	25	15
	Major City	48	20
	Harbor City	25	10
	West City	120	50
<i>Times for Catamaran (when possible to keep march speed of 25 knots):</i> From Harbor City to Paradise Resort = 45 min From Small Town to Paradise Resort = 12 min			

Table VI. Ambulances and helicopters in South East Region + North City

Based	Ambulances		Helicopters	
	Totally	Non-office hours	Totally	Non-office hours
Major City	24	6	2	1
Harbor City	16	6	1	1
Small Town	8	2	-	-
East City	8	3	-	-
Bluelight	6	2	-	-
Paradise	3	1	-	-
Fort Major	4	-	AB 412: 4	-
			MI 5: 2	-
North City	24	6	2	1

Capacity

Civilian ambulances 1 patient on stretcher

Military ambulances 2 patients on stretcher

Civilian helicopter 1 patient on stretcher (carries medical staff + equipment)

Military helicopter AB 412: 2 patients on stretchers (carries no medical staff or equipment)

MI 5: 4 patients on stretchers (carries no medical staff or equipment)

Response times

Civilian ambulance: 1 min after alert

Civilian helicopter: 15 min after alert (can fly in darkness)

Military ambulances and helicopters: Depending on time to get in staff (not on call)

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Hospital Command Group

List of abbreviations

EMD = Emergency Department

HCG = Hospital Command Group

ICU = Intensive Care Units

OR = Operating Rooms (Theatres)

RMC = Regional Medical Command Centre

R-MOC = Regional Medical Command Centre, Coordinating Medical Officer

Alerting of the hospital

How is the hospital alerted?

The hospital is alerted by the officer on call at the Regional Medical Command Centre (RMC). If an alarm would reach the hospital in another way, contact RMC (tel) for confirmation.

Receiving the alarm

An alarm reaching the hospital from RMC is connected to the senior nurse on duty at the Emergency department. When receiving the alarm, follow check list:

- Time for the alarm
- Alarm from who (tel)
- Is “Major Incident” declared?
- **Time** for incident
- **Location** of incident
- **Type** of incident
- Estimated **number** of casualties

The alarm is forwarded to the surgeon on duty (beeper)

Decision of level of alert

The surgeon on duty contacts the senior surgeon on call (beeper) who decides:

- If the hospital should increase the level of preparedness
- If so, to which level of alert

If the senior surgeon on call not is immediately available, the surgeon on duty can make these decisions.

Further processing of the alarm

If the decision is to increase the level of preparedness, the alarm will be forwarded according to the action cards for every position. When receiving the alarm:

- Note the level of alert
- Follow the action card for that level

Where to go when alerted

Staff in hospital stay at their positions and follow the action cards for every position.

Staff not being on duty but called in:

- Nurses, secretaries and technicians in wards, emergency department, OR, anaesthesiology, ICU, laboratories: Go to normal positions.
- Nurses in out-patient clinics, go to room for arriving staff
- Physicians, go to room for arriving staff
- Porters and security staff: Go to check-point for transport and security

What to do when alerted

Note the level of alert and follow the action cards for that level. Staff on wards, see action card for “Wards

Cancelling of the alarm

Cancelling or lowering of the level of alert can only be done by the hospital command group, HCG (tel).

Levels of alert

The hospital has 3 levels of alert:

- Green alert = “Stand by”
- Yellow alert = Partial mobilisation
- Red alert = Full mobilisation

The senior surgeon on duty makes the decision with regard to the primary level of alert based on:

- The content of the alarm from RCC
- The present situation in the hospital

Green alert (“Stand by”)

Used when:

An accident has happened or a threat has come up, but it is yet not known whether, or to which extent, the hospital will receive casualties

Means:

- Activation of the hospital command group
- Information to critical functions in the hospital, simultaneous investigation of capacity
- Report of capacity to RMC
- *Considering “freezing” of planned treatments that can wait*

Green alert is minimally resource-consuming but increases preparedness significantly and should be used on wide indications

Yellow alert (“Partial mobilisation”)

Used when:

It is confirmed that the hospital will receive casualties, but within a limit that not requests full response

Means:

As above plus:

- Freezing of all non –started treatments that can wait
- Alert of 6 emergency-room nurses, 6 anaesthesiology –teams (physicians+ nurses), 4 surgeons, 2 orthopaedic surgeons and 6 OR nurses from staff not being on duty
- Alert HCG support group

Alert of additional teams and staff can be initiated by HCG if needed.

Yellow alert is sufficient to cope with the majority of major incidents in peace-time.

Red alert (“Full mobilisation”)

Used when:

It is confirmed or suspected that the hospital within short time will receive a large number of casualties, requiring its full capacity

Means:

As above, plus automatic alert of all available staff within emergency- and supporting disciplines according to a prepared alarm schedule (“rings-on-the – water”-system)

Coordination and command

Regional command centre (RMC)

The regional command centre has a regional coordinating medical officer (R-MOC) available within 15 minutes on a 24-hour basis. When a major incident is confirmed, suspected or threatening, the alarm goes to RMC and is forwarded to R-MOC if the health care system is expected to be involved.

The R-MOC decides whether “Major incident” will be declared and which hospitals that should be alarmed. The R-MOC also communicates with the ambulance centre and other transport organisations with regard to the expected need of transportation of casualties. If need of prehospital triage teams on scene, R-MOC coordinates mobilisation of such teams from hospitals or other units.

Alerted hospitals should immediately (within 15 minutes from the alarm) report their capacity with regard to available OR- and ICU capacity (immediate capacity and capacity within 30 minutes). Report of bed capacity is less urgent.

Based on this information, the R-MOC gives a “key” for primary distribution of patients between hospitals. This “key” is continuously adjusted, based on continuous reports from the hospitals and from the scene to RMC.

The R-MOC is responsible for contacts with hospitals outside the region that might need to be utilized.

The R-MOC should consider transfer of staff, equipment and supplies between hospitals, and also from hospitals outside the region if needed and possible.

RMC continuously coordinates activities between health care, rescue service, police and other involved agencies. RMC also coordinates media information from all involved units and organises regional press-conferences with participation from all involved agencies.

Hospital command group (HCG)

HCG in the initial phase is based on staff immediately available:

- Senior surgeon on call (responsible for medical decisions including level of alert)
- Senior manager on call (responsible for administrative decisions)
- Senior anaesthesiologist on call

If the senior surgeon or anaesthesiologist on call is not immediately available, the surgeon and anaesthesiologist on duty cover these positions in the HCG until the senior colleagues on call arrive.

Officers in HCG go immediately to the hospital command centre (tel) and follow the action card for HCG according to the level of alert decided.

This initial HCG should be on place in the command centre and have established contact with RMC within 15 minutes after the alarm has reached the hospital.

When mobilised senior staff arrives, officers in the HCG can be replaced by staff with special training in these functions (a list of such staff is available in the command centre). The task of the senior manager on call can be taken over by the hospital director, when and if available.

HCG support group

In yellow and red alert, HCG needs support from a bigger group, working in close connection to the hospital command centre and including:

- One senior administrative manager, coordinator of the group and responsible for its staffing
- Manager of technical support functions
- Senior hospital nurse (coordinator of nursing staff)
- Security manager
- Information officer (head of information centre, responsible for media-contacts)
- Transport manager (responsible for porter functions and in-hospital traffic regulation)
- Catering manager (responsible for catering to staff, non-injured relatives and ambulatory patients)
- Coordinator of psychosocial management (head, psychological management group)
- Supply manager (coordinator of supplies)
- Secretarial manager (coordinator of administrative support)

This group is successively built up by mobilised staff. The senior administrative manager is responsible for distributing tasks between available staff so that all functions listed above can be covered.

Medical staff in command in different functions

In major incident response, it must be clear who has the coordinating responsibility for all critical functions in the hospital. It is one of the initial tasks of the HCG to define or appoint the leaders for different functions, in some cases a nurse, in some cases physician + nurse. This staff is clearly labelled with command symbols.

