AUSTRALIAN EMERGENCY MANUAL
DISASTER MEDICINE

SECTION FOUR

RESPONSE

CHAPTER FOURTEEN

TRIAGE

INTRODUCTION

14.01 Triage is the process by which disaster casualties are sorted, prioritised, and distributed according to their need for first aid, resuscitation, emergency transportation, and definitive medical care. Triage is a continuing process which begins in the field and continues into the hospitals and involves the matching of victims' needs with available resources in order to achieve the best outcome for the greater number of casualties.

> **PRINCIPLE**
>
> **The aim of triage is to achieve the greatest good for the greater number of casualties.**

14.02 OBJECTIVE

The objective of triage is to minimise the death and suffering that is the result of a disaster. This is achieved by ensuring that available health resources are directed to those who will receive the greatest benefit. As a corollary, response effectiveness demands that limited resources not be applied to victims with very low (or nil) survival probability.

14.03 RESPONSIBILITY

Accurate triage by implication necessitates experienced medical judgement. Triage should therefore be undertaken, wherever possible by an experienced clinician. If such a person is not available, the most experienced ambulance officer or nurse present should undertake the duty

14.04 IDENTIFICATION

The Triage Officer should be clearly identified.

14.05 SUPPORT

The Triage Officer will require adequate logistical support to allow the triage process to progress quickly. This may imply deployment of additional medical, nursing, ambulance and clerical personnel.

SITE TRIAGE

14.06 In a restricted impact disaster (eg airline crash) casualty evacuation to a staging area by first responders may occur without triage.

14.07 Formal triage should commence once a forward treatment area is established. As casualties are brought from the field they should pass through a single entry point and should be categorised according to their need for immediate treatment. The number of triage categories may vary from two to five, or more depending on local plans. Irrespectively, casualties in the same urgency category should be collocated geographically within the treatment area, to facilitate treatment and orderly evacuation.

14.08 Ambulatory persons with minor or no injuries, may be directed to a completely separate area for non-ambulance transportation.

14.09 In many disasters, eg. cyclones and fires, victims may make their own way to hospital using non-ambulance transportation (taxi, private vehicle). Hospital disaster plans should ensure that single point entry to the Emergency Department is created, that a tagging system is available and that an experienced doctor acts as triage officer.

PRINCIPLE

Triage is the continuing process which commences on the field and continues into the hospital.

TRIAGE TAGS

14.10 Triage tags may be used to indicate the category in which the patient has been placed.

14.11 There is no uniform standard for tag design but all tags should indicate clearly the patient's priority for treatment and transport as well as providing space for the recording of vital signs and details of medical care provided. See Chapter Eighteen on Documentation for an example of a triage tag.

14.12 In some circumstances, triage tags may be applied by ambulance officers in the field, or in other situations they will need to be applied when casualties arrive at hospital.

14.13 FIELD MEDICAL TEAMS

Field medical teams will generally be deployed in the forward treatment area by the Field Medical Controller. Triage in this area is continuous with medical and ambulance personnel undertaking re-evaluation of casualties to determine the priorities for treatment and transportation. Information on priorities is to be communicated to the Field Medical Controller and the Ambulance Transport Officer. The Field Medical Controller needs to be aware of progress at all times.

ASSESSMENT FOR PRIORITIES

14.14 The assessment and management of casualties in the forward treatment area should generally follow the 'ABCDE' approach as outlined in the Early Management of Severe Trauma course - (Royal Australasian College of Surgeons). See also Chapter Fifteen on Clinical Management.

14.15 Thus, casualties with airway obstruction would be managed before those with breathing difficulty, who would be managed before those with haemorrhage In circumstances where adequate medical teams have been deployed, the care of patients with different priorities may be undertaken simultaneously.

14.16 Priority for evacuation to hospital should be given to those casualties who require immediate life saving surgery, (eg massive haemothorax, intra-abdominal haemorrhage, deteriorating conscious level)

14.17 **THE HOPELESS CASE**

In situations where medical resources are limited, a decision not to undertake resuscitation of victims with poor or hopeless prognoses may have to be taken. See also Chapter Fifteen on Clinical Management

14.18 **DISTRIBUTION OF CASUALTIES**

The efficient distribution of casualties to appropriate health care institutions is a critical success factor in disaster response. Except in rural or isolated areas, the transportation of all of the victims of a disaster to the closest hospital will lead to sub-optimal care for at least some of the victims, irrespective of the size of the receiving hospital.

14.19 Annex A to this Chapter illustrates how victims of an air crash might be distributed between hospitals of different size in an urban setting while Annex B to this Chapter illustrates the process of triage for secondary transfer in a rural disaster model.

14.20 The Field Medical Controller and the Ambulance Transport Officer should have a complete understanding of the function, reception facilities and capacity of all of the hospitals available to take casualties Information on hospital reception capacity should be continually updated via the Command Post.

14.21 In general, patients with severe injuries should be distributed to available major hospitals, whilst the less severely injured may be transported to community hospitals.

14.22 Children with severe injuries should be triaged to a paediatric tertiary referral centre if this is an option, but all hospital emergency rooms should be able to receive and resuscitate children and care should be taken not to overload the paediatric centres.

14.23 **HOSPITAL TRIAGE**

Victims arriving at hospital should be re-triaged at the entrance to the Emergency Department by an experienced doctor, or, if unavailable, an experienced Triage Nurse. Casualties will be allocated to appropriate designated areas (Resuscitation, Urgent, Ambulatory).

14.24 Once assessment and resuscitation are underway, priorities for surgery, critical care and transfer, will be determined, usually by a senior surgeon after liaison with Emergency Medicine and Anaesthetic staff

