POLICE SCOTLAND
Keeping people safe

FIRST AID MANUAL

CONTENTS

Introduction

Welcome to the Police Scotland First Aid Manual.

This manual is for police officers and police staff as a First Aid reference source.

The manual covers the following topics:

Introduction to First Aid at Work

The Health and Safety (First Aid) Regulations 1981 which came into force on 1 July 1982, place a responsibility on employers to ensure that there is appropriate first aid provision in the workplace.

Definition of First Aid

First aid can be described simply as the initial assistance or treatment given to a casualty before more qualified help arrives.
The Health and Safety (First Aid) Regulations 1981 define 'first aid' as:

- in cases where a person will need help from a medical practitioner or nurse, treatment for the purposes of preserving life and minimising the consequences of injury or illness until such help is obtained; and
- treatment of minor injuries which would otherwise receive no treatment or which do not need treatment by a medical practitioner or nurse.

The First Aider

First aid has an important role within the workplace in helping to maintain the health and safety of people at work. Police officers and public contact support staff may also be required to administer first aid to members of the general public. Within the police service there has traditionally been an expectation upon police officers to 'protect life'. Article 2 of the Human Rights Act 1998 now provides a positive obligation to 'protect life' which will extend to all police employees, although in terms of the administration of first aid this expectation is limited by:

- the training and experience of the individual
- the requirement for the individual to first ensure adequate safety precautions are taken to protect his or her own life and the lives of others
- the fact that the risk to the individual in protecting life should not exceed that to the person being protected.

First aiders must always act within their competence and within the framework of the Health and Safety (First Aid) Regulations.

The Aims of Workplace First Aid

To reduce the effects of injury or illness suffered at work, whether caused by the work itself or not. First aid provision must be adequate and appropriate in the circumstances. This means that sufficient first aid equipment, facilities and personnel should be available at all times.

- To give immediate assistance to casualties with both common injuries or illnesses and those likely to arise from specific hazards at work
- To summon an ambulance or other professional help

Scottish Police Emergency Life Support (SPELS) Course

The SPELS course is designed to provide Police Officers and members of police staff with the requisite skills and knowledge to render emergency First Aid prior to the arrival of assistance.

Guidance note 75 of the Health and Safety (First Aid) Regulations 1981 strongly recommends that first aiders undertake annual Refresher training during any three-year FAW/EFAW certification period.

The SPELS course affords Police Officers and Members of Police Staff who hold a valid FAW/EFAW certificate, the opportunity to conform to the foregoing guidance by refreshing their core competencies annually.

The First Aider and Legislation

The Health and Safety at Work Etc. Act 1974

The purpose of the Health and Safety at Work Etc Act 1974 is to provide the legislative framework to promote, stimulate and encourage high standards of health and safety at work. The aim must be to promote safety awareness and effective safety organisation and performance, by schemes designed to suit the particular industry or organisation.

The Act places duties on employers, the self-employed, employees, controllers of premises, designers, manufacturers, importers and suppliers. It requires that, so far as is reasonably practicable, premises, equipment, systems of work and articles for use at work do not pose risks to health.

The Commission

The Health and Safety Commission is made up of eight representatives from trade unions, employers and local authorities and a full-time chairman appointed by the Secretary of State for Employment. Its primary function is to make arrangements to:

- secure the health, safety and welfare of people at work
- protect the public from risks arising from work activities
- control the keeping and use of explosives, highly flammable or other dangerous substances.

It has a general duty to help and encourage people concerned with these matters, whether professionally or on a voluntary basis. The Commission proposes legislation, provides relevant information advice and guidance and carries out and sponsors research. It consults widely on all its proposals and is helped by advisory committees for particular industries and types of hazards.

The Executive

The Health and Safety Executive, a statutory body, advises the Commission. Its staff are the primary instrument for carrying out the Commission's policies.

The Executive has a special responsibility to ensure that the HSW Act and other law on health and safety are observed. Its main instruments for this purpose are the inspectorates:

- HM FACTORY INSPECTORATE – Manufacturing and heavy industrial premises and processes, as well as construction activities, local authority undertakings, hospitals, schools, universities and fairgrounds.
- HM-AGRICULTURAL INSPECTORATE – Farms, horticulture and forestry.
- HM EXPLOSIVES INSPECTORATE – The manufacture, transport, handling and security of explosives.
- HM MINES AND QUARRIES INSPECTORATE – All mines, quarries and landfill sites.
- HM NUCLEAR INSTALLATIONS INSPECTORATE – On the HSE's behalf licenses nuclear installations ranging from nuclear power stations and nuclear chemical works to research reactors.
- HM RAILWAY INSPECTORATE - Ensures the proper control of risks to the health and safety of employees, passengers and others that might be affected by the operations of British Railways.

The legislative process is changing all the time, and rightly so. In order to keep up to date with the changes that occur in legislation and how that legislation may impact on the role of First Aid in the workplace, the Health and Safety Executive have created an excellent website:

http://www.hsegov.co.uk

Hazard and Risk Explained

In ordinary speech we may use these two words interchangeably but at work each has a special meaning.

Hazard
A hazard is anything with the potential to cause harm.

Risk
Risk is the chance, great or small that someone will be harmed by the hazard.

Risk = severity x probability.

Poor control can create a substantial risk even from a low risk hazard. With proper controls the risk of being harmed can be minimised.

The Approved Code of Practice and Guidance document states that first aid should be seen as part of an employer's wider management of health and safety at work. A proper risk assessment helps to identify both hazards associated with the work and risks to health and safety.

Hazards and risks do not arise only in clearly hazardous environments. They can be hidden in the most commonplace situations. Potentially low risk environments such as offices and shops can be just as hazardous, therefore the risks need to be assessed. It is quite possible for employees to get used to unsafe working practices or to simply put up with a hazardous working environment.

First aiders can be in the front line of advocating better working environments, working closely with their occupational health colleagues such as the doctor, nurse or safety officer. Being equipped with the knowledge of hazard and risk, can give a preventive role to the first aider. The fewer accidents that occur the less often the first aider will have to put his/her skills into action.

Regulation 3.1

An employer shall provide or ensure that there is provided, such number of suitable persons as is adequate and appropriate in the circumstances for rendering first aid to employees if they are injured or become ill at work.

Appointed Persons:
Where an employers assessment of first aid needs identifies that a first aider is not necessary, the minimum requirement of an employer is to appoint a person to take charge of the first aid arrangements, including looking after the equipment and facilities and calling the emergency services when required. Arrangements should be made for an Appointed Person to be available to undertake these duties at all times when people are at work.

- **Appointed Persons** are not First Aiders and should not attempt to give first aid for which they have not been trained
- An **appointed person** is also responsible for First Aid equipment in the absence of the First Aider.
- In exceptional circumstances the employer is required to provide an **appointed person** during the temporary unforeseen absence of the First Aider.

Risk Assessment

A risk assessment involves a systematic approach to analysing the work activities in a specific workplace. This is undertaken by a 'competent person', whose tasks will be to identify any hazards, and any control measures which can be employed to reduce the risks posed by hazards.

It is important to look at safe working practices within the working environment.

- are they really safe?
- is there a possibility that due to working practices employees can actually make things far worse?

Observation is often a simple but effective tool in making a risk assessment. Standing back and taking a long hard look at the way working practices are being undertaken can often reveal a host of issues that may need improving.

Risk assessments are required for work environments and activities which are categorised as low, medium or high risk environments and activities. There are no exceptions.

Human error, taking short cuts, failing to pay attention, and failing to follow safe practices can all create hazardous environments with potential risk to others.

Workplace hazards are usually categorised as:

- physical hazards, e.g. risk of assault, noise, lighting, heat
- chemical hazards, e.g. toxic substances, dusts
- biological hazards, e.g. infection
- psychological hazards, e.g. shift patterns, stress, boredom, job satisfaction.

Attributes of a First Aider

(HSE First Aid Regulations 1981, Approved Code of Practice and Guidelines Para 55)

- reliable, disposition and communication skills
- aptitude and ability to absorb new knowledge and learn new skills
- ability to cope with stressful and physically demanding emergency procedures
- normal duties. These should be such that they may be left to go immediately and rapidly to an emergency.

First Aid Containers

The minimum level of first aid equipment is a suitably stocked and properly identified first aid container. Every employer should provide for each work site at least one first aid container supplied with sufficient quantity of first aid materials suitable for the particular circumstances.

First aid containers should be easily accessible and preferably be placed conveniently, if possible near to hand washing facilities. Be stocked with items useful for giving first aid and should be dustproof and waterproof. The actual contents will vary according to the needs of each site and the type of work. The contents should only contain items useful for giving first aid and exclude other items such as medications.

The contents of first aid containers should be examined frequently and should be re-stocked as soon as possible after use. Sufficient supplies should be held in a back-up stock on site. Care should be taken to discard items safely after the expiry date has passed.

All first aid containers must be identified by a white cross on a green background.

EACH kit **must** contain a treatment book (2:24:6)

Additional first aid materials and equipment

Assessing the needs of a given workplace may conclude that there is a need for additional materials and equipment. These items should be stored separately as long as they are available for use if required. Any additional stores should be marked in the same way.

There is no mandatory list, however the following is the HSE advisory list of contents subject to first aid needs assessment.

- a leaflet giving general guidance on first aid
- 20 individually wrapped sterile plasters (assorted sizes) – appropriate to the type of work.
- two Sterile eye pads
- two individually wrapped triangular bandages preferably sterile
- six safety pins
- six medium sized individually wrapped un-medicated wound dressings
- two large individually wrapped un-medicated wound dressings.
- At lest three pair of disposable gloves

The needs assessment may indicate that additional materials and equipment are required, for example, scissors, adhesive tape, disposable aprons and individually wrapped moist wipes.

Depending on the findings of the first-aid needs assessment, more than one first-aid container might be required on large sites. First-aid containers should be easily accessible and preferably placed near to hand-washing facilities. They should only be stocked with items useful for giving first aid and should be protected from dust and damp. All first-aid containers should be identified by a white cross on a green background.

They may be kept in the first aid container if there is room or stored separately.

Other pieces of equipment may include adhesive hypoallergenic microprous tape, shears capable of cutting through clothing and sterile disposal tweezers.

If mains tap water is not readily available for eye irrigation, at least a litre of sterile water or sterile normal saline (0.9%) in sealed, disposable containers should be provided. Once the seal has been broken, containers should not be used beyond their expiry date.

There may be a need for items such as protective equipment in case first aiders have to enter dangerous atmospheres, casualties from the elements or calcium gluconate for the management of hydrofluoric acids burns. Such items should be stored securely near the first aid container, in the first aid room or in the hazard area, as appropriate. Access to them should be restricted to people trained in their use.

Tablets and medication

First aid at work does not include giving tablets or medicines to treat illness. The only exception to this is where aspirin is used when giving first aid to a casualty with a suspected heart attack in accordance with currently accepted first aid practice. It is recommended that tablets and medicines should not be kept in the first aid container.

Some workers carry their own medication that has been prescribed by their doctor (eg. an inhaler for asthma). If an individual needs to take their own prescribed medication, the first aider's role is generally limited to helping them do so and contacting the emergency services as appropriate.

Travelling first aid kits

There is no mandatory list of items to be included in first aid kits for travelling workers.

They might typically contain:

(a) a leaflet giving general guidance on first aid (for example HSE's leaflet Basic advice on first at work)

(b) six individually wrapped sterile plasters (hypoallergenic plasters can be provided, if necessary)

(c) two triangular bandages, preferably sterile.

(d) two safety pins

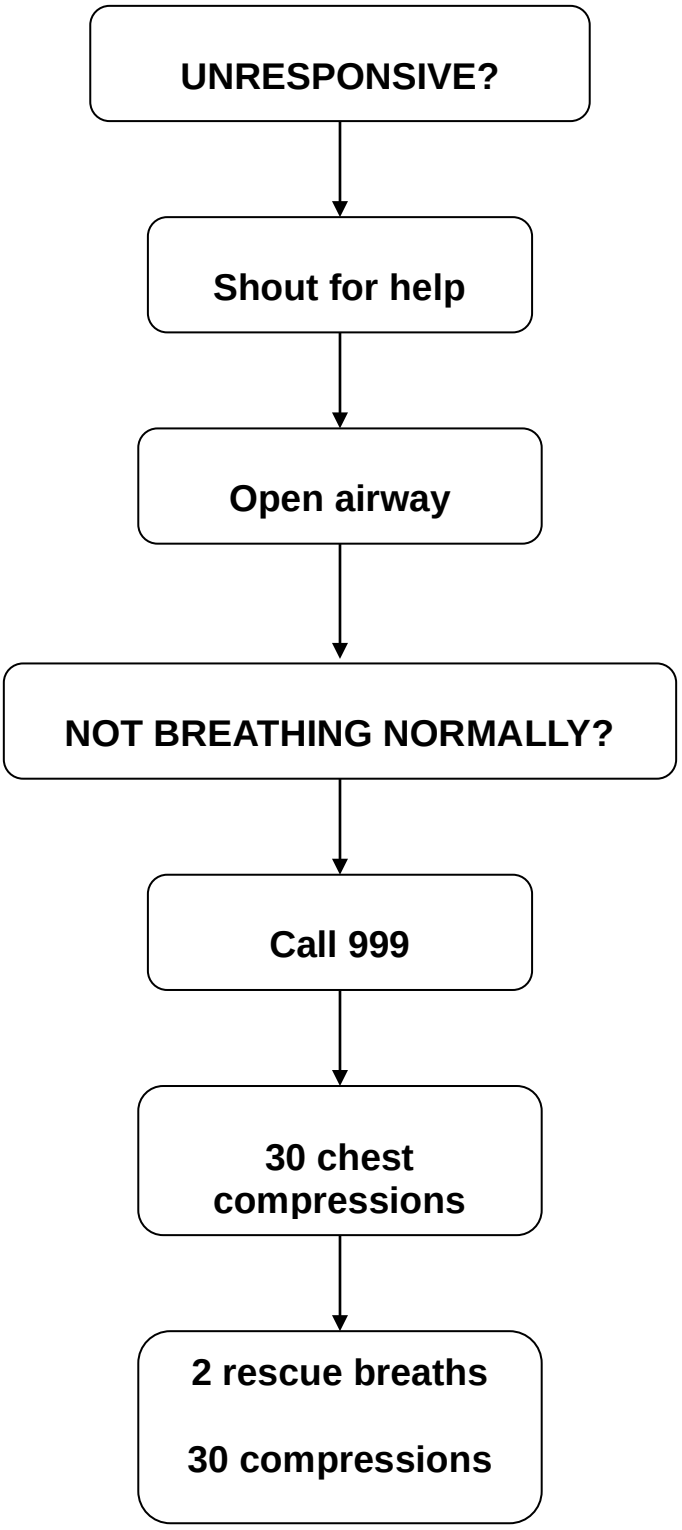
(e) one large sterile un-medicated dressing

(f) individually wrapped moist cleansing wipes

(g) two pairs of disposable gloves (see HSE's leaflet *Latex and you*)

The following is an extract from the Resuscitation Council (UK) Guidelines 2010

Adult Basic Life Support Algorithm



The following is an extract from the Resuscitation Council (UK) Guidelines 2010

Delivering chest compressions is tiring. It is now recommended that, where more than one rescuer is present, another should take over the compressions (with a minimum of delay) about every 2 minutes to prevent fatigue and maintain the quality of performance.

Adult BLS sequence

Basic life support consists of the following sequence of actions:

D

1. Make sure the victim, any bystanders and you are safe.

2. Check the victim for a response

- Gently shake his/her shoulders and ask loudly "Are you all right"

3A If he/she responds

R

- Leave him/her in the position in which you find him/her, provided there is no further danger
- Try to find out what is wrong with him/her and get help if needed
- Reassess him/her regularly

3B If he/she does <u>not</u> respond

S

- Shout for help
- Turn the victim on to his/her back and then open the airway using head tilt and chin lift:
  - Place your hand on his/her forehead and gently tilt his/her head back
  - With your fingertips under the point of the victim's chin, lift the chin to open the airway

A

4 Keeping the airway open, look, listen and feel for normal breathing

- Look for chest movement
- Listen at the victim's mouth for breath sounds
- Feel for air on your cheek

In the first few minutes after the cardiac arrest, a victim may be barely breathing, or taking infrequent, noisy gasps. This is often termed as agonal breathing and must not be confused with normal breathing.

The following is an extract from the Resuscitation Council (UK) Guidelines 2010

Look, listen and feel for **no more** than **10 seconds** to determine if the victim is breathing normally. If you have any doubt whether breathing is normal, act as if it is **not** normal.

B

5A If he/she is breathing normally

- Turn him/her into the recovery position (**see page 31**)
- Summon help from the ambulance service by mobile phone. If this is not possible, send a bystander. Leave the victim only if no other way of obtaining help is possible.
- Continue to assess that breathing remains normal. If there is any doubt about the presence of normal breathing start CPR. (5B)

5B If he/she is not breathing normally

- Ask someone to call for an ambulance and bring an AED if available or, if you are on your own, use your mobile phone to all for an ambulance. Leave the victim only when no other option exists for getting help.

  Start chest compression as follows:

  - Kneel by the side of the victim
  - Place the heel of one hand in the centre of the victim's chest which is the lower half of the victim's sternum. (breast bone)
  - Place the heel of your other hand on top of the first hand
  - Interlock the fingers of your hands and ensure that pressure is not applied over the victim's ribs. Do not apply any pressure over the upper abdomen or the bottom end of the bony sternum.
  - Position yourself vertically above the victim's chest and with arms straight press down on the sternum 5-6cm.
  - After each compression release all the pressure on the chest without losing contact between your hands and the sternum. Repeat at a rate of 100-120 per min.
  - Compression and release should take an equal amount of time

The following is an extract from the Resuscitation Council (UK) Guidelines 2010

6A Combine chest compressions with rescue breaths

- After 30 compressions open the airway again using head tilt and chin lift
- Pinch the soft part of the victim's nose closed, using the index finger and thumb of your hand on his/her forehead
- Allow his mouth to open, but maintain chin lift
- Take a normal breath and place your lips around his/her mouth, making sure that you have a good seal
- Blow steadily into his/her mouth whilst watching for his/her chest to rise; take about one second to make his/her chest rise as in normal breathing; this is an effective rescue breath
- Maintaining head tile and chin lift, take your mouth away from the victim and watch for his/her chest to fall as air comes out
- Take another normal breath and blow into the victim's mouth once more to give total of two effective rescue breaths. The two breaths should not take more than 5 secs. Then return your hands without delay to the correct position on the sternum and give a further 30 chest compressions
- Continue with chest compressions and rescue breaths in a ratio of 30:2
- Stop to recheck the victim only if he/she starts to show signs of regaining consciousness such as coughing, opening their eyes, speaking or moving purposefully AND starts to breath normally: otherwise **do not interrupt resuscitation**.

If the initial rescue breath of each sequence does not make the chest rise as in normal breathing, then before your next attempt:

- Check the victims mouth and remove any visible obstruction
- Recheck that there is an adequate head tilt and chin lift
- Do not attempt more than two breaths each time before returning to chest compressions

If there is more than one rescuer present, another should take over CPR about every 1-2 minutes to prevent fatigue. Ensure the minimum of delay during the changeover of rescuers and do not interrupt chest compressions.

The following is an extract from the Resuscitation Council (UK) Guidelines 2010

6B Chest compression-only CPR

- If you are not trained to, or are unwilling, to give rescue breaths, give chest compressions only
- If chest compressions only are given, these should be continuous at a rate of 100-120 minute.
- Stop to recheck the victim only if he/she starts to show signs of regaining consciousness, such as coughing, opening their eyes, speaking, or moving purposefully AND start to breath normally otherwise **do not interrupt resuscitation.**

7 Continue resuscitation until

- qualified help arrives and takes over
- the victim starts to show signs of regaining consciousness, such as, coughing, opening his/her eyes, speaking, on moving purposefully AND starts to breath normally, or
- you become exhausted

The following is an extract from the Resuscitation Council (UK) Guidelines 2010

Further Points Related to Basic Life Support

Risk to the rescuer

The safety of both the rescuer and victim are paramount during a resuscitation attempt. There have been a few incidents of rescuers suffering adverse effects from undertaking CPR, with only isolated reports of infections such as tuberculosis (TB) and severe acute respiratory distress syndrome (SARS). Transmission of HIV during CPR has never been reported.

There have been no human studies to address the effectiveness of barrier devices during CPR; however, laboratory studies have shown that certain filters or barrier devices with one-way valves prevent oral bacteria from the victim to the rescuer during mouth-to-mouth ventilation. Rescuers should take appropriate safety precautions where feasible, especially if the victim is known to have a serious infection, such as TB or SARS. During an outbreak of a highly infectious condition (such as SARS) full protective precautions for the rescuer are essential.

Initial rescue breaths

During the first few minutes after non-asphyxia cardiac arrest, the blood oxygen content remains high. Ventilation is, therefore, less important than chest compression at this time.

It is well recognised that skill acquisition and retention are aided by simplification of the BLS sequence of action. It is also recognised that rescuers are frequently unwilling to carry out mouth to mouth ventilation for a variety of reasons, including fear of infection and disease from the procedure. For these reasons, and to emphasise the priority of chest compressions it is recommended that in adults, CPR should start with chest compressions rather than initial ventilations.

Jaw Thrust

The jaw thrust technique is not recommended for lay rescuers because it is difficult to learn and perform. Therefore, the lay rescuer should open the airway using a head-tilt-chin-lift manoeuvre for both injured and non-injured victims.

Agonal Gasps

Agonal gasps are present in up to 40% of cardiac arrest victims. Therefore lay people should be taught to begin CPR if the victim is unconscious (unresponsive) and not breathing normally. It should be emphasised during training that agonal gasps occur commonly in the first few minutes after

sudden cardiac arrest; they are an indication for starting CPR immediately and should not be confused with normal breathing.

Use of Oxygen During Basic Life Support

There is no evidence that oxygen administration is of benefit during basic life support in the majority of cases of cardiac arrest before healthcare professionals are available with equipment to secure the airway. Its use may lead to interruption in chest compressions, and is not recommended, except in cases of drowning (see below).

Bag-Mast Ventilation

Considerable practice and skill are required to use a bag and mask for ventilation. The lone rescuer has to be able to open the airway with a jaw thrust whilst simultaneously holding the mask to the victim's face. It is a technique that is appropriate only for lay rescuers who work in highly specialised areas, such as where there is a risk of cyanide poisoning or exposure to other toxic agents. There are other specific circumstances in which non-healthcare providers receive extended training in first aid, which could include training, and retraining, in the use of bag-mask ventilation. The same strict training that applies to healthcare professionals should be followed and the two person technique is preferable.

Chest Compression

In most circumstances it will be possible to identify the correct hand position for chest compression without removing the victim's clothes. If in any doubt, remove outer clothing.

Each time compressions are resumed on an adult, the rescuer should place his/her hands on the lower half of the sternum. It is recommended that this location be taught in a simple way, such as 'place the heel of your hand in the centre of the chest with the other hand on top'. This teaching should be accompanied by a demonstration of placing the hands on the lower half of the sternum. Use of the internipple line as a landmark for hand placement is not reliable.

Mouth-to-nose ventilation

Mouth-to-nose ventilation is an effective alternative to mouth-to-mouth ventilation. It may be considered if the victim's mouth is seriously injured or cannot be opened, the rescuer is assisting a victim in the water, or a mouth-to-mouth seal is difficult to achieve.

Mouth-to-tracheostomy ventilation

Mouth-to-nose tracheostomy may be used for a victim with a tracheostomy tube to tracheal stoma who requires rescue breathing.

The following is an extract from the Resuscitation Council (UK) Guidelines 2010

Whilst performing chest compression:

a) Compress the chest at a rate of about 100-120 minute.

b) Each time compressions are resumed, the rescuer should place his/her hands, without delay, 'in the centre of the chest'.

c) Pay attention to achieving the full compression depth of 5-6 cm (for an adult).

d) Allow the chest to recoil completely after each compression.

e) Take approximately the same amount of time for compression and relaxation.

f) Minimise interruptions in chest compression.

g) Do not rely on a palpable carotid or femoral pulse as a gauge of effective arterial flow.

h) 'Compression rate' refers to the speed at which the compressions are given, not the total number delivered in each minute. The number delivered is determined not only by the rate, but also by the number of interruptions to open the airway, deliver rescue breaths and allow AED analysis.

Compression-only CPR

Studies have shown that chest compression-only CPR may be as effective as combined ventilation and compression in the first few minutes after non-asphyxial arrest. However chest compressions combined with rescue breaths is the method of choice for CPR by trained lay rescuers and professionals and should be the basis for lay-rescuer education. Lay rescuers who are unable or unwilling to provide rescue breaths should be encouraged to give compressions alone. When advising untrained lay people by telephone should give instruction on compression only CPR.

Over-the-head CPR

Over-the-head CPR for a single rescuer and straddle CPR for two rescuers may be considered for resuscitation in confined spaces.

Regurgitation during CPR

Regurgitation of stomach contents is common during CPR, particularly in victims of drowning. If regurgitation occurs:

- Turn the victim away from you.
- Keep him on his side and prevent him from toppling on to his front.

- Ensure that his head is turned towards the floor and his mouth is open and at the lowest point, thus allowing vomit to drain away.
- Clear any residual debris from his mouth with your fingers; and immediately turn him on to his back, re-establish an airway, and continue rescues breathing and chest compressions at the recommended rate.

Choking

Recognition

The following is an extract from the Resuscitation Council (UK) Guidelines 2010

Because recognition of choking (airway obstruction by a foreign body) is the key to successful outcome, it is important not to confuse this emergency with fainting, heart attack, seizure or other conditions that may cause sudden respiratory distress, cyanosis or loss of consciousness.

Foreign bodies may cause either mild or severe airway obstruction. The signs symptoms enabling differentiation between mild and severe airway obstruction are summarised in the table below. It is important to ask the conscious victim "Are you choking?"

