

40 Trauma

40.1 Neglected injury: a marker of one of the greatest inequities of our time

“Of all the forms of inequality, injustice in health is the most shocking and the most inhuman because it often results in physical death”, said Martin Luther King at the second convention of the Medical Committee for Human Rights, over 50 years ago.

BACKGROUND

Injury represents one of the largest contributors to the Global Burden of Disease, with mortality and morbidity figures surpassing HIV, TB, and malaria combined.

A disease of modern times, it is now the leading cause of death of men and women under the age of 45yrs, and is responsible for the loss of more productive years of life than heart disease and cancer combined. The magnitude and extent of the problem is well-documented, as are massive disparities in incidence, prevalence, and case fatality rates regardless of injury type, pattern, systemic occasion, geographic locale, or socioeconomic strata.

In 2000, approximately 5 million people died of injuries. More than a decade later, that figure has remained at 4.8 million people, while almost a billion sustained an injury that warranted some type of healthcare. Children bear the brunt of injuries with almost one million dying every year.

Road traffic crashes in 2018 constituted the second highest cause of death in adolescents, killing 115,186 individuals. More than 90% of these deaths are found in low- or medium income countries. Indeed, if you live in such a country, your chances of surviving an injury are far less than those living in a high-income nation, and the risk of your dying from trauma is much greater than from any disease.

Road crash mortality rates are more than twice as high in Africa and Southeast Asia compared with high-income countries, and sometimes ten times as high (when related to vehicle numbers). Simply put, injury as a disease does respect national boundaries!

GLOBAL ROAD CRASH MORTALITY

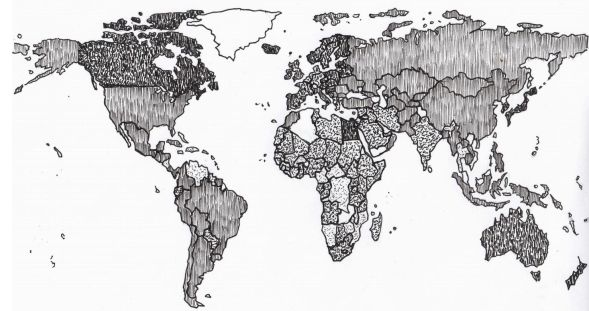


Fig. 40-1 DISTRIBUTION OF GLOBAL ROAD CRASH MORTALITY RATES. The lighter the shade, the more likely you are to die. The 2019 figures show the Dominican Republic to be the most dangerous per 10⁵ of population according to the *WHO Road safety estimated death rate*. https://gamapserver.who.int/gho/interactive_charts/road_safety/road_traffic_deaths2/atlas.html

Children suffering from burns of >40% total body surface area have a 100% mortality in Sub-Saharan Africa compared with 7.7% in the USA.

Effective management strategies in most high-income countries have drastically reduced trauma deaths. Mitigation, therefore, is amenable to public health strategies.

The World Health Organization has recognized this epidemic and classifies injuries as both intentional and unintentional.

Unintentional injuries include road traffic crashes, drowning, poisoning, burns, and falls while intentional injuries result from wars and civil conflict, suicide, child abuse and neglect, and crime and violence.

In almost every category listed, >80% deaths are found in LMICs.

National action plans to prevent violence and injury were recommended after the release of the WHO world report on violence and health. The Decade of Action for Road Safety (2011-2020) was launched at the United Nations General Assembly in 2010 with a goal to decrease by 50% injury mortality rates from road traffic crashes.

In a follow-up report in 2015 on the global status of road safety, the number of road traffic deaths had plateaued to 1¼ million every year.

A ROAD DISASTER WAITING TO HAPPEN



Fig. 40-2 THE POTENTIAL FOR INJURY IS HUGE!

While there is progress towards improving road safety legislation (e.g. laws on seat-belts, drunk driving, motorcycle helmet or child restraints), the report showed that the rate of change is too slow.

Although injury prevention measures have shown success in decreasing the case fatality rates from injuries, the last 20yrs have shown that no system will prevent all injuries.

Indeed, for every trauma death, there are 20-50 more non-fatal occurrences that result in profound disability and loss of economic viability.

The deaths, therefore, are only a fraction of the problem. We need to address the massive number of neglected trauma patients that number some 100 million globally.

Trauma care, which encompasses all aspects of the care of the injured and includes prehospital care, initial resuscitation and definitive treatment at the hospital, and rehabilitation, is a global obligation.

Strong evidence suggests that good organization of trauma care reduces mortality by c.15% and any form of pre-hospital care system, especially in rural areas, reduces mortality in LMICs by c.25%.

Instituting a trauma hospital in a rural area has been found to be very cost-effective compared, for example, with seatbelt law enforcement.

This book seeks to show how to improve trauma care locally, and hopefully also regionally. Obviously if you can influence your medical directors and ministries so much the better!

Starting quality improvement programmes and strengthening of emergency and essential surgical care at first referral facilities closest to the community will have an enormous impact.

This chapter therefore outlines and discusses critical skills you will need to be able to handle any case that comes your way.

The 15 surgical conditions, accepted by the Amsterdam Declaration as an 'essential surgery list' that all district hospitals should be able to deal with, include a majority which deal with injury or its complications.

- (1) Reduction of fractures & dislocations
- (2) Splinting & external fixation of fractures
- (3) Thoracostomy
- (4) Craniotomy
- (5) Tracheostomy & Cricoidotomy
- (6) Exploratory laparotomy
- (7) Debridement of wounds
- (8) Skin grafting

These must serve as the basis for the creation of training tools for the provision of emergency and essential surgical care.

40.2 Wound assessment

The skin is the largest organ in the human body. As a physical barrier, it prevents infection, helps regulate body temperature, and protects underlying delicate structures. Along with subcutaneous fat and fascia, the skin is a resistant, but *soft*, tissue.

Any breach of the skin allows entry of microbes and can damage underlying structures. A major wound of the skin, such as a large burn, also puts into question the regulation of body temperature (50.7).

You must do everything possible to prevent infection and diagnose the severity of a wound. This may well mean wound toilet and debridement (46.2).

Assess the general seriousness of trauma to the whole body, by using the *physiological* parameters of the C-ABCDE algorithm (41.1).

Assess the wound, by looking at the *anatomical* parameters of the extent of tissue injury and the anatomic site:

- (a) How large is the soft tissue wound?
- (b) What are the underlying structures: organ, artery, bone, nerve, or tendon?
- (c) What is the mechanism of injury?

Tissue damage after a stab wound is not the same as a bullet or after a crush injury or a fall from a motorbike.

(a) Big wounds and small ones

In general, the larger the wound the more contaminated it is and the easier for bacteria to enter. Dead and devitalised tissue is an excellent culture medium for bacteria. In a small wound, the body's natural defence mechanisms (macrophages, white blood cells, antibodies etc.) can usually overcome the bacteria present. In a large wound, the amount of tissue damage and bacterial colonisation can easily overcome these mechanisms and, therefore, the importance of wound debridement. There is also a greater chance of injury to deeper structures.

Even small wounds can be dangerous: *a small puncture wound can overlie an important structure*. A deep puncture wound may be anaerobic in its depths, creating the best atmosphere for *Clostridia tetani* or other bacteria. *Make sure your patient is vaccinated against tetanus*.

(b) Wound examination

When examining a wound, make a mental picture in your mind:

- (1) How big is it?
- (2) How dirty is it?
- (3) How deep is it?
- (4) Is there obvious bleeding, torn fascia or muscle, exposed bone?

