



FIRSTAIDPRO

FIRST AID COURSES



Learner Guide

- | | |
|------------------|---|
| HLTAID001 | Provide Cardiopulmonary Resuscitation |
| HLTAID003 | Provide first aid |
| HLTAID004 | Provide an emergency first aid response in an education and care setting |



000



FIRE • POLICE • AMBULANCE



112

Disclaimer:

Accredited Education & Training Pty Ltd and its authors have used reasonable endeavours to ensure the information contained herein was correct at the time of publishing. However, neither Accredited Education & Training Pty Ltd or its author(s) provides any warranty nor accepts any responsibility for the accuracy or completeness of the material. No reliance should be made by any user on the material contained herein.

The information contained in this manual is not intended as a substitute for professional medical advice, emergency treatment or formal first aid training. Do not use this information to diagnose or develop a treatment plan for a health problem without consulting a qualified health care provider. If you are in a life threatening or emergency situation, seek medical assistance immediately.

Accredited Education & Training Pty Ltd reserves the right at any times to make changes as it deems appropriate.

Copyright:

All information contained within this manual is copyrighted. No part of this manual may be reproduced without written permission of the Director(s) of Accredited Education & Training Pty Ltd.

Version:

January 2016



CONTENTS

General Information

Welcome / Assessments	Page 5
Refund Policy / Recognition of Prior Learning / Disclaimer / Copyright.....	Page 6

Provide Cardiopulmonary Resuscitation

What is CPR / Consent / The Wrongs Act	Page 7
Duty of Care / Codes of Practice	Page 8
Ministerial Order 706 / Record Keeping	Page 10
Legal and ethical Issues	Page 11
Basic Human Anatomy.....	Page 13
Child psychological and anatomical / physiological considerations	Page 17
Infection Control.....	Page 21
Barriers / Needle Stick Injuries	Page 22
First Aider Characteristics.....	Page 23
Safe Manual Handling / Basic First Aid Kit.....	Page 24
Caring for the Unconscious	Page 25
Recovery Position	Page 26
Cardiac anatomy / physiology	Page 28
The Chain of Survival.....	Page 31
Basic Life Support Chart (CPR).....	Page 33
Basic Life Support (CPR)	Page 34
Defibrillation (AED)	Page 38
Post Incident Debriefing.....	Page 43

Provide Basic Emergency Life Support

Choking – Adult & Child.....	Page 45
Shock	Page 47
Bleeding	Page 48
Asthma	Page 53
Cardiac Problems.....	Page 54
Angina	Page 55
Anaphylaxis	Page 56

Provide First Aid

Provide an emergency first aid response in an education and care setting

Human Brain	Page 63
Alcohol and illicit drugs	Page 66
Projectile Objects	Page 68
Demonstrating appropriate treatment of a casualty	Page 69
Chemical exposure (Oleoresin Spray) Capsicum Spray	Page 70
Positional Asphyxia	Page 71
Fainting	Page 72
Stroke	Page 73
Seizures	Page 75
Diabetes	Page 77
Head Injuries	Page 79
Spinal Injuries	Page 80
Crush Injuries	Page 82
Abdominal Injuries	Page 83
Poisoning	Page 84
Body Temperature.....	Page 86
Heat Exposure	Page 87
Cold Exposure	Page 89
Respiratory Distress	Page 90
Drowning	Page 90
The Musculoskeletal System	Page 91
Fractures.....	Page 92
Sprains & Strains	Page 95
Dislocations.....	Page 97
Bites & Stings	Page 98
Pressure-immobilisation technique	Page 102
Skin.....	Page 103
Lymphatic System	Page 104
Burns	Page 105
Wound Management.....	Page 108
References.....	Page 110



Welcome to FIRSTAIDPRO

This workbook has been designed to assist you in developing your knowledge and skills that are required to provide Emergency Life Support to a casualty in the event of an emergency.

Our trainers will ensure that your course is interesting, and relevant to the needs of your workplace, or your situation. All our trainers are fully qualified and experienced health care professionals, who have recent work experience within the health industry. Our trainers all hold Certificate IV in Training & Assessment, along with other qualifications relevant to the provision of First Aid.

Assessments

To achieve competency in this qualification, you are required to undertake a formal assessment that will look at your knowledge and skills. Your assessment will include

- Short written test to validate your knowledge
- Observation of first aid skills to validate your skills

All assessments will take place within the class times, and will follow the principles of assessment (fair, valid, reliable and flexible). At the end of your assessment/s you will be classified as Competent or Not Yet Competent.

Competent

All students who are found competent will receive a Certificate / Statement of Attainment.

Not Yet Competent

Achieving a Not Yet Competent result is not the end of your journey. Everyone learns at a different rate, and occasionally additional studies are required before achieving competency. All students who are found Not Yet Competent will be given one other opportunity to be assessed (at a time mutually agreed with your trainer). Your trainer will advise you of further study or practice required prior to your second assessment.

Recognition for Prior Learning:

We will recognise previous learning relevant to the course. Talk with your trainer for more detail.

Qualifications / Assessment Procedures:

Students completing all assessment requirements will receive an accredited certificate pertaining to the course attended. All students receive a Statement of Attainment unless completing a general information session, then a Statement of Attendance will be issued.

It is recommended that CPR is updated annually.

Assessment during training may include oral responses to questions, written response to questions, roll plays, multiple choice test paper, and external written test paper. Students will be given an opportunity for at least one reassessment for any competencies not achieved on the first attempt.

Allergies / Health Problems:

Please notify the trainer if you have an allergy or reaction to Latex, Rubber or Plastic or if you have any back or knee problems or any other health issues which may affect your participation in this course.

FIRST AID

CPR courses should be updated every 12 months

All First Aid courses should be updated at least every 3 years

**ANY ATTEMPT AT RESUSCITATION IS
BETTER THAN NO ATTEMPT**

PROVIDE CPR



Cardiopulmonary Resuscitation (CPR) is an emergency procedure that is used on casualties who are unconscious and not breathing. CPR involves chest compressions (pressing down on the chest) and artificial respiration (rescue breathing / mouth to mouth). It has the power to restore blood flow and oxygen to someone suffering cardiac arrest, keeping them alive until an ambulance arrives. CPR skills should be refreshed at least once a year.

Remember - Any attempt at resuscitation is better than no attempt!

Consent

Prior to assisting any casualty, a First Aider must ask for and receive permission from the casualty before giving first aid. This can be a simple verbal ok from the casualty, or even just a nod of the head. First Aiders must remember that people have the right to refuse assistance. If the casualty is unconscious, then consent is implied. This means that the law assumes that the person would want their life to be saved at this point.

When the casualty is a minor, you should ask their parent or guardian. When their parent or guardian is not available, consent is likewise implied if unconscious

The Wrongs Act (1958) (VIC)

Section 31B of the Wrongs Act (1958) states:

- 1) A Good Samaritan is an individual who provides assistance, advice or care to another person in relation to an emergency or accident in circumstances in which-
 - (a) he or she expects no money or other financial reward for providing the assistance, advice or care; and
 - (b) as a result of the emergency or accident the person to whom, or in relation to whom, the assistance, advice or care is provided is at risk of death or injury, is injured, is apparently at risk of death or injury, or is apparently injured.
- 2) A Good Samaritan is not liable in any civil proceeding for anything done, or not done, by him or her in good faith-
 - (a) in providing assistance, advice or care at the scene of the emergency or accident; or
 - (b) in providing advice by telephone or by another means of communication to a person at the scene of the emergency or accident
- 3) Sub-section (2) applies even if the emergency or accident was caused by an act or omission of the Good Samaritan.
- 4) Sub-section (2) does not apply to any act or omission of a Good Samaritan that occurs before the assistance, advice or care is provided by the Good Samaritan.

Worried? Remember: No Good Samaritan or volunteer in Australia has ever been successfully sued for consequences of rendering assistance to a person in need!

The Civil Liability Act (2002) (NSW)

Part 8 (Section 57) of the Civil Liability Act (2002) states:

56) Who is a good Samaritan

For the purposes of this Part, a "good Samaritan" is a person who, in good faith and without expectation of payment or other reward, comes to the assistance of a person who is apparently injured or at risk of being injured.

57) Protection of good Samaritans

- (1) A good Samaritan does not incur any personal civil liability in respect of any act or omission done or made by the good Samaritan in an emergency when assisting a person who is apparently injured or at risk of being injured.
- (2) This section does not affect the vicarious liability of any other person for the acts or omissions of the good Samaritan.

58) Exclusion from protection

- (1) The protection from personal liability conferred by this Part does not apply if it is the good Samaritan's intentional or negligent act or omission that caused the injury or risk of injury in respect of which the good Samaritan first comes to the assistance of the person.
- (2) The protection from personal liability conferred by this Part in respect of an act or omission does not apply if:
 - a. the ability of the good Samaritan to exercise reasonable care and skill was significantly impaired by reason of the good Samaritan being under the influence of alcohol or a drug voluntarily consumed (whether or not it was consumed for medication), and
 - b. the good Samaritan failed to exercise reasonable care and skill in connection with the act or omission.
- (3) This Part does not confer protection from personal liability on a person in respect of any act or omission done or made while the person is impersonating a health care or emergency services worker or a police officer or is otherwise falsely representing that the person has skills or expertise in connection with the rendering of emergency assistance.

Legislation Summary:

extracted from The Australian Journal of Emergency Management, Vol. 18 No 4. November 2003

Queensland - The Queensland legislation, originally enacted as the Voluntary Aid in Emergency Act 1973 and subsequently as the Law Reform (Miscellaneous Provisions) Act 1995 is the oldest but its operation is limited to doctors and nurses. For the protection to apply a doctor or nurse must be rendering assistance at or near the scene of the emergency or providing assistance whilst a person is being transported from the scene of the emergency to hospital or other 'adequate medical care'. They must act in good faith and without gross negligence and without 'fee or reward' or an expectation of receiving a 'fee or reward'. (Eburn 2000, 66).

New South Wales - The Civil Liability Act 2002 (NSW) provides that a Good Samaritan can incur no personal civil liability in respect, of their acts or omissions (s 57), if certain requirements are met. The relevant conditions that must be met before the Act will apply there must be 'an emergency'; the Good Samaritan must be 'assisting a person who is apparently injured or at risk of being injured' (s 57); and the Good Samaritan must be acting in good faith and without expectation of payment or other reward (s 56).

The protection afforded by the Act will not apply if the Good Samaritan causes the injury in the first place, so the driver of the motor vehicle that runs over a pedestrian cannot rely on the section for protection when they provide first aid to the person they have injured; nor can a Good Samaritan rely on the section if they are intoxicated or if they fraudulently impersonate a professional rescuer (s 58).

South Australia - The Wrongs Act 1936 (SA) protects any person who 'in good faith and without recklessness' comes to the aid of another who is in need or apparently in need of emergency assistance (s 38(2)). Emergency assistance is by definition, limited to medical assistance or other assistance to protect life and safety, not property (s 38(1)). The Act also protects a medically qualified person who, without expectation of payment, gives advice via telephone or other telecommunications device about the emergency treatment of a person (s 38(3)).

Victoria - The Wrongs Act 1958 (Vic) is similar to the legislation in South Australia. Some key differences are that the 'advice' provision can be relied upon by any person, not just a 'medically qualified person' as in South Australia (s 31B(2)). The 'Good Samaritan' needs to act in good faith, but unlike South Australia, there is no requirement that the action be 'without recklessness'(s 31B(2)). Unlike New South Wales, the 'Good Samaritan' can rely on the legislation even if they created the emergency or accident in the first place (s 31B(3)).

Duty of Care

Duty of care is a legal obligation requiring a person to act in a certain way. All First Aiders have a duty of care towards casualties to exercise reasonable care and skill in providing first aid treatment. This is because you will have the knowledge and skills required to manage an emergency situation.

If you choose to provide first aid assistance (which is voluntary under common law when this role does not form part of your employment / position requirements), you have a duty to use your knowledge and skills in a responsible way.

Under common law, First Aiders are not legally required to assist every casualty they may come across – assistance is voluntary. If the First Aider has agreed to take on a role through either employment or a community service, such as being employed as a first aid officer, then that person does have a duty of care to assist others in the context of their employment if necessary.

Although assistance is voluntary for First Aiders in the public, it is important to note that once a person chooses to and begins to assist a casualty; they take on a duty of care to continue assisting the casualty until they are stable. Situations that allow cessation of assistance include:

- The scene becomes unsafe for you or the casualty
- Another trained first aider arrives and takes over
- Qualified help arrives and takes over
- The casualty shows signs of recovery
- You become physically unable to continue

You need to be aware that Duty of Care requirements do differ across Australia, so you should check your legal obligations when moving or working interstate.

Codes of Practice

Codes of practice state ways to manage exposure to risks. These were known as Advisory Standards until November 2004.

If a code of practice exists for a risk at your workplace, you must:

- Do what the code says; or
- Adopt another way that identifies and manages exposure to the risk; and
- Take reasonable precautions and exercise due care.

Ministerial Order 706 (effective from 22 April 2014)

On 14 July 2008, the Children's Services and Education Legislation Amendment (Anaphylaxis Management) Act 2008 came into effect amending the Children's Services Act 1996 and the Education and Training Reform Act 2006 requiring that all licensed children's services and schools have an anaphylaxis management policy in place.

All schools must review and update their existing policy and practices in managing students at risk of anaphylaxis to ensure they meet the legislative and policy requirements outlined below.

Any school that has enrolled a student or students at risk of anaphylaxis must by law have a School Anaphylaxis Management Policy in place that includes the following:

- a statement that the school will comply with Ministerial Order 706 and associated guidelines
- an Individual Anaphylaxis Management Plan (that includes an individual ASCIA Action Plan for Anaphylaxis) for each affected student, developed in consultation with the student's parents/carers and medical practitioner
- information and guidance in relation to the school's management of anaphylaxis, including:
 - prevention strategies to be used by the school to minimise the risk of an anaphylactic reaction for in-school and out-of-school settings
 - school management and emergency response procedures that can be followed when responding to an anaphylactic reaction
 - the purchase of spare or 'backup' adrenaline auto-injection devices(s) as part of the school first aid kit(s), for general use
 - development of a Communication Plan to raise staff, student and school community awareness about severe allergies and the School's Anaphylaxis Management Policy
 - regular training and updates for school staff in recognising and responding appropriately to an anaphylactic reaction, including competently administering an EpiPen and
 - completion of an Annual Anaphylaxis Risk Management Checklist.

Record Keeping

After providing first aid to a casualty, it is always a very good idea to make detailed notes or fill out a casualty report, no matter how minor. This will help you to recall the incident if you are ever asked about it at a later stage. If you complete this very soon after the event, your records could be used by a court of law. This means it is imperative that your notes are legible, accurate, factual, complete, and only state what you observe – not your opinions.

Information that should be included in your report includes:

- Date, time and location of the incident
- The casualties personal details (name, address, date of birth, etc)
- History of the illness/injury
- Observations (signs, symptoms and vital signs)
- Your assessment of the injury/illness
- Date
- Your Signature
- Your name and title



You should also

- Always complete the report in ink (never use pencil)
- Correct all mistakes by crossing them out and placing an initial next to them (never use correction fluid)
- Keep a copy of the report for your own records

If you are employed as a First Aider in your workplace, you may have reporting obligations under your State or Territory Workplace Health and Safety (WHS) legislation. You can check this with your workplace WHS representative.

Legal and Ethical Issues

THE FOLLOWING DOES NOT CONSTITUTE LEGAL ADVICE. INDEPENDANT LEGAL ADVICE SHOULD BE SOUGHT BY INDIVIDUALS AND / OR ORGANISATIONS IF REQUIRED IN THEIR OWN JURISDICTION.

FAMILY ATTENDANCE DURING CPR

It is not necessary to remove family members during resuscitation. All studies to date on both adults and children have demonstrated no detrimental emotional or psychological impacts, with most studies actually finding that being present during resuscitation was associated with improved measures of coping and positive emotional outcomes.

STANDARD OF CARE

Lay persons or volunteers acting as "Good Samaritans" are under no legal obligation to assist a fellow person. However, the ARC encourages the provision of assistance to any person in need. Should a lay person choose to assist, a standard of care is expected appropriate to their training (or lack thereof). Generally speaking, this standard is low. All Australian States and Territories have enacted Statutes which provide some measure of protection for the Good Samaritan / volunteer. They are required to act with "good faith" and without recklessness. The law differs from state to state: In New South Wales and Queensland the Good Samaritan / volunteer is required to act with reasonable care and skill – a standard which is in fact no different from the common law standard which pre-dated the legislation. In the Northern Territory, persons are required by Statute law to render assistance to any other in need.