General signs of choking	
♦ Attack occurs while eating ♦ Victim may clutch his/her neck	
Signs of mild airway obstruction	**Signs of severe airway obstruction**
Response to question "Are you choking?" ♦ Victim speaks and answers "Yes" Other signs ♦ Victim is able to breathe, cough and speak	Response to question "Are you choking?" ♦ Victim unable to speak ♦ Victim may respond by nodding Other signs ♦ Victim unable to breathe ♦ Breathing sounds wheezy ♦ Attempts at coughing are silent ♦ Victim may be unconscious

Adult choking sequence

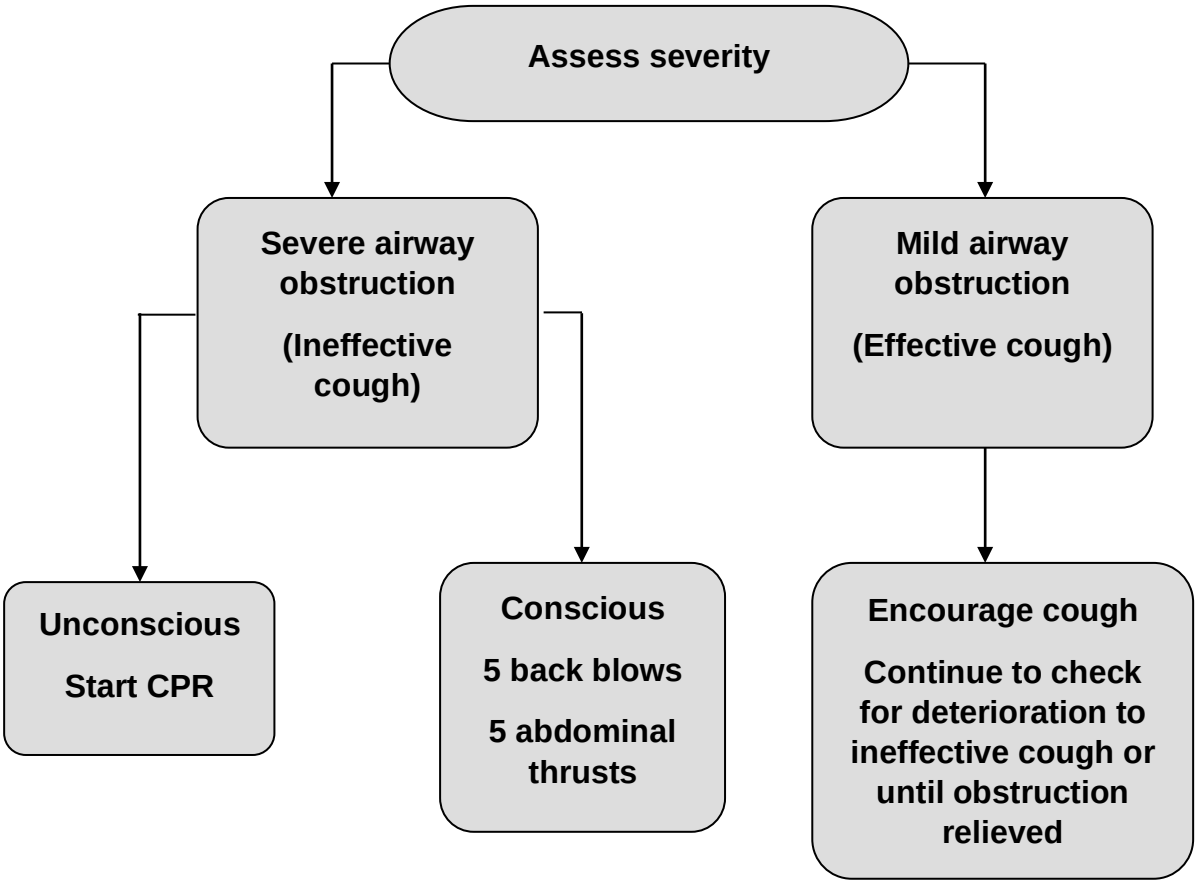
(This sequence is also suitable for use in children over the age of 1 year)

1. **If the victim shows signs of mild airway obstruction:**
   - ♦ Encourage him/her to continue coughing, but do nothing else

2. If the victim shows signs of severe airway obstruction and is conscious

- Give up to five back blows
  - Stand to the side and slightly behind the victim.
  - Support the chest with one hand and lean the victim well forwards so that when the obstructing object is dislodged, it comes out of the mouth, rather than goes further down the airway.
  - Give **up to** five sharp blows between the shoulder blades with the heel of your other hand.

(a) Adult choking sequence



The following is an extract from the Resuscitation Council (UK) Guidelines 2010

- Check to see if each back blow has relieved the airway obstruction. The aim is to relieve the obstruction with each blow, rather than necessarily to give all five.
- If five back blows fail to relieve the airway obstruction, give up to five abdominal thrusts
  - Stand behind the victim and put both arms round the upper part of his/her abdomen
  - Lean the victim forwards
  - Clench your fist and put it between the umbilicus (navel) and the bottom end of the sternum (breastbone)
  - Grasp this hand with your other hand and pull sharply inwards and upwards
  - Repeat up to five times
- If the obstruction is still not relieved, continue alternating five back blows with five abdominal thrusts

3. If the victim becomes unconscious:

- Support the victim carefully to the ground
- Immediately call an ambulance
- Begin CPR (from 5B of the Adult BLS sequence).

Explanatory notes

Following successful treatment for choking, foreign material may, nevertheless, remain in the upper or lower respiratory tract and cause complications later. Victims with a persistent cough, difficulty swallowing, or with the sensation of an object being still stuck in the throat should therefore be referred for a medical opinion.

Resuscitation of children and victims of drowning

Both ventilation and compression are important for victims of cardiac arrest when the oxygen stores become depleted – about 2-4 minutes after collapse from ventricular fibrillation (VF), and immediately after collapse for victims of asphyxial arrest. Previous guidelines tried to take into account the difference in causation, and recommended that victims if identifiable asphyxia (drowning; trauma; intoxication) and children should receive 1 min of CPR before the lone rescuer left the victim to get help. But most cases of sudden cardiac arrest out of hospital occur in adults and are of cardiac origin due to VF (even though many of these will have changed to a non-shockable rhythm by the

time of the first rhythm analysis). These additional recommendations, therefore, added to the complexity of the guidelines whilst applying to only a minority of victims.

Many children do not receive resuscitation because potential rescuers fear causing harm. The fear is unfounded, it is far better to use the adult BLS sequence for resuscitation of a child than to do nothing. For ease of teaching and retention, laypeople should be taught to use the adult sequence for children who are not responsive and not breathing normally, with the single modification that the chest should be compressed by one third of its depth. However, the following minor modifications to the adult sequence will make it even more suitable for use in children.

The following is an extract from the Resuscitation Council (UK) Guidelines 2010

- Give five initial rescue breaths before starting chest compressions (adult sequence of actions 5B)
- If you are on your own perform CPR for approximately 1 minute before going for help
- Compress the chest by approximately one-third of its depth. Use two fingers for an infant under 1 year; use one or two hands for a child over 1 year as need to achieve an adequate depth of compression.

The same modification of five initial breaths and 1 minute of CPR by the lone rescuer before getting help, may improve the outcome for victims of drowning. This modification should be taught only to those who have a specific duty of care to potential drowning victims (e.g. lifeguards). If supplemental oxygen is available, and can be brought to the victim and used without interruption in CPR (eg by attaching to a resuscitation face mask), it may be of benefit.

Drowning is easily identified. It can be difficult, on the other hand, for layperson to recognise when trauma or intoxication has caused cardio respiratory arrest. If either cause is suspected the victim should be managed according to the standard BLS protocol.

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The following is an extract from the Resuscitation Council (UK) Guidelines 2010

The use of Automatic External Defibrillators (AED)

Introduction

This chapter contains guidelines for the use of automated external defibrillators (AEDs) by laypeople, first responders responding with an AED outside hospital.

These guidelines are appropriate for all types of AED, including those that are fully automatic. Guidelines for in-hospital use of AEDs are provided in the electrical therapies section of the advanced life support guidelines.

In the UK approximately 30,000 people sustain cardiac arrest outside hospital and are treated by emergency medical services (EMS) each year. Electrical defibrillation is well established as the only effective therapy for cardiac arrest caused by ventricular fibrillation (VF) or pulseless ventricular tachycardia (VT). The scientific evidence to support early defibrillation is overwhelming, the delay from collapse to delivery of the first shock is the single most important determinant of survival. If defibrillation is delivered promptly, survival rates as high as 75% have been reported. The chances of successful defibrillation decline at a rate of about 10% with each minute of delay; basic life support will help to maintain a shockable rhythm but is not a definitive treatment.

The Resuscitation Council (UK) recommends strongly a policy of attempting defibrillation with the minimum of delay in victims of VF/VT cardiac arrest.

Guideline Changes

There are no major changes to the sequence of actions for AED users in Guidelines 2010. The ILCOR Consensus on Science and Treatment Recommendations makes the following recommendations which are relevant to the RC (UK) AED guidelines.

1. An AED can be used safely and effectively without previous training. Therefore, the use of an AED should not be restricted to trained rescuers. However, training should be encouraged to help improve the time to shock delivery and correct pad placement.

The following is an extract from the Resuscitation Council (UK) Guidelines 2010

2. Short video/computer self-instruction courses, with minimal or no instructor coaching, combined with **hands-on practice** can be considered as an effective alternative to instructor-led BLS and AED courses. Such courses should be validated to ensure that they achieve equivalent outcomes to instructor led courses.
3. When using an AED minimise interruptions in chest compression. Do not stop to check the victim or discontinue cardiopulmonary resuscitation (CPR) unless the victim starts to show signs of regaining consciousness, such as coughing, opening his eyes, speaking, or moving purposefully AND starts to breathe normally.

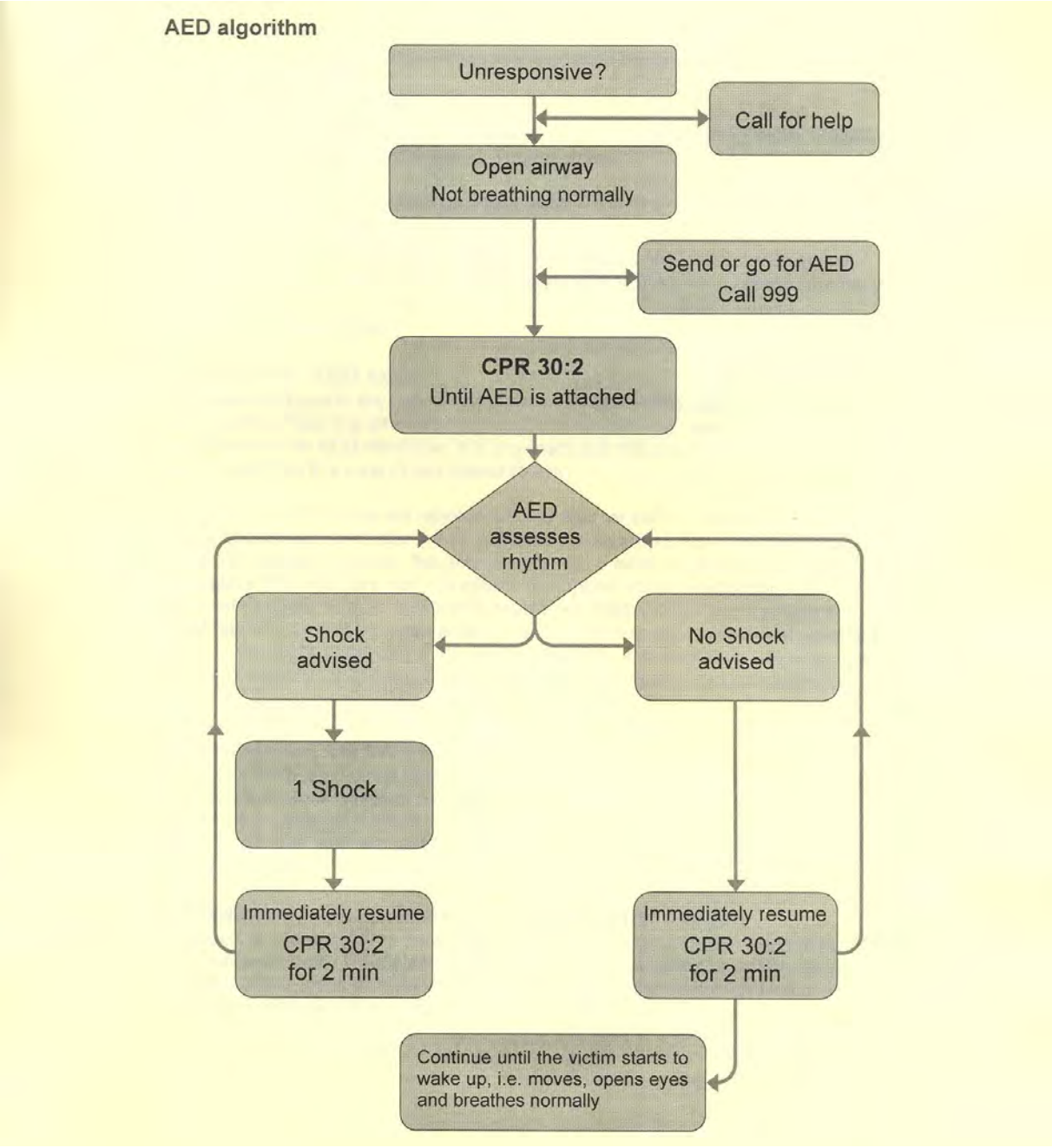
Types of Automated External Defibrillator

AEDs are sophisticated, reliable, safe, computerised devices that deliver electric shocks to victims of cardiac arrest when the ECG rhythm is one that is likely to respond to a shock. Simplicity of operation is a key feature: controls are kept to a minimum, voice and visual prompts guide rescuers. Modern AEDs are suitable for use by both lay rescuers and healthcare professionals.

All AEDs analyse the victim's ECG rhythm and determine the need for a shock. The semi-automatic AED indicates the need for a shock, which is delivered by the operator, while the fully automatic AED administers the shock without the need for intervention by the operator. Some semi-automatic AEDs have the facility to enable the operator (normally a healthcare professional) to override the device and deliver a shock manually, independently of prompts.

The following is an extract from the Resuscitation Council (UK) Guidelines 2010

AED algorithm



The following is an extract from the Resuscitation Council (UK) Guidelines 2010

Sequence of actions when using an automated external defibrillator

The following sequence applies to the use of both semi-automatic and automatic AEDs in a victim who is found to be unconscious and not breathing normally.

1. Follow the adult BLS sequence as described in the basic life support chapter. Do not delay starting CPR unless the AED is available immediately.

2. **As soon as the AED arrives:**
   - If more than one rescuer is present, continue CPR while the AED is switched on. If you are alone, stop CPR and switch on the AED.
   - Follow the voice / visual prompts
   - Attach the electrode pads to the patient's bare chest.
   - Ensure that nobody touches the victim while the AED is analysing the rhythm.

3A **If a shock is indicated:**
   - Ensure that nobody touches the victim
   - Push the shock button as directed (fully-automatic AEDs will deliver the shock automatically).
   - Continue as directed by the voice / visual prompts
   - Minimise, as far as possible, interruptions in chest compression

3B **If no shock is indicated:**
   - Resume CPR immediately using a ratio of 30 compressions to 2 rescue breaths
   - Continue as directed by the voice / visual prompts

4. Continue to follow the AED prompts until:
   - qualified help arrives and takes over OR
   - the victim starts to show signs of regaining consciousness, such as coughing, opening their eyes, speaking, or moving purposefully AND starts to breathe normally OR
   - you become exhausted.

Placement of AED pads

Place one AED pad to the right of the sternum (breast bone), below the clavicle (collar bone). Place the other pad in the left mid-axillary line, approximately over the position of the V6 EDG electrode. It is important that this pad is placed sufficiently laterally and that it is clear of any breast tissue.

The following is an extract from the Resuscitation Council (UK) Guidelines 2010

Although most AED pads are labelled left and right, or carry a picture of their correct placement, it does not matter if their positions are reversed. It is important to teach that if this happens 'in error', the pads should not be removed and replaced because this wastes time and they may not adhere adequately when re-attached.

The victim's chest must be sufficiently exposed to enable correct pad placement. Chest hair will prevent the pads adhering to the skin and will interfere with electrical contact. Shave the chest only if the hair is excessive, and even then spend as little time as possible on this. Do not delay defibrillation if a razor is not immediately available.

Defibrillation if the victim is wet
As long as there is no direct contact between the user and the victim when the shock is delivered, there is no direct pathway that the electricity can take that would cause the user to experience a shock. Dry the victim's chest so that the adhesive AED pads will stick and take particular care to ensure that no one is touching the victim when a shock is delivered.

Defibrillation in the presence of supplemental oxygen
There are no reports of fires caused by sparking where defibrillation was delivered using adhesive pads. If supplemental oxygen is being delivered by a face mask, remove the face mask and place it at least one metre away before delivering a shock. Do not allow this to delay shock delivery.

Minimise interruptions in CPR
The importance of early, uninterrupted chest compressions is emphasised throughout these guidelines. Interrupt CPR only when it is necessary to analyse the rhythm and deliver a shock. When two rescuers are present, the rescuer operating the AED applies the electrodes while the other continues CPR. The AED operator delivers a shock as soon as the shock is advised, ensuring that no one is in contact with the victim.

CPR before defibrillation
Provide good quality CPR while the AED is brought to the scene. Continue CPR whilst the AED is turned on, then follow the voice and visual prompts. Giving a specified period of CPR, as a routine before rhythm analysis and shock delivery, is not recommended.

Voice prompts
The sequence of actions and voice prompts provided by an AED are usually programmable and it is recommended that they be set as follows:

- Deliver a single shock when a suitable rhythm is detected.
- No rhythm analysis immediately after the shock
- A voice prompt for resumption of CPR immediately after the shock
- A period of 2 min of CPR before further rhythm analysis.

The Recovery Position

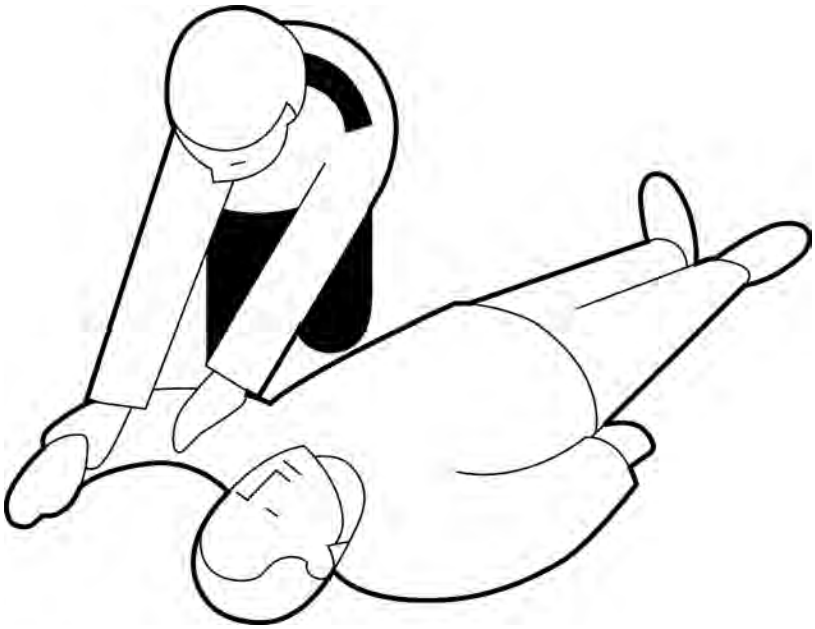
This position is useful in maintaining an open airway, by preventing the tongue from falling to the back of the throat and in the case of vomiting allows any fluids to drain away and thus reduces the risk of further injury through inhalation.

There are several variations of the recovery position, each with its own advantages. No single position is perfect for all victims. The position should be stable, near a true lateral position with the head dependent and with no pressure on the chest to impair breathing.

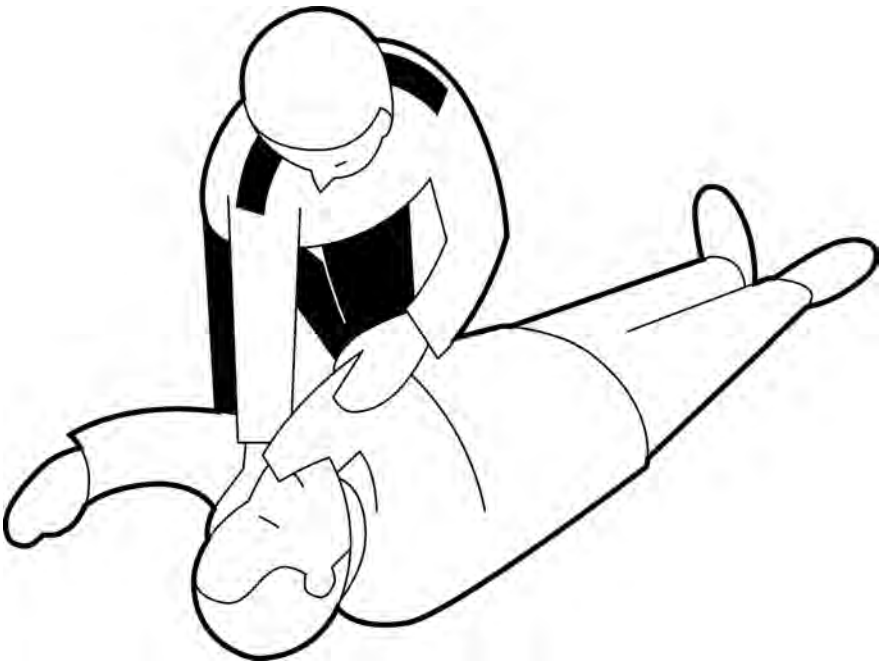
The Resuscitation Council (UK) recommends this sequence of actions to place a victim in the recovery position:

- Remove the victim's spectacles
- Kneel beside the victim and make sure that both his/her legs are straight
- Place the arm nearest to you at right angles to his/her body, elbow bent with the hand palm up
- Bring the far arm across the chest and hold the back of the hand against the victim's cheek nearest to you
- With your other hand, grasp the far leg just above the knee and pull it up, keeping the foot on the ground
- Keeping his/her hand pressed against his/her cheek, pull on the far leg to roll the victim towards you on to his/her side
- Adjust the upper leg so that both the hip and knee are bent at right angles
- Tilt the head back to make sure the airway remains open
- If necessary, adjust the hand under the cheek to keep the head tilted and facing downwards to allow liquid material to drain from the mouth.
- Check breathing regularly

If the victim has to be kept in the recovery position for **more than 30 minutes** turn him/her to the opposite side to relieve the pressure on the lower arm.

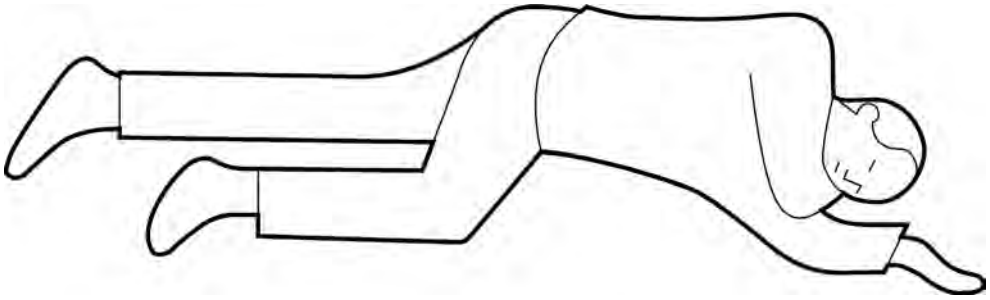


- bring the far arm across the chest and hold the back of the hand against the casualty's nearest cheek, nearest to you.



- with your other hand, grasp the far leg just above the knee and pull it up, keeping the foot on the ground
- keeping the casualty's hand pressed against their cheek, pull on the far leg to roll the casualty towards you onto their side

- tilt the head back to make sure the airway remains open
- adjust the upper leg so that both the hip and knee are bent at right angles
- if necessary, adjust the hand under the cheek to keep the head tilted and facing downwards to allow liquid material to drain from the mouth.
- check breathing regularly.



If you suspect that the casualty has a back or neck injury ensure that the head and neck are supported and aligned whilst the casualty is turned into the recovery position (see page 81). Support the casualty until help arrives.

Reporting Casualty Information

The reporting of information concerning any casualty is of vital importance to the emergency services. The reporting procedure should therefore be as clear and as accurate as possible within the remit of first aid.

It is the responsibility of any first aider to:

- **assess** the situation and the needs of the casualty
- **decide** what is wrong with the casualty
- **treat** the casualty in the appropriate manner
- **transfer** the casualty.

In verbally reporting an incident the report will consist of the findings you have seen and observed. Consider obtaining information with reference to the points below:

- **history** – from a conscious casualty or witnesses
- **mechanism of injury**
- **signs** – by looking carefully and examining the casualty
- **symptoms** – from the conscious casualty describing how they feel.

Information collected and gathered for the purpose of reporting patient information needs to be collected accurately. It is normal practice to take a record of a casualty's:

- pulse; (rate, rhythm and strength)
- breathing; (rate, depth and character)
- level of response; (AVPU Scale).

Also:

Make a note of the time at the start of each recording.

Such activities would normally be undertaken every 10 minutes. This can be decreased depending on the level of seriousness of the casualty's condition.

Form 1:15:6 should be used in the following circumstances:

1. To report an injury/incident/near miss involving a person in custody.
2. To report an injury/incident to a member of the public or a contractor e.g. cleaner or janitor
3. To report an injury/incident to persons from outwith with force attending training arranged by Scotland Police.
4. To report work related diseases (as defined by Appendix IV in HSG007 Accident Reporting) contracted by an employee.

Copies are available from stores where it is a stock item and single copies can be downloaded from the Force Operational Guide (FOG) site on the Force Intranet.

Treatment Record Book (2:24:6)

First aiders in the workplace should be familiar with the accident reporting system in their work setting. The completion of the First Aid Treatment Record Book (form 2:24:6) is the responsibility of the first aider. They should also be aware of the accident reporting system and the location of report forms and accident books.

The main categories usually consist of:

- name of the casualty
- address of the casualty
- occupation of the casualty
- the date and time the accident occurred
- the place where the accident occurred
- what actually happened and the cause of the accident if known
- the extent of any injuries
- treatment or referral information given
- signature and date of the person making the report.

Additional Information

Certain accidents that occur in the workplace are governed by RIDDOR -the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995. Such regulations place a duty on an employer to:

- immediately notify the appropriate authority if anybody dies or is seriously injured in an accident in connection with the employer's business (notification by telephone)
- submit an additional report (within 10 days) if the employer has had to notify any death, serious injury or dangerous occurrence (by telephone)
- report if anybody is away from work for more than 3 days as a result of an accident at work (within 10 days)
- submit a report forthwith if a specified occupational disease is certified by a doctor.

THIS IS DONE BY THE FORCE SAFETY UNIT

Scene and Casualty Management

In dealing with a first aid emergency you should remain calm and approach the incident with firmness and authority. Do not allow yourself to be distracted by non-vital activity. You must ACT:

- **A**ssess the scene
- **C**ommunicate with control
- **T**reat casualties.

Assess the scene

You should make an initial assessment of the scene. In particular you should consider any danger to yourself or the casualty and whether there are any other people at the scene who can help you.

The mnemonic CHALET may be useful in helping you to make an assessment.