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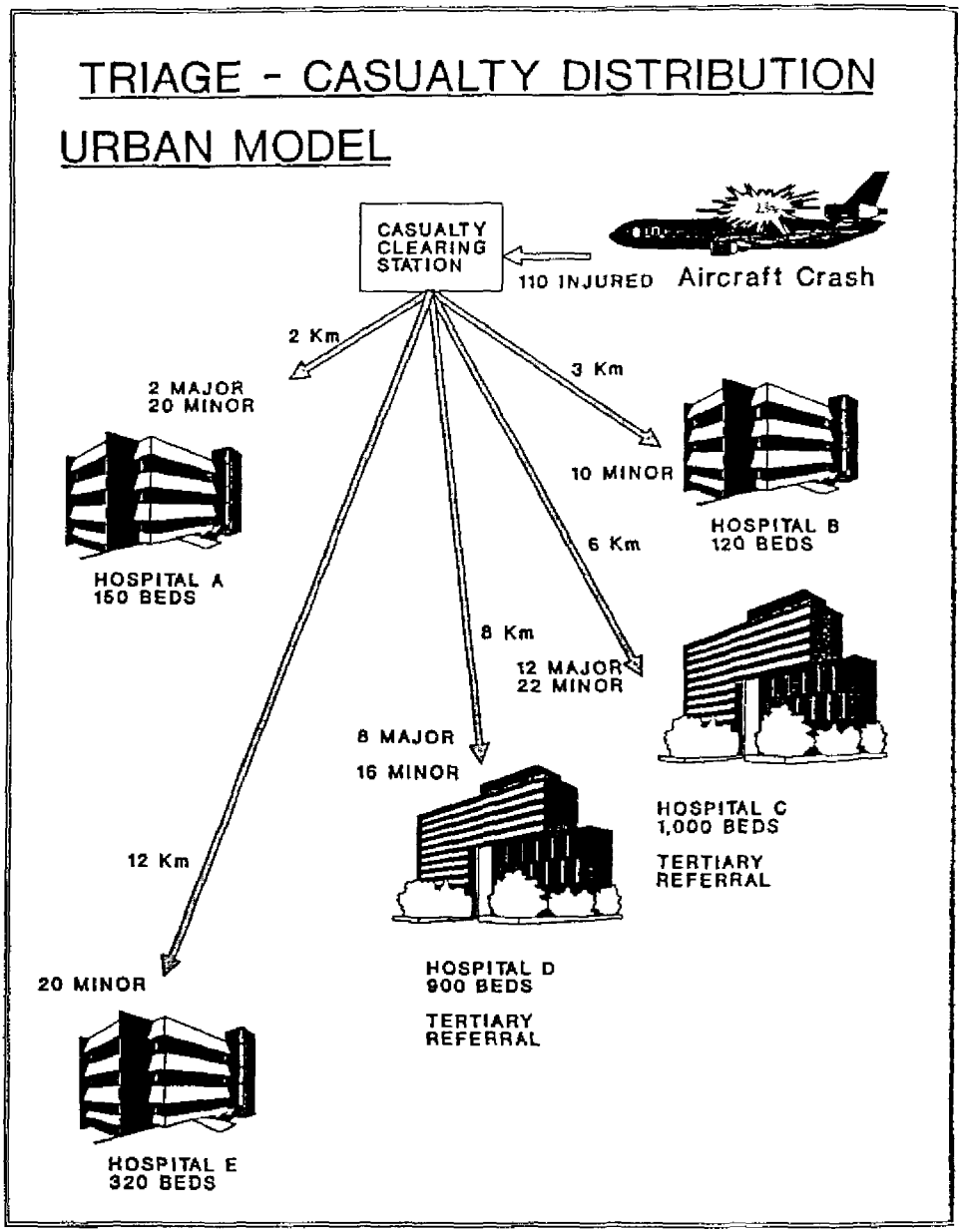
ANNEXES: A. Triage - Urban Model

B. Triage - Rural Model

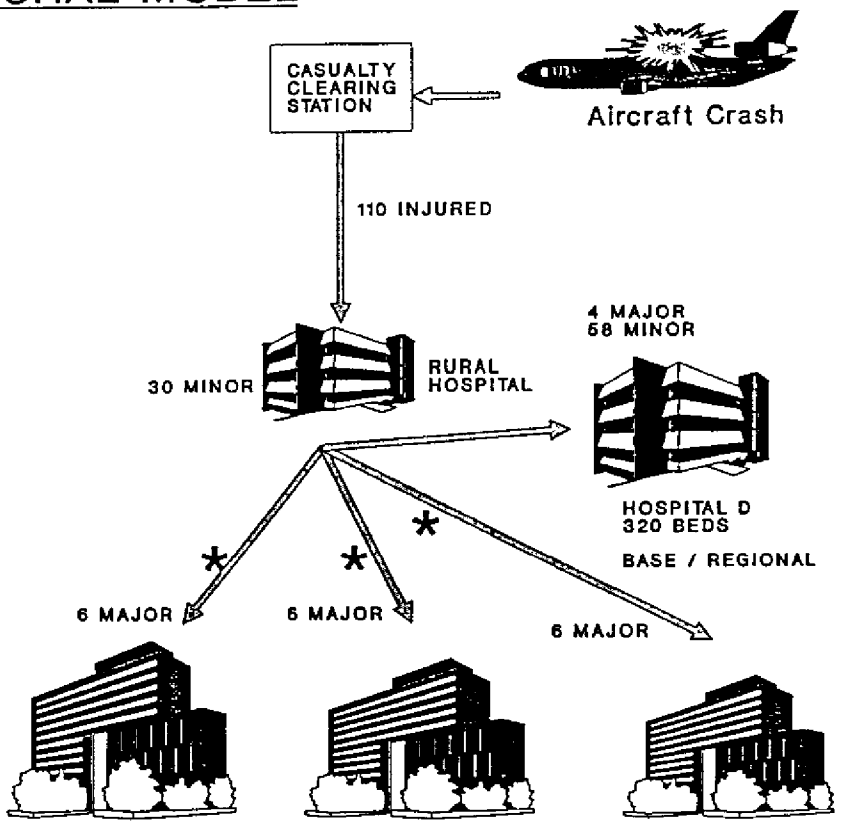
TRIAGE - CASUALTY DISTRIBUTION

URBAN MODEL



TRIAGE - CASUALTY DISTRIBUTION

RURAL MODEL



* Supported by Medical Retrieval Teams

SECTION FOUR - RESPONSE

CHAPTER FIFTEEN

CLINICAL MANAGEMENT

INTRODUCTION

15.01 The usual principles of resuscitation and clinical management which are applied to individual patients in the Emergency Medical System cannot always be effectively utilised in disaster and mass casualty incidents. In these situations, circumstances will arise where the availability of clinical care will be exceeded by the cumulative medical needs of the victims. Expert triage and selective management of patients and injuries is needed if the best overall outcome is to be achieved with the resources that are available.

15.02 OBJECTIVE

The objective of this Chapter is to provide guidance to medical teams and ambulance officers in areas of clinical difficulty which can arise

TRIAGE

15.03 NOT FOR RESUSCITATION

Certain groups of people are known to have poor outcomes, even when maximal field and hospital care is applied. In disaster and mass casualty incidents, it may be necessary to triage the following to an 'expectant' category:

a. **Any person in cardiorespiratory arrest.**

b **Any person with glasgow coma scale score of 3 (no eye opening, no verbal response, no motor response).**

c. **Major burns where age > 60 years and body surface area burned > 50 percent. As a general rule, if (age + %bsa burned) > 100, mortality approaches 1.0.**

d. **Elderly persons with shock and multiple, severe injuries (especially C.N.S. & Thoracic).**

15.04 Where possible, such decisions should be made by a medical officer experienced in triage who has an understanding of mortality expectancy from different patterns of injury and levels of injury severity.