The standard of care required of a person who has a duty of care to respond, is higher. All must, like any other persons in our community who hold themselves out to have a skill, perform their tasks to a standard expected of a reasonably competent person with their training and experience. This does not mean a standard of care of the highest level. For example, medical practitioners and other allied health workers such as nurses and paramedics are expected to meet a standard of care appropriate to their relevant fields of work.

REFUSAL OF TREATMENT

Competent adults are legally entitled to refuse any treatment even if life-sustaining or their decisions are not for their own benefit. Substitute decision-makers, such as parents or guardians of minors, can likewise refuse treatment but only if in the "best interests" of their charge.

Several States/Territories have legislature which gives statutory force to the common law principle that competent persons may refuse treatment. A refusal of treatment certificate (or similar) is required to be completed by the person when competent (an advance directive) or by the legal agent or guardian (e.g. enduring power of attorney) of an incompetent person in conjunction with a medical practitioner. In health institutions/facilities, refusal of treatment orders, such as DNAR (Do-not-attempt-resuscitation) or NFR (not for resuscitation) should be documented in case notes and signed. Such decisions should be recorded on appropriate certification in jurisdictions where they exist. It has long been settled law that parents or guardians of minors, in conjunction with doctors, may make legal and ethical decisions on withholding and withdrawing life-sustaining treatment.



COMMUNICATION WITH CASUALTIES AND BYSTANDERS

Providing first aid can be a very stressful and daunting experience – both for the casualty and first aider as well as bystanders. The manner in which a first aider communicates with a casualty and bystanders is often at the bottom of their priority list, especially when confronted with a potentially serious situation. It is important to always communicate in a respectful and sensitive manner. This is not to say that it isn't necessary to sometimes be assertive, especially if the situation is critical; however this should be done in a respectful and considerate manner. Doing so can often assist to calm everyone down as well as to achieve cooperation from the casualty and bystanders.

It is also important to be culturally aware – for example, some cultures do not like men coming into physical contact with females who are not in their family, and may respond negatively if this is attempted. It may be possible to explain your intentions in a respectful manner. If not, alternatively it may be possible to talk a family member through the basic steps of first aid in order to achieve the same goal without compromising their cultural or religious beliefs.

FIRST AID ON CHILDREN

Where possible, consent of a parent or guardian should be sought prior to undertaking first aid on a minor. Substitute decision-makers, such as parents or guardians of minors, can refuse treatment but only if in the “best interests” of their charge.

If the casualty is unable to provide informed consent, and no responsible person is present the legal requirement to obtain parental / guardian consent is typically waved under emergency / life-threatening circumstances. Under the common law doctrine of **emergency**, a doctor or other healthcare professionals may treat a patient as long as they act reasonably and honestly believes on reasonable grounds that the treatment is necessary to prevent a serious threat to the casualty's life or health (Note: various Australian states have different definitions of emergency treatment and their own legislation allowing urgent treatment, hence professional advice should be sought).

In most professional settings involving the care of children, parental / caregiver consent is required on registration to allow appropriately trained workers or volunteers to respond in the event of an emergency situation, including provision of provide first aid if appropriate, or to contact an ambulance.

EDUCATION AND CARE SERVICES NATIONAL LAW (EXCERPTS)

Education and Care Services National Regulations 2011

Centre-based services - regulation 136(1)

The approved provider of a centre-based service must ensure that the following persons are in attendance at any place where children are being educated and cared for by the service, and immediately available in an emergency, at all times that children are being educated and cared for by the service:

- (a) at least one educator who holds a current approved first aid qualification
- (b) at least one educator who has undertaken current approved anaphylaxis management training
- (c) at least one educator who has undertaken current approved emergency asthma management training.

Services must have staff with current approved qualifications on duty at all times and immediately available in an emergency. One staff member may hold one or more of the qualifications.

Premises on school site - regulation 136(2)

If children are being educated and cared for at service premises on the site of a school, suitably qualified staff must be in attendance at the school site and immediately available in an emergency. Services must have staff with current approved qualifications on duty at all times and immediately available in an emergency. One staff member may hold one or more of the qualifications.

Family day care - regulation 136(3)

The approved provider of a family day care service must ensure that each family day care educator and family day care educator assistant engaged by or registered with the service:

- (a) holds a current approved first aid qualification; and
- (b) has undertaken current approved anaphylaxis management training; and
- (c) has undertaken current approved emergency asthma management training.

Each family day care services staff member, including educator assistants, must hold all three qualifications

Incidents, injury, trauma and illness

An approved service must have in place policies and procedures in the event that a child is injured, becomes ill, or suffers a trauma and should be followed. These must include the requirement that a parent be notified, as soon as possible and within 24 hours of an incident, injury, illness or trauma relating to their child (including the death of a child).

The National Regulations require that an incident, injury, trauma and illness record be kept and that the record be accurate and remain confidentially stored until the child is 25 years old. Information should be recorded as soon as possible, and within 24 hours after the incident, injury, trauma or illness. A sample 'Incident, injury, trauma and illness record' is included on page 161. This may be adapted for use by individual services, or providers may develop their own.

Serious incidents

The National Law requires the regulatory authority to be notified of any serious incident at an approved service. A serious incident means:

- the death of a child while attending a service, or following an incident while attending a service.
- any incident involving serious injury, trauma or illness of a child while being educated and cared for at an education and care service which a reasonable person would consider required urgent medical attention from a registered medical practitioner, or for which the child attended or ought reasonably to have attended a hospital. This might include, for example, whooping cough, a broken limb or an anaphylactic reaction.
- an incident at the service premises where the attendance of emergency services was sought, or should have been sought

First aid kits

A centre-based service must provide an appropriate number of suitable first aid kits that are easily recognisable and readily accessible to adults. The service must have policies and procedures about the administration of first aid to children being educated and cared for by the service.

A family day care educator must provide a suitable first aid kit at the residence or family day care venue that is easily recognisable and readily accessible to adults. First aid kits should also be taken when leaving the service premises for excursions, routine outings or emergency evacuations

When determining how many first aid kits are 'appropriate', the service should consider the number of children in attendance as well as the proximity of rooms to each other and the distances from outdoor spaces to the nearest first aid kit. For example, larger services may require a kit in each room or outside space, whereas a kit between two rooms might be appropriate in a smaller service with adjoining rooms.

Medical conditions

An approved service must have a policy for managing medical conditions which sets out practices in relation to the following:

- the management of medical conditions
- if a child enrolled has a specific health care need, allergy or relevant medical condition, procedures requiring parents to provide a medical management plan
- requiring the development of a risk minimisation plan in consultation with the child's parents
- requiring the development of a communications plan for staff members and parents.

Staff members and volunteers must be informed about the practices to be followed. If a child enrolled at the service has a specific health care need, allergy or other relevant medical condition, parents must be provided with a copy of the policy. Where a child has been diagnosed as at risk of anaphylaxis, a notice stating this must be displayed at the service

Administration of Medication

Medication (including prescription, over-the-counter and homeopathic medications) must not be administered to a child at a service without authorisation by a parent or person with the authority to consent to administration of medical attention to the child. In the case of an emergency, it is acceptable to obtain verbal consent from a parent, or a registered medical practitioner or medical emergency services if the child's parent cannot be contacted. In the case of an anaphylaxis or asthma emergency, medication may be administered to a child without authorisation. In this circumstance, the child's parent and emergency services must be contacted as soon as possible. The medication must be administered:

- from its original container before the expiry or use-by date
- in accordance with any instructions attached to the medication or provided by a registered medical practitioner
- for prescribed medications, from a container that bears the original label with the name of the child to whom it is prescribed
- with a second person checking the dosage of the medication and witnessing its administration
- details of the administration must be recorded in the medication record.

In the case of a family day care service, or a service that is permitted to have only one educator, a second person is not required to check the dosage and witness the administration of the medication. The National Regulations set out requirements for confidentiality and the storage of medication records.

A child over preschool age may self-administer medication under the following circumstances:

- written authorisation is provided by a person with the authority to consent to the administration of medication
- the medical conditions policy of the service includes practices for self-administration of medication.

BASIC HUMAN ANATOMY

The human body is made up of many different anatomical and physiological systems, each performing a vital role. Whilst each system has an important role within the human body, several are particularly useful for a first aider to have a basic knowledge of. This section will provide basic information regarding the human anatomy / physiology that is important



Skeletal System

The skeletal system is a system of 206 bones that provides structure to our bodies, and protects our internal organs from damage. Muscles, ligaments and tendons are closely linked with this system and all play vital roles in allowing movement and function of limbs and body parts.

A First Aider needs to be aware of the basic anatomy of the skeletal system, especially when dealing with possible fractures or dislocations

to be aware of when providing first aid treatment to a casualty.

Cardiovascular System

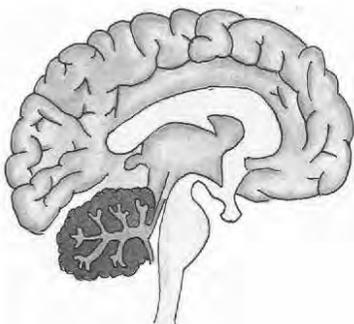
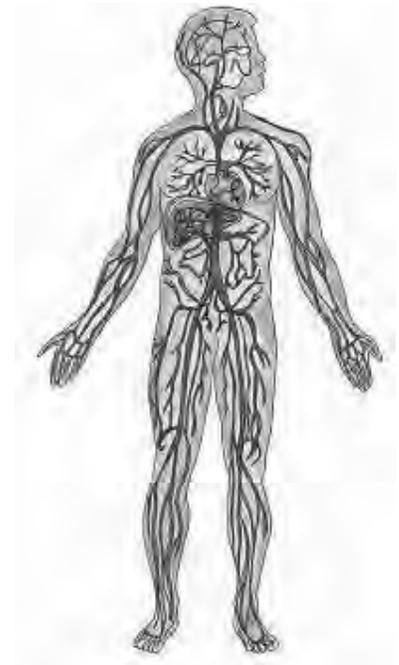
This system is made up of the heart, blood and blood vessels. Blood moving from the heart delivers oxygen and nutrients to every part of the body. The blood stream also removes waste products via transportation to the kidneys and other organs.

Heart – a muscular organ in the chest that pumps blood around our body. The average adult resting heart rate is between 60 – 100 beats per minute.

Blood – Most blood is composed of a clear liquid called plasma. Red blood cells make blood look red, and allow oxygen to be delivered around the body. White blood cells are part of your body's defence against disease. Platelets are cells that help your body repair itself after injury such as through coagulation.

Blood Vessels – Arteries transport blood away from the heart. Veins transport blood back to the heart. Arteries narrow into arterioles. Capillaries are the smallest vessels which connect the arterioles to the venuoles. It is at this level that the majority of transfusion with cells takes place.

A basic knowledge of this system will help in understanding the mechanics of CPR and DRSABCD



Nervous System

The nervous system is made up of your brain, spinal cord and a huge network of nerves that thread throughout our entire body.

The nerves receive and conduct information to the brain for processing to enable coordination of all of our actions and reactions – from applying correct pressure when gripping a cup, to retracting your hand from a sharp or hot object

A basic knowledge of this system is useful when dealing with burns and pain management.

Respiratory System

As all cells in our body need oxygen to survive, our respiratory system is vital to our survival. This system comprises of 2 parts:

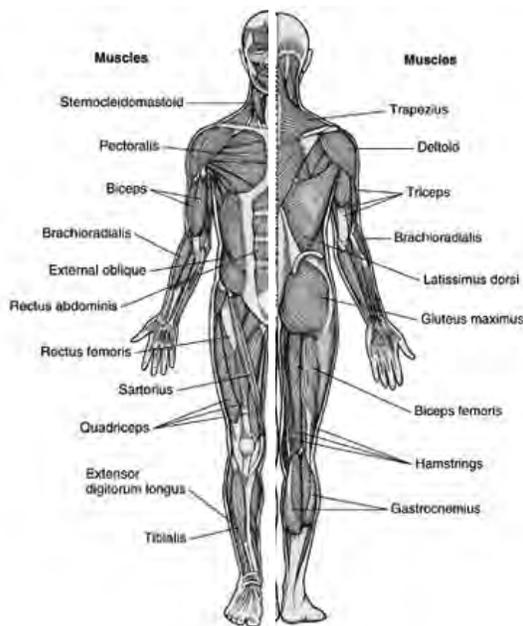
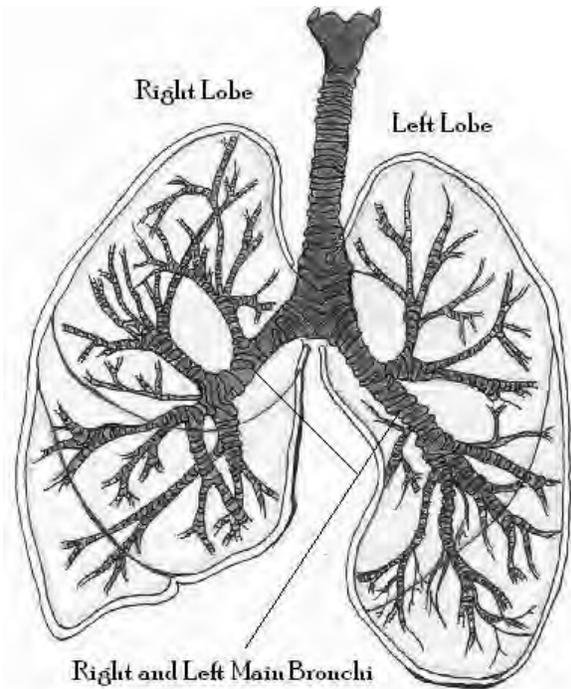
Airway - mouth, nose trachea, larynx, bronchi and bronchioles

Lungs – literally large bags of air which contain small air sacks that are called alveoli

As we breathe, diffusion of oxygen from the alveoli into the blood stream and carbon dioxide out of the blood stream takes place.

This process is essential to our survival – as little as 5 minutes without oxygen can cause permanent brain damage.

A basic understanding of this system is useful when learning about airway management and CPR



Musculoskeletal System

This system involves the bones, ligaments, tendons and muscles which support the body, protect the internal organs, and enable movement.

Muscles contract and relax to provide movement of your body. Most muscles are attached to bones (like your biceps – involved in arm movements), whilst some muscles are attached to large masses of tissues (like your diaphragm which makes your lungs expand and contract)

Muscles can be damaged through injury and can result in tears or strains requiring medical aid.

A First Aider needs to be aware of the mechanics of the musculoskeletal system when dealing with strains or sprains.

Other anatomical Systems:

- **The endocrine system** (organs and glands that secrete chemicals in the form of hormones to stimulate and activate the body's functions – such as your pancreas)
- **The digestive system** (oesophagus, stomach and intestines)
- **The urinary system** (Flushes waste products from your body)
- **The reproductive system** (linked to the body's endocrine system, through the female's ovaries and the male's testes)
- **The integumentary system** (skin, hair, fingernails and toenails)

CHILD PSYCHOLOGICAL AND ANATOMICAL / PHYSIOLOGICAL CONSIDERATIONS

Children are not just smaller adults; they differ anatomically, physiologically, psychologically and cognitively. The same type of trauma often results in different injuries due to their different size and stages of development. For example, children's bones are a lot more flexible due to their cartilaginous make-up which. Together with their smaller height this means that if hit by a car, children are more likely to suffer chest and abdominal injury, as opposed to fractures (such as of the long bones) which is the most common injury to adults in the same situation.



Child (Left) and Adult (Right) chest x-rays. Note the difference in rib position and shape

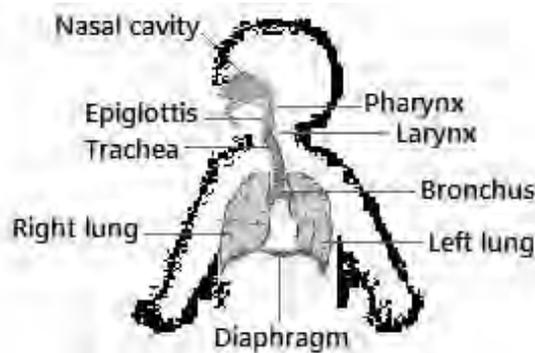
As can be seen above, children's ribs are more horizontally shaped than adults. This is significant to know for several reasons. Firstly, with inspiration, children's ribs move up rather than up and out like adults. This limits inspiration and creates a different breathing motion which childcare workers should take the time to recognise (in order to help be able to identify normal vs. abnormal breathing). Obviously the difference in a child's size alone should alert the first aider to the fact compressions during CPR should be much softer than that of an adult. A child's rib shape and relative flexibility further mean that less force is needed to compress a child's chest to the required 1/3rd chest depth. In infants especially, the diaphragm is essential for breathing hence pressure on the abdomen can limit the ability for an infant to breathe.

