

51.1 Caring for a severely injured patient

A severely injured patient can be a very gruesome sight—so don't panic! There will be much to do, so call for a nurse, a medical assistant, or an anaesthetist to help you. Two people can often work on the same patient simultaneously. First, preserve the patient's life, particularly by restoring his airway and restoring his blood volume. *More injured patients lose their lives unnecessarily from respiratory obstruction than from any other cause.* After you have done this, take the patient's history from anyone who was present at the accident. Extend this by quickly questioning the patient himself. Later, you can take a more complete history and examine him more thoroughly.

You will have to act quickly; no two injuries are quite the same, so vary the usual sequence of history taking and examination. Train yourself to recognize the urgent situations quickly while they are still treatable, especially rupture of a patient's spleen or liver, or an extradural haematoma.

MORE LIVES ARE LOST FROM FAILING TO CARE FOR THE AIRWAY THAN FROM ANY OTHER CAUSE

Many mistakes are caused by not examining a patient carefully. His peripheral injuries are unlikely to kill him even if you do miss them, but you can easily overlook serious central ones, especially injuries to his chest and abdomen. You will not miss bone sticking out of his trouser leg, but you can easily miss blood in his thoracic cavity or a slowly developing haemoperitoneum.

You will need enough space to work in and the right equipment. Figure 51-1 shows the ideal set-up. Try to have as much of this equipment as you can immediately available. You are unlikely to have a special accident treatment area, so the best place to take an injured patient may be the simple intensive care unit described in Section 19.1 of Primary Anaesthesia or the theatre.

There are no hard and fast rules as to what should be first aid at the scene of an accident and what is only possible in hospital. Many of the procedures which follow are practical in both situations. When a patient has arrived in hospital, don't let him wait around. If he needs a laparotomy for an abdominal injury, he should be on the operating table within an hour of admission.

- *TROLLEY, resuscitation, tiltable at the head and foot, with a radio-translucent surface, a device to hold cassettes underneath, holders for an oxygen cylinder and a drip attachment, also a wire basket for the patient's clothes and his property.* You will find this very useful. In spite of its detailed specifications, it is really quite simple.

THE CARE OF A SEVERELY INJURED PATIENT

ORDER OF PRIORITIES This is a summary of what follows—*be systematic and examine the patient in an orderly way.* (1) Clear his airway and maintain it. (2) Deal with any obvious chest injury. (3) Control any external haemorrhage. (4) Assess his circulatory state and correct it. (5) Note his level of consciousness and assess injury to his head (including testing his reflexes and examining his pupils). (6) Examine his abdomen and pelvis; look for fractures of his pelvis. Look for signs of internal bleeding. Note the state of his bladder. (7) Look for wounds and fractures of his limbs. (8) Look for signs of injury to his spine.

IF THE PATIENT IS TRAPPED IN A VEHICLE, cut away the parts trapping him with great care. Move him carefully as in Section 64.3 to avoid injury to his spine. Keep him lying flat.

IS HE ALIVE ? Ask your ambulance driver to call you and let you see a seriously injured patient in the ambulance before he is moved. If he is not obviously alive, feel his carotid pulse, and listen for heart sounds with a stethoscope. If these are absent, and there is any evidence that they have only stopped in the last few minutes, attempt cardiopulmonary resuscitation as in A 3.5. Your task will be easier if you have three helpers, one to perform mouth-to-mouth ventilation, another to perform external cardiac massage, and a third to fetch help.

If the patient is unconscious, can you rouse him by pressing one of his supraorbital notches firmly with your nail?

IMMEDIATE LIFE-SAVING PROCEDURES

CHECK THE PATIENT'S AIRWAY This is a summary of the methods in Chapter 52. You may need any of the methods in Fig. 52-1. (1) Clear any vomit or foreign bodies from the patient's mouth. Sweep your finger deeply into his mouth