Action cards

for primarily involved staff

Anaesthesiologist on duty

Alarm received by: Surgeon on duty

Green alert

1. Inform Senior Anaesthesiologist on call that "Green alert" is activated. If the Senior Anaesthesiologist on call is not immediately available, cover his/her function in the HCG until arrival (=go to hospital command centre).
2. Inform Senior Nurse of Anaesthesia (tel , beeper) that "Green alert" is activated and request report of immediate capacity for anaesthesia
3. Inform, Senior Nurse ICU (tel , beeper) that "Green alert" is activated and request report of immediately available ICU capacity (beds, ventilators, staff)
4. Report the information above to the HCG (tel) < 10 minutes after receiving the alarm
5. Go to ICU. Investigate possibilities to move ventilator patients to wards. If so possible, report to HCG.

Yellow alert

As under "green alert" 1 – 5 with addition of:

- 6 Stop non-started surgery + anaesthesia that can wait
- 7 Request senior nurse of anaesthesia to alert 6 nurses of anaesthesia + 6 anaesthesiologists from staff not on duty
- 8 Start to evacuate patients possible to evacuate from ICU to wards
- 9 Report again capacity of anaesthesiology + ICU to HCG

Red alert

As under yellow alert 1-9 with addition of:

- 10 Request senior nurse of anaesthesia to initiate alert of all available staff of anaesthesia according to alarm plan for red alert

Emergency department, senior nurse

Alarm received by: RCC

Receiving alarm

Follow check list to collect complete information:

- Time for the alarm
- Alarm from who (tel)
- Is “Major incident” declared?
- Time for incident
- Location of incident
- Type of incident
- Estimated number of casualties

Forward the alarm to the surgeon on duty (beeper). Wait for decision with regard to level of alert.

Green alert

1. Inform secretarial staff, emergency department (EMD) that “Green alert” is activated
2. Keep staff ready to leave after completed shifts in “stand by” until further information
3. Investigate the situation on EMD and accelerate treatment of “ordinary” patients.
Report the present situation in EMD to HCG

Yellow alert

As under “Green alert “ 1-3 with addition of:

- 4 Request secretarial staff to call 6 nurses and 4 secretaries from staff not on duty
- 5 Start evacuation of EMD from all patients that can be transferred to other destinations: Patients with minor illness or lesions that can wait can be told to come back later or go to primary care centre, clear in-patients should rapidly be transferred to wards.
- 6 Organise area for receiving and primary triage of incident patients according to plan.
- 7 Organise together with physician in command EMD (appointed by HCG) major incident trauma teams with 2 physicians and 2 nurses in each team, one of each category with trauma-experience. Prepare rooms with equipment for such teams according to plan.
- 8 Request secretarial staff to prepare registration documents for major incident patients.

Red alert

As under “Yellow alert” 1 – 8 with addition of:

- 9 Request secretarial staff to call all available EMD- staff not on duty

Surgeon on duty

Alarm received by: Senior nurse emergency department

When receiving alarm:

Contact senior surgeon on call, report the content of the alarm and the present situation in the hospital with regard to surgery, anaesthesiology and ICU. Senior Surgeon on call makes decision with regard to level of alert.

If the Senior Surgeon on call not is immediately available, the surgeon on duty can make this decision.

Green alert

1. Inform senior nurse EMD (beeper) that “green alert” is activated.
2. Inform Senior Anaesthesiologist on duty(beeper) that “green alert “ is activated
3. Inform hospital telephone board that “green alert “ is activated
4. Inform Senior Nurse OR that green alert is activated. Simultaneously, investigate the present situation in OR: Theatres available for surgery? Occupied until when?
5. Inform Senior Orthopedic surgeon on duty (beeper) that green alert is activated
6. If the senior surgeon on call is not in the hospital or not immediately available, go to hospital command centre and follow action card for HCG until senior surgeon on call is available for this position. When and if senior surgeon on call is available, go to EMD and accelerate treatment and evacuation of surgical patients.

Yellow alert

As under “green alert” 1 – 5 with addition of:

7. Request senior nurse OR to:
 - “freeze” all non-started surgery that can wait
 - call 4 OR teams from staff not being on duty
 - call 4 surgeons from staff not on duty according to alarm list

Red alert

As under “yellow alert” with addition of:

8. Request Senior Nurse OR to alert all surgeons and all OR-staff not on duty according to alarm list

Hospital command group (HCG)

The initial HCG is staffed by the:

- Senior Surgeon on call (responsible for medical decisions including level of alert), alerted by the Surgeon on duty
- Senior Manager on call (responsible for administrative decisions), alerted by the hospital telephone operator
- Senior Anaesthesiologist on call, alerted by the anaesthesiologist on duty

If the Senior Surgeon or Anaesthesiologist on call not is immediately available, the Surgeon or Anaesthesiologist on duty has to cover these positions until the senior colleagues are available.

The officers in the HCG should immediately when alerted go to the hospital command centre. The officers in the initial group may later be replaced by specially trained officers for this function when available.

Green alert

- 1 Inform hospital telephone operator that the command centre is open and staffed
- 2 Inform RMC that the command centre is open and staffed, inform about the decided level of alert and ask for available new information. Document information on the prepared whiteboard.
- 3 Request report on immediately available capacity in OR (theatres available now and within 1 hour) and ICU (available ventilators) with response < 10 minutes. Report this information to RMC < 15 minutes from the alarm
- 4 Consider if planned surgery and other treatments that can wait should be “frozen” waiting for further information. This is not a mandatory part of “green alert” but can be used when it is very likely that the hospital will receive casualties. If so, inform Senior Nurse OR
- 5 Based on information from RCC, consider if the level of alert should be changed. If so, inform:
 - Senior Nurse EMD
 - Hospital telephone operator
 - Surgeon, Anaesthesiologist and Orthopedic Surgeon on duty
 - RMC
- 6 Define/appoint staff in command for critical functions, register name/telephone:
 - EMD
 - OR
 - POSTOP/PREOP
 - ICU
 - Coordinators for wards in involved departments
- 7 Give a short press information to the hospital telephone operator that can be given to media to release the pressure on HCG: What do we know, what have we done, any casualties received or under way? Time for next press information?
- 8 If “green alert” is cancelled, inform according to (5)

Yellow alert

As under “green alert” points 1 - 8 with addition of:

9. Request continuous reports from OR, ICU, EMD and coordinating senior nurses in wards with regard to available capacity, updated consequent to arriving staff, possible evacuation of patients and redistribution of resources. If information is missing= search it. Report continuously capacity to RMC
10. Consider if more staff should be alerted than the minimal level automatically connected to “yellow alert” (6 emergency teams in EMD, 6 OR teams, 6

anaesthesiologists + 6 nurses of anaesthesia, 4 surgeons and 2 orthopaedic surgeons). Alternatively, consider increased level of alert and inform according to point (5) for “green alert”

11. Collect the now mobilised HCG support group for briefing and report. Check that all tasks connected to this group have been initiated. Make plan for staff meetings with regular interval for exchange of information.

Red alert

As under “yellow alert” with addition of:

12. Staff and organise room for arriving staff with responsible senior manager, senior physician, senior nurse and secretarial support. Coordinate distribution of arriving staff to fill needs reported to HCG. Give information to arriving staff and consider coming need of replacements (=it might be indicated to send some staff home for rest being available for call). Give this information also to units with expected heavy work load with the coming 24 hours.

Action Cards for commanding & coordinating functions in the MRMI-course

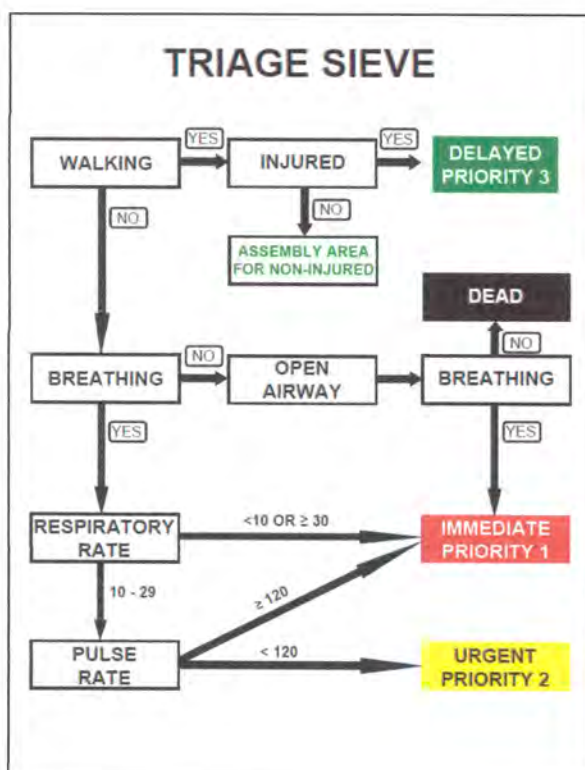
- **Medical Officer in Command on scene (MIC)**
- **Triage Officer on scene (TRO)**
- **Ambulance Loading Officer (ALO)**
- **Rescue Incident Commander on scene (RIC)**
- **Police Incident Commander on scene (PIC)**
- **Ambulance Dispatch Center**
- **Regional Medical Command Center**
- **Rescue Command Center**
- **Police Command Center**