Think of photographing the wound for reference later. *Beware, though, in war zones, you may be thought a spy if you take pictures!*

Then think of the anatomic site of the wound. Wounds of the head and neck, thorax or abdomen take priority for treatment because of the vital organs they contain.

But *don't forget the soft tissue wound* after you have completed a laparotomy, placed a chest tube or explored a nasty head or neck wound.

For wounds of the limbs, which make up the great majority of trauma, think of the anatomy of the arterial supply, the innervation, and the functions determined by the bones and tendons. Each of these structures has its own diagnostic tests.

- (1) **For arteries:** note the six Ps: pain, paraesthesia, pallor, paralysis, poikilothermia, distal pulse weak or absent (49.2)
- (2) **For nerves:** check for sensation and motor power in the distal limb (48.1)

N.B. Arteries and nerves tend to be bunched together in bundles. Injury to one is often accompanied by injury to the other.

(3) **For tendons:** test specific movements at different joints depend on intact tendons (48.4).

(4) **For bones:** close observation will show any deformity of the limb and gentle palpation will tell you if the bone is fractured. A radiograph or ultrasound will confirm the type and extent of fracture.

(5) **For missile wounds,** place a radio-opaque object (needle or coin) at the entry and any exit wound.

When it comes to bullet or shrapnel wounds, *don't speculate!* You are not a forensic specialist! Describe the wound that you see, and note the weapon used, how distant was the victim. Know your limits!

40.3 Preventing trauma

Trauma - the tearing apart, burning, crushing, maiming, lacerating, or irradiating of the human frame is potentially one of the most preventable of mankind's afflictions.

Injuries are the results of accidents or of violence: personal, animal, communal, political or international. Violence may also be institutional and deliberate, including torture (40.11).

Whilst psychological trauma may be very long-lasting (40.5), here we consider physical hurt. Since most injuries can be avoided, it is important that injury prevention programmes are set up. If they already exist, they may need to be properly enforced on a country or local basis.

Almost all injuries could be prevented, so the *absolute importance of prevention*, applies to all injuries described. Common prudence would prevent most injuries!

Causes of injuries can be classified into different groups:

- (1) war or political instability (40.9)
- (2) natural catastrophe (40.8),
- (3) exposure to fire & live electric cables,
- (4) poor technical standards,
- (5) poor governmental & institutional regulations,
- (6) poor enforcement of such regulations,
- (7) poor awareness or educational attainment,
- (8) personal conflict,
- (9) self-harm
- (10) sports/games
- (11) proximity to wild animals (46.10)
- (12) untreated pathology.

So, by reducing occurrence of such factors you would automatically reduce the burden of injuries.

Except in situations of strife, road crashes are the major cause of death & disability in low & middle-income countries, accounting for more mortality & morbidity than important infectious disease combined!

Statistics of road crashes are really horrendous. WHO figures make very sad reading. There is a hundred-fold difference in consequences of road crash for victims in low & middle-income compared to rich countries. The reasons are not usually because the vehicles are newer or better maintained in the latter, but that road safety rules are not followed.

Prevention measures against road crashes are extremely urgent, as this is an epidemic worse than AIDS, Ebola or COVID!

Among other things, this means:

- (1) The wearing of seat belts for all car drivers & passengers and helmets for all two-wheeler drivers & their passengers.
- (2) The absolute rule that nobody should ever drive after having taken any alcohol or sedative drugs whatsoever, not even a single drink.
- (3) The prohibition of driving whilst manipulating something else at the same time: this should include mobile phones, cigarettes, & food and even the putting on of gloves!
- (4) Improvement of road traffic management (speed restrictions, *i.e.* humps, traffic lights, etc.) and rigid enforcement of safety regulations:
 - (a) driving licenses obtainable without bribery and after proper educational courses,
 - (b) vehicle proficiency testing certificates obtained after proper testing,
 - (c) separation of motorized traffic from pedestrians.
 - (d) restrictions on moped passengers.
 - (e) automatic controls at road/rail crossings.
 - (f) the carriage & use of functioning lights on all vehicles including bicycles after dusk.
- (5) Reduction of huge overcrowding of private transport in cities.
- (6) Avoiding traveling at night if at all possible.

DON'T DRINK & DRIVE

ROAD SIGN WARNING OF ALCOHOL



Fig.40-3 ROAD SIGN warning against drinking alcohol & driving.

THE DANGER OF TEXTING & DRIVING



Don't text and drive

Fig.40-4 DANGERS OF USING A PHONE & DRIVING. Not only may the phone distract the driver, it may completely block out the view of a child crossing the road! Using a mobile phone increases the risk of collision 4-fold hands-free sets being not much safer)

Penalties *must be enforced* for non-compliance

N.B. Road blocks checking on vehicles on highways are probably less effective than spot checks within towns & cities!

The risk of early death from road crash is far greater than from exotic tropical illness! Therefore these precautions apply to all of us.

Accidents with industrial or agricultural machines are often gravely mutilating. Proper precautions by the owners and enforcement of proper government regulations would prevent many injuries.

This applies both to machines, the temperature or environs of work area, as well as work in hazardous places. Workers who might fall great heights if they slip must be securely attached to safety harnesses. Helmets are needed where falling masonry or objects can be expected. Proper cleaning & washing areas are also very necessary, and minimal exposure to toxic substances.

If the same hazard causes the same injury in a succession of patients, always ask how it happened. *Do your best to see that the danger is removed.*

Safety at work needs to be managed. It doesn't just happen! This entails: Inspection, Monitoring & Audit.

BARBECUE PLACES FOR COOKING

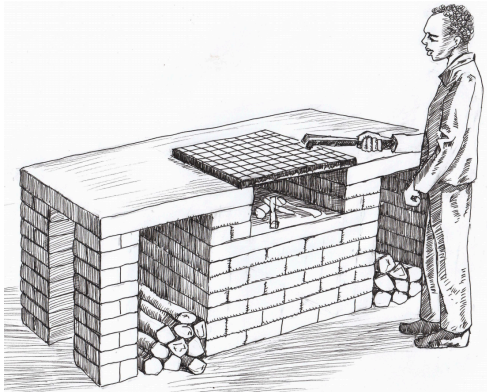


Fig. 40-5 BARBECUE PLACE. The cooking is done at arm level, *not on the floor*. The fire & pots are protected,

Inflammable and explosive substances must be stored in secure places; this includes gas cylinders for sale in shops.

Educational limitations make certain people more vulnerable: this should be accounted for. However, the disabled are often discriminated against in this respect, as are epileptics.

Children are especially liable to injury, principally on roads, but also at home from burns, especially from open fires. Protective measures include building cooking places at waist, rather than floor, level (40-2).

N.B. A wet floor, loose floor rugs & clutter increase the risk of injury at home, as does poor lighting.

Supervision of babies & toddlers is mandatory.

In many mega-cities, but also in rural areas, social disintegration is causing increasing violence. The causes may be lack of access to potable water, arable land, educational opportunities, or simple overcrowding.

The situation in the shanty towns of many megacities is frankly appalling, though high rise buildings also pose their own challenges.

Many of the resultant injuries are due to fists, teeth, bottles, knives, sticks, and bullets, and many are inflicted under the influence of alcohol, or other drugs. Violence during robbery and rape (57.4) are also factors.