AN ACCIDENT RECEPTION AREA

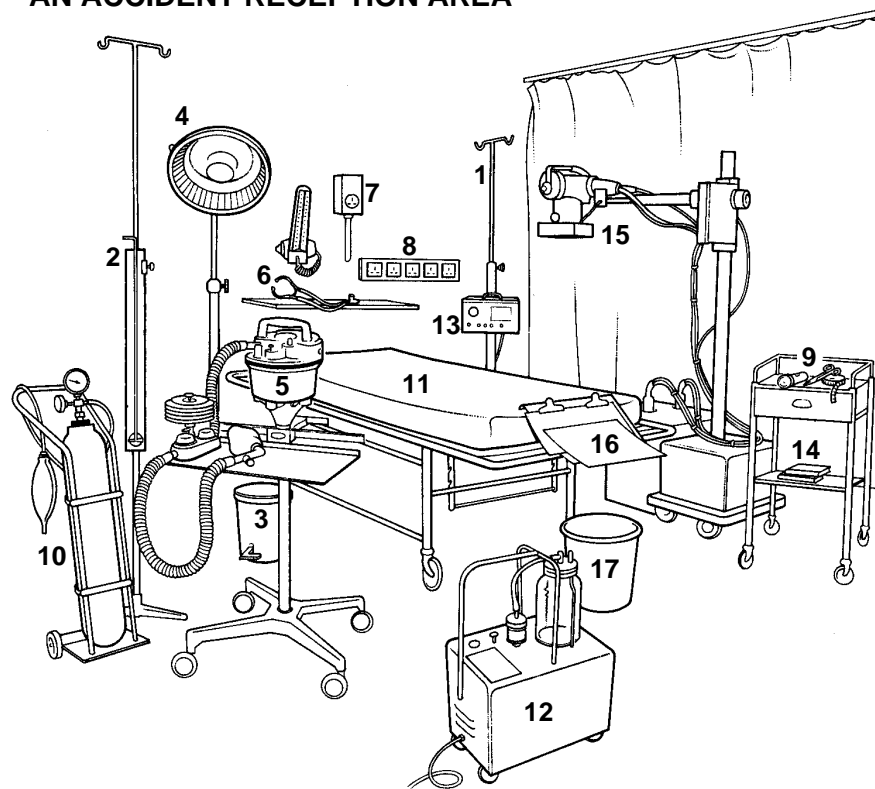


Fig. 51.1: AN ACCIDENT RECEPTION AREA. You may not be able to provide all these things, but try to provide most of them. The best place to take severely injured patient may be your intensive care unit. (1) Drip-stand, (2) central venous pressure set, (3) sluice bin, (4) mobile lamp, (5) a completely equipped anaesthetic machine (and a ventilator if you have one), (6) sphygmomanometer and stethoscope, (7) large plug for X-ray machine, (8) several power points, (9) tape measure, torch, and scissors, (10) oxygen cylinder and flow meter with rebreathing bag, (11) special bed or tipping trolley, (12) sucker, (13) blood warming bath, (14) admission books, (15) X-ray machine, (16) charts, (17) bin for clothes. You will also need an ophthalmoscope and an auriscope, a labelling pen, urine test strips, drip sets, intravenous fluids and cannulae, and a chest drain set (65.2).

and pharynx. Suck out his pharynx. (2) Move his head and neck into the position in which he breathes best (A 4.2). (3) Make sure that his head is slightly dependent so that blood and secretions can drain. Unless particular injuries make it impractical, he will probably be best in the recovery position, if he is not already in it. (4) Insert an oropharyngeal airway if he is unconscious and will tolerate it.

If the patient is sufficiently unconscious after a head injury for you to insert a tracheal tube, insert one. As soon as his level of consciousness improves, he will make spontaneous efforts to remove it.

If his airway is obstructed and intubation is impossible, as with a severe maxillary injury in an adult, you can do a cricothyroid puncture with a needle, or a tracheostomy. In a child you will have to do a tracheostomy.

If he is not breathing adequately after the above measures, either ventilate him with a self inflating bag (A 10.3), or mouth-to-mouth (A 3.5). Give him oxygen. Think of the possibility of a pneumothorax (65.5) or a flail chest (65.6). Feel for deviation of his trachea, and for the position of his apex beat.

CONTROL SEVERE EXTERNAL BLEEDING Do this as in Section 55.1. You will probably find firm pressure on the wound most useful.

If a knife, dagger, arrow, or spear is still in the patient's

A PATIENT IN RECOVERY POSITION

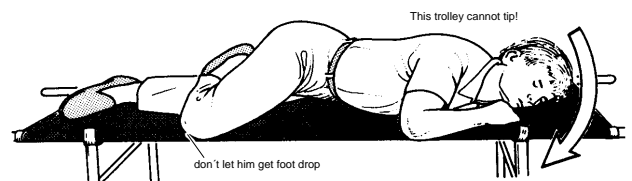


Fig. 51.2: A PATIENT IN THE RECOVERY POSITION. Lie him on his side with his thorax at 45° to the horizontal. You can support his chest with a pillow, but don't let it interfere with his breathing. His head is extended to provide a free airway. His uppermost arm is flexed in front of his trunk with his hand under his jaw to provide additional support. His lower arm is behind his back. To prevent him rolling over, you can flex his upper or his under leg, depending on his injury, while the other leg remains extended. He will be more stable with his under leg flexed. If he is on a stretcher for any length of time, don't let it press on his common peroneal nerve and cause foot drop. From the *Field Surgery Pocket Book* with the kind permission of Guy Blackburn.

body, I leave it there until he reaches the theatre. If you remove it he may bleed severely.