Physiologically there are also differences, specifically respiration and heart rate changes as children develop. This can impact on assessment and evaluation of normal vs. abnormal breathing or pulse assessment (for trained professionals). This is in part due to higher metabolic rates requiring greater oxygen requirements. The table below provides a range of normal values for children of various ages. While it is unreasonable to expect first aiders to remember each of these values, if you are involved in child-care take note of the normal values of children within the age group you care for:

Age of child	Respiration rate (per minute)	Heart rate (per minute)
3 months	30-50	100-170
6 months	30-50	100-170
1 year	30-40	110-160
1-2 years	25-35	100-150
2-5 years	25-30	95-140
5-12 years	20-25	80-120
12+ years	15-20	60-100

Airways & respiratory system:

Children have much smaller / narrower airways. This results in a greater likelihood of obstruction which is compounded by the childhood tendency of taking small items and finding a nice place for them in one's mouth. Loose deciduous teeth can also become dislodged into the airway as can small food items. In conditions such as asthma or anaphylaxis, it takes a lot less swelling to cause obstruction to a child's airways than an adult. The larynx also sits a lot higher in children, which makes visualisation of the airways more difficult.



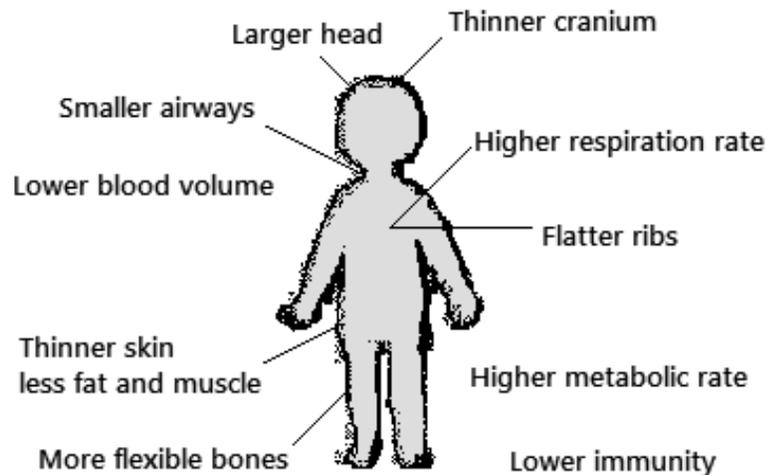
Impact on airway positioning

Children have proportionally larger tongues, which is critical to remember when positioning the head and neck to open the airway. The larger occiput of infants causes forward tilt of the head when lying supine, hence to achieve neutral position it may be necessary to raise the chin slightly, taking care not to hyperextend the neck.

Other various differences between adults and children:

- Infants aged 4-6 months are nose breathers, which means that respiratory distress can be caused by the nose being blocked. In the instance of difficulty breathing, or apparent respiratory distress, the nose should be checked for obstruction in children of this age group.
- In the event of a blunt force trauma to the abdomen, the smaller the child, the more likely multiple organs will be impacted
- Blood volumes in children are relatively larger (compared to the individual's weight) than in adults, however children have a much smaller blood volume. This means that it takes a much smaller loss of blood to constitute significant blood loss in children. As an example, 100ml of blood loss in a 5kg child equates to 10% of their total blood volume.
- Children have much thinner cranial bones, which equals much less protection to the brain. Additionally, children's heads are proportionally much larger than adult heads, which means they have a much higher centre of gravity and as such are more likely to suffer head trauma. As such it is vital to reduce any hazards which may result in head trauma and ensure children are protected when undertaking activities such as riding bikes or skating, especially on hard ground.
- The chest wall is more compliant (softer and more flexible) in children and hence they are less likely to suffer rib fractures than adults. This does however mean that force may be transmitted to underlying structures causing potentially significant internal injuries in the event of a blunt chest trauma
- The liver and spleen take up a greater proportion of a child's abdomen than adults; hence damage to these organs is more likely in children in the event of abdominal trauma. This is compounded by the fact that children have a much thinner abdominal wall (less fat and muscle) which means less protection

The illustration below demonstrates some of the differences to be aware of when learning first aid in a child care setting:



Psychological needs

As discussed in the post-incident debriefing section, children have unique psychological needs which a first-aider should be mindful of. Careful, age-appropriate explanations and a holistic approach to a situation are vital to alleviate anxiety, achieve compliance and to help reduce the potential of lasting psychological impact. This is difficult to achieve, particularly during an emergency situation where stress levels are high and even more so if the first aider has never been involved in such a situation before. The best advice to keep in mind is:

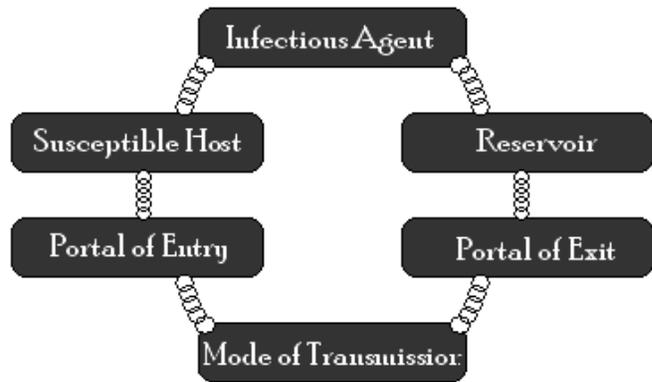
- **Prevention is key.** All workplaces should have a healthy respect for and emphasis on OHS / WHS. Over the years, educational campaigns have helped ensure that employers better appreciate the importance of prevention of injury and ensuring a safe and healthy environment for all, which is a basic human right. Safety however, is the responsibility of everyone. Make sure you are actively ensuring safe work practices and proactive monitoring your workplace for any situations / hazards which introduce risks to workers, volunteers or children. Where possible, involve the children with age-appropriate education on ensuring safety to themselves and their friends. This should extend to the home as well, and all parents should be educated on preventable injuries to children. Responding well to an emergency is little substitute for preventing it in the first place.
- **Be prepared.** Despite following best practice guidelines and even in the safest environments, emergency situations can still happen. Take first aid training seriously and undertake regular refresher courses. If employed or volunteering in an organisation involving the care of children, be aware of emergency protocols and seek clarification if there is any ambiguity or if there is anything you do not understand. It is Australian law that all organisations include orientation / induction for staff and volunteers which covers a detailed description of emergency policies which is a good starting point, however it is the employees responsibility to ensure that they actively ensure a current and accurate understanding of all emergency protocols

- **Stay calm.** Easier said than done, however this cannot be under-emphasised. Running around like a madman (or madwoman) may look impressive, but there is no substitute for a level head in an emergency situation. A first aider who is prepared, collected and calm is worth their weight in gold. This is inexorably linked to tip number 2, the more prepared and confident you are with your first aid abilities and knowledge, the more likely this knowledge will come to the fore during an emergency and help you potentially make a life-saving difference
- **Injuries happen to people.** It is commonplace in medical circles to describe people according to their clinical presentation or injury / illness. During a first aid situation, similar focus can be placed on the specific injury and remembering specific techniques, creating a potential for tunnel vision. Remember the importance of *calming* and *reassuring* the casualty and bystanders. When children are involved this is particularly vital. Children are psychologically and emotionally fragile and do not have the resources or experience that adults do to cope with various situations. Talk with your colleagues and share tips on how to reduce the potential emotional impact of emergencies on children either immediately involved or who are bystanders. Again, preparation is the key; make this part of the conversation when discussing emergency protocols.

Infection Control

Chain of Infection

Whether or not infection happens will depend on a number of things. This is best explained by looking at the chain of infection.



The Six links to the Chain of Infection

In order for infection to occur, the six links to the Chain of Infection must occur.

Infectious Agent: any disease causing micro-organism (pathogen) i.e. bacteria, virus.

Reservoir: Where the pathogen is located (i.e. blood, saliva)

Portal of Exit: The route of escape of the pathogen from the reservoir (i.e. saliva via coughing, blood via cut in skin)

Mode of Transmission: How the pathogen gets from the reservoir to its new host (i.e. propelled through air, direct contact)

Portal of Entry: The route in which the pathogen enters the new host (breaks in skin (cuts, wounds), inhalation, ingestion, sexual contact)

Susceptible Host: The organism that accepts the pathogen (you or the casualty)

How to break the Chain of Infection

Correct Hand Washing: Appropriate hand washing by the First Aider remains the most important factor in preventing the spread of micro-organisms. Good hand-washing techniques include



1
Start with warm or hot water



2
Use soap and make a lather



3
Rub & Scrub thoroughly for at least 20 seconds



4
Scrub palms, backs of hands, wrists, between fingers and under fingernails



5
Rinse well and use a disposable towel to turn off tap



6
Dry hands completely with a clean or disposable towel

Barriers

Use barrier equipment whenever possible (gloves, masks, face shields, eye protection, aprons and tongs). Barriers will dramatically decrease the chance of infection spreading, both to the casualty and to you!



Needle Stick Injuries

Needle stick injuries are an opportunity for a pathogen to penetrate directly into the blood stream of another person if not handled carefully. HIV (AIDS) and Hepatitis B are just a few of the possible blood borne viruses that can be communicated from one person to another. The risk of actual infection depends on a number of factors, including firstly what pathogens are on the needle stick, and also how long it has been outside of the body. Viruses such as HIV generally only survive outside the body for several minutes, but can survive hours if conditions are right. If injured by a used needle stick, one should always contact medical assistance so that testing and preventative measures can be done to decrease the risk of infection.

Ways to reduce the risk of needle stick injuries:



- It is generally recommended that workers who may come in contact with blood or body fluids should receive Hepatitis B vaccinations
- Follow all safety procedures in the workplace
- Latex or nitrile gloves will not protect you against needle stick injuries
- **Never** bend or snap used needles
- **Never** re-cap a needle
- Always place used needles into a clearly labelled and puncture-proof sharps approved container

If you do become contaminated by a sharp you should follow the following steps

- Penetration of skin - wash the blood / body fluid away with water
- Contamination of the eye – rinse with water or saline with the eye open
- Blood in mouth – spit out blood, and repeatedly wash with water
- Seek professional medical assistance from your doctor or hospital



First Aider Characteristics

As a First Aider, you could be dealing with difficult, life threatening situations. People around you may be screaming, moaning, or in a panic. A proficient First Aider will be:

Calm & Collected – As you approach an emergency – take a few deep breaths. This will help you slow down your racing heart, and encourage you to take a moment to collect your thoughts. By taking a few moments you will be able to absorb what is happening around you - what dangers are present, what injuries has the casualty sustained. By collecting your thoughts you will be able to logically approach the situation and remember your training. Concentrate on what you are doing, and try not to get distracted or flustered.

Reassuring – Many conditions can be exacerbated if a casualty becomes overly anxious and distressed. The casualty may be in shock, confused, or concerned. Talk to your casualty as a person, and reassure them that things are under control. If other people are present that are trying to help but are also finding the situation distressing, it helps to reassure them that you know what you are doing and the situation is in hand. This will encourage them to follow your instructions and help them to stay focused.

Assertive – There is a big difference between assertion and aggression. You need to be bold in your statements, and confident in your instructions. People will be relying on you to direct them. If you present yourself as someone who is confident in your own abilities, people will more readily take instructions from you. If you are the only First Aider on site, take control and provide assertive instructions to people with short explanations as to why those tasks are useful. If people understand what they are doing and know that you have things in control they will more readily assist you in what needs to be done to assist the casualty and keep everyone safe. If the casualty is anxious or going into shock, sometimes assertive instructions may be necessary to prevent them from moving or doing something that may exacerbate their condition.

Sensitive – It is important to be sensitive to a casualty's needs and the fact they are likely very stressed / anxious. It is likewise important to be culturally aware. There are many cultures with specific beliefs and attitudes which may cause people to respond negatively if a first aider forces themselves into a situation without considering the ramifications first. Good communication will often resolve any potential conflicts and enable a first aider to assist in a positive and helpful manner. Remember, you are much more likely to receive respect and cooperation from people if you are respectful to them!

Good communicator – You need to be clear in your instructions, as to not create confusion. A clear instruction meets 3 criteria:

- Observable – you must be able to see the person undertake your task
- Measurable – to what extent must the person do it
- Clear – easy to understand and specific

"I need you to call 000 for help, ask for an ambulance, and tell the operator the casualty is unconscious and breathing"

- This is observable, because you can see the person call 000
- This is measurable – because the person has been told what to say
- This is clear – as it is not ambiguous.

SAFE MANUAL HANDLING

Manual handling includes pulling, pushing, lifting, moving, carrying, restraining or holding any person or object.

Safe manual handling involves:

Assessing the situation

- Can you move the person yourself, or is help required
- How far will you have to move the person
- Is the pathway clear or cluttered
- Are there any manual handling aids available (sheets / lifting equipment etc)

Sizing up the load

- Test the weight by lifting the corners, or tilting the object
- Ask for help if it is too heavy
- Use counter weight to assist in movement
- Ensure that the weight is within your capacity to safely lift

Use good lifting techniques

- Use good body mechanics - maintain a straight back, bend your legs and use equipment when available
- Maintain a large base of support. (Stabilising using your feet)
- Don't move a casualty on your own.
- Lift only as a last resort (the best lift is NO lift - unless life threatening)
- Keep the object close to your body.

Refer to Recovery Position (page 27) for techniques for moving a casualty.

Basic First Aid Kit

A basic first aid kit should, as a minimum, include the following:

- Emergency Services telephone numbers and addresses.
- Name, telephone number and extension of nearest First Aider.
- Basic First Aid notes
- Adhesive dressings
- Sterile eye pads
- Sterile covering for serious wounds
- Triangular bandages
- Safety pins
- Small sterile un-medicated wound dressing
- Medium sterile un-medicated wound dressing
- Large sterile un-medicated wound dressing
- Adhesive tape rubber thread or crepe bandage
- Scissors
- Disposable gloves



The kit should be in a solid container, and should be green with a white cross on it. The kit should not be locked, as easy access will be required in the event of an emergency.

Caring for the Unconscious

A casualty who IS breathing, but NOT conscious.

Combinations of different causes may be present in an unconscious victim (see section on causes of unconsciousness). Before losing consciousness, a victim may experience yawning, dizziness, sweating, change from normal skin colour, blurred or changed vision, or nausea. Unconscious victims should be handled with care, to avoid unnecessary twisting or movement of the head or spine. That being stated, care of the airways takes precedence over any injury, including those which present a risk of spinal injury.

The Australian Resuscitation Council recommends using the following acronym when caring for the unconscious

D R S A B C D

DANGER



Checking for danger before approaching any situation is critical. By rushing into a situation without adequately assessing the situation you can put yourself and others at needless risk. Dangers will depend greatly on the situation; hence it is important to assess each individual scene for unique dangers. These can include fire, traffic, fumes, gas leaks, smoke or even broken glass or blood.

If danger is present you need to make a logical decision as to whether it is safe to continue or not. Sometimes dangers can be removed, or the casualty may be able to be moved away from the danger. However, some dangers may present a great risk to yourself and others, and sometimes the best thing you can do is call 000 / 112 and enlist professional assistance to deal with the situation.

RESPONSE



Once there is no immediate danger in assisting the casualty, you need to determine if they are conscious or not. Approach carefully and call out in a friendly tone – tapping their feet can also assist in obtaining a response.

If there is no response to this and it is safe to do so, implement TALK and TOUCH.

- TALK – Hello, can you hear me; tell me your name; squeeze my hand, both hands. Open your eyes, are you O.K?
- TOUCH - gently squeeze the casualty's shoulders and speak more loudly.

CALL FOR HELP, EMERGENCY NUMBER 000 / 112 (mobile phone)

SEND FOR HELP



Once you have determined the casualty is unconscious, you should next immediately send for help. Yell out for assistance! If there are any bystanders, instruct them to call 000. If you are alone and have access to a phone, call 000 and clearly explain the situation.

Remember, early access, early CPR, early defibrillation and early advanced care all maximise the chance of a casualty's survival. The earlier paramedics are notified and attend, the better the chance the casualty will survive.