Action Card MIC

- 1 **Deliver window report** to alarm centre (rough estimation of number of casualties, estimated need of transports and medical care on scene)
- 2 **Confirm MI.** If MI is not already declared but apparent on arrival, inform alarm centre, act according to MI until contact from RMC.
- 3 **Park ambulance**, take on **tabards** for **MIC** and (other crew member) **TRO**.
- 4 **Contact RIC** (if arrived) direct or by Channel....
 - **Require** information about:
 - Estimated number of injured and dead
 - Risk zones (hot, warm) and other risks on scene
 - The most urgent need of care
 - Required and expected resources from rescue service
 - **Decide** together with RIC location of casualty clearing- and ambulance loading zones
- 5 **Decide** if incoming ambulance crews should be kept on scene for medical support, and if so how many and for which tasks
- 6 **Dispatch TRO** to start primary triage according to action card
- 7 **Make quick survey** of the scene and:
 - Estimate again number and severity of casualties
 - Identify need of support in injury zone (trapped)? Identify urgent needs!
- 8 **Decide Level of MI** as guideline for medical work, inform all staff and re-evaluate this level continuously
- 9 **Contact RMC** Channel.... (if no contact with RMC: Alarm center) and:
 - **Deliver second report** based on the information above
 - **Request prehospital teams** to scene if needed
 - **Request helicopters** if needed and not already alerted
 - **Request distribution key** for transports to hospital
- 10 **Start transport** of patients triaged by TRO. Until distribution key is given, start to send severely injured (=potential need of immediate surgery and/or ventilator) according to:
 - 4 severely injured each to Major and Harbor City
 - 2 severely injured to Small TownIf possible, avoid sending more severely injured until distribution-key is received
- 11 **Organize casualty clearing-and ambulance loading zones** for primary and secondary triage and dispatch teams according to that, and also teams when needed to injury zone (into risk zone not without communication with RIC)
- 12 **Appoint ALO** for transport coordination
- 13 **Repeat contacts with RMC**, update reports from scene, request updated distribution keys, request when needed additional support and equipment
- 14 **Maintain contact with RIC and PIC**, in big incidents establish Command Place
- 15 **Cancel MI** on scene in agreement with RMC when all injured are evacuated. Inform RIC, PIC and all medical staff on scene. Lead **debriefing** for all medical staff before departure from scene.

Action Card TRO

- 1 **Take on tabard** "TRO", bring hand radio and equipment with triage cards
- 2 **Make a quick survey** of patients already in the casualty clearing zone to identify and eliminate immediate life-threats
- 3 **Start primary triage** according to Triage Sieve (see back side of Action Card) and separate those not needing ambulance transport from those needing it, and indicate priority with SMART-tag, only color-marking.
- 4 **Inform MIC** (Channel ...) when the **first casualties are ready for transport** and distribute them between available ambulances. MIC gives destination (before an ALO is appointed)
- 5 **Continue with primary triage** in casualty clearing zone
- 6 When teams for **secondary triage** are available, distribute patients needing ambulance transport between them for necessary resuscitation or treatment before transport + secondary triage and surveillance before departure
- 7 When more staff arrives, deploy another ambulance officer for primary triage and take **the over-all command of the casualty clearing zone** with continuous control of patient flow.



TRIAGE SORT

Physiological Variable	Value	Score
Respiratory rate	10-29	4
	>29	3
	6-9	2
	1-5	1
Systolic blood pressure	0	0
	>90	4
	76-89	3
	50-75	2
Glasgow coma scale	1-49	1
	0	0
	13-15	4
	9-12	3
	6-8	2
	4-5	1
	3	0

A total score of	12	indicates	T3
	11		T2
	10-1		T1

Anatomical triage (=based on knowledge of course and prognosis for the different injuries, when competence is available)

As a general principle, patients that have responded satisfactorily on resuscitation and treatment can wait, while those not responding are given continued high priority. *Exceptions are patients with manifest or suspect internal bleeding which should have high priority for transport even if they have responded to treatment on scene.*

Highest priority (RED):

- Airway threat not possible to eliminate on scene
- Impaired ventilation requiring immediate ventilatory support
- Tension pneumothorax if decompression not can be done on scene
- Patients in severe circulatory shock
- Injuries to the trunk with suspicion on internal bleeding (including unstable pelvic fractures)
- Head injuries with clear signs of expanding intracranial hematoma

Exceptions from this are (especially in major incidents level II) patients with small possibilities to save, for example extensive full-thickness burn injuries and head injuries not responding to pain.

Priority after those above (YELLOW):

- Open head injuries*
- Open or penetrating injuries to the trunk*
- Open fractures of long bones
- Crush injuries, compartment syndrome
- Vascular injuries with impaired peripheral circulation
- Severe multiple injuries
- Other patients with circulatory and respiratory impairment
- Full thickness burn injuries > 30 % (see exceptions above)
- Hypothermia with body temperature < 28°C (when possible to determine on scene)

* Higher priority can be considered depending on access to transport resources

Lower priority (GREEN):

- Closed fractures (exception: Femur fractures after severe blunt trauma)
- Rib fracture without respiratory impairment and without suspicion on internal bleeding
- Spinal injuries
- Eye injuries
- Wounds and soft tissue injuries
- Burn injuries < 30 %
- Hypothermia with body temperature > 28 °C (when possible to determine)

Expectant (BLUE) is used in high load of casualties where it is apparent that patients with small possibilities to save have to wait to make possible to save all salvageable (decision to use this level generally is made and transferred by MCI). Examples:

- Extensive burn injuries (full thickness > 70 – 90 %, also related to age)
- Head injuries unresponsive to pain
- Severe multiple injuries with small prospects of cure

Dead (BLACK) has to be confirmed by a doctor (exception: Head separated from body), no other patients can be labeled with black tag on scene.

Action Card ALO

- 1 **Take on waist-coat “ALO”**, bring hand-hold radio and triage-cards for needed re-triage.
- 2 **Take contact with RMC** and ask for present distribution key, distribute patients ready for transport between hospitals according to that, with consideration of normal rules for specific injuries (head injuries, burns).

Waiting for distribution –key to be given, follow the rule:

- 4 severely injured patients each to Major City and Harbor City hospitals
- 2 severely injured patients to Small Town

Avoid sending more severely injured patients before distribution key has been received from RMC

- 3 **Report, or let report, departed patients** (time for departure and estimated types of injuries) to receiving hospitals
- 4 **Report continuously estimated need of ambulances** to MIC
- 5 **Patients which if possible primarily should go to specific hospitals:**
 - Head injuries: Major City or North City
 - Severe burns (full thickness > 20%): Major City or North City
 - Children: Major City, Harbor City, North City

Action Card RIC

- 1. Deliver window report to Rescue Command Center:**
 - Scenario (Hazmat? Terror or criminal activities?)
 - Estimated number of injured
 - Types of injuries (burns, inhalation, blast, fragments, blunt trauma)
 - Need of resources on scene
- 2. Security: Define risk- zones (Hot, Warm)**
- 3. Start to secure area, evacuate casualties from risk-zones**
- 4. Determine Rendezvous-point**
- 5. Establish command place**
- 6. Make rapid survey of scene and deliver second report to Rescue Command Center**
- 7. Establish contact with police incident commander (PIC):**
 - Risk for remaining criminal or terror activity?
 - Cordoning off the scene
 - Traffic control
 - Management of dead
 - Management of non-injured and psychologically shocked
 - Searching the area
- 8. Establish contact with MIC:**
 - Inform about scenario (estimated number of injured and dead)
 - Inform about risk-zones
 - Agree on location of casualty clearing zone
 - Agree on location of Ambulance Loading Point
 - Agree on location of Helicopter Landing Point
 - Agree on registration of casualties
 - Request information on need of specific resources: Buses or other transports, supplies (blankets, stretchers, tents), military transport resources
 - Request information of need of assistant to remove and evacuate trapped patients + information on medical priorities
- 9. Keep continuous contact with Rescue command center**
- 10. Keep continuous contact with PIC & MIC**