APPLY URGENT MEASURES FOR SEVERE CHEST INJURIES A patient may need treatment for an open chest wound (65.7), a tension pneumothorax (65.5), a haemotho-

rax (65.4), or a flail chest (65.6).

TREAT HYPOVOLAEMIC SHOCK Assess this by the methods in Section 53.2. If a patient is severely shocked, can you feel a pulse? Record its rate and his blood pressure. Set up an intravenous line by one of the methods in A 15.2. If he is in severe hypovolaemic shock and you are sufficiently skilled, the best method is to use a large bore catheter threaded into the great vessels of his upper trunk by the methods in A 19.2. Start by giving him a litre of Ringer's lactate or 0.9% saline.

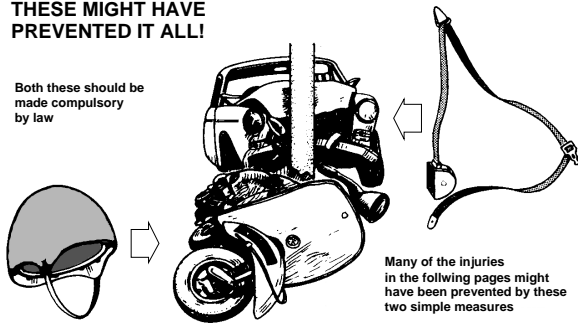
If he is severely shocked and you are sufficiently skilled, set up a CVP (central venous pressure) line, as in A 19.2. This requires the insertion of a fairly wide bore catheter into a central vein or into his superior vena cava.

Continue the treatment of shock as in Section 53.2.

CAUTION ! Take blood for cross matching. If possible, take the sample before the patient's veins collapse, and before you give him a colloid such as dextran, which may interfere with cross matching. At the same time take blood for measuring his haemoglobin or haematocrit.

THESE MIGHT HAVE PREVENTED IT ALL!

Both these should be made compulsory by law



Many of the injuries in the following pages might have been prevented by these two simple measures

Fig. 51.3: THESE MIGHT HAVE PREVENTED HIS MOST SERIOUS INJURIES. Seat belts prevent most severe maxillofacial injuries and chest injuries. A crash helmet will usually prevent a head injury, but not a fracture of the cervical spine, so when you remove one, do so carefully, as in Fig. 64-1.

THE HISTORY OF A SEVERE INJURY

Take a brief history now and complete it later. Exactly what happened at the accident? First question any witnesses, then the patient himself. How did his body have to withstand the trauma of the accident? If you can find this out, you will know better what injuries to expect. For example, if he was hit by a car, expect 3 injuries, one from the bonnet, one from the bumper and another from the road.

If he is conscious ask him where his pain is? Does he have abdominal pain? This is always important (66.1). Has he passed urine since the accident? (68.1)

Don't forget his ordinary medical history. Perhaps he has a history of mental illness, or is taking drugs, such as insulin, steroids, or anticonvulsants.

IS THE PATIENT UNCONSCIOUS AFTER A SEVERE INJURY?

How does he respond when you press his supraorbital margin firmly with your thumb nail?

IS HE PARALYSED ?

Paralysis is easily missed, so don't forget a quick test to exclude quadriplegia, paraplegia, or a brachial plexus injury.

If he is conscious, ask him to move his arms and legs. If his legs are working, he has no serious spinal cord injury. Or, pinch one of his legs, and see if he complains.

If he is unconscious, check his pattern of breathing. The following things suggest a spinal injury: (1) An accident in which there was violent movement of his neck, especially if he also has head or face wounds. (2) Severe occipital, shoulder, or arm pain. (3) Weakness or numbness in his arms or legs.

Don't move him until you have evaluated his injury. You can not immediately exclude an injury to his spinal cord, so