CASUALTIES	Approximate number of casualties: dead, injured, not injured. How severe are their injuries?
HAZARDS	Present and potential: fuel spillage's, debris, weather conditions, terrain, gas, electricity, chemicals, fire or danger of explosion.
ACCESS	Best routes for emergency vehicles and suitable RV points.
LOCATION	Precise location of the incident.
EMERGENCY SERVICES	What other resources do you require - how can you get them?
TYPE	Establish with accuracy the type of incident: its extent, numbers of people, vehicles, buildings, etc.

Take action to minimise or eliminate any danger to both you and the casualty. Where possible remove the danger from the casualty rather than the casualty from the danger. As a last resort move the casualty.

Communicate with control

Communicate the above information to control. Ensure that they have understood the situation and that help is on its way.

Casualty Assessment

Where there is more than one casualty assess them all before treating any.

Use **DR SAB.**

Prioritise and treat the casualty who needs you most. Attend to any unconscious casualties first and ensure that emergency first aid is given without delay.

Those casualties who are moving around and talking are sometimes in a far better medical state than those who are quiet and still.

The importance of treating casualties speedily is indicated by two time periods commonly referred to by medical professionals as:

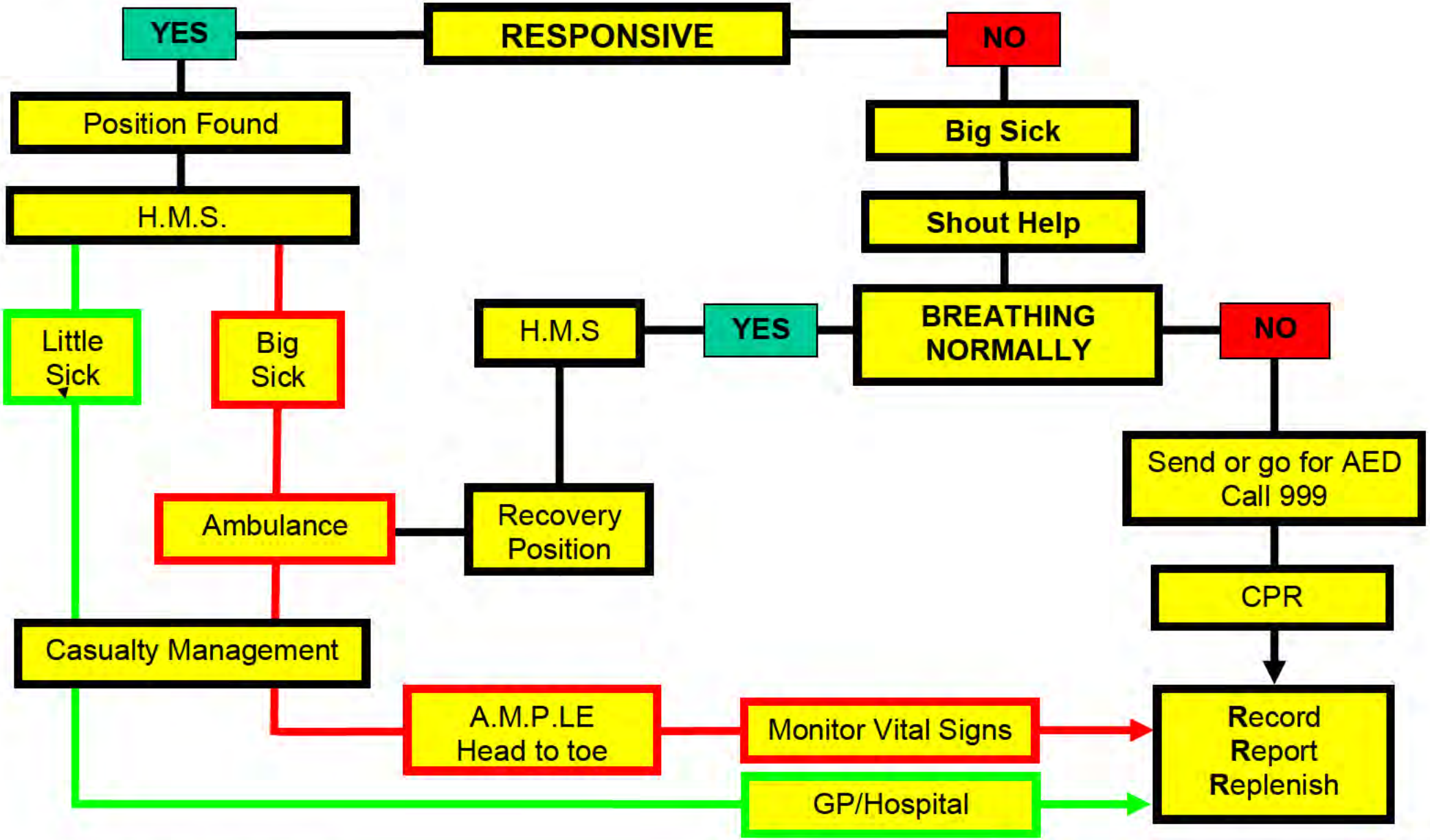
The **platinum 10 minutes** - the first 10 minutes following an injury. (Ambulance staff aim to convey an untrapped casualty from a scene within 10 minutes.)

The **golden hour** - the time from the injury until stabilisation in the operating theatre, if operative care is necessary. (Ambulance staff will make every attempt to ensure that every casualty who has received a serious injury is conveyed to hospital well within one hour of them being injured.)

If **A**irway, **B**reathing and **C**irculation are stabilised and supported within these times then a seriously injured person has a much greater chance of survival.

Information in respect of each casualty should be given to ambulance personnel upon their arrival. In particular the nature of the casualty's injury, their breathing, pulse rates and consciousness level details of any treatment given to them.

Casualty Assessment



Casualty Assessment – Primary Survey

The purpose of Primary Survey is to conduct a quick systematic assessment of a casualty to identify life threatening conditions or injuries (big sick) based on the casualty's response level, airway, breathing and circulation.

Conduct an initial and rapid assessment of the casualty in order to identify and treat any condition posing a threat to life. Use DR ABC.

MAINTAIN AN AIRWAY

TREAT ANY CONDITION POSING A THREAT TO LIFE AS YOU FIND IT.

Once you have provided initial emergency treatment you need to look for other clues that may tell you what has happened to a casualty.

The following sequence may help establish the severity of trauma:

- History (picture of what has happened).
- Mechanism of injury (how the energy was transferred and in what form).
- Symptoms (sensation the casualty feels or experiences).
- Signs (information discovered by rescuer).

Casualty Assessment - Secondary Survey

History -

Question the casualty as to what has happened and obtain a **AMPLE** and history:

- **A**llergies
- **M**edicines taken
- **P**ast medical history
- **L**ast ate or drank
- **E**nvironment

Signs

Information discovered by the rescuer applying his/her senses – look, listen, feel and smell

Symptoms

What effects of bodily injury does the casualty feel?

External Clues

Look for external clues such as medication, SOS talisman or auto-injector.

Head to toe survey

A head to toe survey is a systematic physical assessment of a casualty that is designed to identify signs and symptoms of injury. Start at the head of the casualty and work down the body to their toes.

Avoid removing clothing to carry out this procedure (the casualty may get cold or suffer a loss of dignity).

Examine each part of the body for signs of a fracture (DOTS)

Deformity

Open injury

Tenderness

Swelling

Check:

Start physical examination at the casualty's head

- Scalp

Consider the possibility of neck injury and do not move the head unnecessarily.

Speak to casualty in both ears and check for clear fluid or watery blood.

Examine both eyes, check pupils. Look for any foreign object, blood or bruising in the whites of the eyes.

Check the nose for discharge.

Look in the mouth for anything that might obstruct the airway.

Inspect the skin noting the colour and temperature.

Loosen clothing around neck.

Look at the chest. Ask casualty to breathe deeply if appropriate. Feel the ribcage to check for deformity, irregularity or tenderness.

Feel along, collar bones, shoulders, arms, wrists and hands. Check peripheral circulation.

If there is any signs, symptoms or mechanism of injury which cause you to suspect a spinal injury **do not move the casualty to examine the spine**. Otherwise, gently pass your hand under the hollow of the back and check for swelling or tenderness.

Gently feel the casualty's abdomen.

Check clothing for evidence of incontinence or bleeding from orifices.

Check legs.

Check movement and feeling in the toes.

Pulse and respiration

Assess casualties:

- pulse; (rate, rhythm and strength) normal rate of an adult at rest 60-80 beats per minute
- breathing; (rate, depth ease and noise) normal rate adult at rest 12- 16 breaths per minute. Babies and young children it increases to 20-30 breaths per minute.

Level of Response; (response to stimuli). A.V.P.U.

Try to note whether the casualty is **A**lert and aware of his/her surroundings or whether they are confused or disorientated. Do their eyes open spontaneously?

A

Does the casualty respond to **V**erbal stimulus? Is there movement when you speak to him/her? Does the casualty respond to commands such as 'open your eyes'?

V

Does the casualty respond to **P**ain? A suitable means of attempting to obtain a response to pain may be to apply light pressure to the nailbeds of the fingers or toes.

P

Does the casualty remain completely **U**nresponsive making no response either through movement, speech, pain or by opening their eyes?

U

It is important to regularly reassess a casualty as they may drift in and out of any of these stages.

Temperature

Does the casualty feel hot or cold? What kind of environmental conditions exist at the scene?

Protect the casualty from excessively hot or cold surroundings.

Whilst waiting for help to arrive the casualty should be continually monitored. The success of any first aid intervention should be checked and the initial assessment repeated frequently.

Definition of injury

Injury may be defined as any action against the body that results in damage to tissues or organs and as a result causes either external (visible) or internal (not immediately visible) damage with possible associated dysfunction's related to any of the systems of the body.

Impaired Consciousness

There is no absolute dividing line between consciousness and unconsciousness.

Causes of impairment:

- head injury
- fainting
- heart attack
- shock
- diabetic emergency
- epilepsy
- stroke.
- drug overdose

The Respiratory System

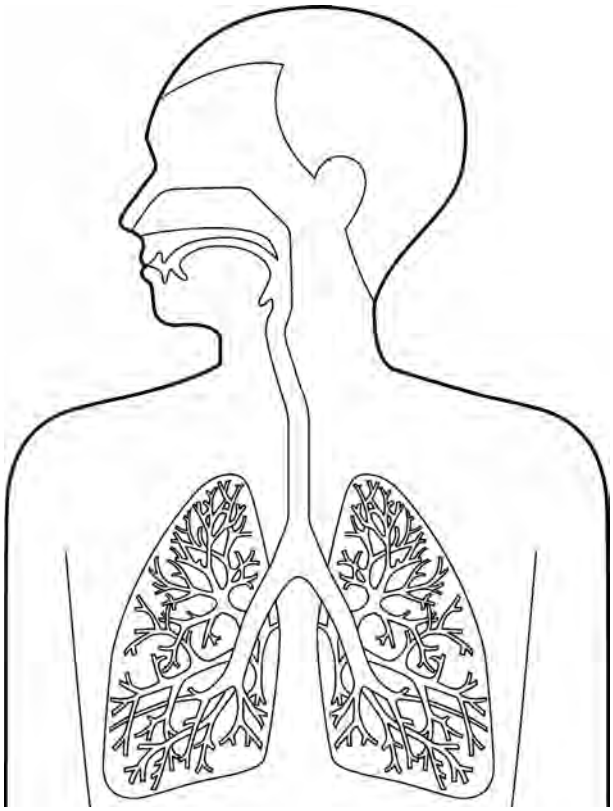
This section deals with:

- anatomy of the respiratory system (including common respiratory problems)
- asthma
- drowning

Excited Delirium Syndrome

The airway

The airway consists of a passageway of tubes.



During *inspiration* **oxygen** is drawn through these tubes into the lungs. In the lungs oxygen is absorbed into the blood.

During *expiration* **carbon dioxide** passes from the blood to the airway and is expelled in the air we breathe out.

The airway starts at the mouth and nose and passes to the back of the throat (**pharynx**), down the windpipe (**trachea**) and into the two **bronchi** that divide into the right and left lung. The bronchi continue to subdivide into smaller **bronchioles**. Eventually the bronchioles form blind-end tubules known as **alveoli.** The lining of the alveoli is only one cell thick and it is here that the gaseous exchange between oxygen and carbon dioxide takes place. The alveoli can easily be damaged through smoking or working in dusty environments.

An open/closed airway

It is vital to life that a casualty has an open airway at all times. If the airway is closed or obstructed a state of suffocation or **asphyxia** rapidly develops causing breathing to stop.

There are many causes of a blocked airway:

- blocked airway, caused by food or the tongue
- suffocation, e.g. pillow over face obstructing airway
- inhalation of smoke, gas or fluids.

Any of the above will create low oxygen levels in the body **(hypoxia)**. In this condition tissues and organs begin to deteriorate due to a lack of oxygen. The cells in the brain are particularly susceptible to irreversible deterioration if starved of oxygen and will start to die after just three minutes without a supply of oxygen.

Breathing

The process of breathing is an automatic function controlled by the brain. Through a variety of small receptors placed strategically in the brain stem, the brain is able to carefully monitor the amount of oxygen and carbon dioxide circulating in the body at any one time. The outputs from these receptor areas stimulate either inspiration or expiration.

Inspiration

During inspiration the rib cage moves upwards and outwards and the **diaphragm** (a strong sheet of dome shaped muscle resting between the chest and abdominal cavities), moves into a flatter position to increase the volume within the chest, drawing air in.

Expiration

During expiration the muscles relax, the rib cage returns to a normal resting position and the diaphragm takes on its normal dome shaped position. This process of relaxation causes air that is in the lungs to be forced out. Expiration is a passive process after which there is a short pause before the whole procedure starts again.

Common respiratory problems

There are many respiratory conditions that can affect normal breathing, e.g.:

- asthma
- Chronic Obstructive Pulmonary Disease (Chronic Bronchitis and Emphysema)
- pneumonia
- pleurisy
- emphysema
- certain allergic responses
- croup (usually in children, occurring at night)

A potential problem that can occur in detainees is:

- positional asphyxia

The death of persons in custody has been attributed to this condition. In otherwise healthy individuals it can occur where an individual is held down or placed in a prone (face down) position. Although instances are comparatively rare risks may be increased where the detainee is obese, drugged or intoxicated.

Most recent medical opinion suggests that it is restraint and the exertion against such restraint that may result in death, rather than the casualty's position. Some doctors put forward the view that the condition may exist exclusively in intoxicated and obese persons, particularly those persons with a 'beer belly'. The term Restraint Associated Death (RAD) may give a more accurate description of this condition.

Excited Delirium Syndrome

A delirium is characterised by a severe disturbance in the level of consciousness and a change in mental status over a relatively short period of time.

Signs:

- perfuse sweating due to hyperthermia
- there is a reduced clarity of awareness in their environment
- the ability to focus, sustain or shift attention is impaired
- the individual's attention wanders and is easily distracted by other stimuli
- the individual is almost certainly disorientated and may not know what year it is, where they are, what they are doing and the impact of their behaviour
- perceptual disturbances are common and the person may hallucinate

A delirium is the result of a serious and potentially life threatening medical condition. Potential causes include infection, head trauma, fever, and adverse reactions to medications or overdose of illegal drugs such as cocaine and methamphetamines.

Any person who is delirious requires prompt medical evaluation and treatment. The delirious person is likely to manifest an acute behavioural disturbance. These individuals can appear normal until they are questioned, challenged or confronted.

When confronted or frightened these individuals can become oppositional, defiant, angry, paranoid and aggressive. Further confrontation, threats and use of force will almost certainly result in further aggression and even violence. Attempting to restrain and control these individuals can be difficult because they frequently possess unusual strength, pain insensitivity and instinctive resistance to any use of force. As many as five to eight people may be required to restrain one delirious adult.

The Police Complaints Authority (PCA) recommend the following training for police officers to help them differentiate between intoxication and excited delirium syndrome:

- learn how to recognise the signs of delirium or the initial symptoms;
- obtain immediate medical consultation and attention for any person who may suffer from a delirium;
- do not excite, confront or agitate individuals who are delirious;
- contain rather than restrain when the individual is not dangerous to self or others;

- avoid the use of force unless individual is dangerous to self or others;
- use the lowest level of force necessary as well as a method of restraint that will not cause asphyxiation; and

Be cautious and aware of potential side effects of medication.

Asthma

Asthma is a condition that is extremely common:

- there are almost three and a half million asthma sufferers in the UK and over 1500 people die from the condition each year
- one in seven children and one in 25 adults are sufferers.

The condition is characterised by spasms of the muscles in the air passages and swelling of the air passage linings. The spasms and swelling make breathing difficult and the greater the spasms and swelling the more difficult breathing becomes.

Attacks can be triggered or aggravated by:

- stress
- heavy exercise
- infection
- exposure to allergens
- exposure to irritants, e.g. dust, vapours, fumes, smoky atmospheres
- unknown causes.

Many attacks occur at night.

Signs and symptoms of an asthma attack:

- obvious state of distress and anxiety may be present
- difficulty breathing with a prolonged breathing out phase.
- pale or cyanosed (grey/blue coloured) skin - a black or dark skinned person will not appear blue, there may however be some discoloration of the lips, tongue, conjunctiva of the eyes, palms or soles of the feet
- a wheezing sound as the casualty breathes out.
- coughing
- exhaustion in a severe attack

Treatment

Known asthmatics may carry a Blue Reliever inhaler with them for use when an attack occurs and may well be capable of managing an attack without the assistance of others.

You should:

- reassure the casualty (being unable to breathe properly is extremely frightening) and keep him/her as calm as possible
- place the casualty in a position that they themselves find to be most comfortable and which helps them with their breathing (usually a sitting position). Do not let them lie down.
- instruct the casualty to breathe slowly and deeply
- allow the casualty to use their reliever inhaler. It should relieve the attack within a few minutes. Ask casualty to breath slowly and deeply. (Reliever inhalers, identifiable by their blue cap, help to dilate the passageways and so ease breathing)
- a mild attack should ease within a few minutes. If it does not ask the casualty to take another dose from the same inhaler
- advise the casualty to contact his or her own doctor following recovery
- if the attack remains prolonged and one of the following has occurred: the inhaler has not helped and/or the casualty appears to be getting worse or exhausted – call an ambulance without delay
- help the casualty use the inhaler as required

NB Inhalers should be used as directed by the casualty's doctor, pharmacist or drug company. (Over use of this medication may increase the heart rate and cause heart problems.)

Difficulty talking and the presence of cyanosis are danger signs requiring immediate medical assessment and treatment.

Drowning

Avoid entering water to rescue a drowning casualty where possible. Do not put yourself at risk. Use a rope or stick to reach out to a casualty where possible. If you must enter the water, don the lifejacket contained within the Police Scotland Water Safety kit and follow the Water Safety protocol.

Treatment

- where possible keep the casualty's head lower than their chest when carrying them from the water
- lay casualty on their back on a rug or coat with their head lower than their body and check for normal breathing
- if not breathing normally follow BLS resuscitation procedures

  (Water in the lungs and the effects of cold can increase resistance to rescue breath and chest compression therefore you may have to do both at a slower rate).
- if breathing normally and unconscious place in recovery position
- protect casualty from cold
- treat hypothermia
- transfer to hospital
- monitor pulse and breathing at least every 10 minutes whilst waiting for ambulance to arrive
- be ready to resuscitate the casualty if required. (If a **lone** rescuer is required to leave a non-breathing, unresponsive casualty unattended – give 1 minute of CPR before going for help).
- Give 5 initial rescue breaths before starting chest compressions.

Where possible note the length of time the casualty has been in the water and inform ambulance staff upon their arrival.

If a diving accident – preserve diving equipment for subsequent investigation.

Be aware that the casualty is at risk of sudden collapse minutes after rescue.

A casualty may vomit with the resumption of spontaneous respiration.

Secondary drowning may occur several hours after a drowning incident therefore all casualties from a drowning incident require medical attention.

The Circulatory System

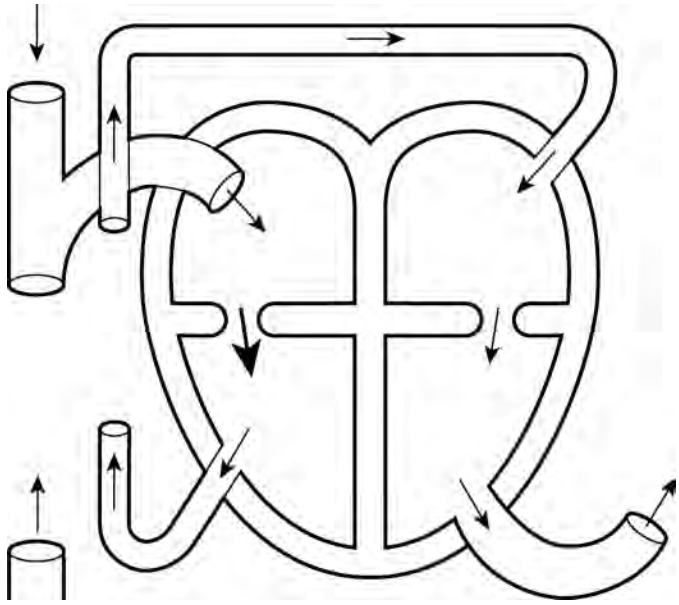
This section deals with:

- anatomy of the circulatory system
- shock
- anaphylactic shock
- heart attack
- angina
- fainting.

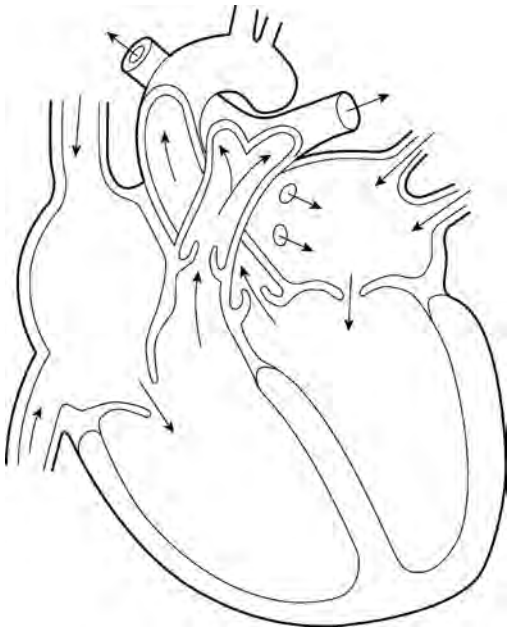
The Circulatory System

The circulatory system as the name implies consists of a closed system of vessels called **arteries, veins** and **capillaries** through which blood is pumped by the heart around the body.

The primary function of this system is **transportation**. The need for an effective and efficient transportation system in the body is required when one considers the amounts of oxygen, carbon dioxide, nutrients, hormones and waste products that have to be moved on a continual basis.



The human **heart** is a hollow muscular organ that is roughly cone shaped and has two main functions.



These functions operate simultaneously but are in fact quite separate:

- the left side of the heart is responsible for the pumping of oxygenated blood to the body
- the right side of the heart is responsible for the pumping of deoxygenated blood to the lungs.

The structure of the blood vessels

The transportation network of vessels that exists around the body and that connect the left side of the heart to the right side of the heart is made up of:

- arteries
- arterioles
- veins
- venules
- capillaries

The vessels that carry oxygenated blood (**arteries**) are different from those that carry deoxygenated blood (**veins**).

Arteries

Arteries carry blood away from the heart. They vary in size and have elastic walls which enable them to expand under the force of pressure from the heart as it pumps blood through them to the rest of the body. The proportions of elasticity and muscle in the walls of the arteries gradually change and reduce as the arteries become smaller (**arterioles**).

Veins

Veins carry blood to the heart. The walls of the veins are much thinner than arteries as they are not under the same amount of pressure as arteries. Some veins also contain **valves** which prevent back flow of blood, e.g. the veins in the legs. If the valves in the legs fail to work properly blood can pool back on itself causing **varicose veins**. Smaller veins are called **venules.**

Capillaries

Capillaries are the smallest blood vessels in the body. Their walls are composed of a single layer of cells which allow water, oxygen and nutrients from the blood to pass into the tissues and waste products from the tissues to pass into the blood. Capillaries are connected to both arterioles and venules and thus complete the transportation network of the circulatory system.

Blood pressure

Blood pressure is the force or the pressure which the blood exerts on the walls of the blood vessels in which it is being transported. The blood pressure in the arteries is higher than the blood pressure in veins. Arteries are always full of blood, thus their walls are structured to enable them to stretch. Blood pressure varies according to such things as:

- cardiac output (strength of the heartbeat)
- blood volume
- elasticity of the arterial walls
- constriction of the arteries
- venous return (the ability of the veins to return blood to the heart).

A nurse or doctor using an instrument known as a sphygmomanometer can measure blood pressure**.** There are also many automated devices on the market which can be bought over the counter at a pharmacy to enable people to keep regular checks on their own blood pressure. Two blood pressure readings can be obtained in an adult. The higher reading, approximately 120 mmHg (millimetres of mercury), is a pressure created as the heart beats and is known as the systolic blood pressure. A lower reading can be obtained when the heart is at rest, 80 mmHg, known as the diastolic blood pressure.

Shock

This life-threatening condition occurs when the circulatory system fails and vital organs such as the heart and brain are deprived of oxygen.

Causes of Shock:

The most common cause of shock is severe blood or fluid loss. If this exceeds 1.2 litres (2 pints), which is about one-fifth of the normal blood volume, shock will occur.

Shock can be made worse by fear and pain.

Loss of other body fluids can also result in shock.

- diarrhoea
- vomiting
- blockage in the intestine
- and severe burns.

In addition, shock may occur when there is adequate blood volume but the heart is unable to pump the blood.

- severe heart disease
- heart attack
- or acute heart failure

Other causes of shock include:

- overwhelming infection
- lack of certain hormones
- low blood sugar (hypoglycaemia)
- hypothermia
- severe allergic reaction (anaphylactic shock)
- drug overdose
- spinal cord injury.

Signs and Symptoms

0.5 Litres 1 Pint:

- Little or no effect.

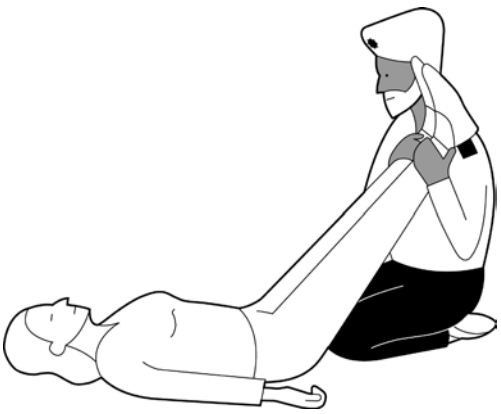
Up to 2 Litres 3.5 Pints:

- Sweating, pail, cold clammy skin
- Weakness and dizziness.
- Nausea and possibly vomiting.
- Thirst
- Rapid, shallow breathing.
- A weak, “thready” pulse. When the pulse at the wrist disappears, about half of the blood volume will have been lost.
- Grey-blue skin (cyanosis), especially inside the lips. A fingernail or earlobe, if pressed, will not regain its colour immediately.