AIRWAY



In an unconscious casualty, care of the airway takes precedence over any injury. Airways should be checked with the casualty in the supine position (on their back)

Open casualty's mouth and check for signs that the airway may be blocked. By using the '**Pistol Grip**' you can open the casualty's mouth without placing pressure on their neck. If the casualty has anything obstructing their airways, you will need to turn the casualty into the **Recovery Position** and use 2 fingers to scoop out any foreign objects, fluid or vomit.

If the airways appear clear, then you do not need to move the casualty at this point, you can proceed onto checking **Breathing**

BREATHING



LOOK - LISTEN - FEEL FOR BREATHING.

Get very close to the casualty, placing your ear just above their mouth. Can you feel breathing on your cheek? Can you hear breathing? By looking towards the casualty's feet and placing a hand on their abdomen you will also be able to check for chest movement. If the casualty is breathing, they should be turned into the Recovery Position.

If there is **NO SIGN OF BREATHING** or casualty is **NOT BREATHING EFFECTIVELY**, you will need to **proceed immediately onto CPR**.

If the casualty IS breathing effectively, then CPR is not necessary, do not proceed to compressions (see full DRS ABCD flowchart from page 33)

If the casualty is breathing, then place them in the recovery position (next page). Check for signs of good circulation. With the casualty in the recovery position, look at the inside of their lip – it should be pink. Check the colour of their skin. If they start turning blue – there may be a circulation problem and you should alert 000 / 112.

Next, check for internal and external bleeding.

Are there pools of blood? Is the casualty soaked in blood? You can also check for internal bleeding by placing your hand on the casualty's abdomen and feeling for any abdominal distension. If the abdomen or thighs looks swollen or feels hard, or if there are areas of deep purple discolouration then this may indicate internal bleeding. If the casualty has vomited or coughed up blood this may also indicate internal bleeding.

If internal bleeding is suspected (blood from ears, abdominal / thigh swelling) call 000 / 112 immediately. If bleeding from ear, put in recovery position with the bleeding ear downwards. If external bleeding is identified, apply pad and pressure bandage, then elevate the effected limb

Recovery Position

Once you have followed DRSABCD and established the casualty is breathing, you need to place them into the recovery position. This is extremely important as it is the best position for an unconscious, breathing casualty. **An unconscious casualty lying on their back can very easily choke on their own tongue or regurgitated vomit.**

Recovery Position for a Child (1-8) or Adult (8+)

- Follow DRSABCD, ensure the casualty is breathing effectively
- Raise the casualty's knee closest to you and bend it
- Place both of the casualty's arms pointing away from you (the closest arm will be across the casualty's chest)
- Place one hand under the raised knee, and the other arm behind the casualty's shoulders, and remember to support the neck as best as possible
- Gently turn the casualty onto their side facing away from you and bend up the raised knee further to the front of the casualty to ensure they don't roll onto their front
- Lift chin forward in open airway position and adjust hand under the cheek as necessary.
- Continue monitoring DRSABCD until an ambulance arrives – never leave an unconscious casualty unattended
- If injuries allow, turn the casualty to the other side after 30 minutes.

REMEMBER - WHEN MOVING THE PERSON ONTO THEIR SIDE MAKE SURE THEIR NECK AND BACK DO NOT MOVE.



Recovery Position for an infant (Under 1 year old)

- For a baby less than a year old, a modified Recovery Position must be adopted. Cradle the infant in your arms, with his head tilted downwards to prevent him from choking on his tongue or inhaling vomit. Monitor and record vital signs - level of response, pulse and breathing until medical help arrives.
- A 1-handed recovery position can be used by placing your fingers supporting the baby's neck and jaw. The baby should be facing towards the ground so that any vomit or regurgitation will not obstruct their airways. This position also leaves your other hand free to make phone calls (i.e. 000 / 112), open doors, do back blows for choking etc.
- If you need to walk around with the infant, be very careful not to trip as you can easily cause injury by dropping or falling onto the child.

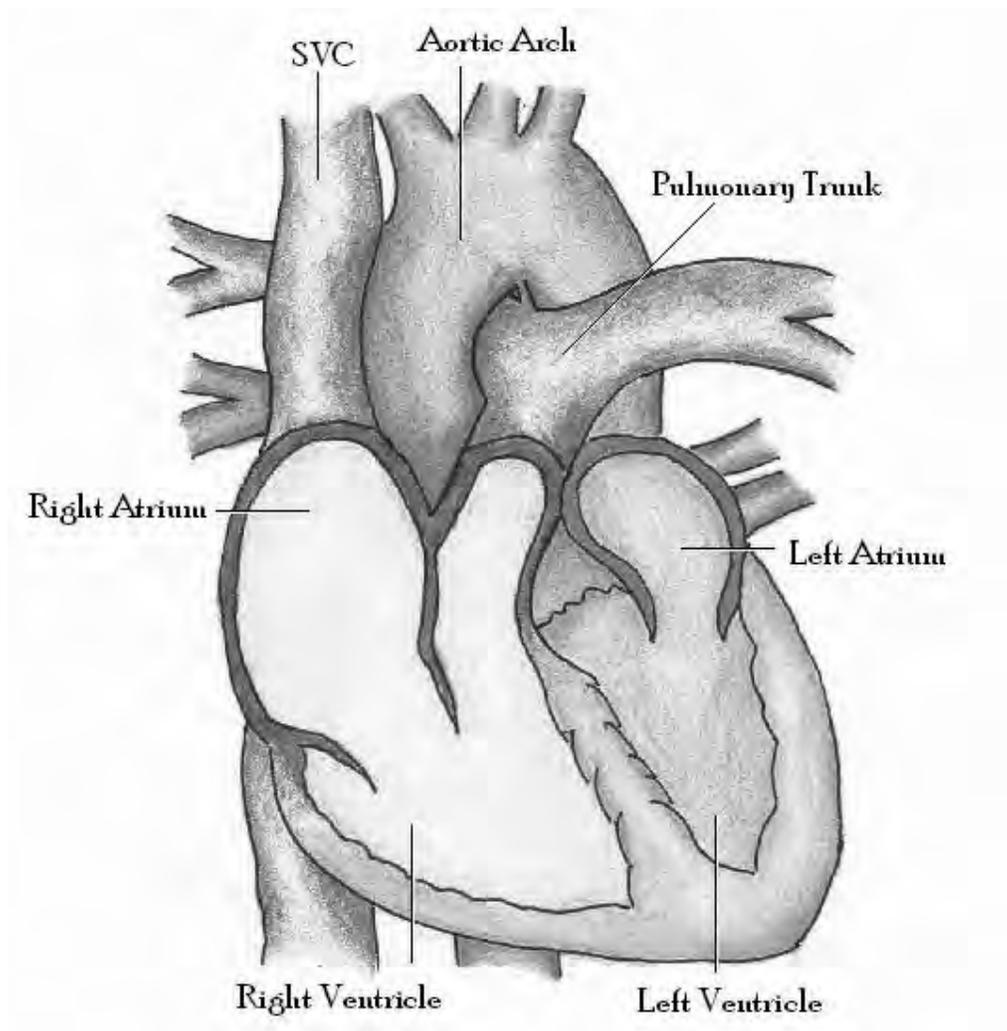


HEART

Your heart is a muscle that pumps blood to all parts of the body. The blood provides your body with the oxygen and nourishment it needs to function. Waste products carried by the blood are removed from the body by organs such as the kidneys.

When you are exercising, your heart will pump blood up to 4 times faster – that's 20 litres per minute compared to the average 5 litres per minute while at rest.

The right side of the heart obtains de-oxygenated blood via the main veins (Superior and Inferior Vena Cava) and pumps this blood to the lungs where oxygen is absorbed and carbon dioxide is released. The oxygenated blood returns to the heart via the pulmonary vein into the left atrium. The blood is pumped then into the left ventricle which pumps blood into the body's main artery – the aorta. The aorta is the body's largest artery and carries blood to smaller arteries which distribute it to all parts of the body. On the return trip, the now de-oxygenated blood carries blood back to the heart via veins into the right atrium and the cycle continues.



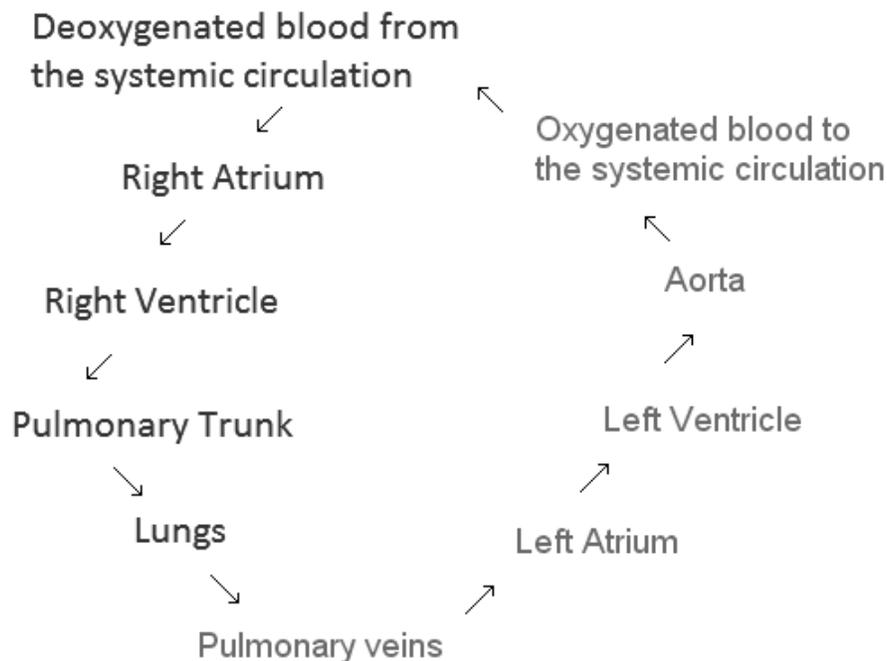
The heart is composed of four chambers as marked on the diagram:

- Left atrium
- Left ventricle
- Right atrium
- Right ventricle

Blood circulation around the body

The right and left sides of the heart pump blood through the pulmonary circulation (to the lungs) and the systemic circulation (to the rest of the body). The right side of the heart receives deoxygenated blood (blood that has little to no oxygen in it) from the body through the two large main veins, the superior vena cava (SVC) and the inferior vena cava (IVC). This blood circulates into the right atrium, to the right ventricle, and then to the lungs via the pulmonary trunk so the blood can take up oxygen.

The blood absorbs oxygen from the pulmonary circulation in the lungs and returns the blood to the heart via the pulmonary veins. The now oxygenated blood enters the left atrium, and then passes through the left ventricle which pumps the blood into the aorta - the main artery in the body. From the aorta, the oxygenated blood circulates throughout the body, transporting the oxygen from the lungs, as well as nutrients, waste products and many other components of blood to and from cells to maintain homeostasis (maintaining the body's internal environment and the needs of the cells). By the time the blood has passed throughout the systemic circulation, the blood has lost most of its oxygen and returns via the veins to the right side of the heart where it continues again to the lungs. This information is summarised in the flowchart below.



The blue text describes when the blood has little to no oxygen, and the red is when there is lots of oxygen in the blood. It is important to understand that the heart along with the rest of the cardiovascular system is responsible for transporting oxygen and nutrients which keeps the cells in the body alive. In ventricular fibrillation, the heart muscles do not pump effectively, which means that blood is not being effectively transported throughout the body – in particular the brain. The brain is of significant importance in this context because cells in the brain can last only a few minutes without oxygen before they start to die. This means if successful CPR and defibrillation does not take part very soon after the casualty's heart no longer is functioning, the casualty may very well suffer permanent brain damage, or worse, may not survive. This is explained in more detail in the 'Chain of Survival' section a bit later.

Blood supply to the heart

It has been mentioned that cells in the body require oxygen and nutrients to properly function as well as to survive. The heart muscles themselves are no exception. Even though the heart pumps blood throughout the body, the muscles that pump the blood also need oxygen and nutrients to be able to properly function. The heart muscles are known as the myocardium (myo - muscles, cardium – heart). The circulation to the myocardium is termed the coronary circulation, and is composed of:

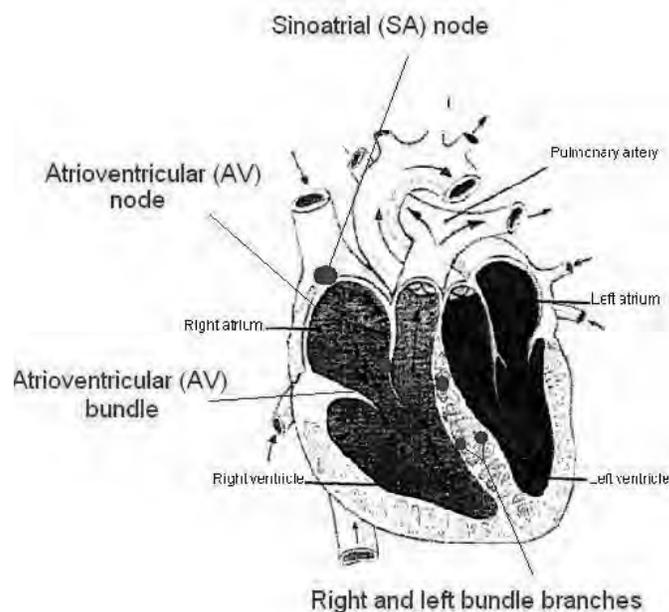
- Coronary arteries
 - Two main coronary arteries – the right and left coronary arteries, branch off the ascending aorta and enable oxygenated blood to supply the myocardium via a network of smaller arteries and capillaries
- Coronary veins
 - Once passed through the arterial circulation of the heart, the blood passes through several coronary veins and collects in a large vascular sinus called the coronary sinus which drains the blood back into the right atrium

In some circumstances, the blood supply to the heart can become compromised due to pathology. A build up of fatty plaque in the walls of the coronary arteries known as atherosclerosis can cause a decrease of blood supply to the heart and lead to cardiac problems such as angina or even a heart attack. An embolus (a piece of material such as a clot that breaks off from one part of the circulatory system and gets lodged in another part) can also cause a sudden blockage to an artery supplying the heart. When the circulation to the heart becomes compromised in these ways, the heart is unable to function as per normal and this can cause a variety of cardiac problems.

How does the heart pump?

Now that we have covered some basic anatomy of the heart, let's look at how the heart actually works.

Within the heart wall there are cells that act as a pacemaker to the heart, called autorhythmic cells. These cells set the beat of the heart, and in doing so generate an action potential of electronic impulses that they then transmit to nodes and bundles located at specific points in the heart. These impulses cause contraction of the heart muscles at different points causing the cardiac cycle. The main nodes and bundle locations are shown below:



The Chain of Survival



Cardiac arrest can happen at any-time, at any place. Over 75% of all cardiac arrests happen outside a hospital, and of that – only 5% will survive.

“Survival of cardiac arrest depends on a series of critical interventions. If one of these critical actions is neglected or delayed, survival is unlikely. The American Heart Association has used the term Chain of Survival to describe this sequence.” (*Emergency Cardiac Care Committee and Subcommittees. American Heart Association.*)

Early Access

When a person is unconscious and not breathing, they will need more than basic first aid. Early access means calling for an ambulance or medical assistance as soon as possible. By calling 000 / 112 you can tell the operator what sort of emergency you are reporting:

- Injury or sudden illness: **Ambulance Service** – call 000 (112 from a mobile)
- Fire or toxic environment: **Fire Service** – call 000 (112 from a mobile)
- Danger to other workers or the public: **Police** – call 000 (112 from a mobile)
- Gas leak: **Fire Service** – call 000 (112 from a mobile)
- Electrical hazards: **Fire Service** – call 000 (112 from a mobile)

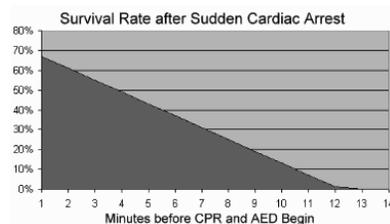
When calling for assistance you need to be clear on your information. Give specific details as to your location, the nature of the emergency, and follow all their instructions. When the area is difficult to find, allocate a person to meet with the emergency services personnel.

Early CPR

The 2 most vital anatomical systems in our body are the Cardiovascular System and the Respiratory System. If these systems fail for only a short time, then the body cannot function normally, and death can quickly result. Cardio-respiratory arrest (also known as cardiac arrest) is a condition that is caused by both the Cardiovascular and Respiratory Systems stopping abruptly. This is a life threatening condition!