15.05 RESUSCITATION

In general, the approach to resuscitation of multiple casualties is similar to the 'ABCDE' model of primary survey and resuscitation as advocated by the Early Management of Severe Trauma Course (EMST) of the Royal Australasian College of Surgeons, Advanced Trauma Life Support Course (ATLS) of the American College of Surgeons and Trauma Nursing Core Course (TNCC) of the Emergency Nursing Association. This treatment paradigm involves a sequential approach to the injured patient necessitating a rapid initial assessment and management of:

a airway and cervical spine care,

b. breathing and oxygenation;

c. circulatory support and control of haemorrhage;

d. rapid neurological assessment; and

e. exposure to permit examination and treatment.

Life-threatening conditions may be treated as they are found, according to the availability of expertise and equipment and having regard to the overall circumstances. In mass casualty situations, this approach is useful in making triage and clinical management decisions. For example, patients with airway and breathing difficulties are treated before patients with extremity fractures. However, clinical resource limitations may require modification of the approach.

AIRWAY MANAGEMENT

15.06 In dealing with a lone, severely traumatised patient, medical resuscitation teams will invariably adopt an aggressive approach to airway management, performing endotracheal intubation early so as to protect the airway and optimise oxygenation, especially in patients who are comatose. However, in the multi-casualty situation, consideration must be given to the resource implications of intubating patients both in terms of the time taken to undertake the procedure and the usual requirement for someone skilled to continue with ventilatory assistance. Important considerations are detailed below.

15.07 EQUIPMENT

a. Medical Teams attending disasters and multi casualty incidents should have special field kits carefully assembled in advance and checked regularly. These kits should include airway management equipment (including surgical airway kit). Disaster plans should determine whether medical teams or the ambulance provide oxygen delivery systems and portable suction.

b. Laryngoscopes do not operate effectively in daylight. A blanket, or similar, is needed to darken the area about the patient's head during intubation.

15.08 MUSCLE RELAXANTS

a. Muscle relaxants eg. succinylcholine should not be used in the field if the operator is not experienced and confident of success in securing the airway with an endotracheal tube.

b. the use of depolarising relaxants may be relatively contra-indicated in patients with severe crush injuries, or burns.

15.09 SEDATIVES

a. Short-acting narcotics (eg. fentanyl) and benzodiazepines (eg. midazolam) are favoured by some authors for field induction, if this is necessary.

b. Medical team kit should include reversal agents (Naloxone and Flumazenil).

c. Ketamine may be useful as an induction agent.

d. Avoid the use of sodium thiopentone because of the serious risk of precipitating shock in patients with unrecognised hypovolaemia.

ANALGESIA

15.10 The relief of pain is a high priority. Small doses of intravenous narcotics should be used and titrated to response

15.11 NERVE BLOCKS

Immobilise fractures and cover burns In some circumstances, for example during difficult extrications, special techniques such as nerve blocks may be usefully employed by appropriately skilled teams

BURNS

15.12 Mass burns present major logistical difficulties. Most dedicated Burns Units operate at maximum occupancy and there is no excess capacity to absorb large numbers of additional patients. Therefore mass burns should usually be distributed between available receiving hospitals initially so as to ensure optimum early resuscitation

15.13 As the extent of the disaster becomes known, decisions can be taken as to whether the on-going burns care is centralised in special facilities created to deal with the emergency (usual strategy), or is decentralised.

15.14 BURNS RESUSCITATION

Field priorities include the removal of burned clothing, cooling of burned tissue, oxygen therapy, covering of burns with clean dressings, establishment of IV access, volume resuscitation with N/Saline/Haemaccel, and titrated IV analgesia, wherever possible. Victims with respiratory burns should be prioritised for early evacuation to hospital because of the risks of insidious and progressive airway obstruction

15.15 CARBON MONOXIDE POISONING

Victims from closed space fires may suffer carbon monoxide poisoning. Patients with significant CO poisoning are ideally treated with hyperbaric oxygen (HBO), but this is unlikely to be feasible in a disaster or mass casualty incident. Treat with 100% oxygen.

15.16 SUMMARY

Any victim of a fire disaster suffering dizziness, weakness, incoordination, headache, nausea and vomiting, eye or mucus membrane irritation, or who has any history of loss of consciousness or dyspnoea, should be transported to hospital for assessment.

HYPOTHERMIA

15.17 Victims of disasters occurring in cold environments may suffer secondary injury from hypothermia. Remove wet clothing, wrap in blankets and protect from the wind whilst awaiting transport Depending on resources, it may be reasonable to perform CPR on hypothermic victims without vital signs and with no obvious lethal injury, whilst rewarming.

CRUSH INJURY

15.18 In earthquakes, cyclones, building collapse, victims with crush injury may be encountered. Priorities include rapid extrication and IV fluid resuscitation. If a victim has been crushed for a prolonged period, Medical Teams should consider premedication with bicarbonate and calcium chloride (to counteract hyperkalaemia) immediately prior to extrication.

15.19 Forced alkaline diuresis may reduce the incidence of renal failure and the requirements for surgical treatment of marginal compartment syndromes

WOUNDS

15.20 The management of most soft tissue injuries can be delayed, but haemorrhage control should be effected through direct pressure. In mangling limb injuries and amputations, tourniquets may be used if direct pressure fails, and in severe scalp injuries, a 'cobbling' suture may be required to stem the bleeding. **Remember** that wounds not observed to be bleeding initially may recommence haemorrhage as blood pressure rises with resuscitation.

15.21 Wounds older than 6 hours, and grossly contaminated wounds should be irrigated, cleaned, debrided and left open for delayed primary closure at 48 - 72 hours.

15.22 In disasters, it is advisable to give all patients with wounds a booster vaccination against tetanus.

FRACTURES ETC

15.23 Ensure that all fractures are splinted so as to minimise pain, reduce haemorrhage and the risk of neurovascular damage.

15.24 DISLOCATIONS

Reduce dislocations as soon as possible, but definitive treatment of most closed fractures can be deferred for 24 - 48 hours if necessary, provided that they have been correctly splinted.

CHILDREN

15.25 Paediatric disaster victims require special care if long term medical and neuropsychiatric sequelae are to be avoided. A calm reassuring approach is imperative. Fluid resuscitation and drug dosages should be carefully calculated, based on the child's estimated weight. (Site Medical Teams should carry laminated reference cards with paediatric weight tables and drug doses).

RADIATION INJURY

15.26 Significant numbers of casualties arising from radiation exposure are not common. Special plans involving trained personnel should be in place to deal with identified risks and decontamination procedures

15.27 IONISING RADIATION EXPOSURE

Victims who have been exposed to ionising radiation, but who are **not** contaminated with radioactive materials pose no risk to health workers.

15.28 GENERAL PROCEDURE

Medical Teams would not usually be required in the field, with victims being transported to Emergency Departments.

a. The medical management of a victim with serious trauma takes precedence over treatment for radiation exposure or radioactive contamination as these are never immediately life-threatening.

b. Nasal, mouth and wound swabs should be taken as soon as possible after the exposure to assist in determining the extent of contamination.