Even in more affluent societies, the poor are more vulnerable than the rich. In the USA, blacks have a 5% higher chance of being murdered, and their mortality from road crashes is 17 times as high as for white children, and twice as high from other injuries. Obviously the causes are multi-factorial, but this goes to show that poor backgrounds result in more frequent and more serious injury

A serious global epidemic is also the easy availability of guns in many places. The result is that in certain civilian situations, casualties resemble war victims entirely.

The control of hand weapons is an immediate concern for everyone who takes prevention seriously.

Keeping a register of injuries is a very useful tool, for any workplace, but also hospitals.

40.4 Psychological care in trauma

(a) In general

You might think that mental health & surgery are opposite sides of the health spectrum. However, especially in a crisis setting, psychosocial support is crucial to a holistic response. This is even more important in multiple trauma and war situations.

In the latter, there is usually an exodus of qualified personnel, exacerbating an already low number of experienced staff. As the general infrastructure of a war zone deteriorates, every aspect of health care, including logistics, becomes more complex, more time-consuming and frustrating. A decrease in resilience, and exposure to gross trauma, often overstretches the functioning of the existing work force and makes everyone more psychologically vulnerable.

Furthermore, the extent of trauma individually and corporately far exceeds average peacetime experience. Demands for supplies (e.g. for blood, prostheses, surgical space etc.) may quickly outstrip supply.

Also, demands for social and psychological support, frequently way beyond everyone's usual experience, often falls on health staff where no such social infrastructure exists, or where it is itself no longer functional.

(b) In the immediate situation

In the early hours after a serious trauma event, both health care staff and victims are in a state of chaos, confusion and exhibit general loss of control.

In this phase, it is crucial to provide, as much as possible, a sense of safety and control. *Regular and clear communication are crucial, both amongst staff and with patients.*

This includes creating a satisfactory safe working zone, explaining the next steps, obtaining opinions from involved persons, and explaining decisions. These may need to be repeated several times. *Don't give the impression you are too rushed, or you are losing control. Don't get angry! Remember that psychological, emotional & social wellbeing of patients and staff may be their greatest acute need. Don't trivialize injuries.*

MARIA WENT MISSING: CAN YOU ANSWER TRUTHFULLY:

"We don't know, Madam, but we have told the police and given them her name and a description of her. We have also given them our mobile number, so they can call us as soon as they have any information"

Make sure you have in place:

- (1) An immediate response.
- (2) Contact & dialogue with the wounded.
- (3) Relay of relevant Information.
- (4) Monitoring of patients one-to-one
- (5) A safe secure environment.
- (6) A sense of order & calm.
- (7) Organized use of non-medical personnel.
- (8) A social/psychological support team.
- (9) Liaison with the public.
- (10) Refreshments.

Early supportive intervention is the most effective way to prevent post-traumatic stress. Be attentive to the needs of the patients and allow them to express their emotions.

Whilst most will show an acute stress reaction, with an adrenaline rush and hypervigilance, others may become mute & withdrawn.

Handling agitated relatives, who may contribute significantly to the general chaos around a mass casualty event, may significantly reduce the burden on health staff and contribute to better care.

(c) Patients

Don't forget that you must deliver a holistic approach to trauma care. Simply fixing a fracture without considering a patient's psychological, emotional & social wellbeing ignores what may be the greatest need.

It is important to communicate with patients, care givers & relatives, and so identify and detect early signs & symptoms of psychological distress.

Give guidance according to culturally acceptable practice, and offer help. The more you do this, the more your nursing staff will follow suit.

PSYCHOLOGICAL RESPONSE TO TRAUMA



Fig.40-6 PSYCHOLOGICAL RESPONSE TO TRAUMA may be profound but hidden.

You should highlight that it is completely normal that adverse events cause mood changes; the more serious the event the greater the effect on mood. Thus a serious mood change does not imply a patient is mentally sick. Furthermore, confrontation with death of others will produce profound emotional and social reactions. *These are normal reactions to an abnormal situation.*

Sleeping and eating may be affected; some 30% of victims experience nightmares and flashbacks, which usually last <2-3 days.

The initial reaction is intense, but is usually short-lived if normal function is resumed quickly.

If there is a life-changing event, understanding needs to grow to accept losses and changes. This is especially so after trauma, and particularly if body parts or image are lost. Try to accompany victims in accepting and integrating their loss, developing strategies to return to independence or help train support if that too is lost.

Psychological trauma implies a crucial experience of loss of control, and it is very important to lead the victim to take back control as soon as possible.

This is time-consuming, so you should delegate this task to others, who have an interest and expertise in this kind of work. You need to show them how to recognize exacerbations or relapse of pre-existing mental illness.

INFORMATION GIVES A SENSE OF CONTROL

Fundamental elements of counselling are:

- (1) listening attentively,
- (2) addressing pre-occupations,
- (3) encouraging coping mechanisms,
- (4) explaining emotional reactions to loss,
- (5) helping adjustment.

Ask open questions & be friendly. Use a private room for this if possible, and ensure it is a safe place.

Careful explanations of treatment options are mandatory. *Don't make false promises!* Be patient & positive, and ready to repeat details, and show empathy. *Don't be judgmental, and avoid "what if" conversations.* Link up a victim with a support group, if possible.

If victims are agitated, violent or very passive, get help, *don't leave them alone,* speak calmly & gently, reason with them and attempt to negotiate. *Don't argue or contradict, & avoid sudden or threatening movements.* Reassure & re-orientate them (if necessary), explaining the next steps, giving choices.

Protect a patient from harming himself or others. You may, rarely (with the help of others), need to apply restraint. Document the reason for this. You may need large doses of haloperidol (37.2).

Monitor the patient when you use sedation. Get the psychological support team to be involved in treatment planning, join in medical rounds & report back. Get them to develop peer support groups, and develop group consultations and online chat groups.

Make sure pain relief is adequate. Phenothiazines usefully boost pain relief therapy (37.2)

THE EARLIER THE ANALGESIA, THE BETTER THE OUTCOME!

COMBINATION THERAPY IS MORE EFFECTIVE THAN MONOTHERAPY!

MIDDLE & LONG TERM EFFECTS

This is outside the scope of this book, but you will need an integrated holistic approach, which includes: rehabilitation, occupation therapy, psychotherapy, and more. Do not rely on medications alone: all these have their advantages and limits.

N.B. Remember post-traumatic stress disorder: it is real!

(d) Yourself

Dealing with the pain of others day in & day out will also stress you!

This is also termed vicarious trauma, compassion fatigue or secondary traumatization.

It actually happens because you care, and in a sense you take on the suffering of the victim.

PROTECTING YOURSELF

Recognize the signs in yourself:

- (1) Extreme fatigue,
- (2) Having no time or energy for yourself,
- (3) Neglecting to eat, drink, sleep or wash,
- (4) Becoming irritable,
- (5) Disconnecting from loved ones,
- (6) Withdrawing socially,
- (7) Getting into conflict with colleagues,
- (8) Becoming cynical, sarcastic, or depressed,
- (9) Having nightmares, or poor sleep,
- (10) Becoming oversensitive.

N.B. Beware of developing alcohol or drug dependency!

PREVENTION

(1) Physically:

Eat healthily & regularly; take exercises; get enough sleep; play sport; do things you enjoy.