More than 2 Litres 3.5 Pints:

- Restlessness and aggressiveness.
- Yawning and gasping for air.
- Unconsciousness.

Finally, the heart will stop.



Treatment

- Dial 999 for an ambulance
- Treat any possible cause of shock that you can detect, such as severe bleeding or serious burns.
- Lay the casualty down on a blanket to insulate him/her from the cold ground. Constantly reassure him/her.
- Raise and support his/her legs to improve the blood supply to the vital organs. Take care if you suspect a fracture.
- Loosen tight clothing at the neck, chest, and waist to reduce constriction in these areas.
- Keep the casualty warm by covering his/her body and legs with coats or blankets.
- Monitor and record vital signs – level of response, pulse, and breathing. If the person becomes unconscious, open airway and check breathing; be prepared to give rescue breaths and chest compressions.

DO NOT:

- let the casualty eat, drink, smoke or move unnecessarily. If he/she complains of thirst, moisten his/her lips with a little water.
- leave the casualty unattended, except to call an ambulance.
- try to warm the casualty with a hot-water bottle or any other direct source of heat.

Internal Bleeding

Bleeding inside the body cavities may follow an injury, such as a fracture or blunt trauma, but can also occur from a stomach ulcer. The main risk from internal bleeding is shock and pressure on internal organ.

You should suspect internal bleeding if a casualty develops signs of shock without obvious blood loss. Check for any bleeding from body openings (orifices) such as the ear, mouth, urethra or anus.

Signs and Symptoms

- Initially pale, cold, clammy skin. If bleeding continues, skin may turn blue-grey (cyanosis).
- Rapid, weak pulse.
- Thirst.
- Rapid, shallow breathing.
- Confusion, restlessness and irritability.
- Possible collapse and unconsciousness.
- Bleeding from body openings (orifices).
- In cases of violent injury, “pattern bruising”.
- Pain.
- Recent injury, illness or operation.

Treatment

Treat as for shock (page 55).

Anaphylactic shock

This is a severe allergic reaction affecting the whole body. It may develop within seconds or minutes of contact with a trigger. It occurs when a susceptible person comes in contact with something which they are allergic to, e.g. peanuts, shellfish, or eggs, takes medication which they are allergic to, e.g. penicillin, or where they are stung by a bee or wasp.

Signs and symptoms

- difficulty in breathing
- stridor (a whooping sound on inspiration) or wheezing
- signs of shock leading to collapse and loss of consciousness
- warm flushed skin (skin may have red blotches or a rash) - in black or dark skinned people it may be easier to detect a rash by feeling the skin surface
- abdominal pain, vomiting and diarrhoea.
- red, itchy rash on raised area of skin
- confusion, agitation or feeling of terror
- swelling of the face, hands and/or feet
- red, itchy watery eyes

Treatment

- transfer to hospital immediately
- support the casualty in a comfortable position (usually sitting) which best relieves the breathing difficulty. If the casualty becomes pale treat for shock
- place casualty in the recovery position if appropriate
- monitor the casualty's condition and be ready to commence CPR if required.

Some casualties who know that they are susceptible to this condition may carry a preloaded syringe containing medication with them. The most common make is 'Epi-pen' although there are others. Help the casualty administer his/her medication. Repeated doses of medication can be given at 5-minute intervals if there is no improvement or the symptoms return.

Heart Attack

The heart muscle needs its own blood supply. This is obtained from the **coronary arteries** that run over the surface of the heart.

The coronary arteries divide and subdivide like the branches of a tree. If one of these branches becomes blocked the part of the heart muscle that is supplied by the artery is deprived of oxygen resulting in damage.

Where a small part of the heart muscle dies it is said to have undergone a change called “infarction”. The medical term for a heart attack therefore is **myocardial infarction** (myo = muscles, cardial = heart).

Signs and symptoms

- severe vice like sub-sternal chest pain (often described as like a weight or tightness) which may radiate across the chest up to the jaw or down one or both arms
- pale skin
- the skin feels cold or clammy with blueness at the lips
- the casualty may feel sick or vomit
- the casualty may feel compelled to sit down or lean against a wall for support
- breathlessness is common
- the casualty may become unconscious without warning
- extreme gasping for air (air hunger)
- rapid weak or irregular pulse
- profuse sweating
- discomfort occurring high in the abdomen, which may feel like severe indigestion
- sudden faintness or dizziness
- sense of impending doom

Treatment

The main aim is to reduce the work of the heart.

- call an ambulance, tell control you suspect a heart attack
- if conscious allow the casualty to sit in the position that they find most comfortable – usually sitting down with the knees bent (see diagram)
- if the casualty is safe they should be left in this position
- loosen tight clothing
- reassure the casualty
- if breathing and/or heartbeat stop commence CPR.
- allow to take any medication for pre-diagnosed heart condition.
- assist the casualty to take one full dose of aspirin tablet (300 mg in total). Advise him/her to chew it slowly
- monitor and record vital signs

Angina

Angina affects the heart and is caused by a narrowing of the coronary arteries. This narrowing means that the coronary arteries are unable to deliver an adequate blood supply to the heart muscle especially when the casualty is exerting himself/herself. An attack forces the casualty to rest; the pain should ease soon afterwards.

Signs and symptoms include:

- vice like central chest pain which may radiate to the jaw and one or both arms
- breathlessness.
- Tiredness often sudden and extreme.
- anxiety
- pain easing with rest

The signs and symptoms of angina can be very similar to those of a heart attack. The principle difference is that in angina the condition gets better with rest.

Treatment

- rest and reassurance
- assist casualty to administer any prescribed medication to himself/herself.

The symptoms should disappear with rest and the use of medication.

If symptoms continue:

Treat as for a heart attack and call an ambulance.

Fainting

A faint is a brief loss of consciousness caused by a temporary reduction of the blood flow to the brain. It may be a reaction to pain, a fright, hunger or environmental factors such as inactivity in a warm environment.

Inactivity in such circumstances causes blood to pool in the lower limbs, which reduces the amount of oxygenated blood travelling to the brain.

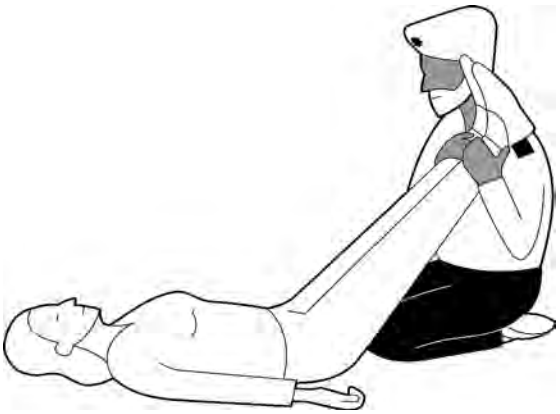
The casualty in a *pending* faint complains of feeling dizzy, may be short of breath and usually remains conscious enough to move to an environment where fresh air can be obtained.

Advise him/her to lie down. Kneel down and raise and support his/her ankles on your shoulders.

In a complete faint the casualty falls to the ground in a limp state. The casualty will have a slow pulse and further signs similar to shock prevail such as cold, pale skin and sweating.

Treatment

- try to improve the flow of blood to the brain by raising the lower limbs
- open windows to allow fresh air to enter the environment and loosen clothing and ask bystanders to stand clear
- reassure the casualty as he/she starts to regain consciousness
- once consciousness has fully returned the casualty can slowly sit up
- treat any injuries that might have resulted from the fall into unconsciousness
- if consciousness does not return check breathing and maintain the airway whilst sending for emergency assistance.

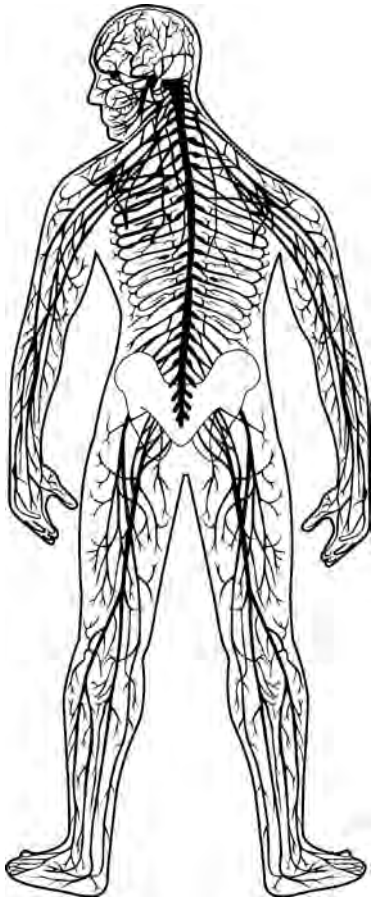


The Nervous System

This section deals with:

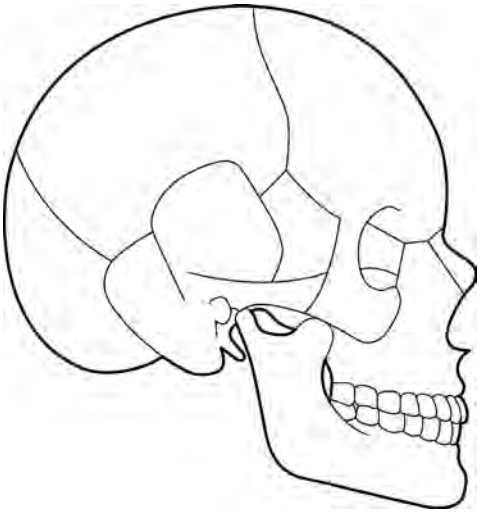
- head injury
- concussion
- compression
- stroke
- unconscious casualty
- convulsions
- epilepsy
- spinal injury.

The nervous system consists of the brain, spinal cord and nerves. The brain and spinal cord analyse sensory information and transmit appropriate responses back to the body through the nerves. Injury to the brain or spinal cord is serious, as damaged cells do not recover. Although nerves may recover from injury such recovery may take a long period of time.



Head Injury

Anatomy and physiology



The skull rests upon the upper end of the vertebral column and its bony structure is divided into two main parts: the **cranium** or brain case and the **face.**

Because the skull houses and protects the brain, all head injuries are considered as dangerous and require careful assessment.

Assume all casualties with a head injury may also have a neck (spinal) injury.

Signs and symptoms

Signs and symptoms related to head injuries can be many and varied from obvious external damage which is visible to no evidence at all in the initial stages. Soft tissue and/or bone injury can occur without brain injury and brain injury can occur without soft tissue/bone injury. The medical state of head injured persons can also change significantly over a short period of time. Even if a person has been seen by a doctor in hospital, if there is cause for concern, they should return for further assessment/treatment.

Possible signs and symptoms include:

- progression deterioration in the level of response
- wound or bruise to the head
- increasing drowsiness
- worsening headache
- dizziness

- vomiting episode since the injury
- visual problems and or breathing problems
- distortion or lack of symmetry to the head or face
- a soft boggy area of depression
- bruising underneath and around the eyes
- clear fluid (*cerebrospinal fluid*) leaking from the nose or ears which sometimes can be mixed with blood
- blood on the white of the eye
- bruise behind the ear

Bear in mind that the head injury may have been caused as a result of another condition.

Treatment

- If a neck injury has not been discovered or suspected and the casualty is fully conscious position the casualty in a comfortable position and apply a cold compress if appropriate
- if unconscious open the airway using the jaw thrust method and be prepared to resuscitate if necessary (see page 17, 83)
- control bleeding
- If there is a discharge from the ear, cover the ear with a sterile dressing or clean pad. Do not plug the ear.
- obtain medical help and monitor vital signs.

A medical practitioner MUST check all casualties with head injuries.

It is also important to inform medical staff whether anything has been said by the casualty following head injury. If consciousness is lost immediately and is continuous then this may indicate severe brain injury. The mechanism of injury is also important to note as this will assist the doctor to make a disposal.

Remember that neck injuries often accompany head injury.

Occasionally a casualty may appear to make a full recovery but bleeding within the brain and the accompanying rise in pressure within the skull causes unconsciousness to follow (see compression, page 69).

DO NOT:

move a casualty unnecessarily if you suspect the casualty may have injured the area around the neck - an injury to the head or face can result in neck injury [1].

Concussion

A brief period of impaired consciousness which usually occurs as a result of a blow to the head. It is common in cases of boxing matches where a boxer receives a direct blow to the point of the jaw. The force of the blow causes a shaking or vibration to occur of the brain inside the skull.

Signs and symptoms:

- Concussion produces a widespread but temporary disruption of normal brain activity.
- short temporary impairment of consciousness following a blow to the head
- nausea
- dizziness
- temporary loss of memory of events at the time of or immediately preceding the injury
- headache, mild or generalised

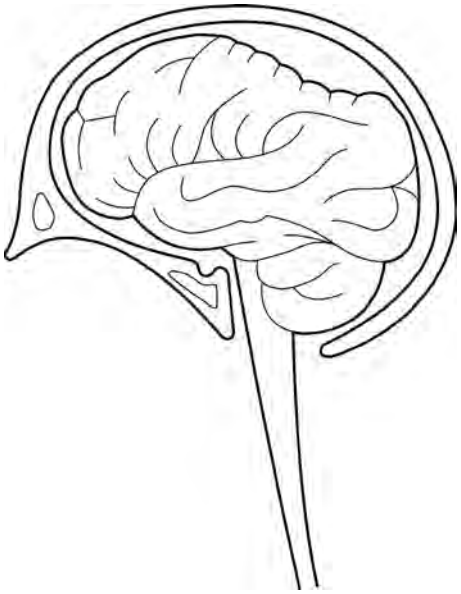
Treatment:

- if the casualty is unconscious or has an impaired level of consciousness ensure the airway is open and be prepared to resuscitate if necessary.
- call for an ambulance
- during any period of unconsciousness record levels of responsiveness, pulse and breathing
- monitor the casualty for signs of deteriorating level of response
- reassure the casualty at all times
- even if recovery occurs continue to rest the casualty and watch for any signs of deterioration which might occur with delayed effect (if the casualty does not make a full recovery or there are any signs of nausea, continuing headache or tiredness, then call for an ambulance immediately)
- the casualty should always be kept in the care of a responsible person until such time as a full recovery is achieved.

A medical practitioner MUST check all casualties with head injuries.

Occasionally a casualty can appear to make a full recovery but bleeding within the brain and the accompanying rise of pressure within the skull causes unconsciousness to follow (see compression, page 69).

Compression



Cerebral compression occurs when there is a build-up of pressure on the brain. This pressure may be due to one of several different causes, such as an accumulation of blood within the skull or swelling of the injured brain tissues.

Cerebral compression is usually caused by head injury. Other causes: stroke, infection and tumour

This is a most serious condition that may require surgery. The casualty must therefore be sent to hospital immediately.

Compression can occur at the time of a head injury or can be delayed by hours or even days. For this reason rescuers should try to establish whether a casualty has a recent history of head injury.

With the condition of compression there may be weakness down one side of the body, that can affect both upper and lower limbs. This type of paralysis can also be caused by a blood clot in the brain (a **stroke,** page 71).

Signs and symptoms

The signs and symptoms of compression are dependent on the area of the brain affected by the bleeding and the size of the bleed. They may include the following:

- history of a recent head injury
- severe headache
- breathing may be noisy and start to become slow
- pulse is strong but slow
- pupils may be unequal and may not respond to light
- paralysis or weakness down one side of the face or body
- the face looks flushed – high temperature.
- drowsiness with changing state of response level
- the casualty may become irritable/change in personality or behaviour.

Treatment

Conscious

- Call an ambulance
- If the casualty is conscious steady and support his/her head
- If unconscious and obviously breathing normally, open the airway using the jaw thrust technique (P83) and be prepared to resuscitate if necessary.
- If the casualty is unable to maintain his/her airway – **RECOVERY POSITION**
- If the rescuer is alone and requires to leave the casualty unattended – **RECOVERY POSITION**
- Constantly monitor airway and breathing.

Unconscious

- open airway
- check breathing and be prepared to resuscitate if necessary
- Place casualty into the recovery position if appropriate.
- call an ambulance

Stroke

A stroke or brain attack is a medical emergency which is caused either by:

- a blood vessel in the brain being blocked by a clot. or
- a ruptured blood vessel bleeding into the brain,

Bleeding into the brain causes an increase of pressure within the skull, damaging brain tissue.

A clot on the other hand can block blood vessels preventing areas of the brain from receiving oxygenated blood. This results in damage to the brain.

Signs and symptoms

- the casualty may complain of a severe headache with sudden onset and no known cause
- the casualty may appear confused and slur their speech – often mistaken for drunkenness
- the mouth may droop or sag to one side with associated dribbling and problem swallowing, facial weakness.
- the casualty may remain conscious or can become unconscious depending on the severity of the stroke
- there is normally some degree of paralysis or loss of power or movement down one side of the body
- the casualty may be incontinent.
- if asked to show teeth, only one side of the mouth will move or be uneven.

Treatment

Conscious casualty:

- keep the casualty comfortable and supported. You may help him/her to lie down.
- call an ambulance
- offer reassurance and monitor vital signs.
- loosen any tight clothing
- **do not** give the casualty anything to eat or drink
- monitor vital signs

Unconscious casualty:

- open the airway
- check for normal breathing
- place casualty in the recovery position
- call an ambulance
- monitor breathing, pulse and consciousness level – keep a record
- loosen any tight clothing
- don't be afraid to offer reassurance to an unconscious casualty

A current government awareness campaign encourages knowledge of the **FAST** test for recognition of stroke. **FAST** lists the main symptoms of stroke and prompts members of the public to call 999 for immediate emergency treatment if they see any one of these signs. **FAST** can help identify up to 90% of strokes, and swift action can reduce the risk of serious disability and death.

Facial weakness – the casualty is unable to smile evenly and the mouth or eye may be droopy.

Arm weakness – the casualty is only able to raise one arm.

Speech problems – the casualty is unable to speak clearly.

Time to call 999/112 if you see one or more of these signs.

Convulsions / Seizures / Fit

A seizure, convulsion or fit is an involuntary contraction and relaxation of a group of muscles in the body. Convulsions can occur as a result of:

- Head injury
- Epilepsy
- Brain – damaging diseases
- Shortage of oxygen or glucose in the brain
- Poisoning including alcohol or drugs
- Convulsions can also occur in children if the child has a high temperature due to some other illness (febrile convulsions).

Signs and Symptoms

- Sudden unconsciousness
- Rigidity and arching of the back
- Convulsive movements

Treatment

In all cases treat as for an unconscious casualty:

- remove any object against which a casualty may injury himself/herself
- protect the casualty's head by placing soft padding underneath and around his/her neck
- loosen tight clothing around the neck if possible

Post Convulsion

- make sure the airway is patent
- check for other injuries
- Monitor and record vital signs and record duration of the seizure.

Epilepsy

The brain is a complex structure that is made up of millions of nerve cells. These cells are responsible for a wide range of functions. A sudden temporary interruption in some or all of these functions can result in a seizure or fit. An epileptic is an individual who has a tendency to experience repeated seizures.

There are several types of seizure but the most commonly encountered in a first aid situation are **generalised seizures.** Generalised seizures are sometimes referred to as major epilepsy or grand mal. Other types of epilepsy may affect just one part of the body, e.g. a hand or arm may initially convulse but progress to a generalised convulsion.

Generalised seizure

Signs and symptoms of a casualty experiencing a seizure:

Initially the seizure may come to your notice where:

- ♦ the casualty suddenly falls unconscious
- ♦ generalised stiffness of the muscles and arching of the back
- ♦ seizures
- – jerking movements of the body, which are often accompanied by incontinence of bladder and/or bowel.
- ♦ possible loss of bladder or bowel control
- ♦ difficulty breathing or cessation of breathing (cyanosis) the face and neck may become red and puffy.
- ♦ excess of saliva around the mouth (this may be blood stained if the tongue or lips have been bitten).

After some minutes the seizure ceases and a flaccid stage commences. The casualty becomes relaxed, normal breathing and consciousness returns.

- ♦ casualty may appear dazed or act strangely and be unaware of this/her actions
- ♦ post seizure, the casualty may feel tired and fall into a deep sleep

If the casualty is breathing normally, place them into the recovery position.

Treatment for a casualty experiencing a seizure

- make sure that the area where the casualty is having the seizure is safe.
- remove any object against which he/she might injure himself/herself.
- place a soft item padding under or around the casualty's neck to prevent them from injuring themselves.
- loosen tight clothing around the neck if possible.

DO NOT:

- restrain the casualty
- try to wedge anything between the casualty's teeth in an attempt to open the airway.
- move the casualty he/she is in immediate danger.

Treatment

- Once the convulsions have stopped open the casualty's airway, check breathing and place him or her in the recovery position until they recover.
- Treat any injuries incurred during the fall.
- Always offer reassurance to the casualty and advise them to contact their doctor upon full recovery.

Call an ambulance if:

- the casualty experiences repeated seizures (*status epilepticus)* or is unaware of the reason for the seizure (first seizure).
- the casualty has injured himself/herself during the fit
- the seizure continues for more than 5 minutes
- the casualty takes more than 10 mins to regain consciousness (a relative/friend may be able to tell you how long a seizure would normally last).

Absence seizures

No true loss of consciousness or conclusive movement the casualty may appear distant and unaware of their surroundings. Tends to affect children more than adults.

Signs and Symptoms

- sudden switching off; casualty may stare blankly ahead
- Sight of localised twitching or jerking of the lips, eyelids, head or limbs
- Odd 'automatic' movements such as lip smacking, chewing or making noises.

Treatment

- help casualty sit down
- reassure casualty until you are content that he/she has made a full recovery
- no improvement – call for an ambulance
- full recovery – refer to doctor

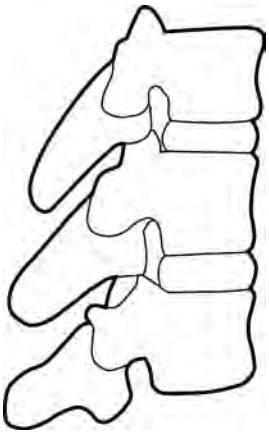
Spinal injury

Basic anatomy of the spine:

The spine, sometimes referred to as the backbone is one of the most important bone structures of the human body. The spine itself consists of a total of 33 bones (vertebrae) through which passes the important spinal cord.

It is damage to the spinal cord as in the case of fractures that is of great significance in spinal injuries. The spinal cord is delicate and is made up of many nerve fibres (**motor** nerves and **sensory** nerves) that lead to and from the brain. They help to control every function of the body and are vital for normal functioning in all the daily activities that we undertake.

In between each of the bones of the spine is a small pad of gristle known as a disc. These discs act as cushions or shock absorbers and prevent the end of the vertebrae from wearing. Sometimes the discs can become dislocated and compress the spinal cord. This is known as a 'slipped-disc'. It is normally treated with bed rest, but is often very painful and can cause loss of sensation in the limbs and extremities.



If the spinal cord is severely damaged the casualty will experience a loss of power, movement and/or sensation in the body below the area of the spine that has been damaged.

The two most common sites where spinal fractures can occur are the area of the spine around the neck (**cervical**) and the area of the spine around the area of the lower back (**lumbar**).

Mechanism of injury

It is good practice to suspect the possibility of a spinal injury if you are aware that a casualty may have fallen from a height, has been involved in a situation where abnormal force has been exerted on the back, especially the lower back and neck areas, or if the conscious casualty complains of lack of power or sensation.

Some common examples would perhaps be:

- falling from a height, particularly twice the casualty's own height
- road traffic accidents where the casualty has been thrown from a vehicle
- significant head injury
- diving into a shallow pool
- heavy object falling across the back
- sports injuries such as rugby or gymnastics
- sudden deceleration in a motor vehicle

Signs and symptoms

Remember that the casualty initially, may not be aware of the spinal injury due to other injuries, which might be masking the signs and symptoms. Damage can be sustained to either the spinal column or the spinal cord. In either case the first aider should treat as for injury to both.

Signs and symptoms (Spinal Column)

- pain in the neck or back at the injury site. This may be masked
- step irregularity or twist in the normal curve of the spine
- tenderness and/or bruising of the skin over the spine

When the spinal cord is damaged there may be:

- loss of control over the limbs, movement may be weak or absent
- loss of sensation or abnormal sensation such as burning or tingling; a casualty may tell you that his/her limbs feel stiff, heavy or clumsy
- Loss of bladder and/or bowel control
- Breathing difficulties

Treatment

Providing safety is maintained for both the rescuer and the casualty, it is advisable to treat a casualty in the position in which they have been found before making any decision to move them. In most cases it is often not necessary to move a casualty at all, providing the airway is clear. The rescuer's main role may simply be to offer reassurance to the casualty, take a history and wait with the casualty until the ambulance service arrives, maintaining regular checks throughout.

The three main **priorities** for dealing with spinal injury must be:

- primarily safety of the rescuer and secondary to the casualty
- preventing the condition from worsening
- arranging for urgent transfer to hospital.

Conscious casualty:

- arrange for the ambulance service to be called.
- offer the casualty reassurance and stipulate that they should not move
- immobilise the head by cradling it between two hands. This support should be maintained until the ambulance service arrive.
- issue instructions to other bystanders to help you as required (additional materials such as coats, blankets or other materials can be used to place by the side of the casualty to maintain stability)
- ask bystander to monitor and record vital signs

Unconscious Casualty

- immobilise the head
- open the casualty's airway using the jaw thrust (P83)
- check breathing – CPR if required
- monitor vital signs

If you require to turn the casualty use the log-roll technique (P80)

When stabilising the head **do not put traction on the head** and neck; i.e. do not apply any pressure, especially pressure that tends to pull the head in the opposite direction to the body.

If an ambulance is being despatched to your location there should be no need for any further action.

Only on rare occasions should it be necessary to move a casualty before the emergency services arrive. In such cases a co-ordinated response is required by personnel who are experienced and have had opportunities to practice the procedure of in-line stabilisation.

Ideally:

- a neck collar of the correct size should be fitted by personnel trained to do so
- a scoop-stretcher should be used to lift the casualty by personnel trained in its use.

It is acknowledged that such personnel and equipment may not be available other than via the ambulance service.

Alternatively and again only if necessary, a '**log-roll'** manoeuvre can be co-ordinated with at least 5 people. This procedure can be used for both conscious and unconscious casualties. The head, neck, chest and lower limbs are all kept in a straight line. The head is always supported throughout and the person supporting the head will normally take charge of the situation and issue the commands to gently roll the casualty as required in a singular co-ordinated movement. At all times the casualty is supported with everyone working together as one unit.

Position three people along one side to pull the casualty towards them, and two on the other side to guide him/her forwards. The person at the legs should place their hands under the furthest leg, the middle supports the casualty's leg and hips.