Action Card PIC

- 1. Deliver window report to Police Command Center:**
 - Scenario (Hazardous material? Terror or criminal activities?)
 - Estimated number of injured and dead
 - Need of resources on scene
- 2. Security: Define risk-zones with regard to remaining criminal- or terror activities, deploy staff to secure those zones**
- 3. Survey area and give second report to Police Command Center**
- 4. Establish contact with Rescue Incident Commander (RIC):**
 - Inform about risks for remaining criminal or terror activity and required measures with regard to that
 - Require information about rescue security zones (hot zone, warm zone). Deploy staff to assist in control of these zones
 - Agree on Rendezvous-point (RVP) and traffic control, deploy staff
- 5. Deploy staff to cordon off the scene**
- 6. Deploy staff to search the scene for shocked victims or non-injured**
- 7. Establish contact with Medical Incident Commander(MIC):**
 - Inform about risk-zones with regard to remaining criminal- or terror activities
 - Request information on organization of the medical work: Triage area, casualty clearing zone, ambulance loading point
 - Agree on location of Helicopter Landing Point, deploy staff for security
 - Agree on localization of assembly area for non-injured and psychologically shocked
 - Agree on assembly area for dead victims
 - Agree on registration of casualties
- 8. Keep continuous contact with Police Command Center**
- 9. Keep continuous contact with RIC & MIC**

Ambulance Dispatch Center (ADC): Guidelines for action

The Ambulance Dispatch Center (ADC) is in the MRMI-course located together with the Regional Medical Command Center (RMC), the Police Command Center (PCC) and the Rescue Command Center (RescCC) in a Regional Command Center (RCC).

The ADC includes in this organization also the Alarm Center (SOS) and the Air Rescue Control Center (ARCC), responsible for the helicopter service.

All available ambulances and helicopters in the region, including military units, are illustrated with magnetic symbols the board in ADC. Every unit is labeled with a number indicating original position. Time for alert of these units should be registered on the board and at the expected time for arrival (see table over transport times), the units should be brought manually to the scene (or, if alerted to a hospital, to this hospital).

The first ambulance on scene will stay on scene during the response, the crew taking the roles as Medical Incident Commander on scene (MIC) and Triage Officer (TRO). An officer in one of the following ambulances will take the role as Ambulance Loading Officer (ALO). For the tasks of these officers, see Action Cards for MIC, TRO and ALO.

The following ambulances alerted to the scene are at disposal for the Medical Incident Commander on scene (MIC) either for being kept on scene, using the crews for prehospital resuscitation, or for transport. The destinations to hospitals are decided by the MIC/ALO based on a distribution key given by the RMC and based on continuously updated capacity reports from the hospitals (the MIC/ALO has guidelines for initial distribution before this key is available so no time will be lost in starting transport).

After having delivered patients to destinations, the ambulance – symbols are given back to the ADC for further use.

The same principles are valid for helicopters and also for coaches for transport of less severely injured. ***Consider bringing prehospital medical teams to the scene already primarily with hospital- based helicopters!***

Mobile oxygen supplies are also at disposal for ADC.

Action card for ADC on suspicion of Major Incident

Already the first alarm to ADC from the alarm center might give a strong indication of “Major Incident” = a situation where available resources are insufficient for the immediate need of medical care. Normally, it is the responsibility of the RMC to officially declare Major Incident. If it is not possible to get immediate contact with the officer on call at RMC and the need of rapid alert of resources is apparent, ADC should start to alert resources for transport according to the following:

- Alert all available ambulances in the nearest ambulance station
- Alert all available ambulances in the nearest city with the exception of 1 ambulance to cover urgent needs
- Alert one helicopter with prehospital triage team from the nearest medical helicopter-station
- Inform the nearest hospital

- If the incident occurs in rural area (outside city): Alert prehospital team from nearest primary care center
- Alert nearest fire-brigade station, all available units
- Inform fire-brigade in nearest city
- Alert nearest police station, all available units
- Inform police station in nearest city
- Establish contact with MOC in RMC as soon as possible and report performed alerts
- Request window report from first ambulance on scene, mediate to MOC when contact is established
- Inform MIC when RMC takes over medical command

Regional Medical Command Center (RMC): Guidelines for action

The organization in the Anyland scenario is based on a Regional Medical Command center, **RMC**, which is used in many, but not all European countries. To have this role requires officers available on call 24 hours a day, a medical officer (**MOC**) instantly responding on telephone and prepared to be on site in the command room < 20 minutes, and an administrative officer (**AOC**) available on call, but maybe with a little longer time to be on site. The **MOC** can be a senior hospital- or ambulance physician and the **AOC** a manager from the hospital or county. The **MOC** should be the operative chief, making the medical decisions, and the **AOC** gives support, makes economic and political decisions and also reports to central administration on county- and government level. To this group should be connected additional medical and administrative officers when resources permit.

This unit can be localized alone, sometimes in a major hospital, but it can also be located together with collaborating agencies as the Ambulance Dispatch Center (**ADC**), and/or the rescue (**RescCC**)-or police (**PCC**) command centers. In the MRMI-course, all these organizations are located together in one Regional Command Center (**RCC**), which by many is considered as the optimal solution.

The tasks of the **RMC** are (according to the Anyland organization) to:

- **Declare Major Incident** when justified and, when more information comes in, also define the level of Major Incident (levels 1- 4).
- **Alert hospitals** based on the estimated need of care, and on the same time:
 - Inform the hospitals about expected casualty load
 - Request primary capacity reports from the hospitals (primarily OR, ICU)
- Inform **ADC** about the expected need of transport resources.
- Continuously communicate with the Medical Incident Commander (**MIC**) on scene and:
 - **require** information about expected casualty load and need of additional medical resources on scene (staff, equipment)
 - **give** a continuously updated “**distribution key**” for patient- transport to hospitals, based on updated capacity reports from the hospitals
- Communicate with **ADC** with regard to use of available ambulances and helicopters (Air Rescue is here included in ADC).
- Communicate with **RescCC** with regard to need of resources on scene.
- Communicate with **PCC** with regard to security, registration of injured and dead, management of dead, information about dead and injured.
- Coordinate the **psychosocial management** of injured, non-injured survivors and relatives to lost or injured victims
- Communicate with **media**, give press releases and organize planned press conferences together with collaborating agencies, collaborate with media with regard to information.
- Contact **hospitals outside the region** to refer patients, or ask for transfer of staff or supplies. This has to be coordinated with ADC.
- Communicate with other **authorities** on county-and governmental level.
- Communicate with **foreign embassies** in case of involvement of foreign citizens in the incident
- **Cancel Major Incident** with information to all involved medical units
- Coordinate and deliver the **medical report** of the response

In the RCC is a common board for continuous updating of incoming information from the scene, including a map over the area of the incident, to facilitate the work for all involved agencies.

RMC also has a separate board for continuous updating of incoming information from the hospitals and from the medical staff on scene.

A log over activities and decisions should be filled in continuously as a support for the evaluation.

The MOC or AOC should participate in *regular debriefings* and exchange of information with other agencies in the RCC.

The MOC and AOC should also participate in the *general evaluation* of the response and give a short report of the experiences from the RMC perspective.

Rescue Command Center (RescCC): Guidelines for action

The Rescue Command Center (**Resc CC**) is in the MRMI-course located together with the:

- Alarm Center
- Ambulance Dispatch Center
- Helicopter Dispatch Center
- Medical Command Center
- Police Command Center

in a **Regional Command Center (RCC)**. This makes it possible to talk directly between all these functions and coordinate the activities between all involved units.

The role of the **Resc CC** is to lead and organize the rescue service in the region during an incident in collaboration with the Rescue Incident Commander (**RIC**) on scene, the different rescue/fire-brigade stations in the region and other involved agencies and units.

In the MRMI-exercises, the fire-brigade stations in the region are not staffed. The resources for rescue service /fire brigade at different places are illustrated in the description of “Anyland”. These resources (units and staff) are represented by magnetic symbols, at the time for alert located in the **Resc CC**.