(2) Psychologically:

Take time for self-reflection; write a journal; read books (unrelated to work); discuss your feelings with others (preferably not colleagues); be open with others. *Don't deny your own frailty!*

(3) Emotionally:

Keep enjoyable company; stay in touch with your loved ones; *don't bottle feelings up!*

(4) Professionally:

Take a break, especially during the week; discuss with your colleagues; iron out disagreements & conflicts; share your successes. Reassess your priorities. Realign your own expectations.

(e) Your staff

You may see the signs listed above for one or more members of staff. Note also:

- (1) Inability to co-operate with others,
- (2) Loss of respect for others & victims,
- (3) Diminished capability at work,
- (4) Impaired ego (heightened or suppressed),
- (5) Being excessively demanding,
- (6) Dissociation & depersonalization,
- (7) A tendency to generalize,
- (8) Exacerbations of pre-existing ailments,
- (9) Changes in self-view, spirituality, world view,
- (10) Behavioural change.

Allow your staff the same self-care, and make sure you examine the demands made on your staff. Workshops are very helpful: act out role-plays, have case discussions, use questionnaires, get feedback, do regular debriefings, arrange for on-site teaching, and look out for resources outside your hospital environment. Finally, set up peer review & mentoring systems.

(f) Your organization

Look at how your hospital functions overall; reflect about what you can do as manager or team leader. Consider, for example, what you can do to improve pain management in your trauma unit.

To evaluate results, look at changes in 4 different areas:

- (1) Physical improvements
- (2) Efficiency
- (3) Emotional change in patients & staff
- (4) Behavioural changes

40.5 At the scene of the injury

A severe accident kills some patients instantly. Other patients die shortly afterwards from causes that could be prevented, if they had been properly treated immediately after the accident. First aid involves those measures that preserve life, preventing unnecessary death, further injury, and disability *before the patient ever reaches hospital*.

You, the surgeon sitting in your hospital wants to receive an injured patient in the best condition possible. This helps in getting the best outcome possible for the greatest number of patients. It decreases the workload on the hospital in general and the nursing staff in particular. It allows for the most efficient use of often scarce resources.

A good ambulance or pre-hospital emergency service help in many ways:

- (1) Access to medical care for those who otherwise would not get to a hospital,
- (2) Early evacuation of the severely injured,
- (3) Emergency medical care before arriving at a hospital,
- (4) Triage of multiple patients in the field so that the most severely injured arrive at the hospital first,
- (5) Care of many minor injuries so that hospitals are not overburdened with them,
- (6) All of the above in case of a major disaster or armed conflict.

For an ambulance service to function efficiently there are a number of requirements that you must meet: organisation, training of personnel, equipment, supplies, communications, financing, public support. An ambulance is not just a "taxi" for sick and wounded people.

In many countries, prehospital services are woefully inadequate, even non-existent. Indeed, many, if not most, injured people often reach hospital by private means. The first people to help are usually the public passing by; if the average knowledge of first aid in the community is high, this would be of great benefit. In some countries, the National Red Cross or Red Crescent Society has an ambulance service & first aid volunteers, and they have trained the police, taxi and lorry drivers in basic first aid.

In other countries, there are private ambulance services. In some, there is nothing and the sick and wounded depend entirely on private means of transport to get to a hospital. You should encourage all training programmes in community-based first aid.

If your hospital has an ambulance, try to send a nurse or medical assistant with the ambulance to an accident. You will probably be unable to keep one on permanent standby, so put your most aware and interested driver in charge of the ambulance and teach him the basics of first aid. Interest him by letting him see how you care for injured patients in the emergency department and the theatre.

N.B. An ambulance is not a taxi service!

AT THE SCENE OF A SERIOUS CRASH



Fig.40-7 THE FIRST RESPONDER AT THE SCENE. The immediate need is to maintain safety of survivors, and tend to the most seriously injured.

AT THE SCENE OF AN ACCIDENT

The basic rules of First Aid are basic common sense.

The site of an accident, especially a road traffic crash, is a 'danger' zone; vehicles are still travelling on the road. *Security comes first!* Warn other traffic by displaying a red triangle, or hazard warning lights, or other lights, or by any other means.

EXTRACTING A VEHICLE CRASH VICTIM

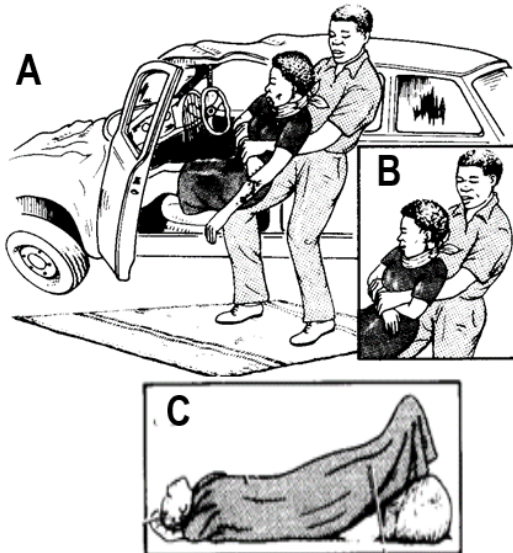


Fig. 40-8 EXTRACTING A VICTIM. A, lift the victim onto your thighs, kneel, and then slide her onto a blanket or a stretcher. If her arm is injured, let it hang free. B, if both arms are normal, lock your arms under both of hers. When a shocked patient is waiting for transport, lie her as in C, horizontal, the legs raised, and the head tilted backwards. Wrap her up for warmth, but *don't* overheat her. *N.B.* These passers-by probably had no headboard to slide behind her and steady the cervical spine, nor experience how to use such. Adapted from Hanns Pacy, *Road Accidents: Medical Rescuer*. Med J Austral 1967; 1(16):806-810 with kind permission.

Get everyone to extinguish lighted cigarettes or other fire hazards and ask drivers to switch off their engines.

Get uninjured people out of vehicles and into a safe place; only then go to the casualties.

PREVENT FURTHER INJURY: REMOVE CASUALTIES FROM DANGER!

Seek help from passers-by if necessary and try to ensure the cooperation of the patient.

MULTIPLE CASUALTIES

Often, there are several injured persons after a single accident, e.g. from an overturned bus or lorry carrying passengers. Again, securing the scene and seeking help are the basis of the management of the scene.

A triage of the victims is then necessary (40.8), putting them in categories of priority for care, and then priority for evacuation, which are not the same thing.

EXTRACTING A TRAPPED VICTIM

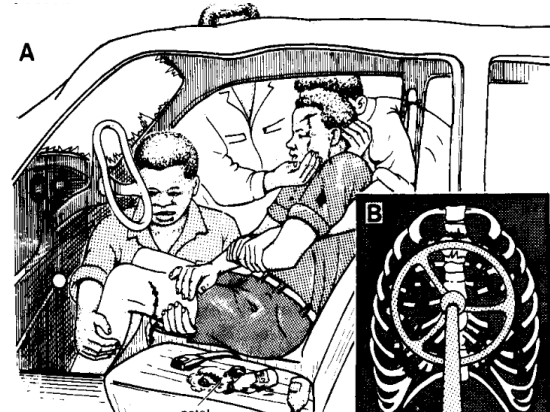


Fig. 40-9 EXTRACTING A TRAPPED VICTIM. One man uses the grip shown (40-6), another stabilizes the victim's neck and keeps the airway clear, while a third eases the legs out. B, shows what the steering wheel has done to the chest. *N.B.* This is the typical result of a head-on collision where the driver has no seat-belt, and there is no air bag! Adapted from Hanns Pacy, *Road Accidents: Medical Rescuer*. Med J Austral 1967; 1(16):806-810 with kind permission.