SOME LIFESAVING MEASURES

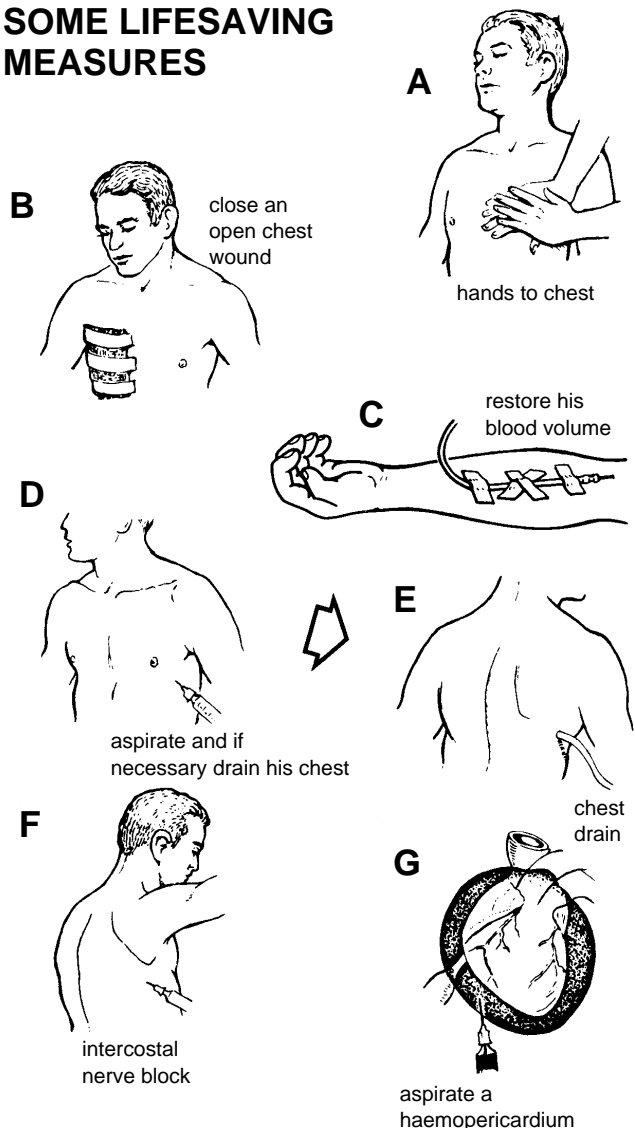


Fig. 51.4: SOME LIFE-SAVING MEASURES. A, if a patient has a flail chest, put your hands on it to control it. B, close an open chest wound. C, after severe bleeding, restore the blood volume. D, and E, if a patient has had a chest injury, aspirate his pleural cavity, and if necessary insert an underwater seal drain. F, after a severe chest injury an intercostal nerve block may greatly help breathing. G, if a patient has a haemopericardium, aspirate it. After Naclerio, with the kind permission of Grune and Stratton.

assume he has one and move him lying flat and without flexing or extending his spine as in Section 64.3.

Cervical cord injuries can come on insidiously, so don't allow him to stand or sit up.

THE PRELIMINARY EXAMINATION OF A SEVERELY INJURED PATIENT

Clean the blood from his face, and note if it is coming from his nose or ears. If necessary, cut away his blood stained clothing. His history and immediate signs and symptoms will tell you what to expect, so look elsewhere for the detailed history and examination of his major injuries, such as those to his head (63.1), spine (64.3), thorax (65.1), abdomen (66.1), and pelvis (76.1).

LOOK FOR FRACTURES Feel his limbs gently through his clothes. If there seems to be an injury underneath, you may have to cut them away along the seams. Compress his chest from front to back to test for fractured ribs (65.1).

On each side, feel the whole length of all his subcutaneous bones, the margins of his orbits, his clavicles, his olecranon, the subcutaneous borders of his ulnae, his patellae, and his tibiae.

CAUTION ! (1) Don't forget to look for blood at the tip of his urethra (68.1). (2) Observe and record all bruises. If these bear the imprint of his clothing, the injury underneath them is likely to be severe. (3) Carefully turn him onto his side and examine his back. Deformity and bruising here may indicate an injured spine (64-6). (4) If he has any limb injuries, make sure that he has no injured tendons (55.11), nerves (55.8), or vessels (55.2) in his wrists, fingers, ankles, or feet.

WOUNDS Remove any large pieces of clothing or foreign bodies which come away easily. Cover any wounds or open fractures and do the rest of the exploration in the theatre (54.1).

PERIPHERAL CIRCULATION Check the peripheral pulses of all his four limbs, especially the circulation peripheral to any limb injuries, particularly if he has supracondylar fractures of his humerus or femur. If a limb is cold and blue, a peripheral pulse is absent, or the capillary return to his nail beds is slow, you may need to reduce a fracture or dislocation urgently. **CAUTION !** A delay of only 4 hours in restoring the circulation to a limb can cause muscle necrosis (70.4).

DRUGS Restore a patient's respiration and circulation before you give him an analgesic. If you expect internal injuries, avoid morphine until you have planned a course of action. If he has severe multiple injuries, pain is not so much of a problem.

If a patient is merely restless, this probably indicates progressive bleeding rather than severe pain. He probably does not need morphine.

If he is in pain, give him small doses of intravenous morphine or pethidine. See also Section A 8.7. Dilute 10 mg of morphine in 10 ml of saline and give him fractions of 1 ml at a time intravenously until you have relieved his pain.

CAUTION ! (1) Don't give him an *intramuscular* narcotic until you have excluded head and abdominal injuries, because they will confuse the diagnosis. You can give him *small* intravenous doses before you are certain of his diagnosis. If he has a head injury, he only needs morphine if he is conscious and has other injuries. (2) If he has a severe injury, such as a dislocated hip, he needs morphine—analgesic tablets are not enough!