Recovery Position (Suspect Spinal Injury)

If you suspect a spinal injury but have to place the casualty into the recovery position to maintain an open airway eg if you have to leave the casualty to call an ambulance or if the casualty is vomiting, use the following guidelines:

- **If you are alone use the standard recovery position technique (page 31/33)**
- If you have a helper one person should steady the head while the second person turns the casualty
- If there are 3 people one person should steady the head, the second person should turn the casualty and the third person should help to keep the back in alignment with the head
- **If there are 4 or more people, use the log roll technique**

Removing Protective Headgear

The main priority here is to remember that protective headgear **should not be removed** unless it is absolutely necessary. Eg in order to protect a casualty's airway or treat a life threatening condition. If the item does require to be removed the casualty should do this themselves if possible.

There are two main types of helmets:

- open face
- full face.

If the helmet must be removed proceed as follows.

With an open face helmet either open the buckle or if necessary cut through the strap.

With the casualty's head and neck supported at all times lift the sides of the helmet apart and then lift the helmet gently upwards and backwards away from the head. Hold the lower jaw with one hand and support the neck with the other hand.

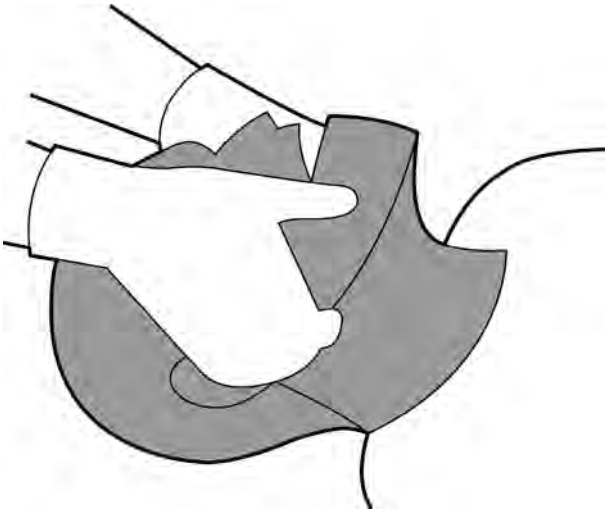
With a full face helmet even greater care and attention to the removal procedure is required. Again the head needs to be stabilised by supporting both the neck at the back and the jaw at the front. With the buckle open or strap cut, ask a helper to gently tilt the helmet back to allow the front of the helmet to lift over the chin. Then while still supporting the head tilt the helmet forward to pass it over the base of the skull. When this is achieved the helmet can be lifted straight off.

Remember **DO NOT** remove a helmet unless it is absolutely necessary.

Remember also that in cases of spinal injury where a casualty is not breathing normally, the priority is given to the resuscitation procedure.

The following is an extract from
Resuscitation Council (UK) Guidelines 2010

Treating an unconscious casualty with a suspected spinal injury.



Jaw thrust manoeuvre:

The jaw thrust technique should be the preferred option to open an unconscious casualty's airway when the mechanism of injury indicates the possibility of spine or neck injury, which is typical of car accidents, falls and some sports injuries. The advantage of the jaw thrust is that it minimizes movement of the head as compared to the head-tilt/chin-lift method.

- Kneel behind the casualty's head.
  Grasp the sides of his or head firmly with your hands over the ears. Steady and support the casualty's head in the neutral position, in which the head, neck and spine are aligned.
- If necessary, open the airway using the jaw thrust manoeuvre. Place your hands on each side of his/her face with your fingertips at the angle of the jaw. Gently lift the jaw to open the airway. Take care not to tilt the casualty's neck.
- If the casualty is breathing normally, continue to support his/her head until the arrival of an ambulance.
- If you are forced to leave the casualty unattended to summon help, and if the casualty is unable to maintain an open airway, you should turn the casualty into the Recovery position. (see recovery position – Suspected Spinal Injury Page 81).

Skeletal System

This section deals with:

- breaks (fractures)
- dislocations
- strains and sprains.

Basic anatomy

The skeleton

The skeleton is the framework of the human body made up of many bones of various shapes and sizes. The bones are composed mainly of calcium and phosphorus, which makes them strong and rigid and suitable for creating a protective environment for organs and tissues.

Functions of the skeleton

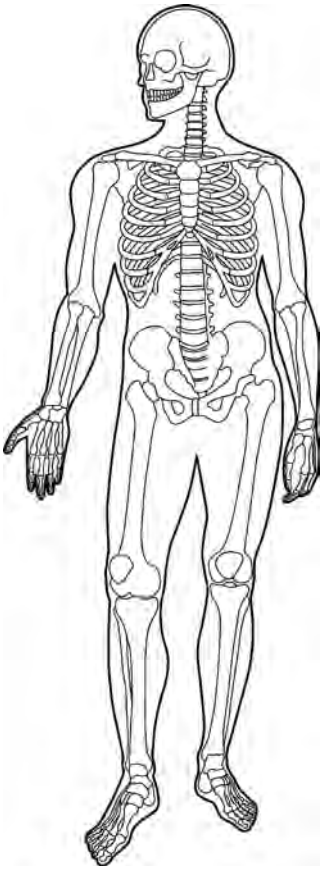
The skeleton gives the body shape.

It provides levers for our muscles to work.

It protects important organs.

The major bones of the body are:

- the skull
- the jaw bone *(mandible)*
- the spine *(vertebrae)* (see section on spinal injury)
- the ribs and sternum
- the collar bone *(clavicle)*
- the shoulder blade *(scapula)*
- the upper arm bone *(humerus)*
- the lower arm bones *(radius and ulna)*
- the pelvis
- the upper leg bone *(Femur)*
- the lower leg bones *(Tibia and Fibula)*



- the kneecap *(patella)*
- the bones of the wrist *(carpals)*
- the bones of the hand and fingers *(metacarpals and phalanges)*
- the bones of the feet and toes *(metatarsals and phalanges).*

The medical terminology in italics has been produced for reference purposes only. You are not required to know them.

The Joints

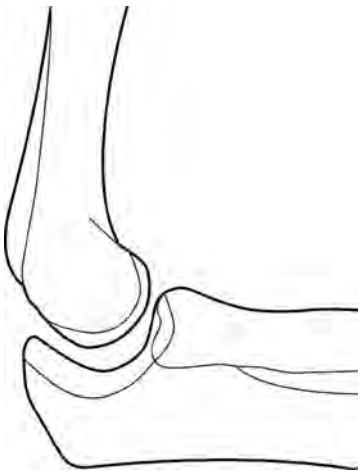
There are two types of joints:

- movable joints
- immovable joints.

Joints occur where the ends of bones meet, for example, where the upper bone of the arm meets the lower bones of the arm at the elbow. This is a movable joint.

Movable joints are described as either:

- ball and socket joints e.g. where the end of the thigh bone joins the pelvis or the upper arm meets the shoulder blade
- hinged joints e.g. the elbow and the knee are examples of hinged joints to allow extension and flexion within given limits
- slightly moveable joints e.g. the vertebrae of the spine.



Muscles

Muscles are normally divided into two types:

- voluntary muscles
- involuntary muscles.

Voluntary muscles are under the control of the will and operate when called upon to undertake a task e.g. picking up something heavy with the hand will cause the **bicep** muscle at the front of the upper arm to contract while its partner muscle at the rear of the upper arm the **tricep** will relax. This causes the lower arm to lift upwards.

Involuntary muscles are not under the control of the will, instead they are under the control of the autonomic nervous system and continue to function day and night without stopping even when we are asleep. Such muscles would be the heart or the muscle in the digestive tract.

Breaks (fractures)

A fracture is the name given to a broken or cracked bone. Bones or the **bone matrix** is made up of inorganic salts and organic substances or fibres.

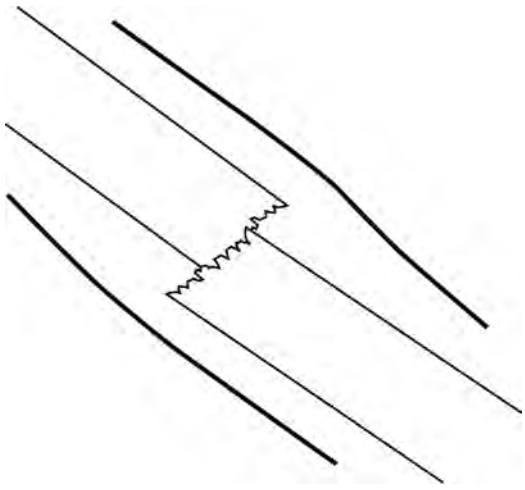
The main salts **calcium** and **phosphate**, and smaller quantities of magnesium and sodium come together to form a calcified structure that is very strong. The organic substances (fibrous material) add to this strengthening and also give the bone a plastic-like resilience. This enables the bone to resist stress – within reasonable limits.

Bones therefore are normally strong and take considerable force to be broken. Certain diseases such as cancer and diseases that affect bones e.g. osteoporosis can cause weakening of the bone structure and make them more liable to break. The ageing process also has its effect on bones and tends to make them less strong and more brittle.

There are several types of fractures but in first aid we tend to categorise three main types:

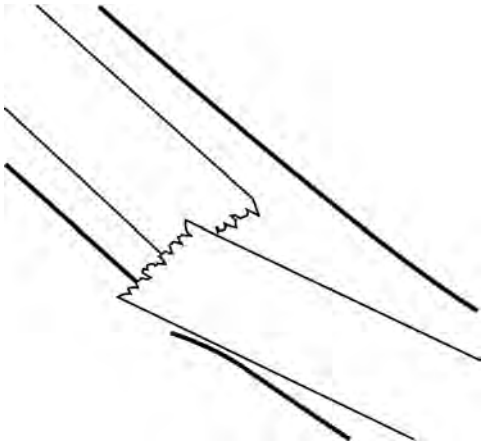
Closed fractures

A closed fracture exists where there is a clean break of the bone and there is no communication with the outside surface of the skin. There may be localised swelling visible as well as distortion of the limb.



Open Fractures

An open fracture exists where there is a clean break of the bone and there is communication with the outer surface of the skin. There can be a wound leading down to the fracture site or the ends of the fractured bones may protrude through the surface of the skin. Through this opening infection may enter.



Unstable Fracture

Any fracture whether it is an open or closed fracture may be further complicated by virtue of damage caused to associated vessels or organs near the fracture site.

Signs and symptoms of a fracture

Compare the injured side of the body with the uninjured side where possible.

Look for **DOTS**

Deformity
Open injury
Tenderness
Swelling

- pain at the site of the fracture may be severe
- crepitus (the sound made by bones grating together) may also be present*
- shock is also likely to be present.

Treatment (open fracture)

Bone protruding

- Cover the wound with a sterile dressing.
- build up pads of clean, soft, non-fluffy material around the bone and secure with a bandage over the pads.
- Immobile the injured part as with a closed fracture.

No bone protruding

- secure with a dressing, padding and a bandage
- immobilise as per closed fracture

Treatment (closed fracture)

- maintaining **A**irway, **B**reathing, **C**irculation, and controlling bleeding take priority over the treatment of fractures
- immobilise the limb, support the joints above and below the injured area
- place padding around the injury for extra support
- for firmer support and/or if removal to hospital is likely to be delayed, secure the injured part to an unaffected part of the body
- do not move the casualty unless absolutely necessary
- reassure the casualty
- have the casualty conveyed to hospital.

* Injured part should not be deliberately moved to discover whether crepitus is present.

Some of the more common fractures are discussed below:

Head Injury

This is commonly caused by direct or indirect force being exerted on or transmitted to the skull by a fall or by landing heavily on both feet.

If a casualty has a head wound, be alert for a possible skull fracture.

Suspect a skull fracture in any casualty who has received a head injury resulting in a loss or impairment to consciousness (see page 68).

Signs and Symptoms

- wound or bruise to the head
- bloodshot sclera (the white areas of the eye)
- bruising or swelling behind the ear
- blood or straw coloured fluid from the ear canal or nose (which may be bloodstained)
- soft boggy area of depression on the scalp.

Bruising around the eyes, especially the lower parts of the orbital areas can sometimes be seen although it is often a late sign.

Treatment

- Suspect that all casualties with a suspected fracture of the skull may also have a neck/spinal injury (see pages 77-82)
- do not move the casualty unless absolutely necessary
- monitor pulse, breathing and levels of response at least every 10 minutes
- be prepared to start resuscitation if necessary
- place unconscious casualty's in the recovery position
- if there is any blood or straw coloured fluid from an ear canal (a sterile dressing may be placed over the ear to absorb discharge, do not plug the ear)
- Call an ambulance (give any records that you have made to the ambulance personnel).

* Note

- If you suspect spinal injury is present treat casualty accordingly.

Fracture - lower jaw

This is usually caused by direct force such as a blow to the jaw. (There may also be a wound inside the mouth with this type of injury). Fractures to the jaw may be indirect (the fracture occurs on the opposite side of the face to which the blow was received) or direct. The lower jaw may also be dislocated by a blow to the face. Casualties with a suspected jaw fracture may also have sustained a loss of impairment to consciousness (see page 42).

Signs and symptoms

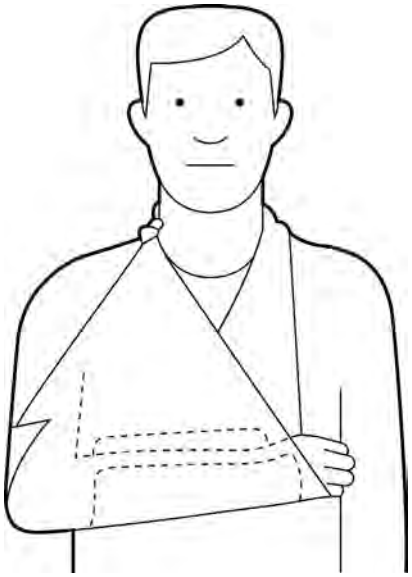
- pain at the site of the fracture
- pain and nausea if the jaw is moved
- difficulty speaking, swallowing and moving the jaw
- bruising and swelling inside and outside the mouth
- difficulty in swallowing/abnormal salivation causing dribbling
- bleeding and displaced and loose teeth inside the mouth

Treatment

- consider the potential for neck/spinal injury (79-80)
- if the casualty is conscious they should sit forward and allow any excess blood/saliva to turn the drain away
- encourage the casualty to spit out loose teeth and keep them with the casualty for examination by the hospital staff
- give the casualty a soft pad to hold firmly against the jaw
- discourage the casualty from speaking and make sure that the airway is clear
- transport the casualty to hospital making sure that the jaw is supported throughout.

Fracture - Ribs (uncomplicated)

Ribs may be fractured by a heavy fall to the ground where the casualty lands on the chest or by a direct blow.



Signs and symptoms:

- pain at the site of the fracture
- pain on taking a deep breath
- difficulty breathing
- shallow breathing
- bruising / swelling at or around the fracture site
- pale or cyanosed skin - a black or dark skinned person will not appear blue, there may however be some discolouration of the lips, tongue, conjunctiva of the eyes, palms or soles of the feet
- obvious distress/anxiety.

Treatment

For a simple fracture (no wound present) of the ribs:

- reassure the casualty
- support the arm on the injured side in a arm sling (this helps to stabilise the rib cage)
- transport the casualty to hospital.

Fracture - ribs (complicated)

This is a far more serious injury to the ribs as it involves complications (a chest wound or wounds). A condition known as '**paradoxical breathing'** may be evident. In cases of paradoxical breathing the opposite occurs, so that when the casualty breathes in the chest is sucked in and when the casualty breathes out the chest moves out also. This type of breathing indicates a need for urgent medical attention.

Fractures of the lower ribs may Injure internal organs such as the liver and spleen and may cause Internal bleeding (see page 58)

Signs and symptoms

- severely distressed shallow breathing
- paradoxical breathing
- severe pain when taking a deep breath
- shock
- there may be a sucking-wound in the chest (air is sucked into the chest cavity with each breath)
- bleeding from the wound
- rapid weak pulse
- cold clammy skin
- disorientation possibly leading to unconsciousness.

Treatment

- reassure the casualty
- aim to support and seal the chest wall
- place a sterile pad and cover with a plastic bag, foil or kitchen film over the wound and seal it to the chest wall with tape on three sides [1]
- position the casualty so that the head and shoulders are raised, and that they are inclined towards the injured side
- call an ambulance
- place the arm on the injured side in an elevation sling (this will give support to the rib cage and may help breathing)
- if the casualty becomes unconscious, place them gently into the recovery position, injured side down

[1] The treatment of sucking wounds to the chest are described on page 115/116.

Fracture - Collar Bone

This particular fracture is often caused by indirect force, (force applied to an area of the body other than where the fracture occurs), e.g. falling onto an outstretched hand. In this example the force is transmitted from the hand up the arm causing an impact fracture(s) to the collarbone.

Signs and symptoms

- pain on the injured side, increased by movement
- tenderness at the site of the fracture
- casualty inclines the head towards the side of the injury whilst supporting the arm on the injured side.
- Swelling and deformity of the shoulder.

Treatment

- reassure the casualty and sit them down.
- the arm on the injured side should be placed across the chest supported at the elbow in readiness for the application of an arm sling.
- Make sure the knot is clear of the site of the injury.
- for additional security and immobilisation a broad bandage may be used and tied around the chest over the elevation sling (this will help to increase the immobilisation of the limb, reduce the pain and increase the comfort for the casualty)
- tie off the broad bandage on the opposite uninjured side and towards the front making sure the knot is clear of the injury.

Fracture - Upper Arm/Lower Arm/Wrist

The two bones of the lower arm, the **radius** and **ulna** can both be fractured from a heavy blow to the arm. Another fracture, particularly common in the elderly is the **Colles** fracture, which occurs at the wrist. In the upper arm the **humerus** bone can be broken in a fall or as a result of direct force.

Signs and symptoms:

- Tenderness and deformity at the site of the fracture increased by movement
- localised rapid swelling and bruising, which may develop slowly
- immobility of the limb

Treatment:

- help the casualty to sit down
- reassure the casualty
- ask the casualty to support the injured limb with the uninjured hand and arm at the elbow if possible.
- remove constricting objects e.g. jewellery, watches, etc
- gently place soft padding or a thick bandage around the site of the fracture
- apply an arm sling to the injured arm
- if additional support is required a broad bandage can be tied across the support sling for additional security
- arrange transportation to hospital.

Fracture – Arm (Region of the Elbow)

These fractures may prevent the elbow from being flexed.

Signs and symptoms

- fixed elbow
- pain at the fracture site increased by movement
- bruising which may develop slowly
- localised rapid swelling
- deformity

Treatment

- reassure the casualty
- if the elbow can be bent treat as per page 95.
- If the casualty cannot bend his/her arm, sit the casualty down. Place padding around the elbow for comfort and support.
- secure the arm in the most comfortable positing using broad fold bandages, keeping the bandages away from the fracture site.
- Monitor circulation on the injured arm. If there are signs of circulatory improvement gently undo the badges and straighten the arm until circulation is improved

Fracture - hand/fingers

Fractures to the hand and fingers are usually caused by direct force to the area. Dislocations are also common amongst finger and thumb joints.

Do not try to differentiate between a fracture and a dislocation. Always treat as for a fracture.

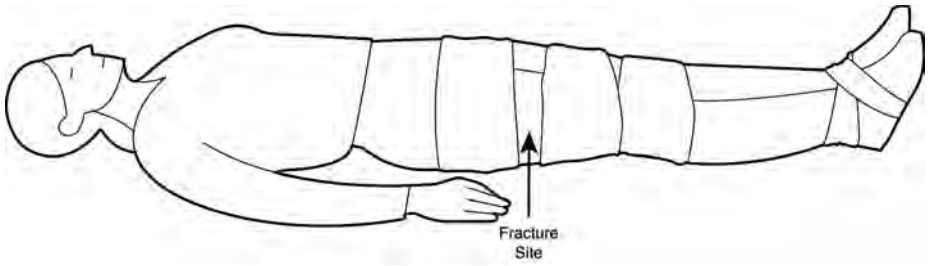
Signs and symptoms:

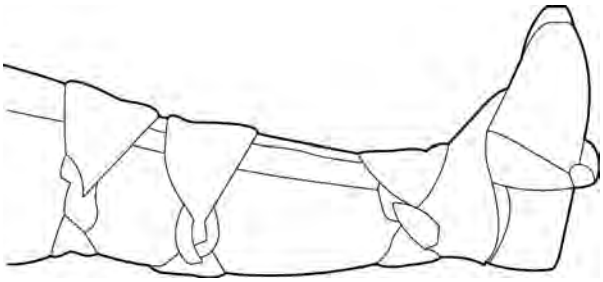
- pain at the site increased by movement
- swelling
- deformity
- possible bleeding with an open fracture

Treatment:

- reassure the casualty and sit him/her down
- if there is any jewellery on the fingers remove them (fingers may swell preventing removal later)
- elevate the hand
- treat any bleeding and loosely cover wound with a sterile dressing or clean non-fluffy pad
- place padding for comfort around the hand and fingers
- place the hand into an elevation sling
- if further immobilisation is required an additional broad bandage may be used
- arrange for transport to hospital.

Fracture - thigh and lower leg





Fractures to the leg are common, especially the thigh (**femur**), in road traffic accidents. Fractures to the lower parts of the leg, the **tibia** and **fibula,** are common sporting injuries.

In either case the main aim must be to immobilise the leg , if medical aid is imminent there is no treatment required other than keeping the casualty still, supporting the injured limb and offering reassurance.

Signs and symptoms:

- pain at the site of injury may be severe
- in cases of thigh injuries the casualty will not be able to walk
- there may be a wound
- signs of shock
- shortening of the leg and turning outwards of the knee and foot

Treatment:

- reassure the casualty and help him/her to lie down
- treat any bleeding
- treat for shock
- protect with a blanket
- support the limb at the knee
- gently straighten the casualty's leg. If necessary realign the limb. Support the limb at the ankle while it is straightened; pull gently in the line of the limb. Stop if pain is increased.

If the casualty must be moved or the ambulance is delayed:

- bring the sound leg alongside the injured leg.
- place padding between the legs
- immobilise the legs with a narrow fold bandage around the ankles and feet
- place additional broad bandages around the legs above and below the fracture site (**do not** bandage over the fracture site). Add additional broad fold bandages above and below the fracture if required.
- Secure the bandages on the injured side.
- transfer to hospital.

Fracture of the femur can result in a significant amount of blood loss which can be life threatening.

Fracture of the pelvis

Fracture of the pelvis sometimes occurs in road traffic accidents. Casualties may be unable to walk and have pain and tenderness in their hips, groin or back, which worsens with movement. They may be unable to pass urine and may have severe internal bleeding. These casualties should be assisted to lie on their back where possible. The legs should be immobilised and the casualty transferred to hospital urgently.

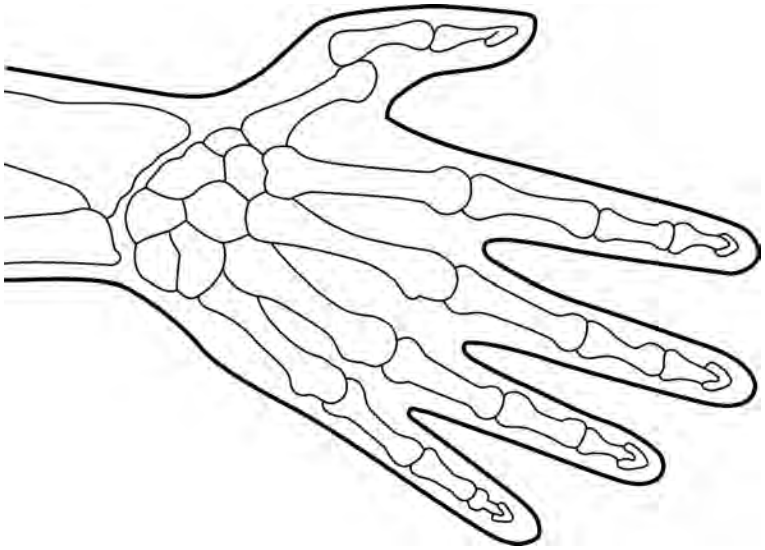
Signs and Symptoms:

- an inability to walk or even stand, although the legs appear uninjured
- pain and tenderness in the hip, groin or back which increases with movement
- difficulty/pain passing urine and/or blood stained clots
- signs of internal bleeding

Treatment:

- lay the casualty onto their back keeping the legs straight or slightly bent and supported if the casualty feels more comfortable
- place padding between the knees and immobilise using a broad fold triangular bandage
- Secure the feet and ankles with a narrow fold triangular bandage and padding

Dislocations



A dislocation occurs when bones are displaced from their natural position in the body. Dislocations occur at the places where bones meet - the joints.

The **most common sites** for dislocations tend to be:

- the thumb
- the finger
- the shoulder
- the jaw.

Dislocations and fractures sometimes occur together - a dislocation can cause a fracture to occur. Therefore the signs and symptoms are often similar.

Signs and Symptoms:

- sickening severe pain
- inability to move the joint
- shortening, binding or deformity

Treatment:

- support the injured part in the position the casualty finds most comfortable
- immobilise using triangular bandages / slings as appropriate
- take or transport to hospital

Never try to replace a dislocated joint.

Always treat a dislocation as though it were a fracture.

Do note move the casualty until the injured part is secured and supported unless in immediate danger.

For hand and ankle injuries; remove rings etc in case of swelling.

Strains and sprains

The two conditions are often confused and are injuries to soft tissues.

A strain involves muscles and tendons which can be strained, ruptured or bruised.

A sprain involves ligaments, usually at a joint, e.g. the ankle.

Soft tissue injuries are usually helped by the application of cold compress wrapped in soft padding.

An appropriate supportive bandage may be applied to the sprained injury which should extend to the next joint.

Check the circulation beyond the bandages every 10 minutes.

Signs and Symptoms:

- pain and tenderness
- difficulty in movement
- swelling and bruising

The **RICE** Procedure is normally used for treating sprains and strain injuries:

- **R**est the injured part
- **I**ce – apply ice pack or cold pad
- **C**omfortable support.
- **E**levate the injured part.

(Ice should not be applied directly to the skin – wrap it in something first. Cool the injury for 10 minute only).

*Remember, if in doubt treat as a fracture.

The composition and function of blood

This section deals with:

- the composition and function of blood
- bleeding
- wounds
- burns and scalds
- eye injuries.

In the average adult body there are approximately 10 pints, (six litres), (1 pint per stone) or (1 litre per 13kg) of blood circulating through vessels known as **arteries** and **veins**. These vessels create passageways to enable blood to carry oxygen to the vital organs and tissues of the body.

55% of blood is made up of a clear yellow fluid called **plasma**.

The remaining 45% is made up of **red** and **white blood cells** and **platelets.**

The red cells contain a pigment called haemoglobin. It is this pigment that has a great affinity for oxygen. When we breathe in the haemoglobin grabs the oxygen and transports it around the body to help nourish the vital organs and tissues.

The white cells help to defend the body against infection. If there is a wound or a small cut, the white cells immediately rush to the area concerned and absorb any bacteria that is likely to cause infection.