PREVENT WORSENING THE INJURY: SHELTER THE CASUALTIES!

First, if there are more than just a few, call out: "everyone who can walk, stand up and come over here", under a tree for example. These patients will usually have relatively minor injuries. Examine first those patients who cannot move; they are more likely to be seriously injured.

CATEGORY I (CODE RED)

Victims with life-threatening injuries who require immediate measures: *e.g.*

- (1) catastrophic external haemorrhage;
- (2) airway or breathing problems;
- (3) coma, apart from the moribund.

CATEGORY II (CODE YELLOW)

Victims who require transfer to hospital, but their condition is not so serious that they cannot wait, *e.g.* (1) fractures & soft tissue wounds.

CATEGORY III (CODE GREEN)

Victims who only need basic first aid measures that you can provide on the spot. If there are too many, transfer them last to hospital for ambulatory care.

CATEGORY IV (CODE BLACK OR WHITE)

Victims who are dying, or already dead. Separate these & evacuate them last of all.

The priority for treatment is not the same as priority for transfer to the hospital. Evacuation of patients depends on the particular situation to hand. Are you in a city, only minutes from the hospital? Are you in a rural area hours or days away? What is the state of the roads and traffic? Are the roads passable? These factors, and others, all affect the time to reach the hospital. Distance to a hospital is not measured in distance but time!

(a) Minimum first aid

Here are some of the things to teach your ambulance driver and rescue personnel.

Apart from security measures, the driver & nurse (or extra personnel) should know how to examine a casualty for immediate life-threatening conditions according to C-ABCDE (41.1). Once these are under control, protect casualties from the elements (sun, rain, wind etc.) and put them in the most comfortable position and get others to provide psychological support.

Then, proceed with stabilization measures and check the casualty's condition and effectiveness of the measures taken, before evacuation to the hospital, if admission is necessary. Often, it is not, and first aid measures are sufficient.

The first responder should ideally be able to:

- (1) Stop massive external bleeding by packing a wound and applying a pressure bandage, or a proper tourniquet (if available: see below).
- (2) Clear the airway by holding the jaw forward (42-2) and removing blood, vomit, and foreign bodies from the mouth.
- (3) Insert an oropharyngeal airway (42-4).
- (4) Use nasal or oropharyngeal suction.
- (5) Place the patient in the recovery position (42-1) *for transport to hospital. Not doing this is a common critical mistake.*
- (6) Lift and carry a victim appropriately, particularly if a spinal injury is suspected (54-5).
- (7) Fit a temporary cervical collar if necessary.
- (8) Close an open chest wound.
- (9) Ventilate with an Ambu-bag & intubate, as well as give external cardiac massage and mouth-to-mouth ventilation.
- (10) Control other bleeding by raising a wounded limb, and applying local pressure.
- (11) Stabilise any fractures.
- (12) Wash any open wounds or burns.
- (13) Keep the casualty warm.
- (14) Start an intravenous infusion.

The most common cause of preventable death is continuing peripheral haemorrhage, hence the "C" in C-ABCDE.

N.B. This is more often the case at the site of an accident than in the hospital emergency room.

There is no use in evacuating a massively bleeding casualty first if he dies en route. Give priority to those patients who have serious injuries but also have a good probability of survival (40.8).

CAUTION!

- (1) Transporting an unconscious accident victim on the back without proper attention to the airway is a major cause of unnecessary death.
- (2) *The use of a tourniquet, especially an improvised one (44.2) is likely to do more harm than good.* The proper application of a tourniquet requires training, knowing when it is really necessary, and how to monitor it. *Use only a special manufactured tourniquet (44-7).* To improvise an efficient tourniquet requires more knowledge than the average first aider, or even doctor, has.

Intervening after a serious accident can be psychologically difficult for someone untrained. *Don't forget to debrief those involved after every incident.* It is the best way to improve skills, help them to recuperate and relax, and go out again to the scene of another accident.

(b) First aid for suspected fractures

(1) Spine

Move the victim en bloc (54-4) preferably on a board, a door, or strapped to a plank.

Don't try to remove a helmet!

(2) Pelvis

Tie 3 triangular bandages firmly round the pelvis, put pads between the legs and tie them together.

(3) Arm

Put the arm in a sling and bandage it firmly to the body, or tie the arm to a splint which reaches the axilla.

(4) Thigh

Put the leg in a well-padded Thomas splint. *Take especial care to pad the neck of the fibula to prevent paralysis of the common peroneal nerve.* If you can, use a few plaster bandages.

(5) Lower leg

Tie a Thomas splint, or if unavailable, pad a piece of wood or bamboo, or even a palm branch, to the injured leg, and bandage this to the uninjured one.

(c) Minimum requirements for an ambulance

THE AMBULANCE BOX

The contents of this will depend on the training, competency and experience of the user. It should include, as much of the following as possible:

- Torch, with spare batteries and spare bulb
- Searchlight connectable to the vehicle battery
- Permanent marker pens (different colours)
- Writing pens & pencils
- Notepads & triage cards
- Non-sterile disposable & sterile gloves
- Soap and hand towels
- Rubbish bags
- Face mask or shield
- Antiseptic solution
- Bandages
- Elastic gauze
- Triangular bandages
- Sterile gauze compresses
- Cotton wool pack
- Adhesive bandage (wound plaster)
- Aluminized dressing for burns 35x45 cm (2)
- Oral rehydration salts
- Drinking water flasks
- Rescue sheet 210x160 cm
- Sharp & blunt scissors (small & large)
- Dressing scissors
- Toothed & non-toothed forceps, 9.5 cm
- Self-inflating (AMBU) bag (1)
- Face masks and oral airways (different sizes)

40.6 Disaster management & hospital triage

SITUATIONS CREATING MASS CASUALTIES

In a normal day in your hospital, you face every single patient one by one. You take a history, examine the patient, ask for radiographs or laboratory tests.

You do everything possible within the limits of your hospital to diagnose and treat your single patient for every single patient.

One day, there is a major accident: a bus or lorry, carrying many passengers, turns over and a large number of patients arrive at the hospital more or less at the same time. You call in staff off duty, you work through the night, you prioritize the patients for emergency care, for operation, and for semi-urgent management.

You manage in the end to treat all the patients. Although you have performed triage of a major incident involving multiple casualties, you have still managed to do everything for everyone.

Then, one day, there is an earthquake, or an epidemic, an isolated terrorist bomb blast, a stampede or fighting breaks out between a rebel group and the government. All of a sudden, a very large number of injured or sick patients arrive at your hospital. Calling in off duty personnel and working without a break are not enough: there are just too many patients. Now, you must practice triage of mass casualties. *You can no longer compensate by mobilising extra resources and personnel. You can no longer do everything for everyone. You need to change your way of thinking, the organisation of your hospital, and how you practice medicine.*

DISASTER SITUATION



Fig.40-10 DISASTER. Here you can expect multiple casualties, serious or superficial, arriving either in a rush or sequentially.

WHEN TO PERFORM TRIAGE OF PATIENTS

This defines priorities of treatment among many patients with differing severity of injury. You must now try to do the best possible for the greatest number. *You can no longer do everything for everyone.* This 'best for most' policy can create ethical dilemmas.

It is not easy to change your way of thinking and how you face your patients. But if you want to help the greatest number, according to the capacity of your hospital, then *you must be prepared to make this change.*

Having to decide out of many patients whom to admit and whom not is no easy task.