Cardio-respiratory arrest can be triggered by:

- Obstruction in the airway
- Heart attack
- Injury to the chest walls or lungs
- Reduced oxygen in the atmosphere
- Disruption of a heart function
- Severe blood or plasma loss
- Head injury, poisons or drugs



Statistics show that our brain cells begin to die in as little as 3-4 minutes without oxygen. Brain cells do not regenerate, hence the longer CPR is delayed, the more chance the casualty may suffer permanent brain damage, and the less chance they will survive.

Early CPR within the first 3-4 minutes can help improve the chances of survival greatly.

Early Defibrillation



Automated External Defibrillators (AEDs) are portable computerised devices that provide an electrical charge to “jump-start” the heart. These portable devices have built in computers and sensors that will check for a heart rate once placed on the casualty’s chest and determine if defibrillation is required. Voice prompts are then given to the user to follow, to streamline the defibrillation process

Access to Early Defibrillation is the single most important step in this cycle. Every minute where early defibrillation is delayed reduces the person’s chances of survival by 10%. This is why it is so important to call 000 / 112 if a heart attack is suspected, as if the casualty is in ventricular fibrillation, a defibrillator is necessary to reverse this process and ‘reboot’ the heart back into its normal cycle.

Early Advanced Care

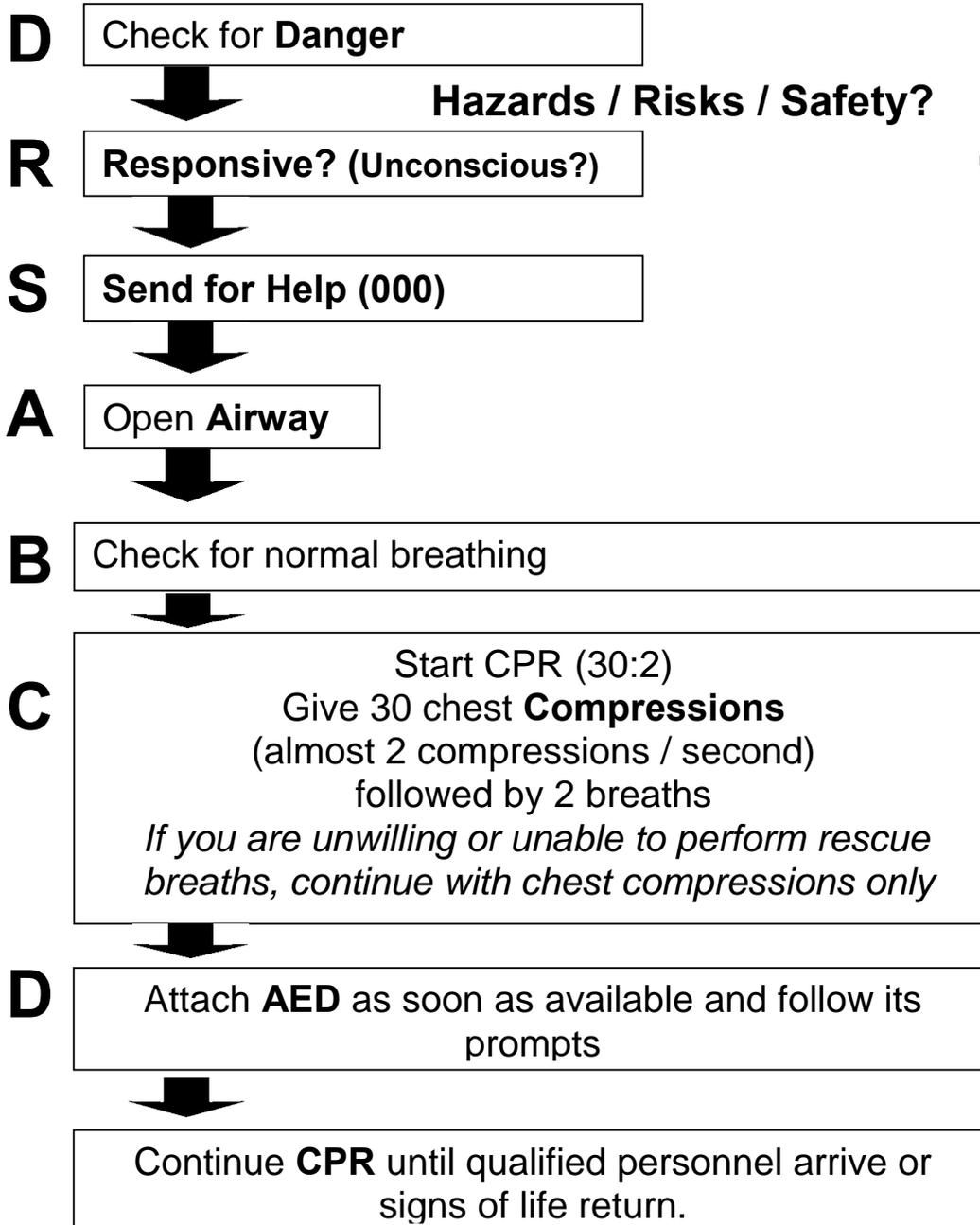
Early advanced care means the sooner a paramedic can attend, the greater the chance is that the casualty can be stabilised. As such, it is important that you call 000 as soon as possible. The sooner you contact emergency services, the sooner a paramedic will be on the scene, which dramatically increases the casualties’ chance of survival.



Basic Life Support Chart

Casualty who is NOT breathing and NOT conscious.

The Australian Resuscitation Council recommends using the following acronym when caring for the unconscious – **DRSABCD**



As you will see, this process is very similar to providing care to Caring for the unconscious. Infact, you will find that the some of the words are the same

- **Danger**
 - **Response**
 - **Send for Help**
 - **Airway**
- } — same for breathing and non-breathing casualties

Over the page you will see DRSABCD for unconscious, non-breathing casualties.

Basic Life Support (Full DRS ABCD)

D - Danger



This step is the same when both caring for a breathing or non-breathing casualty.

Checking for danger before approaching any situation is critical. By rushing into a situation without adequately assessing the situation you can put yourself and others at needless risk. Dangers will depend greatly on the situation; hence it is important to assess each individual scene for unique dangers. These can include fire, traffic, fumes, gas leaks, smoke or even broken glass or blood.

If danger is present you need to make a logical decision as to whether it is safe to continue or not. Sometimes dangers can be removed, or the casualty may be able to be moved away from the danger. However, some dangers may present a great risk to yourself and others, and sometimes the best thing you can do is call 000 / 112 and enlist professional assistance to deal with the situation.

R - Response



This step is the same when both caring for a breathing or non-breathing casualty.

Check conscious state, speak in a calm positive manner, identify yourself and ask if you can help. Always approach a casualty with caution, feet first. If there is no response and it is safe to do so, implement TALK and TOUCH.

- TALK - Tell me your name; squeeze my hand, both hands. Open your eyes, are you O.K.?
- TOUCH - gently squeeze the casualty's shoulders and speak more loudly.

CALL FOR HELP, EMERGENCY NUMBER 000 / 112 (mobile phone)

S - Send for Help



This step is the same when both caring for a breathing or non-breathing casualty.

Once you have determined the casualty is unconscious, you should next immediately send for help. Yell out for assistance! If there are any bystanders, instruct them to call **000 / 112**. If you are alone and have access to a phone, call **000 / 112** and clearly explain the situation.

Remember, early access, early CPR, early defibrillation and early advanced care all maximise the chance of a casualty's survival. The earlier paramedics are notified and attend, the better the chance the casualty will survive.

A - Airway



This step is the same when both caring for a breathing or non-breathing casualty.

Open casualty's mouth and check for signs that the airway may be blocked. By using the '**Pistol Grip**' you can lift the jaw forwards without putting pressure on the casualty's neck. If the casualty has anything obstructing their airways, you will need to turn the casualty into the **Recovery Position** and use 2 fingers to scoop out any foreign objects, fluid or vomit.

If the airways appear clear, then you do not need to move the casualty at this point, you can proceed onto checking **Breathing and Signs of Life**.

B - Breathing



This step is the same when both caring for a breathing or non-breathing casualty.

LOOK - LISTEN - FEEL FOR BREATHING.

Get very close to the casualty, placing your ear just above their mouth. Can you feel breathing on your cheek? Can you hear breathing? By looking towards the casualty's feet and placing a hand on their abdomen you will also be able to check for chest movement. If the casualty is breathing, they should be turned into the Recovery Position.

If there is **NO SIGN OF BREATHING** or casualty **is NOT BREATHING EFFECTIVELY**, you will need to proceed immediately onto CPR.

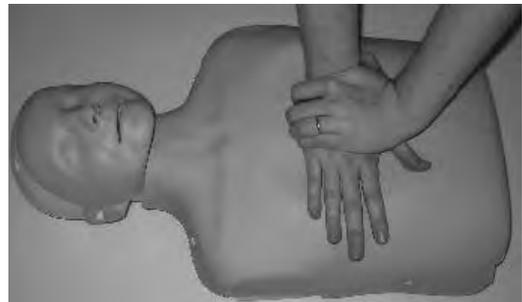
C - CPR

This step is only to be applied to a non-breathing casualty.

Compressions are the first part of CPR used in conjunction with rescue breathing to circulate the oxygen that has been exhaled into the casualty's mouth around the body.

Compressions are performed as follows

- Kneel beside the casualty (at the level of the casualty's shoulders)
- Locate lower third of casualty's sternum. You can do this by finding the xyphoid process and placing your hands just superior to it (towards the head)
- Position yourself vertically above the chest and lean over the casualty
- Place your interlocked hands (or 2 fingers for infants) on the casualty's chest
- Keeping your arms straight, and your wrists and elbows locked, press down vertically to about a third of the casualty's chest depth, then release pressure
- Give 30 compressions (about 100 per minute – a little less than 2 a second)
- Give 2 rescue breaths
- Repeat compression / breaths at 30:2 ratio until help arrives



Unconscious & Not Breathing – Compressions to Breaths		
Adult (over 8 years old)	Child (between 1 and 8 years old)	Infant (under 1 year old)
<ul style="list-style-type: none"> • 2 hands lower 1/3rd of the Sternum • 1/3 depth of chest (4-5cm) • 30 compressions for every 2 Breaths • Full Head Tilt • 2 Rescue Breaths • Approx 5 Cycles of 30:2 every 2mins (100 per minute) • Keep going until Medical aid arrives or Signs of Life 	<ul style="list-style-type: none"> • 2 hands lower 1/3rd of the Sternum • 1/3 depth of chest (2-3cm) • 30 compressions for every 2 (Small) Breaths • Half Head Tilt • 2 Small Rescue Breaths • Approx 5 Cycles of 30:2 every 2mins (100 per minute) • Keep going until Medical aid arrives or Signs of Life 	<ul style="list-style-type: none"> • 2 fingers lower 1/3rd of the Sternum • 1/3 chest depth (1-2 cm) • 30 compressions for every 2 puffs • No Head Tilt • 2 Puffs over nose/mouth • Approx 5 Cycles of 30:2 every 2mins (100 per minute) • Keep going until Medical aid arrives or Signs of Life

Our recommended method is to sing Twinkle Twinkle Little Star to assist in achieving the correct speed of compressions. You compress on every syllable, and when you sing the work SKY – you look up to the casualty's face and perform 2 rescue breaths

Twin . . .	. . .kle	Twin . . .	. . .kle	Lit . . .	. . .tle	Star	pause
Compress	Compress	Compress	Compress	Compress	Compress	Compress	Compress

How	I	Won . . .	. . .der	What	You	Are
Compress	Compress	Compress	Compress	Compress	Compress	Compress

Up	A . . .	. . .bove	the	World	So	High	Pause
Compress	Compress	Compress	Compress	Compress	Compress	Compress	Compress

Like	A	Dia . . .	. . .mond	In	The	sky	Pause
Compress	Compress	Compress	Compress	Compress	Compress	Compress	2 Breaths

Fractured ribs – This is a common consequence of CPR, however this is acceptable given that the alternative to CPR is likely death of the casualty.

First aider change-over – When possible, it is recommended that first aiders change every 2 minutes (5 cycles) to prevent fatigue and also to help ensure that the depth and speed of compressions is maintained. If this is performed, it is important to minimise interruptions to compressions

CPR – Rescue Breath methods

Perform 2 rescue breaths after 30 compressions using one of the following methods.

Mouth to Mask involves the first aider using a CPR mask for providing rescue breaths. The first aider exhales through a 1-way valve through the mask into the casualty's mouth. The valve prevents air from returning into the first aider's mouth and therefore prevents contact with potentially infectious fluids such as saliva, blood or vomit. Head tilt is still required to open up the casualty's airways and full head tilt for adults should be used if there is no suspected cervical injury.

Mouth to Mouth is the recommended form of rescue breathing when a mask is not available. The following steps should be taken to correctly provide mouth to mouth:

- Tilt the casualty's head back to open the airways
 - Adults – Full head tilt
 - Children (1-8) – Half head tilt
 - Infants – No head tilt required

- Block the casualty's nose using one hand
- Use the pistol grip to open up the casualty's mouth
- Make a firm seal of your mouth onto the casualty's mouth
- Blow firm enough to make the casualty's chest rise and fall

Mouth to Nose can be used if preferred by the first aider. For infants, an adaptation of mouth to mouth is for the first aider to cover the infant's mouth and nose with their own mouth instead of attempting to pinch the infant's nose. If providing mouth to nose on adults, the same method as mouth to mouth is used, except instead of blocking the nose, the first aider should ensure the casualty's mouth is closed when exhaling into the casualty's nose (this involves sealing the mouth by pushing the casualty's lips together with your thumb).

Blocked Airway - If the casualty's chest does not rise during rescue breathing, check that:

- The head is tilted back correctly
- There is no foreign material in the airway
- The seal of your mouth on the casualty's is firm
- The nose has been blocked
- Enough air is being blown in.

Vomiting and Regurgitation – It should be noted that about one in four casualties will regurgitate whilst having CPR performed on them, especially when drowning is the cause of unconsciousness. This is because when unconscious, the casualty's muscles are totally relaxed, including the valve that stops regurgitation above the stomach.

If the casualty does vomit or regurgitate during CPR, turn them into the recovery position and clear the airways using the 2 finger scoop method. If they are still not breathing once the obstruction is cleared from the airway, place them on their back again and re-commence CPR.

Although full CPR is recommended, in the event that you are unwilling or unable to perform rescue breaths, you should continue performing CPR using chest compressions only. Remember – any attempt is better than no attempt!

CPR – Considerations in children

DRSABCD is identical for children and adults. The main differences between child and adult CPR are as follows:

- Degree of head tilt
- Use of fingers (or 2 thumb technique) rather than hands in infants
- Whilst chest compression remains constant at 1/3rd of the chest depth, children clearly have a much smaller chest diameter than adults, and their ribs are much more compliant (elastic, flexible), which means significantly less force is required to maintain the 1/3rd chest depth required for CPR
- The emotional impact on children should be considered when they are either directly involved or witnesses of an emergency requiring CPR. Remember to reassure and calm the bystanders

Unconscious & Not Breathing – Compressions to Breaths	
Child (between 1 and 8 years old)	Infant (under 1 year old)
<ul style="list-style-type: none"> • Half Head Tilt • 2 Small Rescue Breaths • 2 hands lower 1/3rd of the Sternum • 1/3 depth of chest (2-3cm) • 30 compressions for every 2 (Small) Breaths • Approx 5 Cycles of 30:2 every 2mins (100 per minute) • Keep going until Medical aid arrives or Signs of Life 	<ul style="list-style-type: none"> • No Head Tilt • 2 Puffs over nose/mouth • 2 fingers lower 1/3rd of the Sternum • 1/3 chest depth (1-2 cm) • 30 compressions for every 2 puffs • Approx 5 Cycles of 30:2 every 2mins (100 per minute) • Keep going until Medical aid arrives or Signs of Life

D - Defibrillation

This step is only to be applied to an **unresponsive** and **non-breathing** casualty.

A defibrillator is a very useful and effective device and can play a great part in saving a person's life.

AED (Automated External Defibrillators) are portable devices that can be used effectively with minimal training, as all the current model units are designed not to function unless the unit cannot detect a normal heart beat.

AED use is not restricted to trained personnel – any first aider can use an AED. Time is a key factor when using an AED. For casualties suffering from VF (ventricular fibrillation), for every minute defibrillation is delayed, there is approximately a 10% reduction in survival rate.

AED units can accurately identify the casualty's cardiac rhythm as 'shockable' or 'non-shockable'.



What is an Automated External Defibrillator (AED)?