15.29 Hospital protocols should include the preparation of an isolated reception area, with barrier nursing and contamination control, and early communication with health physicists and nuclear medicine specialists.

CHEMICAL INJURY

15.30 Medical Teams managing victims of hazardous chemical incidents must first ensure that they do not become victims themselves by failing to ensure that the treatment area is safe, or by failing to take adequate precautions against contamination during patient treatment.

15.31 MANAGEMENT PRIORITIES

a. Remove contaminated clothing and decontaminate exposed skin (NB. Medical Team to wear protective gloves and clothing for the task).

b. Continuous copious irrigation of eyes, mucus membranes and skin if chemical burns from acid or alkali.

c. Basic and Advanced life support as necessary.

d. Administer specific antidotes, if available.

15.32 Specific management of identified chemical injuries should be obtained from Hazardous Chemical Units, Poison Information Centres, large Emergency Departments, and other authorities.

CHAPTER SIXTEEN

TRANSPORT

INTRODUCTION

16.01 Prompt transport of casualties will invariably be required in disasters other than those in which there are no survivors. As with all disaster responses, this function will be dependent on the type of disaster, its location and available resources. The type of disaster and prevailing weather conditions may make transport difficult For example, flooding, earthquakes or landslides may restrict ground access whilst large bushfires, cyclones and other storms may limit air or sea operations. The distance of the disaster site from major population centres and the resources available will be modifying influences Usual medical transport services may themselves be inhibited by the disaster.

16.02 Transport of patients to Casualty Collecting Areas and Casualty Clearing Posts will normally be accomplished by rescue personnel using manually handled stretchers. Casualties may then be further transported to other field treatment facilities or intermediate staging areas located at some distance, prior to transport to a definitive treatment location such as a regional or major teaching hospital.

16.03 This Chapter will cover why, when, where and how casualties are transported.

PRINCIPLE

Transport should deliver the right casualties, to the right place, at the right time, by the right means.

WHY?

16.04 Patients require transport to remove them from danger, environmental exposure, and to allow definitive diagnosis and treatment.

16.05 **CAUTION PRIOR TO DISCHARGE**

It may be possible to discharge the uninjured or those with minor problems direct from the site. Caution is needed so that injuries are not missed in the often less than adequate facilities for examining casualties on site. In radiation and toxic chemical incidents, symptoms may not be evident for some hours after exposure. Records must be kept of all those seen but not transported to other health facilities to enable follow-up.

16.06 Whilst casualties with minimal injuries can often be dispatched more easily, it is necessary to ensure that receiving facilities are not flooded with low priority cases (that have already had some medical assessment at the site), prior to arrival of the critically ill. Casualties travelling by their own means or with unregulated volunteers have been cited as overwhelming hospitals trying to deal with serious cases. (Auf Der Heide, 1989)

WHEN?

16.07 INJURY PRIORITIES

Casualties with serious but treatable injuries will normally be the first priority for transport by ambulance vehicles once essential resuscitation measures have been undertaken. These priorities will be decided jointly by the medical officer supervising the Casualty Treatment Post (Medical Team Leader) in consultation with the Ambulance Transport Officer or Ambulance Commander. Also see Chapter Fourteen on Triage.

16.08 Individuals with less severe injuries will normally be transported at a later time.

WHERE?

16.09 CASUALTY DISTRIBUTION

Patients with serious injuries will normally be transported to the nearest suitable facility. Where more than one facility exists in reasonable proximity, serious cases should be distributed evenly across these facilities to prevent single institutions from being overwhelmed

16.10 Casualties with lesser priorities may be likewise regulated and sent to appropriate institutions even further away, to minimise the impact on nearby hospitals. This is provided that transport resources are available and the transport is clinically acceptable for the patient's condition. Some consideration should also be given to keeping family members together when possible.

16.11 The destinations of casualties should be decided by the Medical Triage Officer or the Field Medical Controller on site, in consultation with the Ambulance Commander and any Medical Controller at a distant Control Centre.

PRINCIPLE

Distribute casualties widely to prevent single institutions from becoming overwhelmed whilst others are under-utilised.

HOW?

16.12 CO-ORDINATION

Patients should be transported by those services which normally do so, where possible This is to ensure optimal patient care and to maintain control and co-ordination of transport.

PRINCIPLE

Where possible, casualties should be transported by those services which normally do so.

16.13 Co-ordination of the total medical transport effort must be the responsibility of the Ambulance Service.

16.14 Other emergency vehicles and seconded forms of transport may need to be considered, but must be co-ordinated by the Ambulance Service.

PRINCIPLE

All forms of casualty transport need to be regulated as to where and when casualties are carried.

16.15 **MODES OF TRANSPORT**

The range of transport modes includes:

a. manual handling;

b. road ambulances;

c. other emergency vehicles;

d. private road vehicles;

e. flood rescue boats;

f. small and larger vessels;

g. helicopters;

h. fixed-wing aircraft; and

i. vehicles of opportunity - bus, truck, train, etc.

16.16 **ROAD AMBULANCES**

The simplest available methods of transport should be used where appropriate. It is to be expected that ground transport will be used for the majority of patients.

16.17 Appropriate marshalling and parking of all vehicles is necessary to ensure access to the site is not impaired. A separate Ambulance Holding Point may be required which is distant to the Ambulance Loading Point located adjacent to the Casualty Treatment Post. Flow-through loading of casualties is desirable if at all possible.

16.18 HELICOPTERS

Helicopters have some advantages in rescue from water or difficult terrain and can provide rapid transport over intermediate distances (up to 150 kilometres) However there are also limitations in the number of patients which can be carried and problems due to the noisy and confined working area. They should be reserved for rescue, rapid transport of special services to a site and medical transport of patients where there are sound clinical indications. Designated controlled landing points need to be established

16.19 FIXED-WING AIRCRAFT

In remote areas of Australia, fixed-wing aircraft may also form part of an initial response, however in most instances they will be part of a secondary transport system bringing in additional resources and transporting patients to distant centres.

16.20 Fixed-wing aircraft require suitable landing areas of a minimum length and dimensions. These are usually at some distance from the centre of operations so transport to and from the landing area will also be required and may include road ambulances or helicopters.

16.21 Fixed-wing aircraft have advantages of speed and range which make them appropriate for patients requiring transport over longer distances.