Imagine your everyday out-patient department, with tens or even hundreds of patients waiting to be examined. Some will be quiet, in pain; others will be busy talking to their neighbours, children will be running about, or crying, and everybody will be accompanied by family members or friends. There is a considerable amount of noise.

Now, multiply that number by 5 or 10. Many victims will be severely injured and bleeding; everybody will be afraid. Many patients will be very lucid with a relatively minor injury, such as a closed fracture of the forearm, which will give them great pain. They will see blood around them and be very afraid. Some will become hysterical, shouting that they are "dying" and try to bring attention to themselves.

The noise may be unbearable. *The severely injured patient, of course, lies still, and does not make noise!*

Organising the management of such a crowd of injured patients, some severely hurt, others not so much, and yet others with relatively minor injuries is a challenge in the best of circumstances. *You need a plan to face this challenge.* Such a disaster preparedness plan must be made during a time of quiet and requires a re-organisation of the ordinary running of the hospital, training of the personnel, and simulation exercises.

To organise a good response to a mass casualty event, you must realise that there are no hard rules. There are guidelines and a logic that you must understand, and which you can then apply to many different situations. If you understand this logic, then you will be able to reorganise the functioning of your hospital and medical team to meet new challenges.

CREATING A DISASTER PLAN.

Keep it simple; there will already be enough confusion with the arrival of a very large number of patients. Everybody in the hospital, not just the clinical staff, but paramedical, administrative, cleaning, maintenance, kitchen and laundry staff must understand what they are supposed to do, and how it differs from their everyday workload.

The hospital disaster plan may be part of a regional or national disaster plan. It should describe who declares the emergency and what routine procedures should cease. The plan should stay as close as possible to the normal routines of the hospital.

Too many changes only create more confusion in what is already a chaotic situation. Obviously, such a plan involves the entire staff and must be prepared beforehand. This does not require money or special technology, only time, effort and commitment.

ONE-OFF INCIDENT OR ARMED CONFLICT

A natural disaster, a major accident or an isolated terrorist bomb attack is usually a one-off event. All the victims suffer injury at one point in time. You will have to organise the hospital facilities and personnel to meet the extra need.

The mobilisation of resources is called the *surge capacity*. This is different from hospital to hospital and from community to community depending on the means and resources available.

Some extra help might arrive from other hospitals in other areas of the country or, in a major incident, from abroad: foreign medical teams.

Armed conflict is different. The wounded arrive today, and tomorrow, and the day after, until the end of the fighting. This might be weeks, months or even years. Surge capacity is of little use if you have to face a large number of wounded every day. You have to re-think the organisation of the hospital and change the personnel roster to meet a continual need. Even if everyone in the hospital can work through 24h to treat the patients after a one-off event, this is not now possible for a longer time if you have large numbers of new patients, day in and day out. The hospital has to find a new work rhythm. The basic principles of triage apply in both situations, but you must understand the differences as well.

THE CRITICAL BALANCING ACT

Every hospital is different: infrastructure, number of beds, number and experience of the personnel. Therefore, the capacity of each hospital is different. How many patients does it take to overwhelm your hospital? This will not necessarily be the same for your colleague's hospital in the next district. Again, you must understand the logic of triage, and adapt according to your circumstances.

What are the needs? And what are the resources and personnel available? This is the balancing act you must manage and not only will it change from hospital to hospital, but even in your hospital from day to day.

NEEDS

Estimate the number of patients and their pathology. Are there many patients with penetrating trauma, or burns?

The first requires a great deal of surgery; the second a great deal of resuscitation and nursing care.

RESOURCES FOR TRAUMA SURGERY

- (1) Personnel: surgeons, anaesthetists, theatre nursing staff, sterilisation staff
- (2) Operating tables
- (3) Equipment: instrument boxes of different types
- (4) Number of hospital beds
- (5) Staffing of post-operative beds

Not only does the number of new patients change every day during a war – some days there is heavy fighting, other days not so much – but the situation in the hospital can also change dramatically.

Imagine in your hospital you have two general surgeons. One day, one of them falls sick with an attack of malaria. Now, you only have one surgeon.

This will affect how you triage the patients, who will have priority for operative treatment.

WHERE TRIAGE OCCURS

Under the best circumstances, triage of priority patients begins at the point of wounding. It continues through first aid and evacuation, all the way to the hospital. It occurs at reception at the hospital and then continues during the victim's admission.

An examination of the patient and putting that patient in a triage category is like taking a photograph of the patient: it is the patient's condition at that point in time and space.

But the patient is actually like a moving picture, getting better or worse over time from wounding to final treatment. You must always keep in mind that, whatever triage decision you make, you might have to change it as the patient's condition changes.

In many countries, prehospital care is woefully inadequate and little in the way of first aid or ambulance evacuation is available.

Triage, in these cases, only occurs on arrival at the hospital. The longer the evacuation time and the more difficult the transport, the greater the number of severely injured patient who will die before reaching the hospital. Short evacuation times, as occurs when a disaster strikes or fighting takes place in a city, make for the more seriously injured arriving alive at the hospital.

THINK 'SALT':

**SORT, ASSESS, LIFE SAVE & TREAT
(OR TRANSPORT)**

TRIAGE CATEGORIES

Many triage systems exist. Keep yours simple and make sure that all members of the hospital team understand it. One system, based on physiological and anatomic parameters, and used by many organisations is this (40.7):

Category I: Severely wounded requiring resuscitation and immediate surgery.
(Usually designated the 'red' category.)

These victims have life-threatening injuries, but have a good chance of recovery if treated in time. Remember ABC (41.1)

Some examples are:

- (1) Maxillo-facial trauma or burns to the face and neck requiring a tracheostomy;
- (2) Tension pneumothorax;
- (3) Internal haemorrhage, wounds to major peripheral arteries;
- (4) Head injury with deteriorating GCS & lateralizing signs (coning);
- (5) Asphyxiation & crush injuries;

N.B. Usually, this group accounts for 5-10% of the wounded after a major event.

Category II: Seriously wounded requiring surgery, but who can wait.
(Usually designated the 'yellow' category.)

This is a relatively large cohort, c. between 25-30% of victims. Serious wounds, not immediately threatening the life of the patient include:

(1) Abdominal injury without signs and symptoms of haemorrhage, most probably injury to hollow organs only;

(2) Head injury with GCS \geq 8 with intact airway

(3) Most compound fractures and major soft tissue injuries.

Admit these patients, make sure someone is responsible that they receive analgesia, antibiotics and IV fluids, and undergo any necessary investigations.

Category III: Superficially wounded, ambulatory management is sufficient.

(Usually called the 'green' category.)

This is a very large group, up to 50-60%. These patients do not need admission and you can arrange for them to go to an out-patient spot, for cleaning & dressing of wounds, or for immobilisation of closed fractures.

Category IV: Supportive.

(The 'black' or 'white' category.)

These patients have wounds that are so severe that survival is unlikely even in peacetime circumstances, or whose survival would mean excessive disability, or whose treatment is impossible or just too onerous on scarce resources.

They include:

(1) Head injury with GCS <8;

(2) Quadriplegia;

(3) Burns covering >40% body surface area;

(4) Exsanguinating haemorrhage when no blood is available for transfusion.

You do not 'neglect' these patients, but allocate someone to be with & comfort them in a quiet and isolated corner, to die in dignity, receiving palliative care.