An AED is a portable, electronic device that enables users to successfully diagnose and treat casualties who are suffering from the potentially life threatening condition of ventricular fibrillation (loss of rhythmic heart contractions, resulting in an inability of the heart to effectively pump blood).

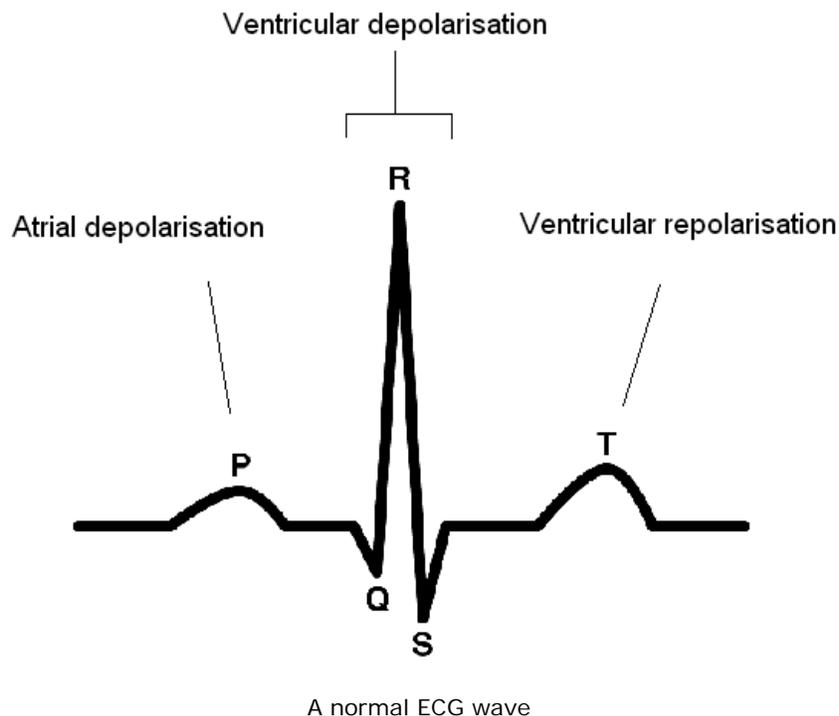


The device achieves this by being able to undertake several functions:

- Electrodes collect information about the heart's rhythm and a microprocessor interprets the data to diagnose ventricular fibrillation
- If the casualty does not need defibrillation, the unit will typically not allow a shock to be administered, or at the very least will alert the user that a shock is not needed – some have over ride functions for trained medical personnel
- Most AED units will advise the user how to undertake the defibrillation by the way of voice prompts, usually along with a visual prompt
- If defibrillation is needed, the unit will advise the user to proceed with a shock by usually pushing a button, or if the unit is fully automatic, it will proceed to emit a shock after advising everyone to stand back.
- After a shock is delivered, the AED will usually advise the user to commence or recommence CPR

Detecting electrical activity within the heart

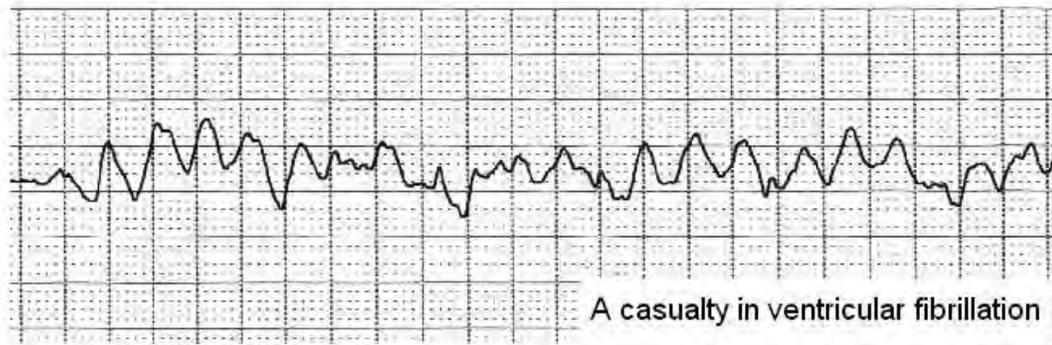
Normally, the action potential that generates muscle contractions begins in the sinoatrial (SA) node and then travels throughout the atrial muscles to contract the atria. The timing of the impulses are incredibly designed to allow just enough time for atrial contraction to finish before the action potential reaches the muscles of the ventricles for ventricular contraction. The SA node typically sets a heart rate of 90-100 beats per minute, and works in conjunction with autonomic and chemical regulation to maintain an adequate heart rate to meet the requirements of the body's cells. The impulses that conduct through the heart to contract the heart muscles generate a tiny current which can be picked up by detectors placed on the chest as part of either an electrocardiograph (ECG) unit or an AED unit. These impulses can be recorded and analysed to determine if the heart is working correctly – as any disruption to the normal rhythmic cycle of impulses can be picked up from the ECG wave.



Although quite simple in appearance, subtle variations in the ECG wave can be caused by a variety of pathologies and problems. Some examples are:

- An enlarged Q wave can indicate a myocardial infarction
- A larger P wave can indicate mitral stenosis
- The T wave can be flattened when the heart is receiving insufficient oxygen
- The length between the P and Q if lengthened can indicate scarring caused by coronary artery disease
- The Q-T interval can be lengthened when there are conduction abnormalities or if there is myocardial damage

Precise timing of impulses is required for the heart to function optimally. In ventricular fibrillation, the heart loses this rhythmic, well-timed series of impulses and the heart muscles go into a spasm. This muscular spasm of the myocardium means that the heart is no longer effectively pumping blood throughout the body which can rapidly result in death. The only way to stop this in the majority of cases is by defibrillation, such as with the use of an AED unit. Note the difference in the normal ECG wave above to that of a casualty who is in ventricular fibrillation as shown below:



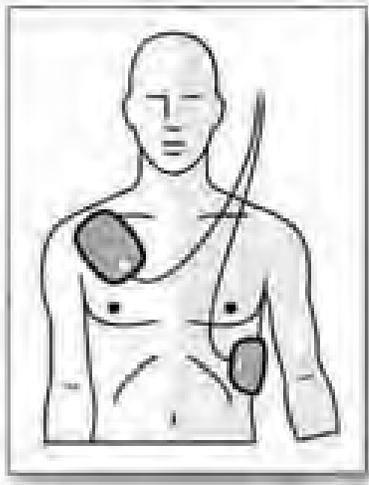
An AED unit incorporates a tiny microprocessor that can interpret this data to find that there is a loss of the normal pattern of electronic activity within the heart, and that the casualty requires defibrillation.

How to use an AED

Time is critical! For every minute defibrillation is delayed, the survival rate for victims in cardiac arrest due to VF is reduced by approximately 10%.

Once it is determined that the casualty is unconscious and not breathing after having a suspected heart attack, then after calling 000 the following steps should be taken to correctly use an AED as soon as one is available:

1. Defibrillation is to be used in conjunction with CPR on casualties who are unconscious and not breathing. The casualty is to be supine (laying on their back)
2. Turn on the AED and follow the voice or displayed commands
3. Move any clothing out of the way of the casualty's chest
4. If the casualty is wet or sweaty, remove any moisture with a dry towel before placing pads
5. Attach one pad to the casualty's upper right chest, and the other to the casualty's lower left chest – these positions will be labelled on the pads (see diagram)
 - a. Avoid placing pads over any implantable devices – pads should be placed at least 8cm from any such devices.
 - b. Do not place pads over medication patches – remove the patches before continuing as these can block the current and cause burns to the casualty



6. If not already attached, plug the wires from the pads into the unit (most units will already have this ready for use)
7. Move any bystanders out of the way – ensure no one is touching the casualty
8. Push the 'Go' or 'Analyse' button so the AED can take a reading
9. If the AED determines that a shock is needed, move everyone away from the casualty. Make sure you are not touching the casualty and press the 'Shock' button, and then let the AED reanalyse.
10. Follow the instructions of the AED – at this point you may be instructed to commence CPR (do not remove the pads), or the AED unit may otherwise instruct you that another shock is necessary.
11. Continue CPR and AED until the ambulance arrives. Disruption to CPR should be minimised as much as possible



AED for children

Standard adult AED pads are suitable for persons 8 years and older. For children between 1 and 8 years old, paediatric pads should be used when available. If these are not available, then standard adult AED pads can be used.

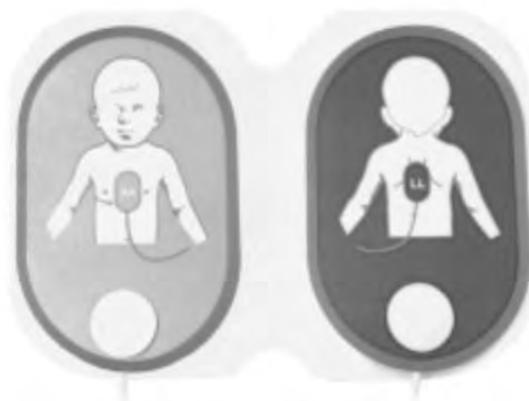
Pads placement is the same as for adult AED. If using adult pads on smaller children (i.e. 1-5), one pad may need to be placed in the centre of the chest, and the other on the postero-lateral chest (casualty's left side towards their back).

Make sure the pads do not touch each other. If the pads are too large for the child there is a risk of charge arcing. If the pads are too large then use an antero-posterior placement (first pad placed on the front of chest, slightly to the left of centre if possible; the second pad to be placed between the shoulder blades on the back of the child).

Adult placement vs. Child Placement

As noted above, child pad placement is the same as for adult AED. Although time is of the essence, it is important to stay calm and take care to look for and select paediatric pads where available, as well as selecting paediatric / child settings if available on the AED unit.

If using adult pads on smaller children (i.e. 1-5), one pad may need to be placed in the centre of the chest, and the other on the postero-lateral chest (see below):



AED - Additional Information:

- Remember, if the casualty does not require defibrillation, the unit will tell you, so if the casualty is unconscious and not breathing, do not be afraid to use the unit.
- There are many different models in the market, hence usage may differ slightly between them – some may have voice prompts, some may not. In all cases, follow the instructions of the unit – they are designed to be as user friendly as possible so non-medical personnel can successfully assist a casualty suffering a heart attack
- Remember, it only takes a few minutes for brain cells to die, hence if a heart attack is suspected call 000 immediately and do not delay CPR / AED usage
- An AED should **NOT** be used in situations where the casualty is breathing, or if the casualty is in a position of direct contact with another person such as a confined place, or if in direct contact with water or other liquids
- Avoid placing an AED over an implantable device or medication patch. If the victim has an implantable medical device, the defibrillator pad should be placed at least 8cm from the device.
- In any situation where CPR / AED usage has been required, the casualty should ALWAYS be taken to hospital for a full assessment. This means that even if the casualty recovers after AED usage, they still need to be properly assessed and managed by trained medical personnel. In most cases, the underlying cause of the ventricular fibrillation will need to be determined and assessed to ensure the casualty has a good long-term prognosis
- AEDs are not to be used on infants less than 1 year of age.
- If no AED is available, then CPR should be continued uninterrupted

Post Incident Debriefing

Once you have provided CPR to a casualty, and handed over responsibility to the paramedics, it is suggested that you undergo a debriefing. Talk through your actions with your manager, other first aiders, psychologists, family or friends. Take time to calm down and reflect on your actions - don't go straight back to work.

The following reactions are normal, and help people come to terms with a critical incident

Physical reactions - Disturbed sleep, Nausea, Nightmares, Restlessness, Headaches, Excessive alertness and being easily startled.

Cognitive reactions - Poor concentration, Poor attention and memory, Visual images of the event, Intrusive thoughts, Disorientation or Confusion.

Emotional reactions – Fear, Numbness and detachment, Avoidance, Depression, Guilt, Oversensitivity. Anxiety and panic, Withdrawal and tearfulness.

Tips to recover from Trauma

- Recognise that you have been through a distressing or frightening experience and that you will have a reaction to it.
- Don't overuse alcohol or drugs to help you cope.
- Avoid making major decisions or big life changes.
- Gradually confront what has happened – don't try to block it out.
- Don't bottle up your feelings – talk to someone who can support and understand you.
- Try to keep your normal routine and stay busy.
- Don't go out of your way to avoid certain places or activities.
- If you feel exhausted, allow time to rest.
- Make time for regular exercise.
- Relax – use a formal relaxation technique or do things you enjoy, such as listening to music or gardening.
- Express your feelings as they arise – talk to someone about your feelings or write them down.
- Try to think clearly – if the trauma brings up other memories or feelings, try to deal with them separately.

Seek professional help

Traumatic stress can cause very strong reactions in some people. You should seek professional help if you:

- Are unable to handle the intense feelings or physical sensations
- Don't have normal feelings but continue to feel numb and empty
- Feel that your emotions are not returning to normal after three or four weeks
- Continue to have physical symptoms
- Continue to have disturbed sleep or nightmares
- Find that relationships with family and friends are suffering
- Are becoming accident prone and using more alcohol or drugs.

Psychological impact on children

Whether the child is the casualty or a witness to the event, it is important to be mindful of the potential impact exposure to emergency situations can have. There are many considerations which should be emphasised, including the immediate post-incident needs, emotional outcomes and stress / grief of the child and their family. Careful, age-appropriate explanations and communication is vital to alleviate anxiety and to help achieve compliance during a critical situation.

Professional guidance and advice should be sought for all children who have witnessed or been involved in traumatic / life-threatening events. In particular, care givers should be aware of and observing for signs of emotional distress, including but not limited to withdrawal, sadness, anger, loneliness, loss of appetite, difficulty sleeping, irritability, or any significant changes to demeanour / personality. Any persons involved in the care of the child (including teachers, babysitters, minders, etc) should be aware of the child's experience and be instructed to inform the primary care giver(s) of any concerns.

This page has been intentionally left blank

PROVIDE BASIC EMERGENCY LIFE SUPPORT

Choking Adult or Child

In first aid, choking is defined as a mechanical obstruction of the airways by a foreign object such as food. Choking can lead to unconsciousness or even cardiopulmonary arrest if the obstruction is severe enough. The quick recognition and proper management of a casualty who is choking is of key importance. Children 4 years and under are most at risk of choking, and statistically food and toy parts make up the highest number of deaths. These can include toys with small parts, balloons or inappropriate food items left in reach of children.

When a person's airway becomes blocked, permanent damage and even death from asphyxiation can result. Brain damage can begin just four minutes after the organ has been deprived of oxygen. If the casualty is able to cough and talk, then this is not considered serious choking. Serious or true choking occurs when the object is firmly lodged in the casualty's throat and they are unable to cough effectively.

Certain foods can be a choking hazard to young children



Choking signs

The danger signs of choking are:

- (a) Inability to cry or make much sound
- (b) Unable to cough, or weak, ineffective coughing
- (c) Soft or high-pitched sounds while inhaling
- (d) Difficulty breathing - ribs and chest retract
- (e) Bluish skin color or lips
- (f) Loss of consciousness if blockage is not cleared
- (g) The casualty may be clutching or pointing at their throat

First Aid:

- 1st, ask "Are you choking?" If the casualty can speak – do not interfere. Encourage them to cough.
- Bend your casualty forward and use the heel of your hand to **give a sharp back blow** between the shoulder blades using an upwards motion. Check to see if the blockage has cleared before giving another blow. If the blockage hasn't cleared after 5 blows, try the chest thrusts.
- Place one hand in the middle of the casualty's back and the other hand in the centre of their chest. Using the heel of the hand on the chest, perform 5 chest thrusts **like CPR compressions but slower and sharper**. Check to see if the blockage has cleared between each chest thrust.
- If the casualty is still choking, **call 000 / 112** and alternate 5 back blows and 5 chest thrusts until emergency help arrives. **If at any point the casualty becomes unconscious, follow DRABCD.**

Choking Infant

As previously mentioned, children 4 and under are at the highest risk of choking related injuries or death. Some statistics demonstrate that the reflex action of infants placing items in their mouths account for as much as 60% of choking deaths. Hence infants should be carefully supervised at all times to ensure they do not find small items or food pieces that can be picked up and placed in their mouths.

Choking occurs when food or other small objects become lodged in a child's throat or airway (trachea), which prevents oxygen from getting to the lungs and brain. Food is among the objects most likely to cause choking in a child.

Children who begin to choke typically cannot breathe, cry or make noise. As choking persists, a child's face may become initially red, then turn blue as the body runs out of oxygen. If the child's airway is not cleared, loss of consciousness will follow. As like adults, brain damage can begin just four minutes after the organ has been deprived of oxygen.