OXYGEN If a patient has a severe abdominal or chest injury, or a low haemoglobin, give him oxygen. Otherwise it is unlikely to be useful.

X-RAYS IN SEVERE INJURIES

Defer these until you have resuscitated the patient. If films are scarce, don't X-ray the obvious. Where possible, try to do all X-rays in one trip. Wheel him to the theatre on a trolley with a radio-translucent top, so that he can be X-rayed on it with the minimum of movement. Splint limb fractures before he goes. This will minimize blood loss, and make positioning easier.

Take a chest X-ray and a supine view of the patient's abdomen. Where possible, take the chest X-ray in the erect position. But beware—this is dangerous if he is shocked. If he is critically injured, X-ray only his major lesions initially. If you suspect a foreign body, X-ray the wound. If he has multiple injuries and needs an anaesthetic, X-ray him to exclude pneumothoraces, which would make anaesthesia dangerous.

CAUTION ! If you suspect a chest injury, but cannot confirm it clinically, X-ray him again in 48 hours. Lack of clinical signs does not exclude a haemothorax or pneumothorax of considerable size.

Before treating any peripheral fracture, make quite sure he has no proximal dislocation. If in doubt, X-ray him.

If you suspect an injury to his cervical spine, accompany him to the X-ray department yourself to supervise the way he is moved.

RECORDS IN SEVERE INJURIES

Complete these, record even negative findings, and make a management plan for the patient. If his consciousness is impaired, start a head injury chart. Prescribe all drugs and fluids. If there are many casualties, use Fig. 51-8.

ALLERGIES If possible, ask if he is allergic to any drugs, particularly antibiotics.

TETANUS PROPHYLAXIS Don't forget this, see Section 54.11.

THE LATER EXAMINATION OF A SEVERELY INJURED PATIENT

Examine him again later after you have attended to his more obvious injuries. As he recovers, expect to find more injuries. Although you may have saved his life from a severe head injury, a finger fracture which you missed may trouble him ever after. A brachial plexus injury (71.3) is easily missed at the time of the accident.

CHILDREN WITH SEVERE INJURIES

A severely injured child is in special danger, particularly from thoracic injuries, because: (1) His blood volume is small, with the result that a correspondingly small loss can be fatal. So replace any blood he loses, even if it is only a little. (2) His air passages are small and are easily blocked.

FLUIDS FOR SEVERE INJURIES

If a patient is shocked, he will probably be thirsty. Don't give him any fluids by mouth, including tea, even in minor injuries, because he may need a general anaesthetic. But, if you don't have enough intravenous fluids, and he is not going to be operated on for some hours, an oral electrolyte fluid (58.5) can be life-saving, especially if you have many casualties to treat at the same time. Prevent a patient's relatives from giving him food or fluids when they should not.

NASOGASTRIC TUBE A patient's stomach may be full and he may regurgitate its contents. So if he is drowsy or unconscious, or has severe injuries to his chest or abdomen, pass a nasogastric tube. This does not remove the risk of vomiting, perhaps with fatal results, but it does reduce its probability.

FEEDING A SEVERELY INJURED PATIENT

Intense catabolism occurs some days after a severe injury. This is proportional to its severity, is worse if the injury is infected, and is especially important in severe burns, so see Section 58.11.

ANAESTHESIA FOR A SEVERELY INJURED PATIENT

A patient may have been injured soon after his last meal. His stomach will empty very slowly. So, if he needs an anaesthetic, be safe, and use local anaesthesia when you can. If you have to give him a general anaesthetic, take the necessary precautions for anaesthetizing a patient with a full stomach (A 16.5).

If you are operating on a patient with multiple injuries, take the opportunity to insert traction tongs or Steinmann pins while he is in the theatre. Where possible, try to care for all his injuries at the same time.

REFERRING A SEVERELY INJURED PATIENT

(1) Never refer or evacuate a patient with an insecure airway—secure it first. (2) Even if a patient is not shocked, he must have a secure intravenous line—travel often causes shock in an injured patient.

GENERAL METHODS FOR PARTICULAR REGIONS

Read on for the general methods for injuries of a patient's: eyes (60.1), face (61.1), maxillofacial region (62.1), head (63.1), spine (64.1), chest (65.1), abdomen (66.1), kidneys (67.1), urinary tract, (68.1) or hand (75.1). Refer also to methods for specific injuries.

If a patient has lost consciousness after an injury, care for him as a head injury.

If he is severely injured, dead, or dying, talk to the relatives yourself, don't leave this task to the nurses. If possible, give them the opportunity to talk to him.