Platelets have an important role in blood clotting. Within one to five seconds after injury to a blood capillary, platelets will adhere to the damaged lining of the vessel and to each other to form a platelet plug that helps to stop the flow of blood into the tissues.

Blood Loss

The body can afford to lose up to a pint, (500 ml), of blood, as in the case of blood donations with little or no effect. However, if larger quantities of blood are lost there is a danger that a casualty may develop the following signs and symptoms:

- sweating
- cold skin
- clammy skin
- pale appearance
- blue discoloration of the periphery, e.g. ear lobes, lips and fingertips - a black or dark skinned person will not appear blue, there may however be some discoloration of the lips, tongue, conjunctiva of the eyes, palms or soles of the feet. (See Shock pages 55 – 57)

Continued blood loss will result in a fall in blood pressure.

Blood can be lost from arteries, veins or capillaries, the three main types of bleeding are:

Arterial bleeding

Often the most dramatic form of bleeding. Blood travelling around the body in arteries is under great pressure and if an artery is damaged blood tends to **spurt** out of the wound in keeping with the beat of the heart. In appearance, blood from an artery appears bright red as it is richly oxygenated.

Venous bleeding

Blood from a bleeding vein is under less pressure and it wells out. Its appearance is dark red as the oxygen has been used up by the body and the veins are taking blood back to the heart to be pumped to the lungs so that carbon dioxide can be excreted. Venous bleeding can still be life threatening even though it does not appear to be as dramatic as arterial bleeding. Often the linings of veins will expand and will allow blood to ‘pool’ inside them almost like collecting chambers. If such areas are damaged as in the case of varicose veins, the effects of such blood loss can be very serious.

Capillary bleeding

Blood from capillaries occurs at the site of all wounds. Capillaries are the smallest of the blood vessels, therefore the volume of blood in them will be small and the effect of them bleeding will not necessarily cause serious complications to the casualty. A good example of capillary bleeding is a bruise (or contusion) caused by a blunt instrument such as a hammer. The skin is not broken but there is capillary bleeding under the skin.

Whatever type of bleeding you may come across in the workplace remember that prompt attention is required in order to stop the bleeding.

Minor External Bleeding

This type of bleeding is normally controlled by pressure and elevation.

Medical aid may be sought under the following circumstances:

- Bleeding is not controlled
- Embedded foreign object
- Particular risk of infection
- Signs of infection (old wound)

Treatment

- Wash your hands
- Put on gloves
- If the wound is dirty, rinse under running water
- Pat wound dry and cover with sterile gauze
- Elevate injured part
- Clean around wound with soap and water
- Pat dry and cover with adhesive dressing
- Advise the casualty to seek medical advice

Treatment of bleeding

Do not delay treatment! After maintenance of the **A**irway and **B**reathing bleeding is the next most important life-threatening scenario to deal with in first aid.

Protection against Body Fluids

Always protect yourself by using disposable* gloves. If you have any existing small cuts, wounds or abrasions on the surface of your skin make sure that these are covered and protected with a waterproof dressing. Wash your hands before and after dealing with a casualty who is bleeding. Consider wearing a plastic apron or glasses when dealing with large quantities of body fluids and dispose of all waste material safely. (See Hygiene, pages 146 – 147).

Aim

Your principle aim has to be to try and control the bleeding. This will help to minimise shock and reduce the risk of infection.

Remember that you must act quickly. Immediately:

- lie the casualty down, providing that his/her condition will allow, preferably with the head lower than the rest of the body (this will help to minimise the condition of shock)
- check that the wound has no embedded objects in it, e.g. pieces of glass that could harm you (see Embedded Objects, pages118 - 119)
- if the bleeding is from an arm or leg elevate the limb to reduce the flow of blood, if possible
- apply direct pressure to the wound with a sterile dressing or clean absorbent pad (in the absence of such material direct pressure with the palm of the casualty's hand can be applied over the wound).

If further bleeding occurs, apply a 2nd dressing. If blood seeps through this dressing remove both dressings and apply a fresh one, ensuring that pressure is applied accurately to the point of bleeding.

Arrange transport to hospital and continue to reassure the casualty.

A useful acronym to remember the treatment for severe bleeds is **PEEP**.

* For those allergic to latex disposable gloves alternatives are available.

P osition – either sit or lie the casualty down.

E xamine/expose the wound.

E levate the limb.

P ressure.

Embedded objects

Where an object is embedded in a wound you can control bleeding by applying firm pressure on either side of the object and by elevating the affected limb if the wound is to an arm or leg

Do not try to remove any object embedded in the wound. To protect the wound drape a piece of gauze over the object. Use dressings to pad around the embedded object until you can bandage over it without pressing it further into the wound. Check circulation beyond the wound every 10 minutes. If circulation is impaired, loosen the bandage and reapply.

Amputation

A limb can in many cases be re-attached by microsurgery. Do not allow the casualty to eat, drink or smoke and get the casualty to hospital as soon as possible – shock is likely and needs to be treated soonest.

Care of casualty – lie casualty down, raise affected area above heart and apply dressing and treat for shock. Care of amputated part – wrap in plastic wrap in soft material or gauze and place in container full of crushed ice.

Clearly mark the package with casualty's particulars and time of the injury.

DO NOT wash the severed part or cause it to come into direct contact with ice.

Impalement

If someone has been impaled e.g. fallen onto railing, **DO NOT** attempt to lift casualty off. This may increase internal injuries. Get help detailing the extent of injuries and the need for cutting equipment.

While waiting support casualties weight as best as possible and reassure.

Crushing Injury

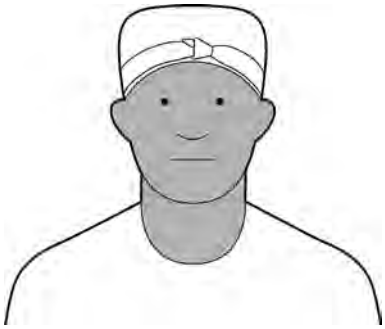
Danger of Prolonged crush injuries – may cause extensive damage to body tissue especially muscles. Once weight is removed shock may develop rapidly. Toxic substances build up which when released into the circulatory system could cause kidney failure "crush syndrome".

Treatment – If crushed for less than 15 minutes release casualty if possible, treat injuries, immobilise fracture and remove to hospital A.S.A.P. If crushed

for over 15 minutes obtain specialist medical help but do not release casualty.

Bleeding from the scalp

This particular injury is worthy of mention for while it is quite common its appearance can often be mistaken for more serious injury. The main reason is that the scalp is very **vascular**, i.e. there are a lot of blood vessels under the skin. The slightest cut to the scalp often results in a torrential outpouring of blood. The main treatment here is to remain calm, reassure the casualty and stop the bleeding. If you feel sure that it is safe to apply pressure to the scalp, do so. Often you will find that it is just a small cut that has caused the problem. An appropriate dressing and scalp bandage should be applied, prior to transfer to hospital. The first aider still needs to be aware that scalp wounds may also mask more serious injuries underneath. If in any doubt follow the treatment for a head injury (P66-67)



Bleeding from the ear

Usually caused by a perforated eardrum. If blood is watery, this may indicate a fracture of the skull and that fluid is leaking from around the brain.

Treatment

- Place casualty into a half-sitting position with head tilted to the injured side. (Consider a neck injury).
- Hold sterile dressing in place on the ear.
- Get help as appropriate.

Bleeding from the palm of the hand and joint creases

The palm of the hand like the scalp is very vascular and again the aims are to prevent further bleeding and to transfer the casualty to hospital.

Providing there are no objects in the wound apply pressure.

Where the wound runs **horizontally** across the palm the casualty may be able to apply pressure themselves by making a fist around a piece of sterile gauze, dressing or small roller bandage. With this type of wound a narrow bandage or additional roller bandage can be used to bandage the casualty's hand in a fist shape – which helps to keep the dressing in place and maintain pressure over the wound. Leave the thumb exposed to monitor circulation.

Where the cut runs **vertically** along the palm of the hand, pressure should be applied with the hand in the open position. The hand should be bandaged in the open position also.

It may be necessary to elevate the arm and place it in an elevation sling to complete the treatment.

The foregoing principle may be applied to a wound at any joint crease. If a joint such as the elbow or knee is closed over to control bleeding, this action may affect circulation beyond the joint. Rescuers should ensure adequate circulation to the lower part of the limb.

Bleeding from varicose veins

Healthy veins contain valves that create a series of chambers end to end along the vein. When the heart beats blood is pumped from one chamber to another. Healthy valves allow the blood to pass in one direction only, closing after each beat of the heart to prevent the 'back flow' of blood. Occasionally these valves fail and blood 'pools' backwards into the previous chamber. This problem can cause varicose veins.

Varicose veins in the legs are often characterised by a knobbly appearance of the vein over superficially stretched skin.

The varicose vein can burst quite easily if damaged and the loss of blood from such an area can often be very great causing a casualty to become shocked.

The first aider must aim to control the loss of blood, arrange urgent transfer and help to minimise shock.

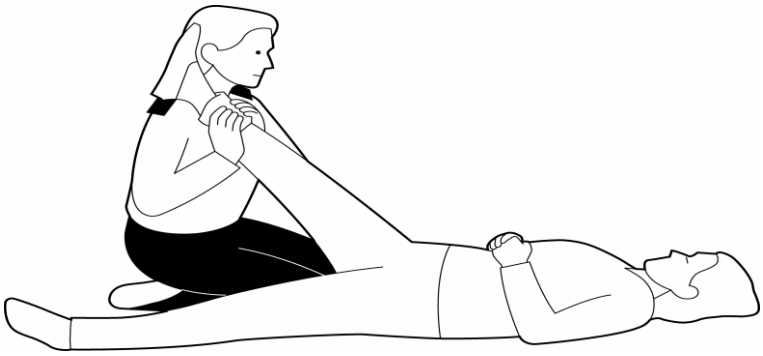
Apply firm direct pressure over the injury until the bleeding is under control then secure with a large soft pad. Remove garments such as elastic topped stockings or garters as they may cause the bleeding to continue.

Treatment

- **P**osition the casualty - lie the casualty down.
- **E**xamine the limb and locate the point of bleeding.
- **E**levate the injured leg to help slow down and reduce the bleeding.
- **P**ressure - use a sterile dressing or clean pad to apply firm pressure to the bleeding area.

The dressing may be held in place by the use of a further securing bandage. If bleeding starts to come through the original dressing and bandage apply another bandage over the top of the initial one. Do not remove the original dressing, as any clotting mechanism that has started should not be disturbed. Do:

- keep the leg in the elevated position at all times
- loosen any tight clothing that might be restricting the circulation
- reassure the casualty, and
- transfer to hospital.



Bleeding from nose

Usually caused by a ruptured blood vessel or trauma. If bleeding follows a head injury, the blood may appear thin and watery (see Bleeding from the ear page 109).

Treatment

- Sit casualty down with the head tilted forward.
- Pinch the nose just below the hard part.
- Release after 10 min and repeat up to a maximum of 30 mins
- Advise the casualty not to speak, swallow, cough, spit or sniff

NB If bleeding continues longer than 30 mins, take or send casualty to hospital.

Vaginal Bleeding

Vaginal bleeding may be due to menstrual bleeding with associated stomach cramps or pain. It may also indicate other causes such as miscarriage, recent surgery, sexual assault or recent birth of a child.

Obtaining a history will help you to determine the cause.

Treatment:

- make the casualty comfortable in any position she prefers and offer reassurance
- treat for shock
- transfer to hospital.

It is important to maintain the dignity of the female casualty at all times and male first aiders should realise that under certain conditions their presence may be disliked or resented. It is advisable therefore for the male first aider to be accompanied by a female. Try to protect the casualty's privacy whilst waiting for an ambulance.

Assist the casualty into a comfortable position. Often this will be sitting on the floor with knees slightly bent and with a rolled up blanket placed underneath the knees (this may take the strain of her abdomen and improve her comfort).

A clean towel or sanitary pad should be given to her if available.

Where sexual assault has occurred it is important to preserve any evidence. It is advisable therefore to encourage the casualty to temporarily refrain from going to the toilet or washing until forensic examination has been undertaken by a police surgeon.

Wounds

Classification of wounds

External bleeding in a first aid situation usually occurs from some form of wound.

Basically there are seven types of wounds:

- **Contused** wound – a name given to the common bruise caused often by the surface of the skin having received a blow from a blunt instrument, e.g. a hammer. Generally the bleeding occurs underneath unbroken skin and is therefore a minor form of internal bleeding. The surface of the skin becomes discoloured as small capillaries bleed into the tissues. With time the colour may go from a vivid purple to a pale yellow and tenderness and swelling diminish (bruising in very black people will not appear as purple - see section entitled First aid and ethnic minorities). Extensive contusion may indicate deeper damage such as a fracture, or an internal injury.
- **Lacerated** wound – caused by a tearing object such as barbed wire, the teeth of an animal or certain types of machinery. This type of wound normally causes severe trauma to the surface of the skin. By its nature it has a high risk of infection and renders itself to be easily contaminated. Often dirt and contaminated objects are trapped in the tissues underlying the surface of the wound.
- **Incised** wound – caused by a sharp instrument, e.g. knife or razor blade. The edges of the wound are normally longitudinal, straight and neat. The wound may bleed profusely and there could be underlying damage to nerves and tendons especially if the wound is at a joint, e.g. the wrist.
- **Puncture** wound – normally caused by a sharp object that penetrates deep into the skin, e.g. a nail or sharp tooth or claw of an animal, or certain types of machinery, or a stabbing. The risk of infection is high as the path created by the sharp object may cause a deep-rooted infection. The wound on the surface of the skin may only be very small and may even look quite harmless. However its size often belies a much larger reality deep in the tissues. This wound is difficult to clean due to the depth of infection and needs prompt hospital attention.
- **Abrasion** wound – sometimes referred to as a graze occurs when the top layer of skin is removed. It is usually caused by friction when the skin is drawn across a hard surface. A high risk of infection is likely due to the nature of the way in which the wound was caused. Dirt can be trapped on the exposed underlayer of skin.

- **Gunshot** wound – caused by a bullet which when it hits the surface of the skin causes a small entry wound. As it moves through the tissues of the body under high momentum the bullet pushes the tissues, bones etc forward along its path causing severe internal damage. If the force is strong enough the tissues will be forced out through a much larger exit wound whose edges are very unequal. Again the risk of infection is very high.
- **Stab** wound – caused by a long or bladed instrument, usually a knife, penetrating the body. Stab wounds to the trunk must always be treated seriously because of the dangers of injury to vital organs or life-threatening internal bleeding.

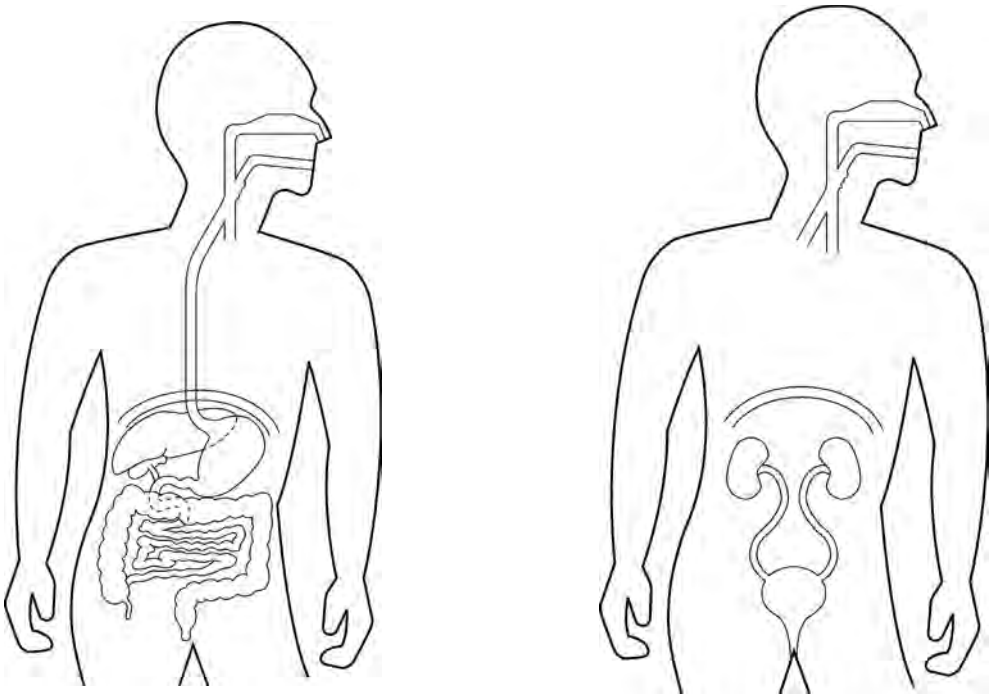
The abdominal cavity

This cavity is again protected by a bony structure, known as the pelvis.

The main organs it protects are:

- the liver
- the kidneys
- the stomach
- the small intestine
- the large intestine.

The kidneys are situated to the rear in the region of the loins. These two important structures filter waste products and form urine, which travel down thin tubes called ureters to the bladder. The urine is stored in the bladder until such time as it is excreted.



Abdominal wounds

Signs and symptoms may include:

- obvious external bleeding
- protrusion of abdominal contents
- internal bleeding (this may be serious with little visible evidence).

The risk of infection and shock is always high in cases of abdominal wounds.

Treatment:

- lay the casualty down on a firm surface
- loosen tight clothing
- place a pad or sterile dressing over the wound and hold it firmly; the casualty may be able to assist. Raise and support the casualty's knees to ease strain or injury .
- assist the coughing casualty by holding the dressing in place during coughing bouts to prevent the abdominal wound from opening further. This should also be done if the casualty vomits.

If bleeding continues to ooze through the dressing apply a further dressing or pad.

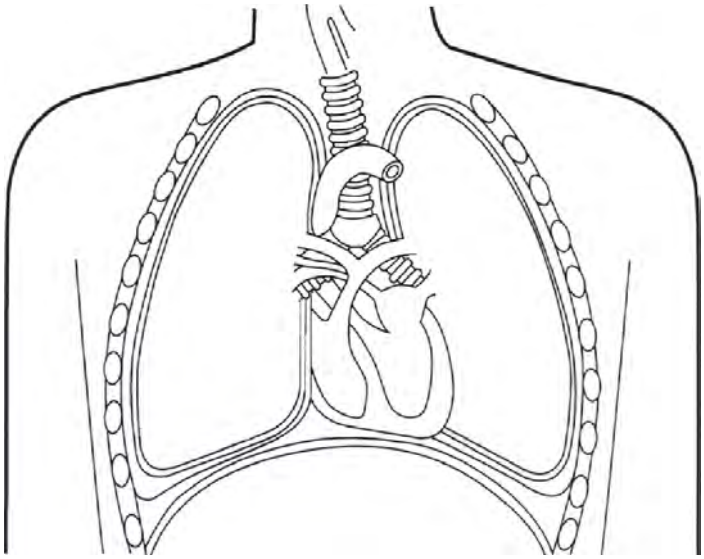
In the event of abdominal contents protruding from the wound:

- protect them with plastic covering to prevent them from drying out
- do not touch or try to replace protruding abdominal contents as this may cause further complications, e.g. further injury and/or infection.

Urgent transfer to hospital is required. Regular checks of pulse, respiration's and response level should be made and recorded accurately.

Penetrating Chest wounds

(b) The chest cavity



The chest cavity contains two important vital organs: the heart and the lungs. The ribs circle these organs forming a cage like structure which meets at the breastbone (sternum) on the front of the chest and at the spine at the rear.

The diaphragm is a strong band of muscle fibres that forms the boundary between the chest and the abdominal cavity. With chest wounds you must be aware that there may be damage to the lungs, heart or major blood vessels.

Signs and symptoms include:

- obvious deformity or wound to chest
- marked agitation and anxiety
- difficulty in breathing
- pain on breathing
- rapid, uneven and shallow breathing
- cyanosis - A white skinned person who is cyanosed may have a blue skin colouration particularly around the lips and nail beds - a black or dark skinned person will not appear blue, there may however be discolouration of the lips, tongue, conjunctiva of the eyes, palms or soles of the feet - applying light pressure to the skin will create pallor, the skin colour should return in less than one second in a healthy person

There may also be:

- signs and symptoms of shock
- red frothy blood may be coughed up if there is damage to the lungs
- the sound of air being sucked into the chest on inspiration
- blood may bubble out of a chest wound
- veins in the neck becoming prominent
- a crackling feeling to the skin around the site of the wound

Treatment

- support the casualty to facilitate breathing so that he/she is leaning towards the injured side and cover the wound with the palm of their hand if possible
- place a sterile dressing over the wound and cover with a plastic bag, foil or kitchen film and tape it firmly allowing one side to remain untaped for drainage and air release to help reduce pressure on the lung
- if the casualty is unconscious, place him/her in the recovery position injured side down to help the healthy lung work more effectively.
- arrange urgent transfer to hospital.

Bruises

Although superficial bruises may be considered somewhat trivial when compared to other types of wounds, bruises are nevertheless painful and indeed are a minor form of internal bleeding underneath unbroken skin, usually caused by a direct blow. They may not always appear at the time of injury but can be delayed and appear some days later.

Although a dressing is not usually required, a cold compress can often bring quick relief and be a comfort to a casualty.

In the case of the elderly or people on anticoagulant medication bruising may appear more easily. If you suspect any other underlying cause, refer the casualty for medical advice.

In a very black person bruises will not appear as purple. A first aider may have to rely on obtaining a history or feeling the skin surface to detect a raised bruise. Some black or dark skinned people, especially newborn babies, have a noticeable pigmentation on the buttocks and lower back and to the backs of the hands and wrists. These marks are of no consequence and often fade as a child gets older. This is **not** bruising.

Burns and scalds

A burn involves injury to tissues. These tissues when damaged by heat secrete a fluid known as serum which is lost either through the skin or in the formation of blisters at the site of the burn. Where burns are extensive there is a possibility that a casualty will lose a considerable amount of fluid and as in all cases of fluid loss there is the danger of shock. Burns also present a high infection risk to the casualty by breaching the integrity of the skin.

A scald is a burn causing damage to the skin through hot liquid or vapour.

Causes of burns and scalds:

- **radiation burn** – the sun (sunburn), sunbeds, radioactive substances
- **dry burn** – fire, flames, hot objects (thermal burns)
- **chemical burn** – caused by chemical substances such as sulphuric acid or caustic soda (the causative agent may be a liquid, solid, gas or fume and may be extremely corrosive to the skin)
- **electrical burns** – are normally divided into three types: low voltage as in the case of normal domestic appliances, high voltage as in the case of high voltage delivery, such as the cables attached to electricity pylons or lightning (the damage to tissue may be more extensive than is immediately apparent - remember to look for exit-burns which indicate where the current went to earth) and lightning strikes
- **scalds** – caused by hot liquid or vapour e.g., moist heat from a boiling kettle or boiling water.
- **cold injury** – frostbite, contact with freezing metals and contact with freezing vapours

Depth of Burns

Superficial:	redness, swelling and tenderness
Partial thickness:	the skin becomes red with rawness and blisters
Full thickness:	all layers of skin are burned

Extent and depth of burns and scalds

The extent and depth of a burn or scald are vital factors in assessing the severity of the casualty's condition. Burns are normally divided into superficial, partial thickness, or full thickness according to the depth of skin destroyed. Superficial burns, if not extensive, normally respond to immediate first aid treatment and often do not require any further medical intervention. In an adult any partial thickness burn greater than 1% of the surface area of the skin (the size of a hand) must be seen by a doctor. In a child all burns of partial thickness or greater should be seen by a doctor. Although partial thickness burns if extensive can be fatal, full thickness burns are far more serious. Casualties with full thickness burns may not complain of pain due to damage to nerves. Areas that have full thickness burns may require grafting.

To ascertain the overall percentage of the body surface that has been burnt, and therefore to enable doctors to make an assessment of body fluid to be replaced.

Burns requiring hospital treatment:

- If the casualty is a child seek medical advice or take directly to hospital
- If the casualty is a child seek medical advice or take directly to hospital
- All full thickness burns
- All burns involving the feet, hands, face or genital area
- All partial thickness burns larger than 1% of the body surface – an area the size of the palm of the casualty's hand
- All superficial burns larger than 5% of the casualty's body surface – 5 palm areas
- All burns that extend right around the arm or leg
- Burns with a mixed pattern of depth
- If you are unsure about the extent or severity of the burn

Minor burns and scalds

Signs and Symptoms:

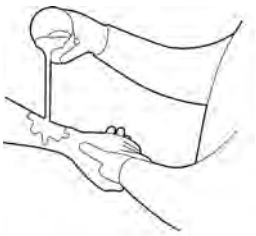
- reddened skin
- pain in the area of the burn

Later there may be:

- blistering of the affected skin

Treatment:

- reassure the casualty
- immediately apply (or immerse the affected part in) copious amounts of water if water is not available any cold harmless liquid can be used
- cool* the tissues in this way for at least 10 minutes
- remove anything of a constrictive nature, especially jewellery on fingers and hands in case of swelling
- cover the burnt area with a sterile dressing where possible or kitchen film can be used as a protective agent (this can be applied in a single layer - do not wrap the film around and around the limb as this could have a tourniquet effect)
- **do not**:
- break blisters or apply any kind of adhesive dressing to the burnt area
- Apply ointment on fats
- Use specialised dressing, spray and gels.



* Although immersion in cold water is important, the immersion of a large percentage of the body or for long periods of time can cause hypothermia, especially in children.

Severe burns and scalds:

Signs and Symptoms

There may be:

- areas of superficial, partial thickness and/or full thickness burn
- pain
- difficult breathing
- shock

Treatment

- ensure the casualty has not been overcome by smoke or fumes if these were involved and has a clear, patent airway
- reassure the casualty
- lay or sit the casualty down
- apply copious amount of cold water* for at least 10 minutes to the burnt areas (if possible protect the burns from ground contamination)
- remove any constrictive jewellery or burnt clothing that is not adhering to the skin
- treat for shock
- maintain vigilance of the airway and monitor breathing
- arrange for immediate transfer of the casualty to hospital
- burns to the face do not require any dressing but should be cooled until medical help arrives
- protect the burnt area with kitchen film place hands and feet in clean plastic bags and seal the ends with tape applied over the plastic, not the damaged skin
- do not break blisters or make any contact with the burnt area
- do not apply anything other than water to the burned area
- make a record of pulse, breathing, history of events, any substances involved
- continue to reassure the casualty.
- do not apply ointments, fats, specialist dressings, sprays or gels

Consider whether the casualty may have inhaled toxic or hot gases as this can result in immediate or severe breathing difficulty.

* Although immersion in cold water is important, the immersion of a large percentage of the body or for long periods of time can cause hypothermia, especially in children.

Electrical burns:

Signs and Symptoms

There may be:

- unconsciousness
- full thickness burns with swelling, scorching and charring
- entry and exit burns
- shock

NEVER approach a casualty unless you are assured that the supply has been disconnected and that the casualty is no longer in contact with any live supply.