The danger signs of true choking are the same for adults, children and infants

FIRST AID

	<ul style="list-style-type: none"> • DO NOT perform these steps if the infant is coughing forcefully or has a strong cry – either of which can dislodge the object on its own. • Lay the infant face down, along your forearm. Use your thigh or lap for support. Hold the infant's chest in your hand and jaw with your fingers. Point the infant's head downward, lower than the body. • Give up to 5 quick, forceful blows between the infant's shoulder blades. Use the heel of your free hand.
	<p>IF OBJECT ISN'T FREE AFTER 5 BLOWS</p> <ul style="list-style-type: none"> • Turn the infant face up. Use your thigh or lap for support. Support the head. • Place 2 fingers on the middle of his breastbone just below the nipples. • Give up to 5 quick thrusts down, compressing the chest 1/3 to 1/2 the depth of the chest. • Continue this series of 5 back blows and 5 chest thrusts until the object is dislodged or the infant loses consciousness.
	<p>IF THE INFANT LOSES CONSCIOUSNESS or if the child becomes unresponsive, stops breathing, or turns blue:</p> <ul style="list-style-type: none"> • Shout for help. • Give infant CPR. Call 000 after one minute of CPR. • Try to remove an object blocking the airway ONLY if you can see it. <p>DO NOT:</p> <ul style="list-style-type: none"> • DO NOT interfere if the infant is coughing forcefully, has a strong cry, or is breathing adequately. However, be ready to act if the symptoms worsen. • DO NOT try to grasp and pull out the object if the infant is conscious. • DO NOT perform these steps if the infant stops breathing for other reasons, such as asthma, infection, swelling, or a blow to the head.

Shock

Shock is a life threatening condition that occurs when the body is not getting enough blood flow. All organs need blood to perform, and if they are not getting sufficient blood they cannot function normally. Shock can damage multiple organs, and requires immediate medical treatment, as it can get worse very rapidly. There are many specific types of shock including:

- Hypovolemic Shock
- Cardiogenic Shock
- Anaphylactic Shock
- Neurogenic Shock
- Obstructive Shock

The signs and symptoms will vary slightly with the specific types of shock, although it is not important for a first-aider to identify what kind of shock a casualty is in. What is most important is for a first aider to recognise the signs and symptoms of a casualty going into shock so that they can assist the casualty and call 000 / 112 when appropriate.

Shock may be caused by any of the following:

- Loss of blood through internal or external bleeding
- Loss of plasma or fluids, i.e. burns, vomiting, dehydration
- Allergic reactions (Anaphylaxis)
- Infections
- Heart trouble, heart attack, or stroke
- Poisoning by chemicals, gases, alcohol, or drugs
- Snake and animal bites
- Respiratory problems, chest trauma
- Lack of oxygen
- Obstructions caused by choking
- Injuries of all types, both severe and minor.

Symptoms may include:

- Anxiety or agitation
- Hyperventilation
- Confusion
- Pale, cool, clammy skin
- Bluish lips and fingernails
- Dizziness, light-headedness, or faintness
- Profuse sweating, moist skin
- Feeling faint
- Rapid but weak pulse
- Shallow breathing
- Chest pain
- Unconsciousness

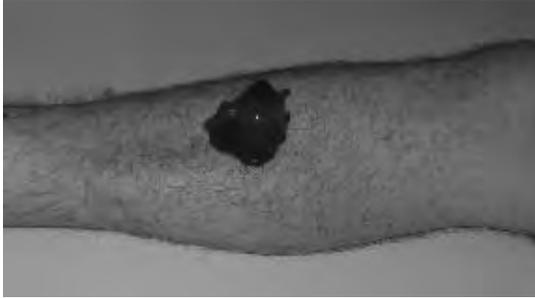
FIRST AID

- If unconscious, follow DRSABCD
- If conscious – Lay the casualty down in the supine position (face up)
- Keep the casualty comfortable, i.e loosen clothing, provide blanket if cold
- Keep the casualty calm
- Manage and treat all other injuries
- You may moisten the casualty's lips – but be sure that they do not eat or drink.
- Call for professional assistance



Bleeding

Bleeding is a very common condition requiring first aid. Bleeding, also termed haemorrhage, occurs when there is a rupture of blood vessels causing a loss of blood. Bleeding can be very minor to life threatening depending on which vessels have been damaged.



In small, superficial wounds, **capillaries** (which are the smallest vessels) may be damaged causing a slow, oozing of the blood from the wound. This is not considered serious and is easy to control – attention should be paid to reducing the risk of infection by washing hands before assisting and using sterile wound dressings (i.e. bandaids).

Sometimes with deeper wounds, **veins** (which carry blood back to the heart) may be damaged. As these are larger vessels than capillaries they carry more blood, hence a more steady flow of dark blood will be seen. This may require firm pressure to control.

In the most serious bleeds, **arteries** (which carry fast flowing blood from the heart) are damaged. An arterial bleed will typically be very fast, bright red and can result in a great loss of blood if not controlled. If damage occurs to the major arteries such as the aorta or femoral arteries, immediate attention is required to prevent death from blood loss.

Bleeding can also be external or internal.

External bleeding means there is damage to the vessels and skin, and the blood is leaking outside the body. This is generally easy to see, however this can be hidden beneath clothing and should be checked for during your DRSABCD check.

Internal bleeding is the same process as external bleeding, the only difference being the blood is leaking **INSIDE** the body, hence this can be very difficult to detect unless specifically looking for it. When checking for bleeding during your DRSABCD check, you should always include palpation of the casualty's abdomen and thighs so that any internal bleeding can hopefully be detected early.

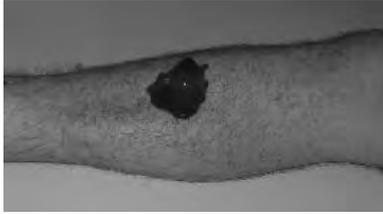
First Aid measures should include stopping the bleeding, using sterile, hygienic measures to reduce the risk of infection where possible and watching for signs of shock.

Bleeding (Minor)

For minor bleeding (cuts, scrapes, etc) apply pressure with a dressing for about 30 seconds. Clean the wound if necessary, and cover with a sterile or clean dressing.

Bleeding (external)

First aid of serious bleeds should follow 3 basic steps as listed below. By remembering the colour of blood (**RED**) you can remember these easy steps:



R – Rest. Any movement of the injured body part can potentially increase the bleeding and make it harder to control. The body part should be kept still until bleeding is controlled.



E – Elevation. By elevating the body part, gravity will make it more difficult for blood to reach the wound, reducing the amount of bleeding. If the injury is to the casualty's abdomen or chest, then these areas cannot be elevated.

D – Direct Pressure. This step is by far the most important and involves using an absorbent material, ideally a dressing such as sterile gauze. If you do not have this, then a clean towel, a piece of clothing or even just your hand can be used if the bleeding is severe and there is nothing else available.

Once the pressure is applied on the wound, a pressure bandage can be used to maintain the pressure by wrapping it firmly around the wound and dressing. If the dressing becomes soaked with blood, it is better to leave the first dressing on, and to apply another dressing firmly on top of the first.



If however, major bleeding continues it may be necessary to remove the pad(s) to ensure that a specific bleeding point has not been missed. The aim is to press over a small area to achieve greater pressure over the bleeding point. For this reason an unsuccessful pressure dressing may be removed to allow a more direct pressure pad and dressing on the bleeding location.

To apply a pressure bandage to the limb:

- Start by wrapping over the dressing.
- Continue by applying 2 wraps downward (towards the fingers / toes)
- Apply pressure whilst you bandage up the limb (away from the fingers / toes), fully covering the dressing
- Secure the end by tucking it under the wrap (away from the injury)
- Check for circulation once you have applied the bandage. The fingers / toes should stay a healthy colour (if they start to turn blue – loosen the bandage and reapply it). The bandage should be firm but uncomfortable for the casualty.
- If the bandage becomes soaked with blood, apply another bandage, and continue to elevate the wound above the level of the heart.
- Tourniquets should only be used for life threatening bleeding from a limb that cannot be controlled by direct pressure. A wide bandage (of at least 5cm) can be used as a tourniquet 5-7 cm above the bleeding point. The bandage should be tight enough to stop all circulation to the injured limb and control the bleeding. The time of application must be noted and passed on to emergency/ambulance personnel. Once applied, the victim requires urgent transfer to hospital and the tourniquet should not be removed until the victim receives specialist care. A tourniquet should not be applied over a joint or wound, and must not be covered up by any bandage or clothing.

Bleeding (embedded objects)



- This is an object that has punctured the skin and is physically stuck in the casualty. Examples include shrapnel, glass, or even being stabbed by a knife.
- **NEVER** attempt to remove an embedded object
- A donut bandage should be applied around the object, to reduce the bleeding and to keep the object as still as possible
- A donut bandage is easily made by using a triangle bandage, or any material you have available and rolling it into the shape of a donut with a hole about the size of the object
- Carefully place the bandage over the object without moving the object
- Use a bandage such as a crepe bandage to firmly wrap around the bandaging to keep it in place and to apply firm pressure around the object to reduce any bleeding.
- If possible – elevate the bleeding part.
- Seek medical aid.

Bleeding (internal)

SIGNS AND SYMPTOMS OF INTERNAL BLEEDING

- bruised, swollen, tender or rigid abdomen
- blood in vomit
- wounds that have penetrated the chest or abdomen
- bleeding from the rectum or vagina
- abnormal pulse and difficulty breathing

First aid for internal bleeding is limited as any serious internal bleed will likely require surgical intervention. If the internal bleed is minor, such as some bruising, then cold packs can be applied to the area to reduce the swelling and relieve pain. If you suspect more severe internal bleeding, carefully monitor the casualty and call 000 / 112 immediately. Checking for internal bleeding should be routinely performed during your DRABC checklist if the casualty is unconscious and breathing. Be aware that the casualty may go into shock. If they are unconscious and breathing then they should be placed in the recovery position and kept under close supervision until assistance arrives.

Bleeding (from head)

Skull – If a casualty has sustained a significant head injury, then internal bleeding into the brain should be considered. If the casualty complains of a severe headache, or seems confused, disorientated or loses consciousness after a head injury, then you should call 000 / 112 immediately.

If the casualty is bleeding from the head after a trauma, a first aider **should not** apply firm direct pressure on the wound if there is a risk of a skull fracture. If the skull feels 'spongy' or you are not sure, then indirect pressure can be applied by wrapping a bandage around the head with minimal risk of causing brain injury by pushing a fractured skull into the brain.



Treatment

- If concussion, bleeding inside the skull, or a skull fracture is suspected, the casualty should be placed in a quiet and dark room, with the head and shoulders raised slightly on a pillow or blanket - (lying down the casualty will help reduce the risk of fainting). Try not to move the casualty unnecessarily, and avoid moving the casualty's neck. Call 000 / 112.
- If a skull fracture is not suspected, then firm direct pressure on the wound with a sterile dressing or clean cloth can be used. If the area feels spongy, do not apply direct pressure, as the casualty may have a skull fracture.
- Seek medical aid, watch for changes, and apply DRSABCD as required

Ear – Bleeding from the ear is a sign of internal bleeding within the skull. Medical aid should be sought for all situations where this occurs.

Treatment

- If the casualty is conscious, then ask them to lie down with the effected ear facing toward the floor. Place an absorbent cloth underneath to collect the blood.
- If the casualty is unconscious then follow DRSABCD, and if they are breathing, place the casualty into the recovery position with the effected ear facing down. Call 000 / 112 and do not leave the casualty unattended.

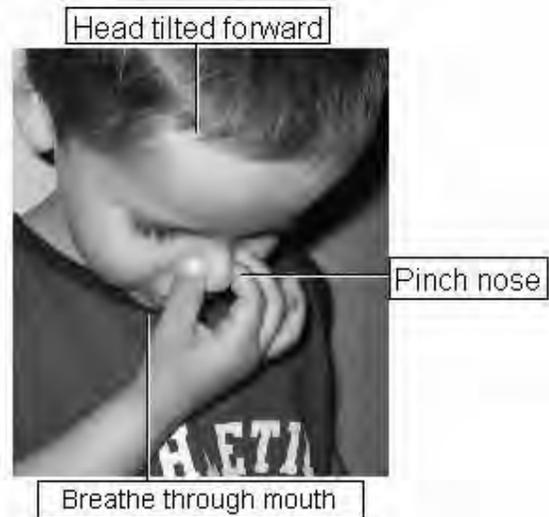
Nose – Bleeding from the nose is fairly common and normally not serious, unless bleeding continues for more than 20 minutes.

Treatment

- Ask the casualty to sit down, with their head tilted **forwards**. The casualty should pinch the soft part of their nose while keeping their head tilted forward to allow the blood to clot.
- The casualty should breathe through their mouth and avoid speaking, swallowing or coughing.
- Cold compressions can also assist in reducing the bleeding.
- If the bleeding does not stop within 20 minutes, seek immediate medical help.

Tips

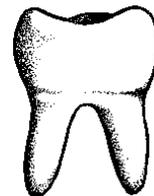
- The casualty should refrain from exercising; and blowing or picking the nose for at least 2 hours after the bleeding stop.
- Never insert any object in the nose to attempt to stop the bleeding



Tooth – The dislodgement of teeth is common, especially among children or sports.

Treatment (dislodged tooth)

- If a child loses a tooth, then this is a normal occurrence – **DO NOT** attempt to replace the tooth in a child's mouth
- If a permanent tooth knocked out an adult casualty's mouth, pick the tooth (be careful not to touch the nerve roots at the base). If the tooth is clean, place the tooth back into its socket. If dirty, rinse the tooth off ideally with milk before replacing it in the casualty's mouth
- Compare the appearance of the tooth to neighbouring teeth to make sure the tooth is not turned around backward.
- If it is not possible for you to reinsert the tooth in its socket, place the tooth in a container of milk and carry it to your dentist immediately.
- If the tooth remains outside of the mouth for over 30 minutes, it will seldom survive. Use cold compresses if there is facial swelling.
- To control bleeding, instruct the casualty to bite onto a clean gauze or cloth.



Treatment (chipped tooth)

- If a casualty breaks off part of their tooth, locate the broken piece and take it to a dentist immediately. He or she can place a medication on the damaged tooth and can sometimes glue the broken piece back on.

Amputation (complete)

Amputated 4th Digit



Amputation is the removal of any part of the body, either by surgery, disease or traumatic event. Amputation accidents around the home or workplace normally involve a finger or a toe. More serious amputations include legs or arms and can occur in workplaces using industrial equipment.

First Aid in the event of amputation of a body part involves firstly controlling the bleeding and looking after the casualty, finding the amputated part and transporting the casualty to hospital or calling 000 / 112

- **Stop the bleeding.** A complete amputation may actually not bleed severely if the blood vessels go into spasm and retract. The bleeding on the other hand can be very significant and in this instance immediate measures should be followed to stop the bleeding before too much blood is lost.
 - Ideally you should wash your hands and put on gloves before assisting the casualty, or at least take measures to reduce the risk of infection to yourself and the casualty as possible using the equipment you have available.
 - Lay the casualty down (**REST**) and **ELEVATE** the injured body part if possible.
 - Apply **DIRECT PRESSURE** using a sterile gauze, or if unavailable, a clean cloth. Continue direct pressure for at least 15 minutes. If the bandaging soaks through with blood, apply another on top and continue direct pressure.
 - Tourniquets should only be used for life threatening bleeding from a limb that cannot be controlled by direct pressure. A wide bandage (of at least 5cm) can be used as a tourniquet 5-7 cm above the bleeding point. The bandage should be tight enough to stop all circulation to the injured limb and control the bleeding. The time of application must be noted and passed on to emergency/ambulance personnel. Once applied, the victim requires urgent transfer to hospital and the tourniquet should not be removed until the victim receives specialist care. A tourniquet should not be applied over a joint or wound, and must not be covered up by any bandage or clothing.
- Care should be taken for the amputated part, as it may be able to be surgically reattached.
 - Once you have assisted the casualty, place the amputated part into a plastic bag and place the bag in a container of cold water or ice.
 - Never place the amputated part directly on ice.
 - Label the bag with the casualty's name, date and time of amputation
 - Transport the amputated part with the casualty to the nearest hospital

Amputation (Partial)

Partial amputation is where a limb has been severely damaged, but is still partially attached to the body.

Wrap or cover the injured area with a sterile dressing or clean cloth. Apply direct pressure to reduce the bleeding if necessary. Remember not to cut off blood flow to the area by compressing the area too tightly. Gently splint the injured area to prevent movement or further damage. Transport the casualty to medical assistance or call 000 / 112.