16.22 PRE-FLIGHT PATIENT STABILISATION

Where practicable the advice of a person with aviation medicine expertise should be sought on the requirement for pre-flight stabilisation

16.23 CLINICAL EFFECTS OF FLIGHT

Air transport has implications for certain types of injuries. In-flight clinical considerations include problems relating to changes in barometric pressure and altered partial pressure of inspired oxygen, but also include practical considerations of noise, vibration and turbulence and cramped working conditions. Clinical effects should be well known by the medical transport organisations routinely using aircraft. Where consideration is given to seconding other aircraft, medical advice must be sought on appropriateness of air transport

GENERAL

16.24 BASIC REQUIREMENTS

Casualty transport vehicles should, where possible, be suitable for the purpose. Some considerations are:

a. ability to traverse the terrain and distances to be travelled;

b. equipped if possible with at least basic resuscitation equipment including oxygen, suction, airway aids and a method for assisted ventilation,

c. adequate lighting and temperature control,

d. suitable stretchers and restraint systems;

e. reasonable comfort for passengers and attendants; and

f an appropriate means of communication.

16.25 Appropriate methods of transport prevent exacerbation of injuries, unobserved deterioration in the condition of patients, and a lesser level of care being provided than existed at the scene. Normally the better methods of transport available should be utilised for the most serious cases

16.26 Transport resources should be used to their best advantage This may include transport of sitting patients in addition to a full complement of stretcher cases on each journey

16.27 **IMPROVISATION**

Vehicles of opportunity may be used with appropriate improvisation This will depend on the transport resources available and the ingenuity of those involved. For example, buses have the capacity to remove large numbers of victims with only minor injuries from the centre of operations, or can be outfitted with stretchers for a lesser number of casualties Trucks and watercraft can also be used in appropriate circumstances.

16.28 **INFECTIOUS DISEASES**

Certain disasters may be associated with casualties suffering from infectious diseases. These cases can normally be safely managed during transport by adherence to universal precautions. Containment systems, as once used for viral haemorrhagic fevers, are no longer regarded as necessary for air or ground transport.

16.29 **HAZARDOUS CHEMICALS**

Casualties from hazardous chemical incidents may pose a risk to transport personnel and special methods of decontamination and protection may be necessary. Appropriate expert advice should be sought.

16.30 **PERSONNEL**

Casualties should be attended by trained persons and some form of observation, monitoring and documentation undertaken during the journey.

16.31 Attendants will normally be ambulance officers

16.32 Doctors and nurses may be used to accompany the critically ill where resources allow· that is. there are sufficient staff already on site. or additional medical teams are brought in.

16.33 For seriously ill patients, it is normally the quality of clinical care available during transport, not the actual mode of transport which is important.

PRINCIPLE

The quality of patient care during transport is usually more important than the mode of transport.

16.34 Standards for inter-hospital transport of patients have recently been formulated. These provide a guide to optimal standards of patient care, but during disasters some degree of compromise may be necessary.

16.35 **DOCUMENTATION**

Casualties must be accompanied by documentation to assist the receiving institution This should indicate:

a. triage category;

b. how the injury occurred;

c clinical assessment and time;

d. treatment given; and

e. personal identification (wherever possible).

16.36 This documentation will be a triage tag or more detailed clinical assessment sheets where available See also Chapter Eighteen on Documentation.

16.37 **DECEASED PERSONS**

Transport of the deceased to temporary or permanent mortuaries can pose significant logistic problems The transport of living casualties must take priority over movement of the deceased. See also Chapter Twenty-One on Management of Deceased

REFERENCES

Auf Der Heide, Erik.· **Disaster Response: Principles of Preparation and Coordination.** St Louis: CV Mosby, 1989, ISBN 0 8016 0385 4

Australian & New Zealand College of Anaesthetists and Australasian College for Emergency Medicine: **Joint Policy on Inter-hospital Transport of Patients** 1991

CHAPTER SEVENTEEN

MEDICAL SUPPLIES AND EQUIPMENT

INTRODUCTION

17.01 Recurring problems in the response phase of disasters arise from a combination of factors, including lack of accurate information from previous disasters, poor understanding of the disaster plan and the unique nature of each disaster.

17.02 Disaster plans must anticipate the need for supplies. Staging areas should be established in safe locations near the site to ensure proper resource management. Appropriate delivery and timely dispatch of supplies, especially critical items such as IV fluids, dressings and splints, should be under the control of a supervisor in this area.

PRINCIPLE

Anticipate supply needs in planning. Manage supplies with timely responses.

MEDICAL SUPPLIES AND STORES

17.03 Disasters generate numerous requests for assistance including pharmaceutical supplies and medical gases and equipment. Often these requests will be unco-ordinated, exaggerated or inadequate. The effectiveness and usefulness of this aid may be hampered by both provider and recipient.

17.04 **POTENTIAL PROBLEMS**

Problems which may occur include:

a. lack of realistic assessment of needs;
b. unrealistic requests;
c. inappropriate equipment;
d. non-essential pharmaceuticals;
e. diversity of supplies;
f. unmarked or unsorted shipments;
g. unintelligible labelling;
h. expensive machinery;
i. time-expired products;
j. late arrivals of stores;
k. inappropriate storage of drugs (security, heat, weather) both in transit and awaiting distribution; and
l. Customs clearance restrictions.

17.05 OPTIMAL CARE

Experience has shown that optimal medical care can be delivered with a limited set of drugs The use of medical supplies varies in relation to·

a the type of medical assistance (i e. first aid, acute surgical care, routine treatment of common diseases, preventive medicine, treatment of infectious diseases and the like),

b. duration of the operation,

c the number and breakdown of people to be assisted (children, infants, geriatric populations); and

d. the type of disaster

17.06 SUPPLY PLANNING

Planning should avoid or minimise deficiencies as follows·

a Epidemiological research. Research and database development should be undertaken, with relevant improvements reaching decision makers, disaster planners and relief organisations,

b. Precise and objective compilation of requests Pre-disaster planning by health and relief groups should be done with lists of pharmaceutical and equipment restricted to essential items. Lists should use generic names and special storage or transport requirements should be delineated. Requests should be precise with supporting data on number of injured, types of injuries and the like; and

c. Standardisation of medical supplies. Basic standardised lists of pharmaceuticals and equipment have been developed by a variety of organisations. Some examples are described below.

PHARMACEUTICAL AND EQUIPMENT LISTS

17.07 NATIONAL DISASTER RELIEF (HEALTH) COMMITTEE (NDRHC) BASIC PHARMACEUTICAL AND EQUIPMENT LIST FOR DISASTERS

This list has been developed by the Commonwealth Department of Human Services and Health (DHSH) and the Office of the Surgeon General, Australian Defence Force. Department of Defence (SGADF). The supplies are not pre-packaged but are identified by Defence Stock Number and can be collected and assembled in a matter of hours by Defence or private supply agencies

17.08 The contents are designed to provide supplies for direct disaster victims and ongoing supplies for a standard cross section of Australian communities indirectly affected It provides for 500 casualties for 3 days in a typical affected community of 50000

17.09 The list is divided into three parts:

a. **Group A** - General - consists solely of pharmaceuticals.

b. **Group B** - Equipment - includes the basic equipment needed to set up a clinic for examination and treatment.

c **Group C** - Anaesthetic (general) - an optional list to be used if anaesthesia and surgery are to be conducted

17.10 All drugs are listed alphabetically with form, strength and quantity identified. Special handling and storage requirements are noted. The preparation and packaging of the list is exercised regularly by the Committee in conjunction with Emergency Management Australia (EMA) and Department of Defence (DOD) and this provides for a cyclic review process.