SEVERE INJURIES ARE OFTEN MISSED

SOME SEVERE INJURIES

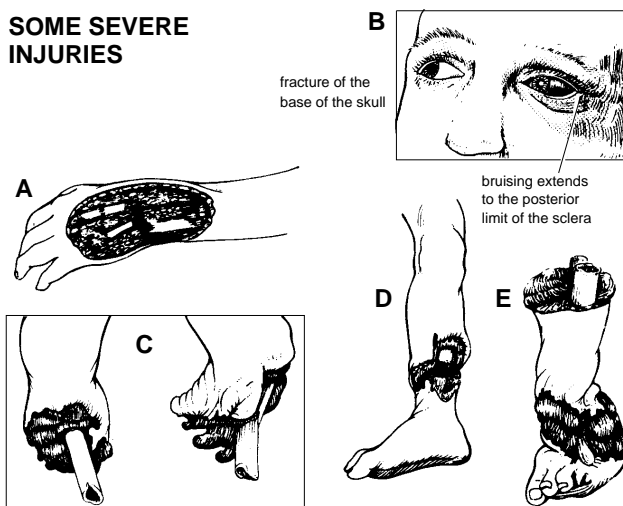


Fig. 51.5: SOME SEVERE INJURIES. A, a severe injury of the back of the hand exposing its extensor tendons. This patient would probably benefit from the groin flap in Section 75.27. B, fracture of the base of the skull (63.1). C, amputations of both legs. This is the patient JACK whose legs were torn off by a farm machine (54.3). D, a severe open fracture of the lower leg (81.12). E, another traumatic amputation of the lower leg.

51.2 Monitoring an injured patient

You have now done all you can for an injured patient for the moment, but there may be more to do at any time, so assess him thoroughly at *definite intervals of time* to observe any changes in his condition, because changes will then be more obvious. Change is gradual, and you are more likely to observe it if you retain a mental picture of him at one moment and then return 15 minutes or half an hour later. You may perhaps observe a change of 10 points in his pulse, increasing pallor, or the onset of sweating. These last two cannot easily be measured and charted, yet they often precede a catastrophic fall in his blood pressure. If you have even a simple intensive care unit, this is the place for him while he is seriously ill, before and after his operation (19.1).

MONITORING A SEVERELY INJURED PATIENT

Record the patient's pulse and his blood pressure and, when necessary, his CVP (A 19.2)—if you are skilled enough to be able to insert a central venous line. When necessary, record his state of consciousness with a head injury chart (63.2), his fluids with a fluid balance chart (A 15-5), and his abdominal girth (66-2).

Make sure that the nurses who make these charts know that their role is life-saving.

CAUTION ! Watch him carefully for the development of a silent pneumothorax. Percuss his lungs daily. Reduced vocal resonance is a useful sign of a haemothorax.

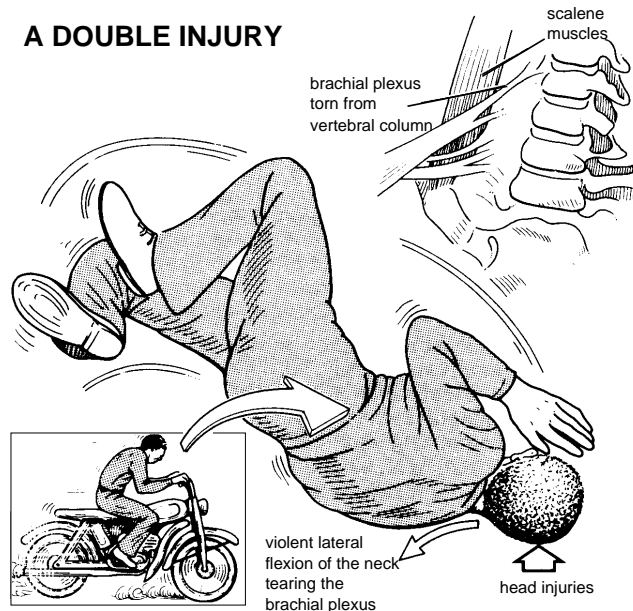


Fig. 51.6: A DOUBLE INJURY-HEAD AND BRACHIAL PLEXUS. This patient has been thrown from his motor cycle, injuring his head and his brachial plexus. He might also easily fracture both his upper and lower arms and his legs, and have internal injuries, especially a ruptured spleen. From an unknown source.

51.3 Some particularly difficult combined injuries

Although a patient can have almost any combination of injuries, there are some pairs of injuries in which one of the pair is often missed. If you find the more obvious injury of the pair, look for the other one.

A head injury and an injury of the patient's cervical spine. The same force can easily produce both these injuries. The patient may be unconscious from his head injury and so unable to complain of pain in his neck. Later, he may recover from his head injury only to find himself quadriplegic, or with a severe injury to his brachial plexus. So, if a patient has a head injury, suspect that he may have a neck injury also.