Low voltage electric current:

- to remove any contact with live supply which cannot be reached or disconnected make sure you insulate yourself with either rubber boots or stand on dry insulating material, such as wood or rubber mats (use a wooden broom or other insulating object to push the live source away from the casualty or the casualty away from the source - **do not** use a baton as this will conduct electricity)
- remove the casualty from the source (consider dragging the casualty into a safe area using a piece of rope tied either to their hands or feet)
- be aware of the effects of undertaking any rescue operations near water (water will conduct electricity and if you stand in it may cause you to be electrocuted).

Burns caused by electricity usually cause damage at the point of entry and the point of exit on the body. There may also be internal damage to tissues. Electricity can also disrupt the normal rhythm of the heart and cause the heart to stop - full CPR will be required if this occurs.

Do not attempt any resuscitation in a dangerous environment.

Once the casualty is in a safe area you can deal with the priorities of:

- **A**irway
- **B**reathing
- **C**irculation (p121)
- treat burns
- treat for shock (p58)
- reassure the casualty
- arrange immediate transfer to hospital.

High voltage electric current

Keep everyone back at least 20 yards (18 metres) from the casualty as high voltage can ‘arc’ and electrocute you.

In the case of high voltage electrical injuries there is no immediate first aid treatment other than:

Don’t approach a victim of high voltage electricity until you are officially informed that the current has been switched off and isolated.

You cannot insulate yourself against this kind of injury.

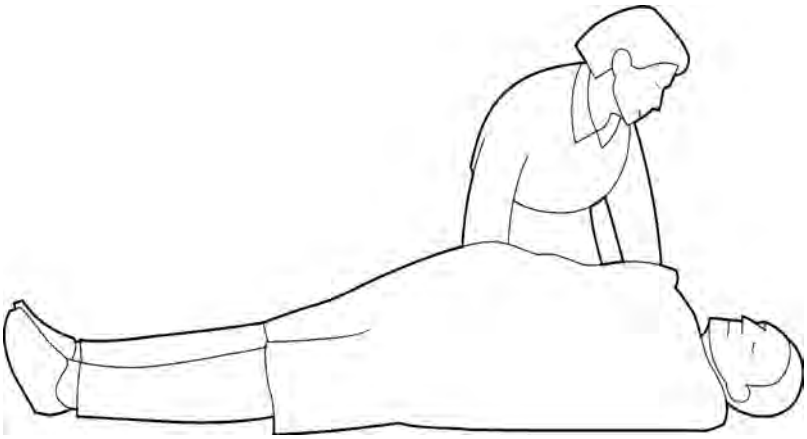
Only when it has been officially confirmed that the supply has been isolated will it be safe to approach the casualty. When it is safe if the ambulance has not arrived:

- open the airway
- check breathing
- commence CPR if the above are absent
- if unconscious place into the recovery position
- treat any burns (p121)
- treat for shock (p58)
- treat for any other injuries, e.g. fractures caused by the casualty being thrown some distance by the force of the electricity.
- urgent removal to hospital

Clothing on fire

If a casualty's clothing catches fire adopt the following three-point action plan:

- **STOP** the casualty from running around (any movement will fan the flames)
- **DROP** the casualty to the floor (to stop flames travelling up the clothes of the casualty and burning the face) (wrap tightly in a fire blanket or a heavy fabric around the casualty - do not endanger yourself)
- **ROLL** the casualty along the floor to help smother the flames.



If you are equipped with a fire blanket stop and drop the casualty and extinguish the flames by wrapping him/her in the fire blanket and roll them on the ground.

Once you are sure that any clothing on fire has been extinguished the usual protocols for dealing with burns should follow.

Smoke and fumes

Fire, especially in a confined environment, causes considerable smoke. Burning materials may give off toxic fumes which can be poisonous if not deadly. The atmosphere quickly becomes devoid of oxygen.

If you are caught in such an environment by yourself or with a group of people, aim to move into a room at the front of the building that is still not contaminated and which has a window access point. Seal the room as best you can with blankets, coats or any materials which will block the entry of smoke or fumes. If the room becomes partially contaminated stay low in the room as the atmosphere is purer at ground level. If you have to escape through a window before the emergency services arrive, exit the window feet first, hang with your arms to your full length and then drop to the floor.

Chemical burns

Signs and Symptoms:

- Chemicals in the vicinity
- Stinging Pain
- Blistering, swelling and peeling

Treatment:

- Make the area safe if possible
- Ventilate the area and wear protective gloves to dispense fumes.
- Irrigate the burnt part thoroughly with water to remove the chemical for at least 20 minutes
- Remove any contaminated clothing while irrigating taking care not to contaminate yourself
- Obtain details of chemical
- Refer the casualty to a doctor immediately
- Never attempt to neutralise acid or alkali burns unless trained to do so
- Do not delay treatment by searching for an antidote

Medical attention should be sought promptly even where injuries appear slight.

Eye injury

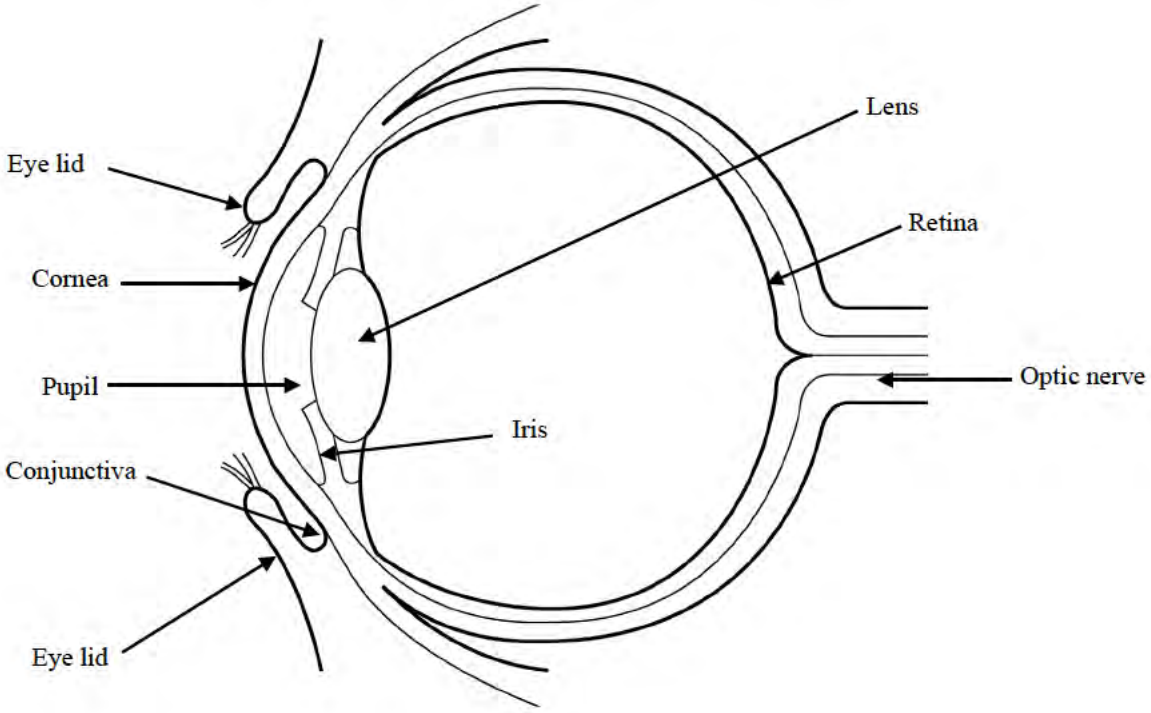
All visual material that we see is sent from the eye via sensory nerves to the brain. These signals are then decoded and interpreted by the brain.

Basic anatomy

A basic anatomical knowledge of the eye is required in first aid, so that appropriate treatment can be given when eye injuries occur.

Most of the structure of the eye is hidden from view as the eyes are situated in two bony sockets at the front of the skull.

The following are the basic anatomical parts of the eye:



The **eyelids** are the protective coverings of the eye, composed of muscle, lined with **conjunctiva** (a membrane that helps to keep the eye moist) and fringed with **eyelashes**.

The **cornea** is transparent at the front of the eye and allows light to pass through it to reach the pupil. The **pupil** is the dark round space in the centre of the eye through which light continues its journey.

The **iris** is that part of the eye which is coloured. If we say a person has 'blue eyes' or 'brown eyes' we are referring to the colour of the iris. In bright sunlight the iris constricts and the pupil aperture becomes smaller. In darker surroundings where there is less light, the iris dilates and the pupil becomes larger to allow all available light to enter the eye.

The **lens** is situated behind the pupil of the eye. It refracts light as it enters the eye onto the **retina** at the back of the eye**.** The image which forms on the retina is then conveyed to the brain via the **optic nerve**.

Examining the eye

If possible take a history from the casualty. This may help you to ascertain what has happened.

When examining an eye, try to make sure you have a good light source and sit the casualty down in a position that is both comfortable for him/her and also convenient for you to examine all aspects of the visible eye. The following procedure may be helpful:

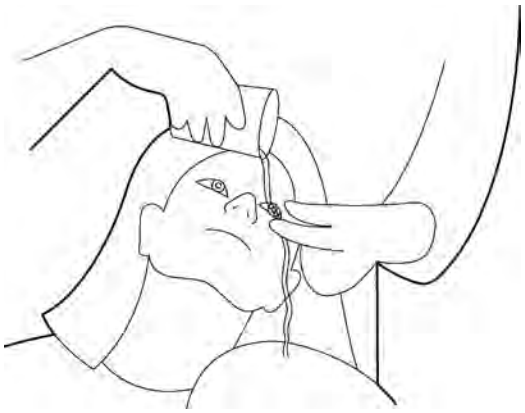
- stand behind or beside the casualty, ask him/her to face a light if possible
- ask the casualty to open the eye as wide as possible*. You can assist if necessary by holding the eyelids apart using both thumbs or index finger and thumb.
- instruct the casualty to look up while you examine the bottom of the eye
- instruct the casualty to look down while you examine the top of the eye
- do the same with right and left instruction
- examine the cornea – the centre of the eye, for any adhering objects. **Do not** turn out the upper lid in an attempt to find a trapped object
- loose objects on the white part of the eye (**sclera**) can either be washed out by pouring clean water from a glass or by using a sterile eyewash.
- If the foregoing is unsuccessful attempt to remove the object with a moist swab or the damp corner or a clean handkerchief
- any other types of objects adhering to the cornea or any other type of eye injury must not be touched.
- Ask the casualty to hold a sterile dressing or clean non-fluffy pad over the affected eye. If it will take some time to obtain medical help, secure the pad in place with a bandage.

* The casualty may not be able to open the eye at all owing to severe protective spasm of the eye.

Irrigating the eye

If irrigation of the eye is necessary follow the procedure below:

- ask the casualty not to rub the eye
- seat the casualty under a good light source
- examine the eye (P127)
- if you can see the objects on the white part of the eye irrigate the eye using clean water or sterile eye wash solution, whichever is freely available
- inform the casualty of the procedure you are undertaking and ask them to look away (pouring liquid directly onto the cornea may result in spasm of the eye causing discomfort)
- place a towel or other absorbent material over the shoulder and close to the neck on the affected side to absorb the water used for irrigation
- allow the water to travel from the inside corner of the eye, across the surface of the eye to the outside corner (this prevents any contamination of the other eye especially if chemicals are involved)
- if irrigation, for whatever reason does not alleviate the problem, lift the object off with a moist swab or the corner of a tissue or clean handkerchief. If the object cannot be removed seek medical help.



NB Some eye injuries can arise when minute metal fragments penetrate the eye. (Such fragments are commonly caused where two hardened steel surfaces impact together, e.g. a hammer striking a chisel.) These types of injury may not cause any short term symptoms but if left untreated can cause blindness within a few weeks. Where this is a possibility casualties **MUST** be referred to a medical practitioner.

Flash burns to the eye

Flash burns are caused by exposure to ultraviolet light, common in industry with welders where the condition is often referred to as ‘arc eye’ or ‘welders flash’. Exposure to ultraviolet light being reflected off a bright surface can also have a similar effect. Using a sunbed without protective goggles can also cause burns to the front of the eye.

Flash burns normally affect both eyes and symptoms of intense pain and burning are normally delayed. A history of what the casualty was doing in the last 24 hours prior to symptoms occurring are normally sufficient to point the first aider in the direction of treatment for flash burns. Other symptoms might include:

Signs and Symptoms

- Intense pain in the affected eyes.
- redness and watering of the eye
- photophobia – sensitivity to light (with flash burns this usually affects both eyes and can be quite severe)
- a feeling that the eye contains grit, even though it doesn’t.

Treatment

- reassure the casualty
- As casualty to hold and eye pad held over both eyes
- arrange hospital care.

Chemical contamination of the eye

Where a chemical has contaminated the eye irrigation under gently running cold water should be instigated as soon as possible for at least 10 minutes.

Signs and Symptoms

- Pain (Intense)
- Inability to open eye
- Redness swelling and watering of the eye
- Evidence of contamination

Treatment

- Put on gloves
- Irrigate eyelid inside and out.
- Casualty to hold clean pad over the injured eye which can be secured with a bandage if the ambulance is delayed.
- Transport to hospital.

SC Spray Injury

A burst of CS spray or pepper spray will affect the eyes. The effect is normally instantaneous but can be delayed up to 20 seconds. In rare occasions there may be no effect at all.

Signs and symptoms

- pain and discomfort in the eyes
- excessive watering of the eyes
- involuntary spasm of the eyelids leading to blinking and closure of the eyes.

Treatment

- put on protective gloves
- reassure the casualty that the effects are temporary
- remove the casualty to an uncontaminated area (preferably in a current of moving air). If the casualties eyes are painful, fan them to help speed up the vaporisation.
- advise the casualty not to rub their eyes
- allow the casualty to remove contact lenses if applicable. Do not attempt to remove contact lenses yourself
- contaminated clothing should be placed in a sealed bag
- if symptoms persist seek medical advice

Ammonia

Where ammonia is sprayed into the eyes irrigation is required as early as possible. This should be followed by rapid transport to hospital. Ammonia sprayed into the eyes can result in blindness and requires urgent medical treatment.

Contact lenses

A first aider should never remove contact lenses. They may be removed by the casualty themselves or a medical practitioner. In cases of chemical contamination it may be advised that lenses are removed in order to irrigate the eye completely and lessen the risk of chemical contamination being trapped behind the contact lens. In all other cases contact lenses should be left in place.

Legislation (Guidance Note 40. HSE (First Aid) Regulations 1981)

"Where mains tap water is not readily available for eye irrigation, at least a litre of sterile water or sterile normal saline (0.9%) in sealed, disposable containers should be provided. Once the seal has been broken, the containers should not be kept for re-use. The container should not be used after the expiry date."

Eye (wound)

Eye wounds may result from a direct blow or from sharp implements or fragments. Superficial injuries to the surface of the eye can lead to the possibility of permanent deterioration of vision. All eye injuries are potentially serious

Signs and symptoms:

- obvious wound and/or bloodshot
- in the eyes or eyelids
- pain
- bleeding
- difficulty in seeing or total loss of vision
- deformity
- seepage of blood or clear fluid from the eye.

Treatment:

- lie the casualty on their back and hold their head
- cover the injured eye with a sterile pad held in place by the casualty if possible
- ask the casualty to keep both eyes still (movement of the good eye will cause movement of the injured eye)
- transfer to hospital.

Medical emergencies

Included in this section are:

- diabetes
- poisoning.

Diabetes

Diabetes is a condition in which the body fails to regulate the concentration of sugar in the blood. Those with the condition must control the sugar in their diet and many need to take insulin injections (insulin reduces the amount of sugar in the blood) or tablets. If a person with diabetes over exerts himself/herself, or misses a meal, or takes too much insulin the blood sugar may fall too much resulting in hypoglycaemia.

Hyperglycaemia

This condition arises in casualties with diabetes where the blood sugar level in the body is less than normal.

A person with diabetes who is aware of his/her condition often knows when a 'hypo' attack is occurring and whilst still conscious can tell the rescuer what is happening even though they may be too weak to help themselves.

However, not all people with diabetes will be aware that they are developing hypoglycaemia and some can become unconscious almost without warning. It is wise to think of hypoglycaemia therefore, whenever a diabetic complains of an unusual sensation or behaves in an unusual way. Look for evidence that the casualty may have diabetes, such as a medic-alert bracelet, talisman or medallion with medical information, sugar lumps, insulin or blood testing equipment.

Signs and symptoms:

- feeling of faintness, weakness or hunger
- diabetic warning card, bracelet/necklace, or glucose gel, tablets or insulin syringe
- personality changes – anger, disorientation, confusion
- sweating with cold, clammy skin
- a rapid pulse
- level of response will deteriorate if left untreated
- unconsciousness

- history of diabetes
- palpitations and muscle tremors

Treatment:

- give the casualty sugar in one form or another, e.g. a sweet drink
- when the casualty has recovered give him/her more food or drink
- if condition improves advise the casualty to contact their doctor.
- If condition does not improve consider alternative conditions and take or send casualty to hospital

Hyperglycaemia

Too high a blood sugar level for a prolonged period of time can result in hyperglycaemia.

This condition is the opposite of hypoglycaemia. It is a raised blood sugar level which can result in the following signs and symptoms. Usually, the casualty may drift into unconsciousness (diabetic coma)over a few days.

Signs and symptoms:

- the skin is warm and dry
- the breathing and pulse are increased
- there is a fruity smell of acetone on the breath of the casualty.
- Thirst
- Drowsiness, leading to unconsciousness if not treated

Treatment:

- transfer to hospital and monitor vital signs

Poisoning

This section deals with:

- poisoning
- drug overdose
- alcoholic poisoning.

Poisoning

A poison can be any substance which when taken into the body either internally or externally can cause injury either temporarily or permanently. A poison may be:

- solid – tablets
- liquid – weed killer
- gas – carbon monoxide.

There are five ways in which a poison may enter the body:

- swallowed – via the mouth into the stomach
- injection – via hypodermic needle/insect bite directly into the blood
- absorption – via the skin
- inhalation – breathed in via the lungs
- instilled at the eyes

Signs and symptoms

Signs and symptoms will differ according to the poison taken and method of entry into the body. They may include:

- pain
- nausea and vomiting
- drowsiness and faintness
- confusion (impaired consciousness)
- difficulty in breathing
- visual problems, seizures and/or anaphylactic shock
- unconsciousness
- flushed damp skin
- fever
- cyanosis, shock and/or hypoxia
- irregular fast or slow heart rate

- Pain, swelling, rash, redness or irritation of the skin

Treatment

Protect yourself against contamination and do not touch any substance which may be poisonous.

The basic aims when dealing with poisoning are to:

- maintain the airway, breathing and circulation
- remove contaminated clothing
- assess for hidden injuries/conditions
- Identify the poison
- transfer the casualty quickly to hospital.

Look at the surroundings to help try to establish the cause. If the casualty is conscious, try and get a history quickly from him/her.

If clothing has been contaminated it may be necessary to get the casualty to remove some of their clothing.

If the casualty is unconscious, place him/her in the recovery position and monitor and record vital signs until emergency help arrives.

Do not make any attempt to make the casualty vomit.

If breathing stops, commence artificial ventilation using a plastic face shield or mask and call an ambulance.

Drug Poisoning

In all cases of drug overdose treat as for poisoning above. The signs and symptoms for drug overdose can vary depending on the type of drug used and its mode of entry into the body.

In cases where painkillers have been used such as paracetamol* and aspirin there may be nothing more than mild abdominal discomfort and nausea depending on the dosage taken. Other drugs such as stimulants like amphetamines can give rise to bizarre personality changes and hallucinations. Narcotics such as heroin can lead to a confused state and eventual unconsciousness.

* Paracetamol overdosage can cause death at a later date by causing liver failure. There is however an antidote available. This underlines the importance of seeking medical help for a casualty claiming to have overdosed even when symptoms are absent.

Treatment

In all cases the objectives remain the same:

- sustain life – Airway, Breathing, Circulation
- transfer the casualty quickly to hospital.
- place conscious casualty in comfortable position
- monitor vital signs
- obtain sample if safe to do so

Alcohol Poisoning

Alcohol helps to depress the central nervous system and can seriously impair the normal physical and mental abilities of a person. With prolonged intake of alcohol a person may lose all recognition of his/her surroundings and may eventually enter into an unconscious state. If alone there is a considerable danger that an intoxicated person may inhale vomit and choke. This is particularly dangerous if the casualty is lying on their back.

Beware of mis-diagnosis. Just because someone smells of alcohol it doesn't necessarily mean that their condition is due to alcohol alone. The cause of their condition may well be head injury, stroke or heart attack and not the result of alcohol consumption.

Treatment:

- maintain an open airway so that the casualty can breathe freely
- protect from cold
- assess for hidden injuries/illnesses especially head injuries.
- maintain regular 10 minute observations
- call an ambulance if necessary.

NB. It is difficult for medical staff, let alone a first aider, to diagnose head injury correctly in a casualty who is intoxicated. This underlines the importance of seeking medical opinion quickly if in doubt.

Alcohol widens (dilates) the blood vessels. The more that the body loses heat increases the possibility of hypothermia.

Intoxication can also cause hypoglycaemia.

Where an intoxicated person is snoring this indicates a partial airway obstruction. When the snoring ceases it indicates that the airway is either completely obstructed or clear.

Inhaled gases

Some enclosed spaces, e.g. sewers, may contain poisonous substances or an atmosphere devoid of oxygen.

Do not enter an enclosed space to rescue a collapsed casualty where there is a possibility of the above. The fire service will be required. Be wary of any unidentified substance and do not put yourself in danger.

Aims:

- without endangering yourself, move the casualty to a safe area away from the danger and into fresh air
- maintain an open airway
- transfer the casualty to hospital.

Treatment:

remember – your own safety is the priority

- do not attempt a rescue if the atmosphere remains contaminated
- do not use your personal radio where explosive gases are present.

The fire service will be required as they have access to, and are trained to use breathing apparatus. Where possible you should:

- move the casualty into fresh air
- make arrangements for urgent transfer to hospital
- if the casualty is unconscious follow the ABC checks and commence resuscitation if required
- place the unconscious breathing casualty into the recovery position.

Hypothermia

This condition occurs when the body temperature falls below (35^{o}C). It sometimes occurs where an elderly person has spent some time in a cold, unheated room. It can also occur due to exposure to cold weather (the homeless are particularly vulnerable) or where a person falls into cold water (30 times faster than in dry air). Infants are at a high risk of hypothermia.

Lack of activity, chronic illness all increase the risk of hypothermia. Alcohol and drugs can exacerbate the condition

Normal body temperature range is 36 to 37^{0}C.

Severe hypothermia occurs below 30^{0}C (often fatal).

Signs and symptoms:

- shivering
- cold pale dry skin
- slow weakening pulse
- slow and shallow breathing
- lack of co-ordination
- confusion, lethargy or impaired consciousness
- gradual loss of consciousness

If body temperature is not restored the heart will stop.

In severe hypothermia a person may appear to be dead but may make a full recovery if proper resuscitation is carried out.

Treatment:

- move the person to a warm and dry environment
- remove and replace any wet clothing if practicable
- wrap them in blankets or clothing and insulate from the ground
- if fully conscious give the casualty a warm drinks, and high energy foods
- seek medical help.
- Re-warm casualty gradually and monitor vital signs

If unconscious:

- place in recovery position
- monitor vital signs and be prepared to resuscitate if condition deteriorates
- transfer to hospital by stretcher.

DO NOT:

- give alcohol
- apply an external heat source directly against the casualty
- allow an elderly casualty to have a bath to warm them up

DO:

- warm casualties gradually (**rapid re-warming can cause shock**).

Infants can be placed in a warm room and wrapped in blankets. Medical help should always be sought.

- handle casualty gently
- be aware that in the elderly hypothermia may mask the signs of a stroke, heart attack or under-active thyroid gland

Heat Exhaustion and Heat Stroke

Heat exhaustion occurs due to the loss of body fluids and salts through sweat. If these losses continue unchecked dehydration will set in. It usually occurs in individuals who are not accustomed to the climate and who undertake heavy exercise. Illicit drugs such as Ecstasy are also a cause of heat exhaustion/heat stroke.

Police officers may be at high risk during public order incidents and other situations where officers are exerting themselves whilst clad in protective clothing. It is important therefore to have drinks available and to rest when possible.

Heat stroke is a much more serious condition when the body becomes dangerously overheated. Whilst heat exhaustion usually develops gradually, the onset of heat stroke can be sudden.

Signs and symptoms

HEAT EXHAUSTION	HEAT STROKE
Headache	Headache, dizziness and discomfort
Loss of appetite	Confusion/Restlessness
Faintness/confusion	Hot and flushed skin
Pale, clammy skin	Dry skin
Sweating	Full, bounding pulse
Feeling sick	Unconsciousness (possibly sudden)
Rapid, weak pulse and breathing	Temperature (40 degrees C+)
Muscular cramps	
Unconsciousness in severe cases	

Treatment

HEAT EXHAUSTION	HEAT STROKE
Lie casualty down and raise feet in a cool environment	Move casualty to a cool environment
Remove excess clothing from casualty	Remove as much clothing as possible from casualty
Give water followed by oral re-hydration salts or isotonic drinks	Wrap casualty in a cool sheet dampened with cold water or sponge the casualty with cold water or fan the casualty. Remove wet sheet when the temperature falls to 38ºC under the tongue or 37.5ºC under the armpit.
If condition improves seek medical help	Transfer to hospital urgently
If condition fails to improve transfer to hospital	
If unconscious (uncommon):	**If unconscious:**
Place in recovery position	Place in recovery position
Monitor vital signs	Monitor vital signs
Transfer to hospital	Transfer to hospital
BE PREPARED TO RESUSCITATE IF CONDITION DETERIORATES	**BE PREPARED TO RESUSCITATE IF CONDITION DETERIORATES**

Hygiene

It is the responsibility of every first aider to have a high regard for, and a desire to, promote good hygiene standards in all procedures relating to dressings and wound care. Indeed good hygiene and the administration of dressings must go hand in hand.

While environmental circumstances may be different for first aiders in dealing with wounds and dressings, from working in the clean environment of a first aid room to working at the scene of a road traffic accident. The following objectives should be striven for where possible subject to the severity of the injuries and the safety of those requiring attention:

- always **WASH YOUR HANDS** before and after contact with dressings
- make sure any open cuts/abrasions that the first aider has are covered with waterproof dressings
- use disposable gloves
- if you have been taught an aseptic technique (a method of wound dressing which avoids touching the wound with non-sterile items) for the application of dressings use it
- **DO NOT** breathe, sneeze, cough or smoke over the wound when applying dressings
- improvise dressings if necessary depending on your situation, e.g. use a clean handkerchief
- **always WASH YOUR HANDS** upon application of a dressing.