17.11 **WORLD HEALTH ORGANISATION (WHO) EMERGENCY HEALTH KIT**

This kit was developed by WHO, United Nations, London School of Tropical Medicine and the International Federation of Red Cross. It has been adopted by national authorities, donor governments and relief organisations as a reliable, standardised, inexpensive, appropriate and quickly available source of the required pharmaceuticals and essential laboratory equipment in any disaster situation.

17.12 **RED CROSS EMERGENCY SET**

The International Federation of Red Cross and Red Crescent Societies espouses the WHO kit as its main response to health needs following natural disasters. The International Committee of the Red Cross (ICRC) deals primarily with conflict disasters and wars and has devised standard sets to respond to those particular medical and surgical needs.

PRINCIPLE

Optimal care can be delivered with a limited set of drugs: Use standardised lists.

MEDICAL EQUIPMENT

17.13 The salient features of any equipment collection are:

a. familiarisation;

b. maintenance; and

c. suitability.

17.14 **FAMILIARISATION**

It is important that personnel know the equipment that they will be using at a disaster site, and how to use it. Equipment used in training should be the same as that used at the disaster.

17.15 Emergency equipment and supplies may be stored or pre-positioned. These sites and personnel who are supposed to use the equipment should be clearly designated.

17.16 **MAINTENANCE**

Equipment should be regularly checked and maintained. This requirement also applies to larger regional stockpiles of equipment and stores.

17.17 **SUITABILITY**

Pharmaceutical supplies can be stockpiled to avoid shortcomings in responses. Individual care can be administered with a limited set of standard drugs, and health professionals must learn to utilise fewer materials than they would ordinarily use.

17.18 Minor equipment and supplies should be interchangeable and can be used at casualty clearing posts, during transport and in reception areas. Pre-packaged kits are inexpensive and can help save lives.

17.19 Sophisticated electronic monitoring equipment is usually unnecessary in the field. The majority of casualties will be suffering from traumatic injuries rather than acute medical problems and as such clinical assessment of vital signs is the most important method of monitoring. Pulse oximetry provides useful benefit especially in monitoring transported patients.

17.20 A simple 'low-tech' approach to providing medical equipment for field use is most appropriate. Diagnostic aids are often limited by noise, lighting and other environmental factors so that powers of clinical observation become even more important.

17.21 Equipment, especially that used in the field, needs to be simple, durable, 'ruggedised', and easy to clean and disinfect. It also requires suitable packaging or containers which are lightweight, durable and well labelled.

MEDICAL EQUIPMENT SETS

17.22 GENERAL MEDICAL

General medical kits should be prepared which cover the anticipated medical needs for dealing with casualties. Various methods of organising these are acceptable, provided the kits cover basic needs of airway management and respiratory support, haemorrhage control and circulatory support as well as management of fractures and burns.

17.23 Emergency drugs are usually limited to those necessary for trauma management (analgesics and anaesthetics) plus some general emergency drugs. More extensive supplies of drugs to deal with routine health problems over a prolonged period are normally not necessary for short duration incidents. Examples of medical kits which might be prepared are outlined below.

17.24 AIRWAY AND RESPIRATORY SUPPORT

These enable effective emergency management of acute respiratory failure, for example, obstructed airway, tension pneumothorax or flail chest. An example listing is at Annex A.

17.25 HAEMORRHAGE AND CIRCULATORY SUPPORT

The control of haemorrhage necessitates a sufficient supply of individual sterile dressings and calico or elastic bandages. Circulatory support requires administration of intravenous fluids for sustaining blood volume until the patient reaches a receiving hospital or until blood transfusion is available. An example listing is at Annex B.

17.26 GENERAL AND MISCELLANEOUS

A collection of basic diagnostic and therapeutic items necessary for staff in the field to complement other kits. An example listing is at Annex C.

17.27 EMERGENCY DRUGS

An example listing of basic emergency drugs is at Annex D.

17.28 OTHER KITS

These can vary according to specific threats, individual regions and particular hospital practice. Some examples include:

a. amputation kits;

b. personal comfort packs;

c. non-disaster major event kits; and

d. fracture immobilisation kits.

17.29 MAJOR EQUIPMENT AND SUPPLIES

Major equipment includes pulse oximeters, cardiac monitor-defibrillators, portable ventilators, combined monitors and intravenous infusion pumps. They have a limited role in management of the critically injured in disasters, and only when there are sufficient resources to deal with all salvageable victims. These items are available in most hospitals, but appropriate portable versions are available for field use, and personnel must be skilled in their use.

17.30 OTHER EQUIPMENT

Oxygen supplies and suction equipment are essential. Ambulances must be equipped with two oxygen supplies, one portable and the other built-in.

17.31 In large urban areas back-up stores should be readily available, be labelled, transportable and should include:

a. stretchers;

b. large burn dressings;

c. back or spinal boards;

d. splints;

e. blankets;

f. triage tags;

g. plastic containers of clean water;

h. haemostatic dressings; and

i. portable oxygen distribution systems and suction units.

PRINCIPLE

Use suitable simple equipment and supplies, maintain them and be familiar with them.

BLOOD (SUPPLY AND TRANSPORT)

17.32 Blood and blood products may be requested in disaster situations. The Australian Red Cross has a National Headquarters and Regional Blood Transfusion Services (BTS).

17.33 All disaster plans, (especially hospitals) should include the Regional BTS in their planning. Crystalloids and/or plasma expanders can be utilised in field situations. If blood or blood products are required, special storage/transport requirements exist and should be catered for in planning.

IMPROVISATION

17.34 Medical equipment in disasters may be lost, unavailable, damaged or simply insufficient in quantity. Field expedient techniques and improvisation will need to be maximised. These can include improvised splinting, immobilisation, intravenous fluids stands, evacuation assets.