A neck injury and obstruction to a patient's upper respiratory tract. This can be the result of a severe injury to his lower jaw. Support his head and neck continuously in a neutral position, until you have seen AP (anteroposterior) and lateral X-rays of his cervical spine. Hyperextending his neck to look at his larynx, or to intubate him, may damage his cervical spine seriously. Careful nasotracheal intubation or a temporary laryngotomy is safer.

An abdominal injury combined with any other severe injury, particularly a head injury. A severe injury elsewhere may distract your attention from a patient's abdomen. If he is unconscious he may be unable to complain of abdominal pain.

Examine him carefully, review him frequently, and, if necessary, use the special methods in Section 66.1.

A chest injury and an abdominal injury. This is a common and difficult combination. Both the surgery and the anaesthesia for a thoracotomy are too difficult to be described here. If you cannot do one, at least be sure to: (1) insert a chest drain with an underwater seal before you operate, and (2) intubate the patient.

Multiple injuries and a haemothorax. A haemothorax would not be so deadly if it were not so easily missed. It may not be noticeable on the initial X-ray, especially in an AP film, but blood may accumulate slowly and silently over several days after the initial X-ray. So if a patient has multiple injuries, watch for a haemothorax over a week or more.

Other common combinations. (1) A chest injury and an injury to a patient's thoracic spine. (2) A fracture of his femur and a dislocation of his hip on the same side (77.4). (3) A fracture of his pelvis with a rupture of his urethra, and less often his diaphragm. (4) A pelvic fracture, a lumbar fracture, and paraplegia.

RAM (28) was one of several casualties brought in about 10 p.m. after a road accident. It had been a difficult night, and there had already been an emergency Caesarean section that evening. He did not look particularly ill and his blood pressure was normal, but surgical emphysema was observed over his left chest. Another patient had a severe malleolar fracture so RAM was second on the list. By 2 a.m. he was severely shocked, and was thought to have an abdominal injury. The anaesthetic assistant gave him ketamine and intermittent suxamethonium, but was unable to intubate him. His ruptured spleen was successfully removed, and a rupture in his diaphragm repaired, but he died just before the equipment for a chest drain could be assembled. **LESSONS** (1) If a patient has a chest injury, it usually takes precedence over that to his abdomen. (2) If you cannot do a thoracotomy at least drain his chest using an underwater seal. (3) A sterile chest drain set must always be instantly available (65.2).

ONE CAUSE OF MASS CASUALTIES

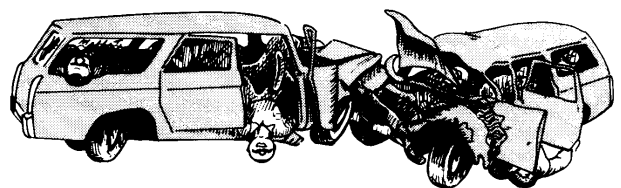


Fig. 51.7: ONE CAUSE OF MASS CASUALTIES. Fourteen people died in this crash on the Kaduna-Zaria road. Several others were seriously injured. Better driving instruction and stricter driving examinations might have prevented it.

51.4 Mass casualties

Sooner or later, ten casualties, or fifty, or even a hundred or more will arrive in your hospital after a bus accident, a fire or some civil disturbance. What are you going to do? The first principle is to approach the problem calmly and thoughtfully, avoiding undue hurry. The second is to have a practical plan prepared and know what it is. With luck, you will have warning of the disaster. More often, your

first awareness of it will be the sudden arrival of many patients. The first half hour will be the worst, and if this goes smoothly, the rest of the plan probably will too.

Your first requirement will be space. One way to obtain it is to evacuate a ward, and, if necessary, to remove the beds. There will be room for more patients if you put mattresses for them in rows on the floor.

The most surgically experienced person should 'triage' (grade) the casualties. First, separate the living from the dead. Then grade the living into three groups. Priority One patients have life threatening injuries, such as penetrating wounds of the chest or abdomen, head injuries, or hypovolaemic shock. These are the patients whose lives you might save and who need an immediate operation. Priority Two patients have such severe injuries that they are likely to die anyway. Priority Three patients have only minor injuries and will probably recover, even if treatment is delayed. Operate on them last.

The decisions as to what to do with each patient should be made by the triage officer. It is the task of the non-surgeons to set up drips and take blood, etc. In a big disaster, and if you have enough staff, divide them into two shifts, each of which works for 12 hours, and then has 12 hours rest. There will be plenty to do, so make sure that everyone has some useful task and does it.