N.B. Once you have dealt with all the Category I wounded, you may attempt to salvage these patients if they are still alive, depending on facilities available.

N.B. These categories are not rigid: victims can improve or worsen while awaiting treatment. So, their categorization may change! A continual reappraisal, and re-triage, is necessary.

For example, a victim with a severe maxillo-facial wound (Category I) gets an immediate tracheostomy. Then the debridement and repair, which may take several hours, can wait: (Category II).

Category III patients are numerous and have relatively superficial trauma, which are painful; they are lucid and frightened (they have just survived an earthquake or bombardment), and often become hysterical and create problems of crowd control in the hospital. You must be prepared to deal with them, and their relatives! Try to separate Category III patients from I & II.

Rarely, a Category III patient may deteriorate; make sure your staff for these patients keep an eye open for this eventuality, and re-categorize them accordingly!

There is an 'unofficial' Category V patient of utmost urgency: a young combatant, often under the influence of alcohol and other drugs, puts a rifle into your ribs and commands you to take care of his buddy first. Most often, the comrade is shouting in pain and fear and has a relatively minor wound. It is wise to take care of this fellow first and let the pair leave the hospital as soon as possible!

TWO-STEP PROCESS OF TRIAGE

The first hospital triage decision is a two-step process: sift and sort. Both involve prioritization.

'Sift' is putting victims in one of the major categories.

'Sort' determines what you need to do first.

Your clinical judgement is important: how serious is this injury? What are the chances of survival?

Make an initial examination taking only 15-30secs. Look at, talk to, listen to the patient, and perform a whole-body palpation.

You can easily see and hear most life-threatening injuries: airway compromise and possible suffocation; dyspnoea and laboured breathing; the mental status of the exsanguinating patient.

Check if the patient responds to your questions: the airway is free, and he is lucid.

Check the rate and character of the pulse:

Palpable radial pulse = BP > 90mmHg,

Palpable femoral pulse = BP >70-80mmHg,

Palpable carotid pulse = BP >60mmHg.

So, by looking, listening, & palpating, you can arrive at a physiological diagnosis of injury severity: the basis of the ABC system.

Now, palpate the whole body of the patient: from head to toe, back, front and sides. You may not see a small fragment or bullet wound, but you will feel the hole and see the blood on your gloved finger.

You must therefore be especially careful of any body part that has normal hair: head, axilla, and pubis. You will be able to feel a penetrating wound by palpation of the head, but also a depressed fracture or boggy haematoma overlying a fracture.

Press the rib cage and quickly palpate the abdomen: are there any fractured ribs or guarding of the abdomen?

Palpate the arms and legs and press the pelvis together: any fractures should be obvious.

This '10-finger whole-body scan' allows you to form a pretty accurate anatomic diagnosis.

You can now classify the victim to one of the main categories. It is important to separate the two extremes of injury: the superficially wounded (Category III) and the probably lethal (Category IV).

These victims should not interfere with the treatment of the seriously injured. Concentrate on Categories I and II. This classification does not depend on the number of victims, but only on the specific condition of the specific patient.

N.B. The clinical triage officer should not treat any patients while performing triage; he must only examine and categorise, accompanied by an assistant who takes notes on each patient, or better fills in a card hanging on the victim.

The 3 exceptions are:

- (1) the comatose patient
- (2) the compromised airway
- (3) catastrophic peripheral haemorrhage

Put the victim in the lateral position to prevent aspiration in case of vomiting, clear the airway, or apply a tourniquet. This is best done by an assistant if available.

The first triage decision does not depend on any laboratory work or imaging by radiography or ultrasound, even less by CT-scan if available. *It is a purely clinical decision.*

In the 2nd phase ('sort'), determine which victims have priority for treatment. You may have 10 Category I patients requiring immediate surgery, but only 2 operating teams. You must decide which 2 of the 10 go to theatre first, and then decide on the next, and the next...

Base these decisions on the severity of the wounds and the expectation of good results in the least amount of operating time.

While patients are waiting to go to theatre, you may be able to perform more detailed examinations and get paraclinical investigations done, unless you have another wave of victims to deal with.

TRIAGE TEAMS AND PERSONNEL

You will need a disaster plan before the disaster arrives on your doorstep! Although things never go entirely according to plan, having a structure helps enormously.

Make bright coloured posters or laminated display cards highlighting:

- (1) Basic triage (C-ABC)
- (2) Who is supposed to do what
- (3) How hospital areas are to be utilized in an emergency situation
- (4) An evacuation plan.

N.B. Everyone must wear a large label saying what their role is, e.g. REGISTRATION, SURGEON, TRIAGE OFFICER etc. so that is clear what everyone does.

Several meetings of the hospital staff are necessary to organise this hospital disaster plan and to allocate specific responsibilities.

Everyone in the hospital needs to know the plan and what is expected of them and how their work may differ from their everyday work.

TRIAGE TEAM LEADER

This is the chief coordinator who announces the initiation and end of the disaster plan. It is usually the hospital director. The leader must have an overall view of what is happening in the hospital, including changing needs for personnel, supplies and equipment.

Communication with the outside world: prehospital services, police, public authorities, journalists all come under the leader's general coordination.

Of course, assistants should be designated to deal with different aspects and report back to the team leader.

CLINICAL TRIAGE OFFICER

This is the person charged with performing the first admission triage. Whether this a senior surgeon, anaesthetist or nurse is not as important as their clinical experience and the respect and trust the staff have in this person.

When a community is hit by a disaster or armed conflict, there can easily be relatives and friends of the staff who are among the victims. If you have to decide on priority for treatment purely on a medical basis, this can lead to very difficult decisions and ethical dilemmas. The respect and trust of the hospital staff in the triage officer are essential. There is no time for arguments or discussion!

HEAD NURSE or MATRON

This is the chief organiser, responsible for the nursing and paramedical personnel and, together with the hospital administrator, for the non-medical support staff: kitchen, laundry, stretcher-bearers, cleaners etc.

RESUSCITATION TEAM

These are personnel allocated to Category I patients to prepare them for theatre. Ideally, each doctor and nurse should have a defined A&E bed and should not move from it.

N.B. Allow the patients to be brought to you. *If everyone in emergency reception rushes to the first patient admitted, chaos ensues.*

The 2nd victim arrives, and then the 3rd, and by the time the last victim comes in, nobody knows who is responsible for whom.

Your underlying motto remains: **Survival – Function – Cosmesis** in that order!

Specific staff should be responsible for putting up IV fluids while taking blood for grouping and cross-matching, tetanus prophylaxis, antibiotics, analgesics, dressing wounds and immobilising fractures, and any necessary bladder catheterisation. If staff numbers allow, keep one 'nurse' to stay with the one patient.

Someone must be designated to perform the 'sort' triage, *i.e.* who goes to theatre first. This may be the same clinical triage officer or someone else, depending on the number and experience of the personnel in any specific hospital.

FOLLOW-UP TEAMS

For the other Categories of patients, specific doctors and nurses need to be designated to do complete clinical examinations, order any investigations necessary, and begin treatment. Admitted Category II patients will need a second phase 'sort' triage to prioritize who gets surgery first.

Most of these patients will have large soft tissue injuries and fractures: an orthopaedic surgeon is usually best placed to perform this 2nd triage.

N.B. A short procedure may take precedence over a large debridement because of time factors!