REFERENCES

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ANNEXES: A. Airway and Respiratory Support

B. Haemorrhage Control and Circulatory Support

C. General and Miscellaneous

D. Drug Box

ANNEX A TO
CHAPTER SEVENTEEN

AIRWAY AND RESPIRATORY SUPPORT

Oral (Guedel) Airways
Size 0
Size 1
Size 2
Size 3
Size 4

Nasopharyngeal Airways
Size 6mm
Size 7mm
Size 7.5mm

Endotracheal tubes, cuffed
Adult size 7mm
Adult size 8mm
Adult size 9mm
(All pre-cut with Portex connectors and introducers)
Adult size 8mm uncut

Endotracheal, uncuffed
Paediatric size 3mm
Paediatric size 4mm
Paediatric size 5mm
Paediatric size 6mm
(All pre-cut with connectors and introducers)

Extension tubing with swivel connection 15mm x 22mm

Laryngoscope with spare batteries and bulbs
Adult Blade
Child Blade

Magill's Forceps
Adult size
Child size

Syringe 10ml
Spencer Wells Forceps

Lignocaine jelly sachets
Adhesive tape 2.5cm
Linen tape

Self-inflating bag valve mask assembly
- Adult bag & reservoir
- Mask size 4
- Mask size 5
- Child's bag & reservoir
- Mask size 1
- Mask size 2
- Mask size 3

Portable mini-suction unit with
- Suction tubing
- Yankuer sucker
- Y-suction catheters
- Size 10
- Size 14

Pneumothorax kit - pre-packed
(including intercostal drain tubes, Heimlich valves or drainage bags, connecting tubing, scalpel, forceps, suture material)

Cricothyroidotomy kit - pre-packed
(including scalpel, introducer, tube with Portex connector, securing tape)

Disposable gloves
- small
- medium
- large

The above list is only a guide. Requirements should be decided locally on the basis of hazard analysis and proper disaster planning.

ANNEX B TO
CHAPTER SEVENTEEN

HAEMORRHAGE CONTROL AND CIRCULATORY SUPPORT

Dressings

Field dressings, standard compressed BPC No 13
Shell dressings, standard BPC No 15
Combine, sterile pack 20cm x 20cm
Multi-trauma dressings 75 cm x 25cm

Cloth triangular bandages
Crepe bandages 5 cm & 7.5 cm

Eyepads
Adhesive tape 2.5 cm
Adhesive tape (non-allergenic) 2.5 cm

Cannulae

Intravenous giving sets - with hand pump
Intravenous cannulae
Adult
Size 14G
Size 16G
Size 18G
Paediatric
Size 20G
Size 22G

Other

Alcohol wipes
Tourniquets - venous
Adhesive dressing tape 7.5 cm
Disposable gloves (small, medium and large)

Intravenous fluids

Hartmann's solution 1000 mls (soft bags)
Haemaccel solution 500 mls

The above list is only a guide. Requirements should be decided locally on the basis of hazard analysis and proper disaster planning.

GENERAL AND MISCELLANEOUS EQUIPMENT

Stethoscope
Sphygmomanometer
Scissors, heavy duty

Tourniquet, venous

Pencils, indelible - waterproof
Ball point pen
Marking pen, felt tipped
Triage tags (each colour)

Torch - Penlight
Light stick, Cyalume Protector

Whistle
Space blanket, disposable
Safety pins (large)
Length of white linen tape/cord
Eyepads
Adhesive tape 2.5 cm
Adhesive tape (non-allergenic) 2.5 cm

Disposable gloves
small, medium and large
Protective gloves (lattice or 'turkey' gloves)

Syringes
- 2 ml
- 5 ml
- 10 ml
- 20 ml

Needles
- 19G
- 23G

A wide range of pharmaceutical drugs will be required where continuing health care is to be provided to disaster affected persons for more than a few hours.

The above list is only a guide. Requirements should be decided locally on the basis of hazard analysis and proper disaster planning.

DRUG BOX

BASIC EMERGENCY CARE AND SUPPLEMENTARY RESUSCITATION

Cardiac

Adrenaline
Atropine
Frusemide
Glyceryl trinitrate sublingual
Lignocaine

Analgesia and Local Anaesthesia

Bupivocaine
Lignocaine
Morphine
Pethidine

Sedation

Halperidol
Ketamine
Midazolam or Diazepam

Miscellaneous

Dextrose 50%
Naloxone
Salbutamol aerosol
Sodium chloride ampoules

Antibiotics

Cephalosporins
Chloramphenicol ophthalmic ointment
Flucloxacillin
Penicillins

Anaesthetic Relaxant

Atrocurium
Pancuronium or Vecuronium
Succinyl choline

Other

Adult Diphtheria and Tetanus vaccine
Aspirin soluble tabs
Combined Diphtheria and Tetanus vaccine
Dexamethasone
Mannitol 20%
Metoclopramide or
Paracetamol tabs
Phenytoin sodium
Prochlorperazine
Salbutamol ampoules
Tetanus vaccine
Water for injection

Note

The range of drugs required in the field at a disaster site for basic care is very limited: analgesics, local anaesthetics and limited emergency resuscitation drugs.

A wider range of pharmaceutical drugs will be required where:

- more advanced care is to be given in the field: elective intubation and ventilation or surgical procedures; or
- where continuing health care is to be provided to patients for more than a few hours.

The above list is only a guide. Requirements should be decided locally on the basis of hazard analysis and proper disaster planning.

CHAPTER EIGHTEEN

DOCUMENTATION

INTRODUCTION

18.01 Whilst it is appreciated that documentation may not be seen as a high priority for a number of reasons, it must be completed accurately and concurrently with patient care. This applies to the single or multi-casualty situation. Documentation within a disaster situation is essential for continuity of patient care, from the scene through to discharge.

PRINCIPLE

Adequate documentation is essential in a disaster.

RATIONALE

18.02 Documentation is required to support **patient care, medico-legal** aspects and **research.**

18.03 **PATIENT CARE**

Initial patient identification at the scene is facilitated by the use of coloured Triage Tags. Although the precise layout of the tags varies, certain principles apply. Triage Tags are numbered, which assists with identification of unconscious patients and patient movement. In general the following colour codes are used:

a. **Red** - urgent

b. **Orange/yellow** - delayed

c. **Green** - routine

d. **Black/white** - deceased

18.04 All forms should allow for the recording of clinical assessment and field treatment. The colour coding can be changed as patients' conditions change. The Triage Tags form the initial medical record and must not be removed until admission to hospital or area of definitive care. The label must then be incorporated into the medical record. The black and white label acts as an interim certificate of death and must be completed legibly by a Medical Officer. The removal of the dead is a Police responsibility.

18.05 MEDICO-LEGAL

Medico-legal aspects within a disaster response encompass both patients and personnel. With this in mind there must be sufficient documentation that will allow for the identification of responders, patients and all care given. Logs must be maintained that should reflect the staff on duty at the scene, what they were doing and when they were relieved. Any injuries to staff and treatment given should also be documented. These logs should also identify changes of command and the time of occurrence. The setting up these logs is the responsibility of the Field Medical Controller and the Ambulance Commander.

18.06 RESEARCH

Documentation should be collated and stored in a manner that will permit the establishment of a data base that can be used for subsequent retrieval for research.

TRIAGE TAGS

18.07 An example of a Triage Tag is shown at Annex A.

OTHER DOCUMENTATION

18.08 AMBULANCE PATIENT RECORD SHEETS

Ambulance patient record sheets are important to patient care and should be completed fully and included within the patients medical record where possible.