When the **Resc CC** staff receives the alert from the alarm center, the Rescue Officer in Command (**ROC**) on duty decides which units to alert. Times for alert of these units are noted on the board, and at the expected time for arrival (see times for transport in the folder), the alerted units are manually brought to the Rendezvous Point (**RVP**) on scene, together with the number of staff included in these units. The use of the units and their staff on scene is from there taken over by the **RIC** and his/her staff on scene.

The **RIC** is a real person, initially from the first arriving unit on scene, communicating with the **Resc CC** (and other staffed agencies) by radio.

RIC has a map over the scene, and the same map will appear in the **RCC**, facilitating the communication between **ROC** and **RIC**. This communication should include:

- Organization on scene
- Security and security zones, cordoning off
- Transport routes for incoming and departing units (coordinate with Police Command Center)
- Need of additional units and staff
- Need of other resources (for example extra supplies for major incidents/disaster, additional transport resources, equipment for decontamination on suspicion of Hazmat-scenario)

The **ROC** should also communicate with other agencies in the **RCC** with bilateral exchange of information and support. To facilitate this work, a board with collected and continuously updated information from the scene is available in the **RCC** to be used by all agencies.

The **ROC** should participate in repeated debriefings/ staff meetings in the **RCC** and is also, together with other commanding officers in the **RCC**, responsible for communication with the media (press-information and press-conferences).

A **log over activities and decisions** should be filled in continuously as a support for the evaluation.

At the end of the incident, the **protocol for Resc CC** should be filled in by the **ROC** as a base for evaluation of its function during the incident- response.

The **ROC** or **RIC** should participate in the general evaluation of the response and give a short report of the experiences made by the rescue service, including the collaboration with other participating agencies.

The course organizers welcome views on the design of the exercise and ideas for potential improvements from all participating units.

Thank you for your valuable participation in this course!

Police Command Center (PCC): Guidelines for action

The Police Command Center (**PCC**) is in the MRMI-course located together with the:

- Alarm Center
- Ambulance Dispatch Center
- Helicopter Dispatch Center
- Medical Command Center
- Rescue Command Center

in a **Regional Command Center (RCC)**. This makes it possible to talk directly between all these functions and coordinate the activities between all involved units.

The role of the **PCC** is to lead and organize the rescue service in the region during an incident in collaboration with the Police Incident Commander (**PIC**) on scene, the different police units in the region and other involved agencies and units.

In the MRMI-exercises, the police stations in the region are not staffed. The police-resources at different places are illustrated in the description of “Anyland”. These resources (units and staff) are represented by magnetic symbols, at the time for alert located in the **PCC**.

When the **PCC** staff receives the alert from the alarm center, the Police Officer in Command (**POC**) on duty decides which units to alert. Times for alert of these units are noted on the board, and at the expected time for arrival (see times for transport in the folder), the alerted units are manually brought to the Rendezvous Point (**RVP**) on scene, together with the number of staff included in these units. The use of the units and their staff on scene is taken over by the **PIC** and his/her staff on scene.

The **PIC** is a real person, initially from the first arriving unit on scene, communicating with the **PCC** (and other staffed agencies) by radio.

PIC has a map over the scene, and the same map will appear in the **RCC**, facilitating the communication between **POC** and **PIC**. This communication should include:

- Organization on scene
- Security and security zones, cordoning off
- Transport routes for incoming and departing units, closing roads for other traffic
- Registration of casualties
- Management of non-injured
- Management of apparently dead on scene
- Management of victims property
- Searching surrounding area
- Need of additional units and staff on scene, in hospitals and for traffic control
- Need of other resources (for example special units on suspicion of criminal activities or explosive devices)

POC is also responsible for establishing an information center for inquiries with regard to casualties

The **POC** should also communicate with other agencies in the **RCC** with bilateral exchange of information and support. To facilitate this work, a board with collected and continuously updated information from the scene is available in the **RCC** to be used by all agencies.

The **POC** should participate in repeated debriefings/ staff meetings in the **RCC** and is also, together with other commanding officers in the **RCC**, responsible for communication with the media (press-information and press-conferences).

A **log over activities and decisions** should be filled in continuously as a support for the evaluation.

At the end of the incident, the **protocol for PCC** should be filled in by the **POC** as a base for evaluation of its function during the incident- response.

The **POC** or **PIC** should participate in the general evaluation of the response and give a short report of the experiences made by the rescue service, including the collaboration with other participating agencies.

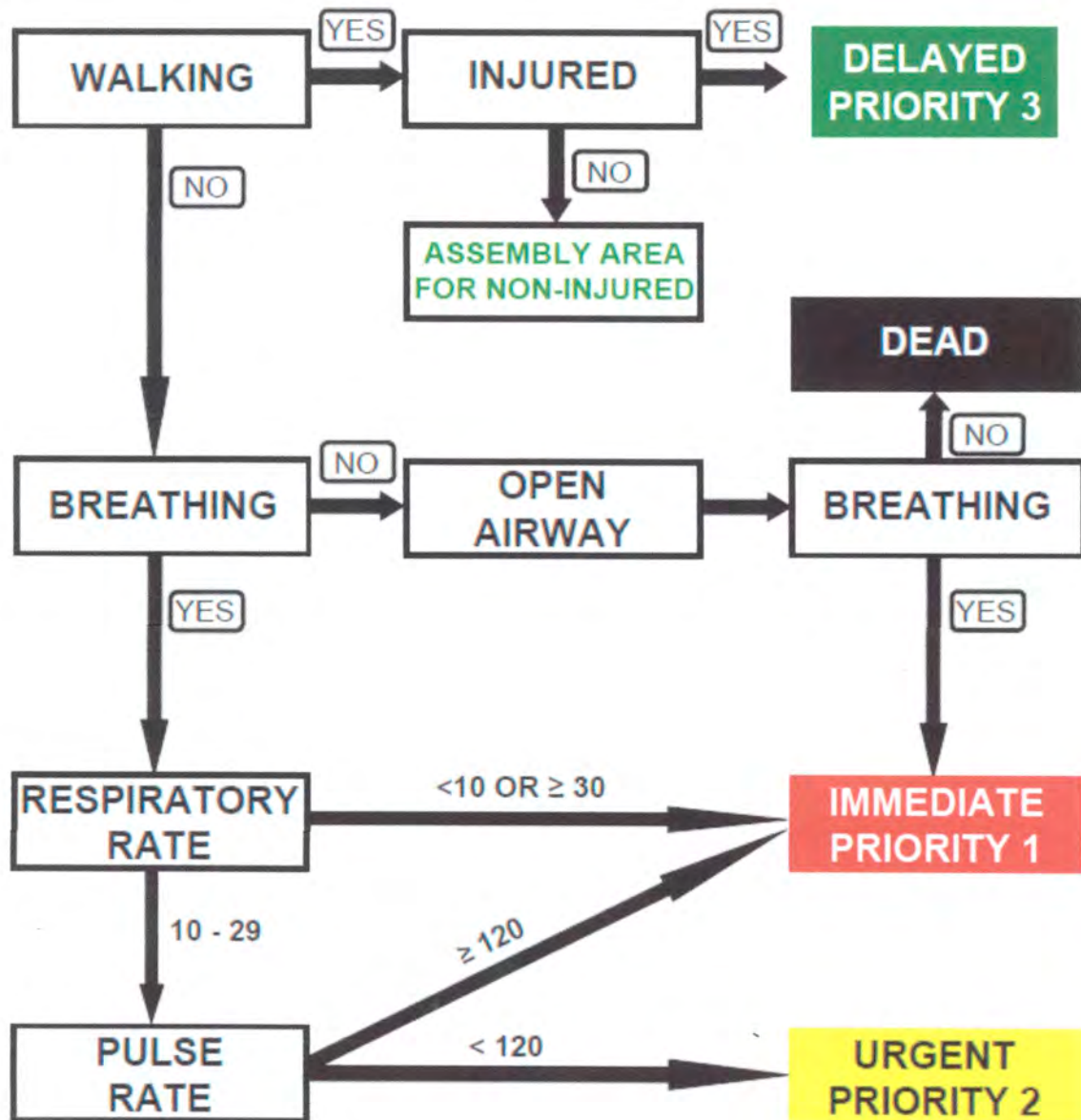
The course organizers welcome views on the design of the exercise and ideas for potential improvements from all participating units.