For Category III patients, nurses in charge will need to make certain that none of these victims actually have a more serious injury requiring admission. As soon as possible, they should be discharged home with reassurance and a follow-up plan.

N.B. Records (on a card) of such patients treated are important in order for relatives later to be informed and for any follow-up.

Put Category IV victims in a quiet and preferably secluded corner and make sure a nurse gives compassionate palliative care.

ADMINISTRATIVE TEAM

The admission of any patient requires paperwork: registration, a patient file; collecting and safeguarding valuables, money and identity papers (in a small plastic bag) and soiled clothing (in a large plastic bag); contacting and informing the family and organising patient visits when appropriate; and making necessary information available to the public authorities.

In the confusion of a mass casualty extent, this can be very difficult, especially the control and informing of families and friends. Administrative staff should have a *simple* system in place to do all their usual work under unusual conditions.

N.B. Some administrative personnel may well be assigned to serve as stretcher-bearers or some other function according to the needs of the specific hospital.

SECURITY TEAM

Security officers should be under the direct orders of the triage team leader. A mass or multiple casualty incident always involves a mass invasion of the hospital by friends, relatives, curious onlookers, police, & journalists. Crowd control is a major issue, especially during combat when many of the 'visitors' are armed.

N.B. Put in place a system for keeping weapons out of the hospital and this may require assistance from the local police or even the military.

During armed conflict a specific culture develops and, little by little, people begin to understand the rules.

THE TEAM

We describe the functions of the different team members in an ideal situation. Which person fulfils which function, or more than one function, depends on the personnel roster of the hospital.

All too often, the hospital director is the sole surgeon. Who is the triage team leader, coordinator or clinical triage officer in such a situation? Each hospital must make all these preparations for the distribution of responsibilities according to your specific situation, *best in advance!*

The surgeon or anaesthetist cannot insist on being the triage officer, and then goes off to the theatre. When more patients arrive, who should then perform triage? This must be planned beforehand and be part of the disaster plan.

Mass casualty situations are always stressful and tiring for the hospital staff. Rest and relief are essential to keep up with the increased workload. Adapt work rosters accordingly. No one should try to be a 'hero', and work till they drop! *An overworked doctor or nurse falling asleep on their feet is no longer efficient and becomes a danger to the patients.*

RE-ORGANIZATION OF HOSPITAL SPACE
It is impossible to perform triage of mass or multiple casualties properly within the normal functional organization of your hospital.

Your Admissions & Emergency Reception area will not be big enough, there will be many superficially injured patients shouting for help, and there is general confusion and chaos.

Your hospital team will have to study the outlay of the hospital. Maybe the best place for the 1st triage will be the car park, the A&E reserved for Category I victims, and the out-patient department for Category III patients.

Category II patients, waiting for surgery, could be admitted to the wards while waiting. Each hospital is different, and you will have to find the best arrangement given the organisation and space available in your hospital. You may well need to discharge those patients already in the hospital early.

N.B. Each Category of patients will need their own specific area.

EQUIPMENT AND SUPPLIES
Think of everything needed during ordinary work, and multiply: extra stretchers and trolleys; beds, blankets, and sheets. Make up specific 'triage boxes' containing essential supplies to cover dressings, IV fluids, catheters, tubes, PoP, splints, gloves etc.

Whether extra supplies of medications are held in the hospital pharmacy or elsewhere will depend on the organisation and infrastructure of each hospital.

N.B. Beware with many 'visitors' to the hospital, that equipment does not 'disappear'!

DOCUMENTATION
This must be simple & standard; a supply of specially numbered triage cards prepared beforehand is ideal (40-9). Put the triage card in a plastic sleeve: *in the ensuing chaos, blood, urine and vomit will quickly render any paper unreadable.*

Use an annotation; ICRC recognizes these:

- O wound
- # fracture
- haemorrhage
- Z burn
- amputation site

Be prepared to improvise! For example, instead of using IV. stands, string a rope across the room from which to hang fluids or bags.

TRIAGE CARD

Name: _____ M, F Age: _____
 Date: _____ Time: _____
 Time since injury: _____
 Type of injury:
 Blunt: Penetrating: Blast: Burn: Other:
 General condition: _____ Remarks / known comorbidities: _____
 Pulse: _____
 BP: _____
 Respiration: _____
 Consciousness: (AVPU) _____

Fig. 40-11 TRIAGE CARD.

INFRASTRUCTURE
Your disaster plan should include extra stocks of spare parts, fuel, water, sanitation equipment and electric power, especially if you depend on generators.

N.B. Maintenance and repair workers need a special work roster as well as the medical staff.

HOSPITAL SERVICES

The kitchen, laundry and cleaning service will carry an extra burden as well: there are greater numbers of patients and staff to feed and clean for. Families of patients, and those seeking shelter in the hospital, can be mobilised to help preparing food, cleaning, and washing the hospital linen; even, after a proper training, as stretcher bearers.

COMMUNICATIONS

As part of the disaster plan, there should be a system to contact off-duty personnel. Communications need to be established with any prehospital services, the police, fire department and any other relevant authorities.

N.B. Many telephone or electronic networks quickly become overloaded! You may need special privileged lines! Mobile telephone networks often do not work after a major natural disaster or during armed conflict. A communication system based on VHF radio is usually better.

You need to make place for the mass media; a designated spokesperson for the hospital, giving out only specific information, should be the *only* person to speak to journalists.

Remember medical confidentiality!

Especially in a warzone, information can be considered a weapon and some information should not be given out. Individual hospital staff should avoid making any 'statements'.

Communication with other hospitals or the ministry of health, either to transfer patients or to request extra personnel, also needs to be established, if possible.

You and your team should be prepared to act quickly, have your priorities of patient care in order and have a pre-organized plan to deal with multiple trauma. You must be flexible as well; *no event is the same* and you must be able to adapt.

Telephone & computer systems may well fail: use simple methods for recording (boards & pens).

Get team members to wear a label describing their function.

TRAINING

Hold simulation exercises on a regular basis to make certain that everyone knows what they are supposed to do and how their work may change from their everyday tasks. These exercises also help to establish standardised protocols for patient triage and management.

N.B. Many treat these exercises as a joke, but they will be very thankful in the actual event that they are carried out.

After a triage exercise, or especially after an actual event, hold a general debriefing of the entire hospital staff. Discussions of what went wrong or right, in a peaceful atmosphere away from any tensions, will help to refine the disaster plan. No plan is perfect and all require improvement based on experience. Such a time can enormously help staff 'bonding'.

SECURITY

As well as victims, the patients previously in the hospital, friends, relatives, the curious, those seeking a safe place, all arrive at the hospital in a short time. This is particularly the case if prehospital triage is limited or non-existent.

Crowd control is essential for doctors and nurses to be able to work properly in the midst of an excited and shouting crowd. You must have some system of keeping people out of the hospital in general, and the triage area in particular, organized beforehand. This might involve security officers or the police.

A special organisation of the entrance may help in crowd control. Some hospitals have tried a preliminary triage tent staffed by first aiders, prior to actual hospital triage, or using a container 'tunnel' with holes cut in the ends wide enough only for a stretcher to pass. This creates an obligatory passage easily controlled by a security officer: only the stretcher and the stretcher bearers can pass.

To control family and friends, a system of information and control of patient visits is important. People appreciate the extra effort made to provide information about their loved ones and well-regulated visits when patient circumstances permit.

SUMMARY

Remember the 'best for most' is rational policy, because usually, 'everything for everyone', is not possible.