18.09 HOSPITAL DOCUMENTATION

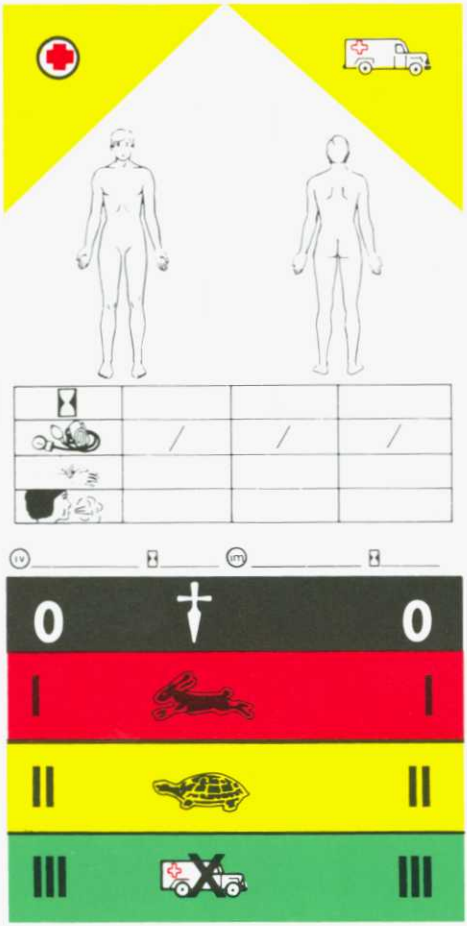
Hospitals should have prepared documentation to assist with rapid processing.

QUALITY MANAGEMENT

18.10 Accurate documentation will permit auditing that will assist in the ongoing development of programs associated with the elements of disaster management - Prevention, Preparedness, Response and Recovery. Inherent in this program is the expectation that appropriate documentation will be made available to assist with operational de-briefing and plan modification.

ANNEX: A. Example of a Triage Tag

EXAMPLE OF A TRIAGE TAG



CHAPTER NINETEEN

HOSPITAL ALERTING AND RESPONSE

HOSPITAL RESPONSE

19.01 DISASTER PLANS

All hospitals must maintain up-to-date Disaster Plans, capable of immediate activation. These Plans must be based on, and conform to, their State's functional service and comprehensive Disaster Plans.

19.02 PROCEDURES AND ROLES

Hospitals should prepare flow charts and action cards summarising actions to be followed by all personnel in the event of a disaster, covering both internal and external disasters. These flow charts and action cards should be displayed within appropriate areas of the hospital, and should be issued to all personnel. Each person's role within the hospital must be clearly defined in the event of any disaster, either internal or external.

19.03 SITE RESPONSE

On occasions, designated hospitals may be required to respond with Medical Teams to the site(s).

EXTERNAL RESPONSE

19.04 RESPONSE TEAMS

Nominated hospitals must provide Medical Teams when requested. Hospitals must notify the Disaster Medical Control Centre or Regional Ambulance Coordination Centre of the names and designations of all team members on departure from the hospital. A Medical Team consists of registered doctors and nurses, with appropriate experience, one of whom will be appointed as Team Leader. It is the responsibility of hospitals to select their most suitable staff for their Medical Teams. Larger hospitals may be requested to provide Teams which include surgeons and anaesthetists.

19.05 TEAM REQUIREMENTS

a. **Equipment** - Teams must be correctly equipped and attired in protective clothing with the name of the hospital clearly marked, and helmets marked 'DOCTOR' or 'NURSE'. Medical Teams' protective wear should conform to the international standards.

b. **Experience and Direction** - Teams must be familiar with the types of injuries likely to be encountered and their correct management. Medical Teams will work under the direction of, and be accountable to, the appropriate Medical Commander.

c **Reporting** - On arrival at the site, the Field Medical Team Leader must immediately report to the Field Medical Controller/Commander if there, or in the absence liaise with the Ambulance Commander.

d. **Discipline** - It is emphasised that discipline during a disaster is of the utmost importance and that instructions from designated senior officers within each Service are to be followed.

19.06 TRANSPORT OF TEAMS AND EQUIPMENT

Responsibility for the transport of Medical Teams and equipment to disaster sites should be predetermined

INTERNAL RESPONSE

19.07 Internal planning must be designed to handle a large influx of patients. Numbers of patients will be determined by the extent of the disaster, and bed status will not override the need to provide sheltered treatment for victims of the disaster or incident. Planning must provide the following:

19 08 NOTIFICATION

Each hospital's plan must indicate the communication channels to permit activation of its Plan.

19.09 COMMAND AND CONTROL

The health service must nominate an overall Controller to control disaster operations. A Field Medical Controller must be appointed to command the clinical services. The hospital must designate an area as a control centre to respond to the receipt of large numbers of casualties. Note that the hospital may still receive patients other than those involved in the disaster, and provision must be made to triage these patients and to manage them appropriately.

19.10 ADDITIONAL RESOURCES

Hospitals receiving abnormally large numbers of casualties may find their resources overwhelmed The Hospital Controller (through the State Health and Medical Controller) may request additional Medical Teams to assist in the management of these casualties. The additional Medical Teams will work under the direction of the Hospital Controller.

PRINCIPLE

To avoid fatigue all staff should be relieved at regular intervals.

19.11 USE OF VOLUNTEERS

Hospitals must maintain up-to-date contact lists of skilled volunteers and auxiliaries which may be used to supplement and assist hospital staff. All volunteers, self-activating or requested, must report to the Hospital for registration and tasking, and will work under the direct supervision of nominated hospital staff to whom they are attached.

19.12 LIAISON

The hospital disaster plans should include the designation of a Liaison Officer to effect liaison internally and externally with Regional/State Medical Controllers, Ambulance Service, other emergency services, the Media and other Health and Medical responders and facilities The Liaison Officer must be up-to-date with accurate information on the status of various treatment areas of the hospital and the arrangements in place for the operations/administration of the hospital and will provide regular situation reports on the progress of the disaster response

19.13 COMMUNICATIONS

Hospitals must have dedicated unlisted telephones to enable the hospital to continue normal administration and operational response during the emergency. Alternative communication systems must be in place and immediately available

19.14 AMBULANCE RECEPTION AND TURNAROUND

Procedures must be established to effect a rapid turnaround of ambulances/vehicles transporting casualties to or from the hospital.

19.15 TREATMENT AREAS

Hospitals must consider the need for rearranged Triage and Treatment Areas to ensure minor wounded casualties are provided for, without affecting the care of the more severely injured

PRIVATE HOSPITALS

19.16 DISASTER ROLE

The role of private hospitals in external disasters is primarily to accommodate patients transferred from casualty receiving public hospitals. Some private hospitals may have the capacity to receive casualties and these facilities should be identified in regional or state medical disaster plans.

19.17 DISASTER PLANS

Private hospitals that are participants of the State Health and Medical Plan are required to have plans to deal with internal disasters, as well as provide for their participation in the response to external disasters