Thank your for your valuable participation in this course!

Methods of triage used at the MRMI-course:

- **Triage Sieve**
Simple algorithm, mainly for primary triage
- **Triage Sort**
Algorithm mainly for secondary triage
- **Anatomical triage**
Requires more experience, mainly for triage before transport & in hospital

TRIAGE SIEVE



TRIAGE SORT

Physiological Variable	Value	Score
Respiratory rate	10-29	4
	>29	3
	6-9	2
	1-5	1
	0	0
Systolic blood pressure	>90	4
	76-89	3
	50-75	2
	1-49	1
	0	0
Glasgow coma scale	13-15	4
	9-12	3
	6-8	2
	4-5	1
	3	0

A total score of	12	indicates	T3
	11		T2
	10-1		T1

Anatomical triage (=based on knowledge of course and prognosis for the different injuries, when competence is available)

As a general principle, patients that have responded satisfactorily on resuscitation and treatment can wait, while those not responding are given continued high priority. *Exceptions are patients with manifest or suspect internal bleeding which should have high priority for transport even if they have responded to treatment on scene.*

Highest priority (RED):

- Airway threat not possible to eliminate on scene
- Impaired ventilation requiring immediate ventilatory support
- Tension pneumothorax if decompression not can be done on scene
- Patients in severe circulatory shock
- Injuries to the trunk with suspicion on internal bleeding (including unstable pelvic fractures)
- Head injuries with clear signs of expanding intracranial hematoma

Exceptions from this are (especially in major incidents level II) patients with small possibilities to save, for example extensive full-thickness burn injuries and head injuries not responding to pain.

Priority after those above (YELLOW):

- Open head injuries*
- Open or penetrating injuries to the trunk*
- Open fractures of long bones
- Crush injuries, compartment syndrome
- Vascular injuries with impaired peripheral circulation
- Severe multiple injuries
- Other patients with circulatory and respiratory impairment
- Full thickness burn injuries > 30 % (see exceptions above)
- Hypothermia with body temperature < 28°C (when possible to determine on scene)

* Higher priority can be considered depending on access to transport resources

Lower priority (GREEN):

- Closed fractures (exception: Femur fractures after severe blunt trauma)
- Rib fracture without respiratory impairment and without suspicion on internal bleeding
- Spinal injuries
- Eye injuries
- Wounds and soft tissue injuries
- Burn injuries < 30 %
- Hypothermia with body temperature > 28 °C (when possible to determine)

Expectant (BLUE) is used in high load of casualties where it is apparent that patients with small possibilities to save have to wait to make possible to save all salvageable (decision to use this level generally is made and transferred by MCI). Examples:

- Extensive burn injuries (full thickness > 70 – 90 %, also related to age)
- Head injuries unresponsive to pain
- Severe multiple injuries with small prospects of cure

Dead (BLACK) has to be confirmed by a doctor (exception: Head separated from body), no other patients can be labeled with black tag on scene.

MRMI basic course, aims and objectives for different categories of staff

a) Prehospital staff

The trainee should after this course **know**:

- The **organization** on the scene in a major incident, including terminology, responsibilities of involved organizations, security regulations, communication and principles for management of injured by physical trauma, psychologically shocked and dead victims.
- The **command-structure** on scene, including distribution of responsibilities between the staffs in command in health-care, rescue, police and other involved organizations

The trainee should after this course **be able to**:

- Perform accurate primary triage on scene in casualties exposed to physical trauma, including medical and ethical considerations
- Perform accurate secondary triage on scene of casualties exposed to physical trauma, including medical and ethical considerations
- On arrival to the scene primarily serve as Medical Incident Commander
- On arrival to the scene primarily serve as Triage Officer
- On arrival to the scene primarily serve as Ambulance Loading Officer

a) Hospital staff

The trainee should after this course **know**:

- The **organization** of the hospital in a major incident, including terminology, receiving and action on alarm, levels of alert, structure and use of the disaster plan, structure and use of the action cards, preparing of the hospital for receiving casualties, security regulations, communication and principles for management of injured by physical trauma, psychologically shocked and dead victims
- The **command- structure** in the hospital including the composition, role and authorization of the hospital command group and responsibilities of staff in charge on different positions
- The common limiting factor for the hospitals **surge capacity** in major incidents with physical trauma

The trainee should after this course **be able to**:

- Perform accurate primary triage in hospital of casualties exposed to physical trauma, including medical and ethical considerations
- Perform accurate secondary triage in hospital of casualties exposed to physical trauma, including medical and ethical considerations
- Perform accurate triage for surgical treatment of casualties exposed to physical trauma with consideration of the indications for primary and delayed surgery and the principles of Damage Control

b) Coordinating staff

The trainee should after this course:

- **Know** the principles for the prehospital and hospital organizations in a major incident, including coordination, command and communication, structure of the disaster plan and action cards, structure of the work on scene and in the hospitals, transport, logistics and supplies, common problems and how they can be solved
- **Know** the responsibilities, authorization, organization and function of the trained coordinating unit (regional- or hospital)
- **Be able to** serve in the trained function in a major incident.



Standard program MRMI Basic Course

Day 1

09.30-10.00	Arrival & registration.
10.00-10.30	Welcome. Background, aims and design of the MRMI-course. Presentation of faculty & participants
10.30-11.00	Pre-test and self-assessment
11.00-11.30	Introduction to the MACSIM simulation system
11.30-12.00	The prehospital response to major incidents
12.00-13.00	Lunch
13.00-13.30	The hospital response to major incidents
13.30-14.00	The principles of triage
14.00-15.30	Demonstration & training in groups with the MACSIM simulation cards
15.30-17.30	Introduction to your station during the simulation exercise. Preparation in groups under guidance of instructors. Getting acquainted to the boards, symbols and folders. Reviewing manuals, plans and action-cards.
17.30-18.00	Short demonstration of stations other than your own.
20.00	Get together

Day 2

08.00-09.00	Medical response to a terrorist attack. What can we expect, and how to deal with it?
09.00-14.30	Simulation exercise I

14.30-15.00	Restoring material, preparing for simulation exercise II
15.00-16.30	Evaluation of simulation exercise I
16.30-17.30	Preparing for tomorrows exercise
19.30	Course Dinner

Day 3

08.00-09.00	All groups prepare on stations
09.00-12.30	Simulation exercise II
12.30-13.00	Restoring material
13.00-14.30	Evaluation of simulation exercise II
14.30-15.30	Course evaluation, exam & self-assessment
15.30-16.00	Diplomas and closure

14.30-15.00	Restoring material, preparing for simulation exercise II
15.00-16.30	Evaluation of simulation exercise I
16.30-17.30	Preparing for tomorrows exercise
19.30	Course Dinner

Day 3

08.00-09.00	All groups prepare on stations
09.00-12.30	Simulation exercise II
12.30-13.00	Restoring material
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14.30-15.30	Course evaluation, exam & self-assessment
15.30-16.00	Diplomas and closure

Protocols for registration of results

- **Coordination, communication & command on scene**
- **Triage on scene**
- **Transport**
- **Hospitals**
 - **Hospital Command Group**
 - **Emergency Department**
 - **Surgery**
 - **Intensive Care**
 - **Wards**
- **Regional Medical Command Center**
- **Ambulance Dispatch Center**
- **Rescue Command Center**
- **Police Command Center**

Coordination on scene

Course _____ Day number _____ Instructors (sign) _____

Incident occurs (time) _____ First ambulance on scene (time) _____

First report (window report, time) _____ Second report (time) _____

First ambulance departs (time) _____ First helicopter departs (time) _____

Last ambulance departs (time) _____ Last helicopter departs (time) _____

Communication between MIC and RMC: Excellent ☐ Good ☐ Accurate ☐ Poor ☐

Communication between MIC, RIC and PIC: Excellent ☐ Good ☐ Accurate ☐ Poor ☐

MIC information to staff on scene: Excellent ☐ Good ☐ Accurate ☐ Poor ☐

Utilization and distribution of staff on scene: Excellent ☐ Good ☐ Accurate ☐ Poor ☐