A MASS CASUALTY FORM

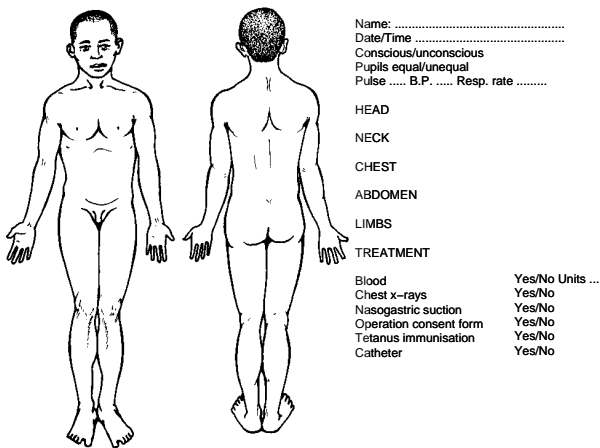


Fig. 51.8: A MASS CASUALTY RECORD FORM. Mark the position of the patient's injuries on the chart. Kindly contributed by John Jellis.

THERE MUST BE A DISASTER PLAN

MASS CASUALTIES

We assume that you are the senior triage officer. Your task is to direct other people, not to become involved in the care of particular patients yourself.

As soon as you learn of the disaster, order the present shift to stay on duty, and summon the shift which is off duty. Send immediately for whatever supplies and help you think you will need.

EMERGENCY EQUIPMENT FOR MASS CASUALTIES

You will need quantities of intravenous fluids, drip sets and dressings, and a supply of 1.5 mm × 40 mm intravenous needles that you can quickly boil up and use to set up drips. Have these ready.

THE ADMINISTRATION OF MASS CASUALTIES

Clear a ward, designate it as 'the mass casualty area', and choose a nearby room for minor operations under local anaesthesia. Warn all departments, such as the laboratory and the X-ray department, to prepare for action. Get the sterilizers ready, assemble and sterilize the general sets and minor suture sets.

TRIAGE AND RECORDS Triage the patients and allocate them to particular doctors, or, if necessary, medical assistants or nurses. Ask a clerk to stick labels on each patient's forehead indicating his category, and to make out a record sheet for each patient, like that in Fig. 51-8. This is reproduced again larger on an endpaper, so that you can photocopy it. If a patient's name is not known, give his label and his form a number.

Staff who have been allocated patients can then start examining and treating them, concentrating entirely on their own patients. Their first task should be to attend to airways and set up drips. Go round looking for seriously ill patients who have been missed in the first triage. These are usually the silent ones; the fit ones will probably be shouting for attention. Visit each staff member in charge of patients to find out what he has discovered, and record your instructions.

Meanwhile, the next most surgically competent person goes to the theatre and waits for the first patient to be sent to him by the triage officer.

After treatment, return all patients to the mass casualty area, so that they are all together. Put a doctor directly responsible to you in charge of them.

RELATIVES should be kept separately somewhere else. Put someone with good public relations ability in charge of them to reassure them, and to answer their questions as best he can. Only in exceptional circumstances allow them near the patients. Ask them to donate blood.

PARTICULAR INJURIES Where necessary, secure each patient's airway (52.1), control bleeding (55.1), seal any open chest wounds (65.7), and set up drips. Only an occasional patient will have severe facial injuries and need an emergency tracheostomy. For the others, an oropharyngeal airway will be enough. Some will need nasogastric suction and some catheterization (68.1). Undress all casualties, and don't forget to look at all their backs.

OPERATION Decide which are the urgent operations and do these first; many fractures, for example, can wait a few days. When you operate, be radical, try to do everything necessary at one operation, because there may be no chance to do another. Do radical excisions, and, where necessary, guillotine amputations.

Your assistants can go down the rows of patients in the ward sewing up minor wounds and dressing them.

TETANUS Don't forget tetanus prophylaxis (54.12). It is tragic to work hard to save lives, only to lose them weeks later quite unnecessarily from tetanus. Some days later, if you are worried about tetanus, ask patients to open their mouths as you go round the wards. Those who have difficulty doing so may have it.

DIFFICULTIES WITH MASS CASUALTIES

If **INTRAVENOUS FLUIDS AND DRESSINGS are scarce**, try to save as many patients as possible with a good chance of survival. Treat those whose lives might be saved with 3 litres before those who need 15 litres. Provided there are no contraindications, such as an abdominal injury or intestinal obstruction, you can give burns patients an oral salt and sodium bicarbonate solution, such as Moyer's solution (NaCl 4 g, NaHCO₃ 1.5 g in water to a litre) or (NaCl 5 g, NaHCO₃ 4 g, in water to a litre). These solutions are adequate for adults with burns of up to 15%. They have been used to treat burns of up to 30% successfully.

If you run out of dressings, use any clean cloth you have.