Blood Borne Viruses (BBVs)

BBVs are viruses that some people carry in their blood which may cause severe diseases in certain people and few or no symptoms in others.

Viruses can also be found in body fluids other than blood e.g. semen, vaginal secretions and breast milk. Other body fluids or materials carry a minimal risk, such as urine, faeces, saliva, sputum, sweat, tears and vomit, unless contaminated with blood. Care should still be taken as the presence of blood is not always obvious.

Prevention/ Control measures

- cover all cuts or grazes on your skin with a waterproof dressing
- wear disposable gloves
- use eye protection and disposable plastic apron
- use face shield when performing mouth-to-mouth
- wash your hands after each procedure

Action after possible infection with BBV

- wash splashes off your skin with soap and running water
- record source of contamination
- report incident to supervisor
- encourage wound (minor bleeding) to bleed – do not suck wound

Dressings

Dressings are used to:

- stem the flow of blood from a wound
- minimise the risk of infection
- absorb discharge from a wound
- act as a protection to the injury.

They may be:

- adhesive
- sterile (unmedicated)
- improvised.

If the wound is dirty use running water or alcohol free wipes to clean the wound.

Only loose superficial objects should be removed from a wound with tweezers.

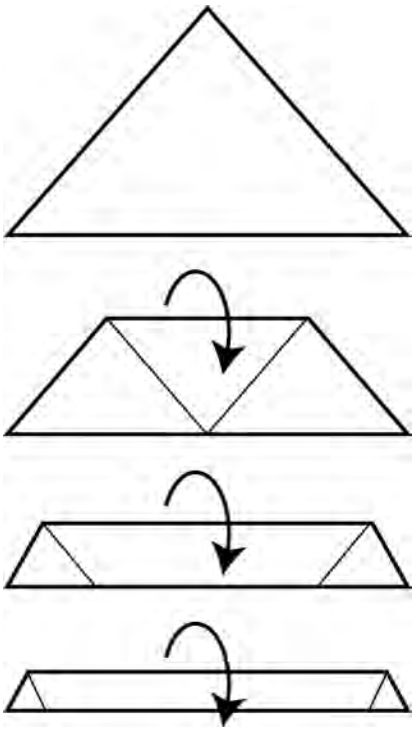
When cleaning a wound with a swab, always clean from the centre of the wound to the edge of the wound and then dispose of the swab appropriately.

Bandages

Bandages are used to:

- maintain pressure on top of a dressing
- help to reduce swelling
- keep dressings in place
- provide support
- immobilise limbs
- assist in lifting casualties.

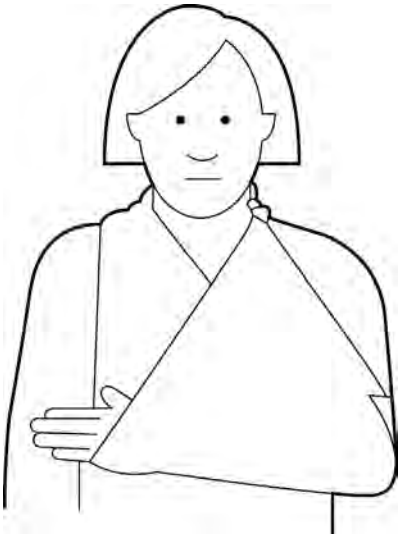
The most common bandage in first aid which has a variety of uses is the **triangular bandage**.



Usually made of cloth or calico, some are also made of disposable material. When not being used as a sling, the triangular bandage when folded as depicted in the picture above will create a broad bandage and if folded again will form a narrow bandage.

The triangular bandage may also be used to form a sling.

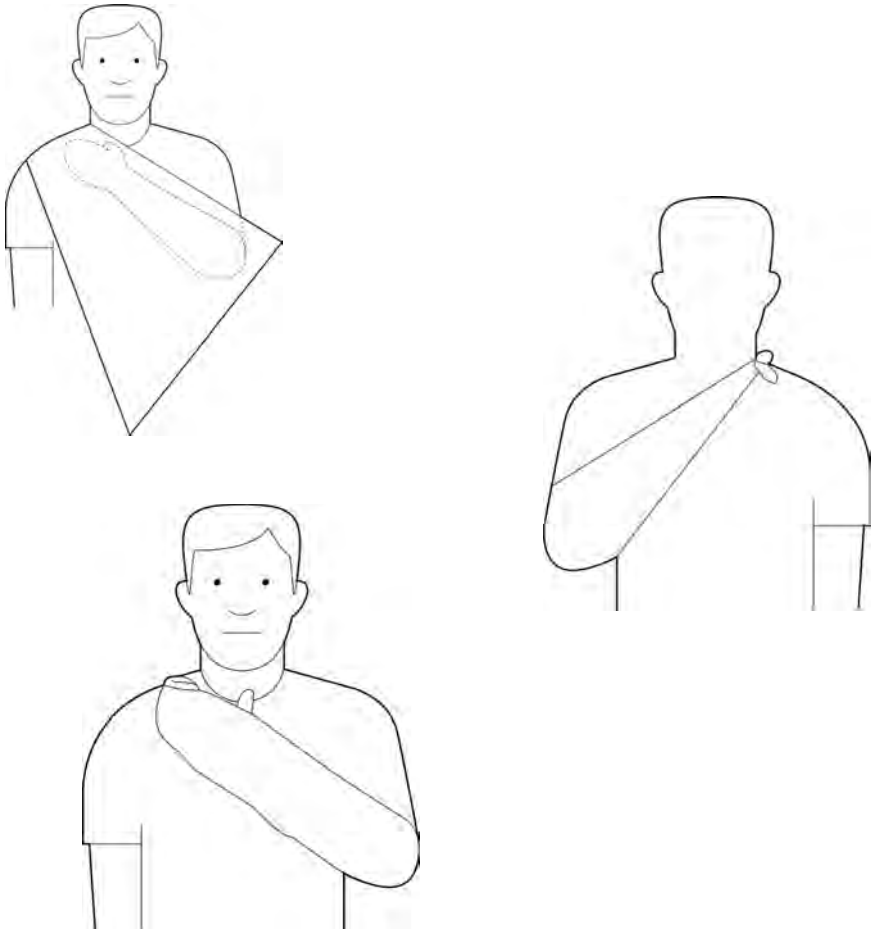
It may be placed under the upper limb with the point of the bandage pointing towards the elbow on the injured side. The ends of the bandage are then tied off on top of the shoulder. This is known as an **arm sling** which is frequently used for arm injuries and to help stabilise rib injuries.



For comfort, pads of cotton wool may be placed between the bandage (especially the knot) and the body of the casualty.

The triangular bandage may further be used to form an **elevation sling** which is used for various types of fractures and specifically in the treatment of bleeding and to assist swelling as in the case of burns.

The elevation sling is initially placed over an elevated upper limb.



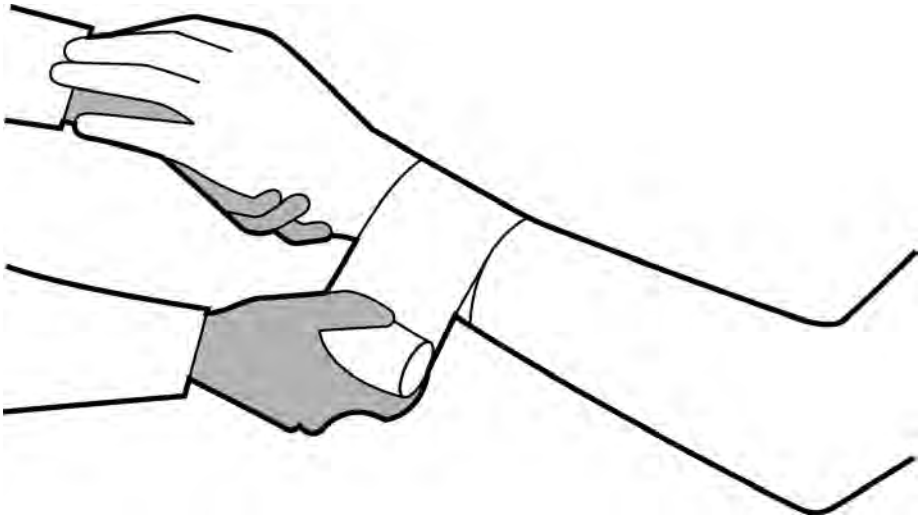
The bandage is then tucked under the arm and then end brought around the back of the casualty and tied off on top of the shoulder. This is called an elevation sling because the arm is elevated inside the bandage to aid the injury and comfort the casualty.

Never tie off a sling at the back of the neck (nape). This is uncomfortable for the casualty and causes undue pressure on the neck.

Roller bandages

Roller bandages help to secure dressings in place and are made from a variety of materials such as open weave, crepe and elasticised material. The crepe bandage offers good support for joint injuries such as twisted ankles or wrist injuries.

To ensure there is sufficient support at a joint flex the joint slightly, then apply the roller bandage in figure-of-eight turns.



When applying a roller bandage keep the main roll of the bandage uppermost and apply the bandage firmly but not too tightly. Always ensure that circulation is not impeded by the bandage, by checking the finger ends for any discolouration or pressing the nail and releasing making sure that the normal colour returns.

Tubular bandages

Tubular bandages are normally used with an applicator and are exceptionally useful to secure dressings on fingers and toes.

The bandage is normally supplied as a roll of gauze, and lengths required can be cut off the main roll as required, placed over the applicator and then applied to the finger or toe and taped down.

If any bandage is too tight the following signs and symptoms may be indicated:

- cyanosis - blue discolouration of the extremities - a black or dark skinned person will not appear blue. Applying light pressure to the skin will create pallor. The skin colour should return in less than two seconds where circulation to the extremities is normal.
- pallor - indicating blood is not circulating to the end of the limb - this term is used to describe a lack of colour in a white casualty - in a black person it is recognisable by an absence of the underlying red tones that normally give black skin its glow or living colour - a brown skinned person will appear ashen-grey.
- coldness of the limb
- casualty may complain of numbness or tingling in the end of the limb.

Transportation of casualties

Kinetics

The dictionary defines kinetics as the body's ability to do work by virtue of its motion. From a first aid point of view we look at kinetic handling, i.e. the ability to lift casualties in this case, in a safe and careful manner.

In so far as lifting is concerned whether it is applied to objects or people, there are certain basic principles to take into consideration:

- make sure you are in a comfortable position
- get as close as possible to the casualty or object you are going to lift
- increase your base of support by relaxing the knees and adjusting feet a shoulders width apart
- place one foot slightly more forward than the other for good stability
- get a firm, safe, well balanced grip
- keep a straight back
- when bending, always bend at the knees, not from the waist
- keep elbows and arms close into the body
- keep the lifted object or casualty close to the centre of your own body
- never be afraid to ask for help.

Remember only move a casualty when absolutely necessary. In the majority of cases casualties will be assisted and dealt with in the position in which they were found providing it is safe to do so.

Casualties may be able to move themselves without any worsening of their condition. It is important to think therefore before attempting to lift them:

- Is there any danger to you or the casualty?
- Is it really necessary?
- Have you trained to lift a casualty in this way?
- Can anyone help you?
- Is the type of lift you are going to use appropriate for the circumstances?
- Is your exit route free from obstructions?
- What kind of terrain will you have to carry the casualty over, e.g. rough ground, up or down stairs?

DO NOT put yourself at risk, or cause yourself injury by lifting incorrectly or unnecessarily.

Subject to the injuries and wellbeing of the casualty and the conditions at the scene of the accident, if it is decided to move a casualty then some of the following methods may be appropriate. Always remember to reassure the casualty during the lifting and carrying process.

When lifting a casualty with the help of others always make sure that someone, preferably the one with most experience, takes charge of the situation and co-ordinates the lifting process with clear, articulate verbal instructions. In this way, at all times, both the casualty and the other assistants will know what they are supposed to be doing and what is happening.

One first aider working alone may consider the following methods appropriate:

The cradle method

Crouch beside the casualty and place one arm around the trunk and the other under the thighs. Holding the casualty close to your own body, stand and walk transferring the casualty to a safe area.

This method is often used for lightweight casualties or children. Usually the casualty is conscious and can hold onto the first aider by placing one arm around his/her neck and grasping their other hand.

The piggyback method

Crouch in front of the casualty with your back to him/her. The casualty places their arms over the first aider's shoulders and grasps their hands in front of the first aider's chest. Secure the casualty's legs by holding underneath the thighs. Stand up slowly, maintaining balance, keeping back straight and move off to a safe place.

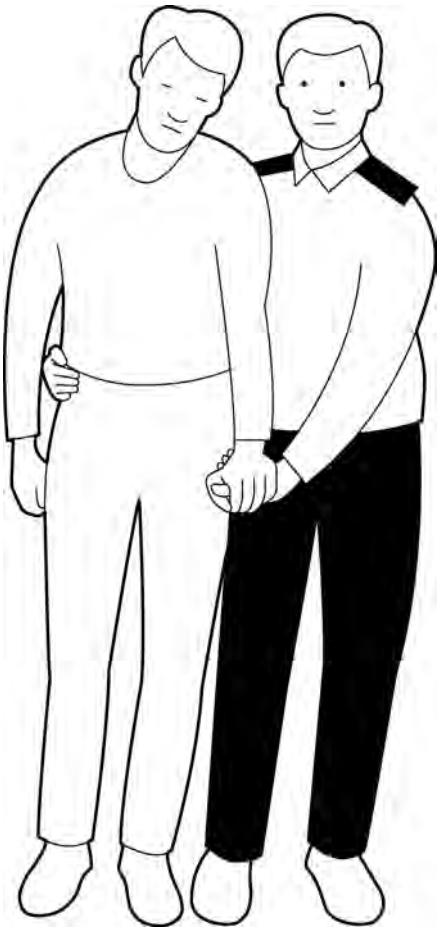
A method often used in children's playground games and activities, but also a method of some advantage in first aid when a casualty is conscious and can hold on.

This method allows the first aider full freedom of vision to see where he/she is going especially if stairs have to be negotiated.

The human crutch method

This method is used where the casualty is conscious but may have an injury on one side of the body. The casualty can either place his/her arm around the neck of the first aider, if both are of similar height, or alternatively place his/her hand in front of him/her and allow it to be grasped by the first aider. The first aider then supports the casualty around the waist with his/her nearest arm standing at the casualty's injured side. The casualty for additional support may use a stick in his/her other free hand.

The first aider moves off with the inside foot walking at the same rate and pace as the casualty.

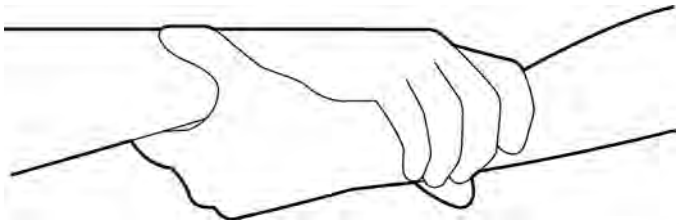


Two first aiders working together may consider the following methods appropriate:

The two-handed seat method

Using this method is best where the casualty is unable to use his/her upper limbs.

Two first aiders crouch either side of the sitting casualty. They then cross their arms behind the casualty's back and grasp the casualty's clothing or belt/waistband.



The first aiders place their other arms under the casualty's thighs, grasping hold of each other's wrist with an interlocking grasp.

The first aiders then rise together and walk forward.

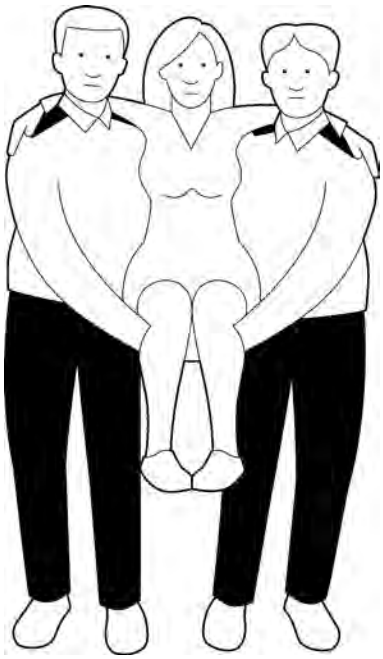
The fourhanded seat method

This method of lifting is useful for lower limb injuries when the casualty is conscious and can use his/her own arms to hold onto the two first aiders.

The fourhanded seat is created by each of the first aiders:

- grasping their own left wrist with the right hand
- then grasping each others right wrist with the left hand
- the seat is then formed.

Both first aiders with the seat formed stand behind the casualty and bend down together allowing the casualty to place his/her arms around the necks and shoulders of the first aiders and raise himself/herself onto the seat. Both first aiders in unison stand together and walk forward.



The fore and aft method

This method is generally only used when in the process of transferring a casualty to or from a stretcher or chair.

The casualty already in a sitting position places his/her arms across the chest.

One first aider crouching behind the casualty places his/her arms under the arms of the casualty and grasps the casualty's wrists.

The second first aider assisting crouches at the side of the casualty passing his/her arms under the thighs of the casualty and takes hold of the legs.

Together both first aiders stand slowly and move the casualty to the new position.

Reference Section

Ballistic injury

This type of injury is caused when an object propelled by an external force makes contact with the body, e.g. bullets, knives, or bomb fragments. Damage can be caused to surrounding tissues in addition to damage at the point of entry of the object. The amount of damage caused is directly related to the amount of energy transferred to the tissue by the object. Ballistic injuries can therefore be classified according to the amount of energy transferred to the tissues.

- **low energy** transfer, e.g. knives – damage is usually confined to the path of the missile and to any underlying structures
- **medium energy** transfer, e.g. low velocity bullets – minor damage to surrounding tissue in addition to the path of the missile
- **high energy** transfer, e.g. high velocity bullets – serious damage to surrounding tissue in addition to the path of the missile.

High velocity bullets can cause cavitations – a temporary cavity several times bigger than the diameter of the bullet. The resultant alterations in pressure suck debris into the wound and cause severe destruction to tissue and blood vessels. The denser the tissue struck, the greater will be the damaged caused. Dense inelastic tissue, e.g. brain is likely to be more severely damaged than more elastic tissue, e.g. lung. Even greater damage can be caused when the projectile breaks up upon entering the body.

Signs and symptoms:

- entry and exit wounds (entry wound may be small and neat – exit wound may be large with unequal edges)
- pain
- signs and symptoms of shock.

Additional symptoms will be experienced depending on the site of injury, e.g. if the injury is to the chest the casualty will have the signs and symptoms of a chest wound. (Page 108).

Treatment

- Danger – do not put yourself at unnecessary risk to rescue an injured casualty.

When you can safely approach the casualty:

- maintain airway, breathing (seal chest wounds) and circulation
- control bleeding
- treat wounds
- treat for shock
- transfer to hospital.

Give information relating to the weapons used to ambulance staff .

Do not delay transfer of the casualty to hospital for this purpose.

First aid and minority ethnic groups

An awareness of differing customs and cultures may assist you to provide first aid to a casualty from an ethnic minority with greater sensitivity. There are a number of publications both within and outside the service specifically designed to give you that awareness. Some general points that may have specific relevance to first aid are briefly revisited below. Most importantly differences in the physical observations to be seen in black and dark skinned people are outlined.

General

There is a preference amongst some religious groups for female casualties to be treated by a female attendant where possible, e.g. Hindus, Muslims, Jews and Sikhs. This is not however an absolute requirement. It should also be remembered that some jewellery, head coverings, scarves and turbans have religious or cultural significance. You should carefully consider whether it is necessary to remove these articles from a casualty: you should explain why you need to do so, and obtain their consent if this is practicable in the circumstances.

Physical observations

Whilst the physiological processes are the same for people of all races, skin changes in the sick or injured differ, a fact which many first aid and medical texts fail to acknowledge. As a result these signs may go unrecognised in people from ethnic minorities, particularly those who are black or dark skinned. It is therefore important for first aiders to thoroughly familiarise themselves with the main differences that they are likely to encounter.

Pallor

This term is used to describe a lack of colour in a white casualty. In a black person it is recognisable by an absence of the underlying red tones that normally give black skin its glow or living colour. A brown skinned person will appear ashen-grey. This colour may also be seen in the lips and nail beds if they are not pigmented.

Inflammation

In white people inflamed skin will appear red. In black or dark skinned people this may not be as easy to detect by sight. If you feel the skin it may feel warm or ‘tight’. There may also be some hardening of tissues under the skin.

Rash

A rash may be less visible on black or dark skinned people. It may be easier to detect a rash by feeling the skin surface.

Cyanosis

A white person who is cyanosed may have a blue skin colouration particularly around the lips and nail beds. A black or dark skinned person will not appear blue. There may however be discolouration of the lips, tongue, conjunctiva of the eyes, palms or soles of the feet. Applying light pressure to the skin will create pallor. The skin colour should return in less than one second in a healthy person.

Bruising

In a very black person bruises will not appear as purple. A first aider may have to rely on obtaining a history or feeling the skin surface to detect a raised bruise. Some black or dark skinned people, especially newborn babies, have a noticeable pigmentation on the buttocks and lower back and to the backs of the hands and wrists. These marks are of no consequence and often fade as a child gets older. This is **not** bruising.

Jaundice

A white person with jaundice may have yellowing of the skin. This may be especially noticeable in the white part of the eye. In black or dark skinned people jaundice may be detected by looking at the whites of the eyes rather than the skin. Yellowing may also be visible in the mouth, on the palms or on the soles of the feet.

When making observations of the skin, particularly in black or dark skinned individuals:

- examine the casualty in good light where possible (preferably daylight)
- remember that colour changes may be more apparent in the lighter coloured areas of the body
- if in doubt ask the casualty, their relative or friend, or a medical professional for their opinion.

Post Traumatic Stress Disorder (PTSD)

Post Traumatic Stress Disorder (PTSD) is a consequence of a traumatic experience.

It is a natural reaction to an abnormal circumstance and is characterised by intrusive, avoidance and symptoms of hyper-arousal.

PTSD is a debilitating disorder, possibly lifelong, which can affect anyone. Armed forces, police, and emergency services personnel might be particularly vulnerable due to their increased exposure to traumatic events. Other people who experience events such as a severe traffic accident, a bombing or a traumatic birth are no less susceptible to this disorder.

Life-threatening events that cause PTSD include but are not limited to:

- rape
- indecent assault
- incest
- shootings
- hostage situations
- military combat
- natural disasters, e.g. tornadoes, earthquakes, floods
- road traffic accidents
- industrial accidents
- near death drownings
- burns victims
- bullying
- harassment
- domestic violence.

Recent studies have shown that PTSD is also common amongst the bereaved with chronic symptoms of depression showing in at least 40% of subjects. This and other studies are now showing that PTSD is much more prevalent than previously recognised.

Some estimates suggest that in the UK alone almost a million people are currently suffering from the effects of PTSD.

Surveys also suggest that as many as 14 million people are being bullied at work, many of who are suffering symptoms of PTSD.

Signs and symptoms:

- sudden emotional distress – maybe delayed months or years later and last for a minimum of a month
- symptoms may be masked initially by the taking of prescribed medication for other conditions not recognised as related to PTSD
- reliving the event in some way
- persistent avoidance of situations, people or situations related or associated with the event
- re-experiencing the traumatic event through painful recurrent dreams or nightmares
- diminished interest in normal activities
- difficulty in sleeping
- flashbacks
- crying spells
- irritability
- anxiety
- depression
- fears
- inability to concentrate or stay focused
- persistent hyperactivity
- impaired memory
- panic attacks
- joint and muscle pains with no obvious cause
- excessive shame, embarrassment and guilt
- low self-esteem, low self-confidence.

Treatment:

- critical incident stress debriefing
- the use of appropriate counselling
- referral to a doctor.

Reference

Kinchin, D., Post Traumatic Stress Disorder: The Invisible Injury ISBN 0-9529121-1-2.

HYPERVENTILATION

Excessive over breathing which can occur due to an anxiety attack or as a result of Post Traumatic Stress Disorder [P.T.S.D.] and may be displayed in hysteria. This is commonly a malfunction of acute anxiety and may accompany a panic attack.

There may be attention seeking behaviour, dizziness, faintness, trembling or marked tingling in the hands and cramps in the hands and feet.

Recognition

- Increased respiration rate.
- Increased pulse rate
- Apprehension

Treatment

Take the casualty to a quiet area where they may better control their breathing.

Be firm but kind and encourage them to slow down their breathing and advise them to see their doctor.

Measuring Pulse and Respiration

The pulse

Each time the heartbeats we can feel it and measure it in the form of a pulse beat. A pulse can normally be felt anywhere by the compression of an artery against a bone near the surface of the skin.

To feel the pulse it is necessary to use 2 or 3 fingers. If you wish to feel the **radial** pulse at the wrist place your fingers on the thumb-side of the wrist. Never feel for a pulse with your thumb as there is a pulse at the end of the thumb itself and you might mistake this for the casualty's pulse.

The normal pulse in an adult has a variable beat between 60 and 80 times per minute. There are occasions when the pulse may be faster than normal as in the case of exercise, fever, heavy blood loss and certain illnesses. The pulse may also be slower in such cases as fainting, poisoning, brain injury and certain heart conditions that produce a slow pulse.

Children normally have a faster pulse than adults. Certain athletes who are very fit will often produce a much slower pulse rate than most adults in their age group.

When feeling for a pulse it is important to check and record the following aspects:

- the rate – how many times a minute the beat can be felt
- the strength – is it bounding and full demonstrating a strong pulse or is it perhaps weak and thready, almost difficult to feel
- the rhythm – is the pulse beat regular or irregular.

Respiration

Respiration is the process whereby oxygen and carbon dioxide are exchanged in the lungs and is visibly seen through the process of breathing. During the process of breathing air in and out of our bodies, oxygen is taken into the lungs and then pumped by the heart to other vital organs and the tissues of the body. Carbon dioxide, a waste product, is breathed out. The air we breathe contains a variety of gasses but nitrogen (78%) and oxygen (21%) are the 2 main gases. Each time we breathe in only a small amount of the oxygen is used by the body, the rest (16%) is breathed out. It is this exhaled oxygen that is so useful when required to resuscitate a casualty by using the method of mouth-to-mouth.

The normal breathing rate of an adult at rest is 12 – 16 times per minute. Children normally breathe much faster, approximately 20 – 30 times per minute. The respiration rate can increase if involved in exercise or in response to injury or illness.

Respirations are measured and recognised by the rise and fall of the chest wall. Each rise and fall is measured as one breath or respiration. It is also possible to listen to breathing if the environment is either quiet enough to detect breathing or if the breathing is noisy. Again each inhalation and exhalation is measured as one breath or respiration.

Respirations are normally recorded as:

- the rate – how many breaths take place in a minute
- the depth – the strength of the respiration.
- the ease – easy, difficult or painful
- the noise – noisy or quiet – if noisy what type of noise?

Both pulse and respiration rates should be accurately recorded and any anomalies duly noted.