Structure and organization of work: Excellent ☐ Good ☐ Accurate ☐ Poor ☐

Leadership of triage (TRO): Excellent ☐ Good ☐ Accurate ☐ Poor ☐

Leadership of ambulance loading (ALO): Excellent ☐ Good ☐ Accurate ☐ Poor ☐

Accuracy of decisions with regard to treatment: Excellent ☐ Good ☐ Accurate ☐ Poor ☐

Staff on scene: Too many ☐ Accurate ☐ Too few ☐

Missing categories of staff (specify) _____

Missing supplies on scene (specify) _____

Transport resources: Too much ☐ Accurate ☐ Too few ☐

Missing transport categories (specify): _____

Distribution of patients between hospitals: Accurate ☐ Deficient ☐

Specify: _____

Comments to organization and performance on scene:

Evaluation of accuracy of Triage on scene

Primary triage

Rank the efficiency and organization of primary triage on a floating scale 1- 10, where

1= Very slow and inefficient

10= Very efficient and well organized

1 2 3 4 5 6 7 8 9 10

Secondary triage of severely injured

Rank the quality of secondary triage of severely injured on a floating scale 1-10, where

1 = Very inaccurate

2 = Totally accurate

1 2 3 4 5 6 7 8 9 10

If mistakes were done, was the most common:

- Under-triage (= giving too low priority)
- Over-triage (= giving too high priority)
- The same for both

Secondary triage of less severely injured

Rank the quality of secondary triage of less severely injured on a floating scale 1- 10 where

1= Totally missed

2= Totally accurate

1 2 3 4 5 6 7 8 9 10

If mistakes were done, was the most common:

- Under-triage (= giving too low priority)
- Over- triage (= giving too high priority)
- The same for both

Re-triage before departure from scene

Rank the quality of re-triage before departure on a floating scale 1- 10 where:

1 = Very inaccurate

2 = Totally accurate

If mistakes were done, was the most common:

- Under-triage (= giving too low priority)
- Over- triage (= giving too high priority)
- The same for both

Comments from instructor.....

.....

Evaluation of transport

How often waited (staffed and ready) ambulances on scene more than 3 min to get loaded with patient + to be informed about destination? In (% of cases):

- < 10 % ☐
- 10 - 20 % ☐
- 20 - 30 % ☐
- 30 - 40 % ☐
- 40 - 50 % ☐
- >50 % ☐

How did MIC utilize the possibility to keep ambulances on scene to get temporary access to staff for work on scene?

- Too little ☐ Specify.....
- Too much ☐
- Optimally ☐

Was sufficient effort made to re-staff ambulances by recruiting other staff to scene (for example more prehospital teams)?

- No ☐ Specify.....
- Yes ☐

How often waited (staffed and ready) helicopters on scene more than 10 min to get loaded with patient(s) + to be informed about destination?

- < 10 % ☐
- 10 - 20 % ☐
- 20 - 30 % ☐
- 30 - 40 % ☐
- 40 - 50 % ☐
- >50 % ☐

How do you evaluate the utilization of helicopters with regard to selected destinations?

- Inefficiently ☐ Specify.....
- Accurately ☐

How do you evaluate the distribution of less severely injured patients to hospital- and primary care facilities?

- Inaccurately ☐ Specify.....
- Accurately ☐

Comments from instructor.....

Protocol for hospital

Course _____ Day number _____ Instructor _____

Name of hospital _____

Alert and response times

Incident occurs (time) _____ Hospital first alerted (time) _____

Hospital Command Group

HCG staffed and functioning (time) _____

Decision to activate plan (time) _____ Primary level of alert _____

First capacity-report delivered to RMC (time) _____

First upgrading or down -grading of level of alert (time/level) _____

Appointment of staff in command in departments/units: Accurate ☐ Poor ☐

Communication between departments/HCG: Good ☐ Satisfying ☐ Poor ☐

Communication between HCG/ RMC: Good ☐ Satisfying ☐ Poor ☐

Structure and organization of work: Excellent ☐ Good ☐ Satisfying ☐ Poor ☐ None ☐

Comments: _____

Patients received

First patient received (time) _____ Triage category (see below) _____

Patients received: Red ____ Yellow ____ Green ____ Blue ____ Dead ____ Un-triaged ____

Surge capacity: Not exceeded ☐ Borderline exceeded ☐ Significantly exceeded ☐

Identified main factor(s) limiting surge capacity: _____

Accuracy of level of alert: Accurate ☐ Too high ☐ Too low ☐

Emergency department

Activated /ready to receive casualties (time) _____ First patients arrives (time) _____

Number of staffed/available MI-teams never needed _____

Patients dead because of delayed access to MI teams (patient numbers) _____

Other red patients with delayed access to MI-teams (patient numbers) _____

Accuracy of decisions on triage/diagnosis/treatment: Good ☐ Satisfying ☐ Poor ☐

Structure and organization of work: Excellent ☐ Good ☐ Satisfying ☐ Poor ☐ None ☐

Comments: _____

Surgery

Ready to receive casualties for surgery (time) _____ First operation starts (time) _____

Number of staffed/available theatres never needed _____

Patients dead because of delayed access to theatre (patient numbers) _____

Other red patients with delayed access to theatre (patient numbers) _____

Lack of supplies (specify): _____

Lack of staff (specify): _____

Accuracy of decisions on triage/ treatment: Good ☐ Satisfying ☐ Poor ☐

Structure and organization of work: Excellent ☐ Good ☐ Satisfying ☐ Poor ☐ None ☐

Comments: _____

ICU

Activated/ready to receive casualties (time) _____ First patient arrives (time) _____

Number of staffed/ available ventilators never needed _____

Patients dead because of delayed access to ventilator (patient numbers) _____

Other patients with need of ventilator but delayed access (patient numbers) _____

Lack of supplies (specify): _____

Lack of staff (specify): _____

Accuracy of decisions on triage/treatment: Good ☐ Satisfying ☐ Poor ☐

Structure and organization of work: Excellent ☐ Good ☐ Satisfying ☐ Poor ☐ None ☐

Comments: _____

Wards, coordination

Re-distribution of in-patient facilities on alert: Good ☐ Accurate ☐ Poor ☐

Bed capacity: Under-used ☐ Well utilized ☐ Exceeded, but handled ☐ Far exceeded ☐

Comments _____

Arriving staff, coordination

Alerted number of staff overall: Too much ☐ Optimal ☐ Too little ☐

Too few of (specify) _____

Utilizing arriving staff (distribution, standby): Excellent ☐ Good ☐ Satisfying ☐ Poor ☐

Comments: _____

Regional command center

Course _____ Day nr _____ Instructor (sign) _____

Incident occurred (time) _____

Regional Medical Command

RMC Officer on call received alarm (time) _____

Decision to declare Major Incident (time) _____

RMC office staffed, ready for action (time) _____

Capacity reports from hospitals:

Major City (time) _____ Harbor City (time) _____

East City (time) _____ Small Town (time) _____

First contact with scene (time) _____ First distribution key given (time) _____

First press-release given (time) _____ First press-conference announced (time) _____

Communication with scene: Excellent ☐ Good ☐ Accurate ☐ Poor ☐

Communication with hospitals: Excellent ☐ Good ☐ Accurate ☐ Poor ☐

Communication with Alarm Center/ADC: Excellent ☐ Good ☐ Accurate ☐ Poor ☐

Communication with rescue-/police command: Excellent ☐ Good ☐ Accurate ☐ Poor ☐

Structure and organization of work: Excellent ☐ Good ☐ Accurate ☐ Poor ☐

Comments _____

Alarm /Ambulance Dispatch

Receiving first alarm (time) _____

Response to action card completed (time) _____ Accurate ☐ Not accurate ☐

Communication with scene: Excellent ☐ Good ☐ Accurate ☐ Poor ☐

Communication with RMC: Excellent ☐ Good ☐ Accurate ☐ Poor ☐

Structure and organization of work: Excellent ☐ Good ☐ Accurate ☐ Poor ☐

Comments _____

Regional Rescue Command

Receiving first alarm (time): _____

RRC staffed and ready for action (time): _____

First contact with scene (time): _____

Communication with scene: Excellent ☐ Good ☐ Accurate ☐ Poor ☐

Communication with RMC: Excellent ☐ Good ☐ Accurate ☐ Poor ☐

Structure and organization of work: Excellent ☐ Good ☐ Accurate ☐ Poor ☐

Comments: _____

Regional Police Command

Receiving first alarm (time): _____

RPC staffed and ready for action (time) _____

First contact with scene (time): _____

Communication with scene: Excellent ☐ Good ☐ Accurate ☐ Poor ☐

Communication with RMC: Excellent ☐ Good ☐ Accurate ☐ Poor ☐

Structure and organization of work: Excellent ☐ Good ☐ Accurate ☐ Poor ☐

Comments: _____

Pre-and post-course self-assessment of knowledge and skills for:

- **Prehospital staff**
- **Hospital staff**
- **Coordinating functions**



Pre survey prehospital

Pre-exercise survey for those who will have positions as prehospital staff during the simulation exercises (ambulance, paramedic, prehospital teams, command staff on scene)

Physician ☐ Nurse ☐ Ambulance/paramedic ☐ Administrative staff ☐ Other ☐

Give your own opinion about your knowledge on the following points by putting a figure (number) in the box after the question, 1 – 10 where:

1 = No knowledge/not capable

10 = Knows well /fully capable

1) How well do you know the **principles for organisation of the scene in a major incident?**

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7	8	9	10

2) How well do you know the **command-structure on the scene in a major incident?**

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7	8	9	10

3) How capable would you be to perform **primary (first) triage of injured casualties on scene in a major incident today?**

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7	8	9	10

4) How capable would you be to perform **secondary (before transport) triage of injured casualties on scene in a major incident today?**

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7	8	9	10

5) How capable would you be to serve as a Medical Incident Commander (MIC**) on scene in a major incident today? (If you do not know what MIC is, indicate "1")**

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7	8	9	10

6) How capable would you be to serve as Triage Officer (TRO**) on scene today? (If you do not know what a TRO is, indicate "1")**

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7	8	9	10

7) How capable would you be to serve as an Ambulance Loading Officer (ALO**) on scene today? (If you do not know what an ALO is, indicate "1")**

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7	8	9	10

Thank you for helping us to validate the exercise!



Pre survey hospital

Pre-exercise survey for those who will have positions as hospital staff during the simulation exercises

Physician ☐ Nurse ☐ Administrative staff ☐ Other ☐

Give your own opinion about your knowledge on the following points by putting a figure (number) in the box after the question, 1 – 10 where:

1 = No knowledge/not capable

10 = Knows well /fully capable

- 1) How well do you know the principles for organisation of the hospital in response to a major incident?

1	2	3	4	5	6	7	8	9	10

- 2) How well do you know the command structure in the hospital in major incident response (who is responsible for which decisions on different levels?)

1	2	3	4	5	6	7	8	9	10

- 3) Do you know what an “action card” is and how it works?

1	2	3	4	5	6	7	8	9	10

- 4) How capable would you be to perform primary (first) triage of arriving casualties in the hospital in a major incident today?

1	2	3	4	5	6	7	8	9	10

- 5) How capable would you be to make secondary triage of severely injured in the hospital in a major incident today?

1	2	3	4	5	6	7	8	9	10

- 6) How capable would you be to perform triage for surgery in the hospital in a major incident today?

1	2	3	4	5	6	7	8	9	10

- 7) How well do you know what “damage control” is and when and how it is done?

1	2	3	4	5	6	7	8	9	10

- 8) How well do you know which the limiting factors for the surge capacity of the hospital are in a major incident? (If you do not know what surge capacity is, indicate “1”)

1	2	3	4	5	6	7	8	9	10

Thank you for helping us to validate the exercise!



Pre survey coordinating units

Pre-exercise survey for those who will have positions in coordinating units during the simulation exercises

Hospital Command group ☐ Regional Command centre ☐ Ambulance Dispatch Centre ☐

Give your own opinion about your knowledge on the following points by putting a figure (number) in the box after the question, 1 – 10 where:

1 = No knowledge/not capable

10 = Knows well /fully capable

- 1) How well are you today familiar with the organisation and function of the coordinating unit you worked in during the exercise?

1	2	3	4	5	6	7	8	9	10

- 2) How capable do you today consider yourself to take a position in this function?

1	2	3	4	5	6	7	8	9	10

- 3) How well are you today familiar with the pre-hospital organisation in major incident response?

1	2	3	4	5	6	7	8	9	10

- 4) How well are you today familiar with the hospital organisation in major incident response?

1	2	3	4	5	6	7	8	9	10

Thank you for helping us to validate the exercise!



Post survey prehospital

Post-exercise survey for those who had positions as prehospital staff during the simulation exercises (ambulance, paramedic, prehospital teams, command staff on scene)

Physician ☐ Nurse ☐ Ambulance/paramedic ☐ Administrative staff ☐ Other ☐

Give your own opinion about your knowledge on the following points by putting a figure (number) in the box after the question, 1 – 10 where:

1 = No knowledge/not capable

10 = Knows well /fully capable

1) How well do you know the **principles for organisation of the scene in a major incident?**

1	2	3	4	5	6	7	8	9	10

2) How well do you know the **command-structure on the scene in a major incident?**

1	2	3	4	5	6	7	8	9	10

3) How capable would you be to perform **primary (first) triage of injured casualties on scene in a major incident today?**

1	2	3	4	5	6	7	8	9	10

4) How capable would you be to perform **secondary (before transport) triage of injured casualties on scene in a major incident today?**

1	2	3	4	5	6	7	8	9	10

5) How capable would you be to serve as a Medical Incident Commander (MIC**) on scene in a major incident today? (If you do not know what MIC is, indicate "1")**

1	2	3	4	5	6	7	8	9	10

6) How capable would you be to serve as Triage Officer (TRO**) on scene today? (If you do not know what a TRO is, indicate "1")**

1	2	3	4	5	6	7	8	9	10

7) How capable would you be to serve as an Ambulance Loading Officer (ALO**) on scene today? (If you do not know what an ALO is, indicate "1")**

1	2	3	4	5	6	7	8	9	10

Thank you for helping us to validate the exercise!



Post survey hospital

Post-exercise survey for those who had positions as hospital staff during the simulation exercises

Physician ☐ Nurse ☐ Administrative staff ☐ Other ☐

Give your own opinion about your knowledge on the following points by putting a figure (number) in the box after the question, 1 – 10 where:

1 = No knowledge/not capable

10 = Knows well /fully capable

- 1) How well do you know the principles for organisation of the hospital in response to a major incident?

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
1 2 3 4 5 6 7 8 9 10

- 2) How well do you know the command structure in the hospital in major incident response (who is responsible for which decisions on different levels?)

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
1 2 3 4 5 6 7 8 9 10

- 3) Do you know what an “action card” is and how it works?

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
1 2 3 4 5 6 7 8 9 10

- 4) How capable would you be to perform primary (first) triage of arriving casualties in the hospital in a major incident today?

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
1 2 3 4 5 6 7 8 9 10

- 5) How capable would you be to make secondary triage of severely injured in the hospital in a major incident today?

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
1 2 3 4 5 6 7 8 9 10

- 6) How capable would you be to perform triage for surgery in the hospital in a major incident today?

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
1 2 3 4 5 6 7 8 9 10

- 7) How well do you know what “damage control” is and when and how it is done?

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
1 2 3 4 5 6 7 8 9 10

- 8) How well do you know which the limiting factors for the surge capacity of the hospital are in a major incident? (If you do not know what surge capacity is, indicate “1”)

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
1 2 3 4 5 6 7 8 9 10

Thank you for helping us to validate the exercise!



Post survey coordinating units

Post-exercise survey for those who had positions in coordinating units during the simulation exercises

Hospital Command group ☐

Regional Command centre ☐

Ambulance Dispatch Centre ☐

Give your own opinion about your knowledge on the following points by putting a figure (number) in the box after the question, 1 – 10 where:

1 = No knowledge/not capable

10 = Knows well /fully capable

- 1) How well are you today familiar with the organisation and function of the coordinating unit you worked in during the exercise?

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7	8	9	10

- 2) How capable do you today consider yourself to take a position in this function?

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7	8	9	10

- 3) How well are you today familiar with the pre-hospital organisation in major incident response?

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7	8	9	10

- 4) How well are you today familiar with the hospital organisation in major incident response?

☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
1	2	3	4	5	6	7	8	9	10

Thank you for helping us to validate the exercise!