Asthma

It is estimated that at least 2 million Australians have asthma. Up to 16% of children are estimated to have asthma in Australia. Latest statistics show that 318 Australians died of Asthma in 2005. The majority of people with asthma do not have an action plan and many do not carry their reliever medication with them.

People with asthma have very sensitive airways. An Asthma attack is caused by spasm or narrowing of the bronchioles (air passages) in the lungs. During an episode, air passages become narrowed by muscle spasm, swelling of mucous membranes and increased mucous production. Although the exact cause of asthma is still relatively unknown, exposure to certain toxins, such as smoking during pregnancy is linked with the disease.

- Muscle Spasm:** The layer of muscle surrounding each bronchiole constricts or tightens, causing the air passage to become narrower.
- Inflammation:** The lining of each passage, being very sensitive becomes inflamed and swollen.
- Excess Mucus:** More than usual amounts of mucus are produced in each bronchiole that contributes to the narrowing of the airways

These may cause coughing (varied) noisy, wheezy breathing (not always), tiredness, difficulty speaking, chest tightness, and shortness of breath or rapid breathing. The victim may become very distressed because of difficulty in breathing.

How to assess a:		
Mild Asthma attack	Moderate Asthma attack	Severe Asthma Attack (Dial 000)
<ul style="list-style-type: none"> • Cough, • Soft wheeze, • Minor difficulty breathing, • No difficulty speaking in a sentence. 	<ul style="list-style-type: none"> • Persistent cough, • Loud wheeze, • Obvious difficulty breathing, • Able to speak in short sentences only. 	<ul style="list-style-type: none"> • Very distressed and anxious, • Gasping for breath, • Unable to speak more than a few words in one breath, • Pale and sweaty, • May have blue lips.

Asthma Medication - Relievers - works within minutes

- **Inhaler colour- Blue - Grey**



- Bronchodilators
- Used to relieve symptoms : Relaxes tight muscles around the airways Common Names: Airomir, Asmol, Bricanyl, Epaq, Ventolin, Atrovent
- Note: preventer inhalers such as Qvar, Flixotide, Tilade, etc (generally colours such as brown, beige, yellow and orange) are only useful at reducing the frequency and severity of attacks, however are not effective at treating an attack once it is occurring.



Spacer

Treatment: Using Your Puffer (4 X 4 X 4)

- Step 1** Sit the person upright, reassure them and attempt to keep them calm.
- Step 2** Without delay shake a blue reliever puffer and give 4 separate puffs through a spacer (if available). Use 1 puff at a time and ask the person to take 4 breaths from the spacer after each puff.
- Step 3** Wait 4 minutes. If there is no improvement repeat step 2. If there is still no improvement **after another 4** minutes, or you are concerned at any time, call an ambulance immediately (Dial 000), and repeat step 2 until ambulance arrives or the casualty is breathing normally.



Using an inhaler

Using inhaler with spacer (preferred)

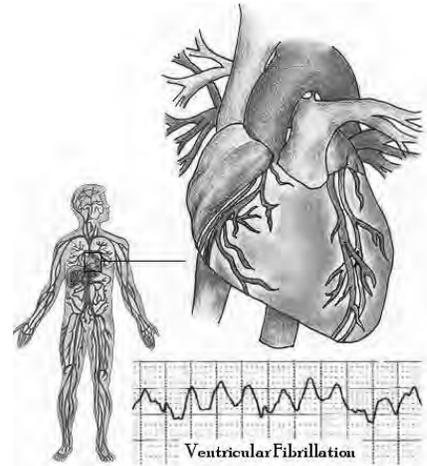


Heart attack

A heart attack is a cardiovascular event caused by a sudden partial or complete blockage of one of the coronary arteries (arteries that supply the heart wall muscles). This may quickly lead to cardiac arrest, which is when the heart stops functioning.

Risk Factors include:

- Smoking (active smoking and being exposed to second-hand smoke)
- High blood cholesterol
- High blood pressure
- Diabetes
- Being physically inactive
- Being overweight or obese
- Depression, social isolation and lack of quality support.



Signs and Symptoms of a Heart Attack

- Casualty will often complain of sudden, severe chest pain that may radiate to the shoulders, neck or jaw. They may also clutch at their chest. These classical symptoms may vary
- Chest pain may be described as tightness, heaviness or a squeezing sensation which may start suddenly or develop slowly over several minutes. This pain may be described as mild, moderate or severe
- Heart attacks may occur without the victim experiencing chest pain, in which case the most common symptom is shortness of breath
- Symptoms can mimic indigestion
- If the victim experiences any of the below symptoms (or a combination) for more than 10 minutes, **act immediately!**
 - Chest pain, possibly radiating to shoulders, neck, jaw, back or even into the arms, wrists and hands
 - Shortness of breath
 - Nausea or vomiting
 - Light-headedness or dizziness
 - Sweating
 - Pale, cool skin, the casualty may start sweating for no apparent reason.
 - Breathing may become strained and rapid. Casualty may have obviously difficulty breathing

Treatment

- **Every minute counts!**
- Call 000 / 112 immediately, and ask for an ambulance
- Encourage the victim to cease activity and rest in a comfortable position
- If the victim has prescribed heart medication (i.e. tablet or oral spray) for episodes of chest pain, assist them to take this medication according to their doctor's directions
- Give the casualty an aspirin (300 mg). Dissolvable aspirin is preferred.
- If there is oxygen available, and you are trained to use this then administer oxygen to the victim
- If practical and resources allow, locate the closest AED and bring it to the victim
- Monitor DRsABCD, and be prepared to start CPR if the casualty becomes unconscious and stops breathing.

Does the victim have:

- Pain
- Pressure
- Heaviness
- Tightness

In one or more of their:

- Chest
- Neck
- Jaw
- Back
- Shoulder(s)
- Arm(s)

They may also feel:

- Dizzy
- Short of breath
- Nauseous
- A cold sweat



Angina

Angina is a symptom of a condition called myocardial ischemia. Basically put, this means that the heart muscles are receiving inadequate blood flow and hence inadequate oxygen for the amount of work the heart is doing at a particular time. This is due to disease of the coronary arteries called atherosclerosis (fatty deposits causing hardening and narrowing of the artery lumen)

At rest, a casualty will have no symptoms. This is because although the arteries are narrowed, the heart does not require a lot of blood at rest anyway. Angina occurs during physical or emotional excitement when the heart starts beating faster and hence requires more oxygen. Because of disease to the coronary arteries (atherosclerosis), blood circulation to the heart is sufficient for normal needs (during rest) but inadequate when the heart's needs increase.

This means that when the casualty starts exercising, they will develop symptoms very similar to that of a heart attack. The big difference however, is once the casualty is instructed to rest and their heart rate decreases, the symptoms will subside and disappear.

Unstable angina is a more severe form of this condition and occurs when the disease process is so pronounced that symptoms become less predictable and can occur during minimal exertion or even at rest. Casualty's suffering this form should seek medical advice immediately as this is a warning that a heart attack may occur soon.

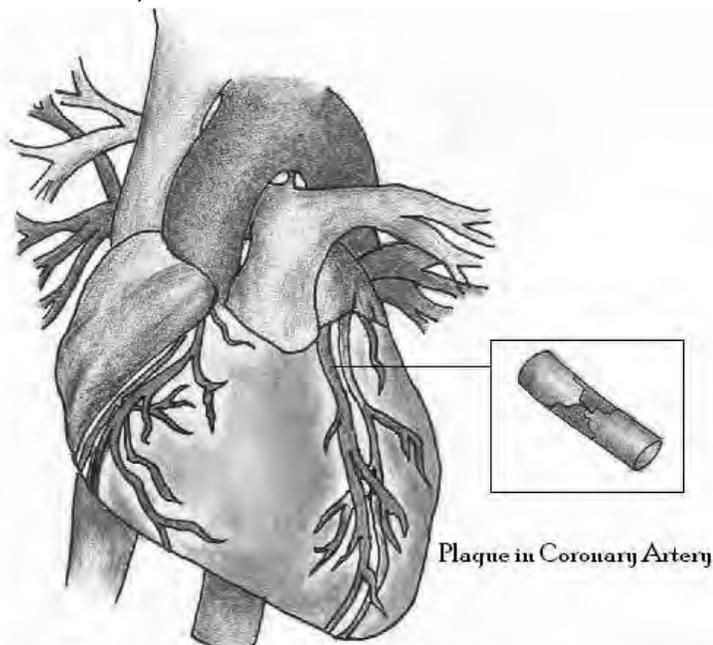
Angina is a warning sign that the casualty is at risk of potential cardiac arrest. You should strongly advise the casualty to seek medical advice regarding their heart if they are not already under the care of a general practitioner or cardiologist.

Signs and Symptoms

- As per heart attack, although generally not as severe
- Only difference is symptoms will subside when the heart slows down or the casualty takes any medications prescribed for their angina.
- The casualty may tell you that they know they have angina

Treatment

- Stop exercise / physical exertion. Advise the casualty to relax
- Keep casualty calm.
- Assist casualty to take any medication they have been prescribed by their doctor (Normally Anginine, nitroglycerine tablets or spray)
- Monitor DRSABCD.
- If pain persists for more than 10-15 minutes, call 000 / 112 (as this could be a sign of a heart-attack).



ANAPHYLAXIS

Anaphylaxis is the most severe form of an allergic reaction. It is an acute, systemic type 1 hypersensitivity reaction. This reaction is a medical emergency, and without prompt medical intervention, the casualty's condition can quickly deteriorate to even respiratory arrest or death. It is caused when a casualty is exposed to a substance that they are severely allergic to – this substance is known as an allergen.

It is worthwhile noting that intolerance to a certain food is not an allergic reaction – for example, some people may experience diarrhoea or abdominal pain from dairy products, chocolate, food additives or certain meats. They may also experience allergic-type reactions such as rapid breathing, tightness in the chest or throat, breathing problems or even a rash. It may be difficult to differentiate between intolerance and an allergy, so medical diagnosis should be sought for clarification – an allergen can be diagnosed with a skin-prick test or blood (RAST) test.

There are no specific risk factors that will identify an individual as being hypersensitive to certain common allergens. Generally the only way to identify such an allergen is by exposure to it – such as a severe reaction to peanuts when first introduced. It is estimated that up to 3% of the population are hypersensitive to some form of allergen. Recent statistics place Australia as having an anaphylaxis rate of approximately 1 in 500 to 1 in 5000 per year – similar to that of the United States and United Kingdom.



Anaphylaxis may induce a skin rash on the chest, neck and extremities

Common Causes of Anaphylaxis

- Food allergies
 - Peanuts or tree nuts (almond, cashew, walnut etc)
 - Peanut allergy usually coincides with a cashew allergy
 - Nuts are the most common cause of death due to food-related anaphylaxis, accounting for >70% of fatal episodes
 - Cow's milk
 - Egg
 - Wheat
 - Soy
 - Sesame
 - Fish, such as shellfish
- Insect stings
 - Bees
 - Wasps
 - Ants (such as Jack Jumper)
- Some Medications
 - Penicillin and other Beta-lactam antibiotics
 - Radiocontrast media
 - Anaesthetics
 - Anticonvulsants
 - Cephalosporines (Keflex, Cefzil, Ceftin etc.)
 - Many others also carry a small risk
- Some materials
 - Such as latex gloves, or balloons
- Some herbal remedies can also induce reactions

Where does it happen?

Own home	47%
School/child care	8%
Hospital	4%
Restaurant	4%
Other	7%
Not documented	31%

Anaphylactic food reactions as can be seen from the chart occur most commonly in the family home. A recent Australian survey reported that >90% of these food reactions occur in preschool age children. Although the ratio of incidence is most common in preschoolers, the risk of death is greatest among teenagers. This is thought to be because they have less parental supervision, and can result from poor decision making or forgetfulness such as leaving their EpiPen at home when they have a known hypersensitivity.

It only takes minute amounts of an allergen to cause anaphylaxis, and exposure can occur several ways:

- Direct contact to the skin
- Ingestion
- Injection
- Inhalation

Signs and Symptoms

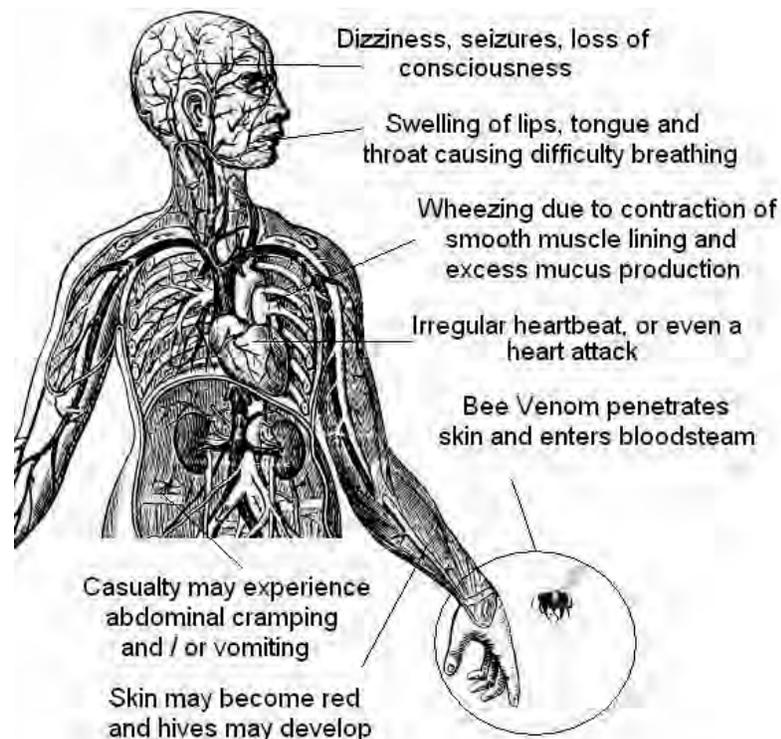
Initial signs (these can be used as warning signs to get help)

- May begin with itchy hands, mouth or feet
- Burning sensation in throat or mouth
- Runny nose
- Skin rash (eczema)
- Eyes may become red and puffy
- Abdominal cramping
- Diarrhoea
- Vomiting or nausea
- Hives (Urticaria) can develop, especially on the chest, armpits and groin

Soon after hives develop, more serious symptoms may occur, including

- Shock
- Altered mental status
- Swelling of the tongue
- Difficulty breathing, or shortness of breath and gasping
- Casualty may become very anxious and have a great sense of fear
- Respiratory or cardiac arrest and unconsciousness
- Young children may become pale and floppy

The signs and symptoms of anaphylaxis can vary greatly, and a casualty can even experience different symptoms from the same allergen. It is hence very important to be aware of the different signs and symptoms that can accompany an anaphylactic reaction. It is also important to note that food allergies can take time to manifest, the average being between 25-35 minutes after ingestion. Reactions have been recorded anywhere between 10 minutes to 6 hours after ingestion. Stings can cause an almost immediate reaction to around 12 minutes. Drug-induced anaphylaxis takes on average 5 minutes to start causing symptoms.



Management

The best way to treat a known hypersensitivity is strict avoidance of the allergen. This means reading labels and even involving a dietician and doctor to go over the foods that can and can't be eaten. People with a known hypersensitivity, especially to peanuts should be especially wary of foods where the ingredients are not known. Regular review with a family doctor should be undertaken to monitor for changes to hypersensitivity – some food hypersensitivities can resolve over time if the body has time to recover from the problem.

If the casualty has a known hypersensitivity and is experiencing severe symptoms, then the best treatment is the use of an EpiPen® IMMEDIATELY. A definite indication for this is if the casualty has a known previous anaphylactic response to the allergen. There are different colour EpiPens® for adults and children

Adults = Yellow

Children = Green

An EpiPen® is NOT indicated on a casualty who has no previous anaphylactic reaction and is experiencing

- Mild systemic reactions, or
- Local reactions



General first aid for mild anaphylactic symptoms after exposure to an allergen consists of:

- Follow DRSABCD
- Call 000 / 112 immediately
- Lay the casualty flat
- If the casualty is having difficulty breathing, sit them upright and try and calm them
- If caused by a bite or sting, apply Pressure-Immobilisation to the limb
- If known and possible, remove the source of the allergy
- Continuously monitor the casualty's airways, breathing and respiration, as a sudden change may occur which may need CPR
- If available and prescribed, an EpiPen® can be used to inject adrenaline
- A second dose of adrenaline should be administered by autoinjector to victims with severe anaphylaxis whose symptoms are not relieved by the initial. The second dose is given if there is no response 5 minutes after the initial dose

What is an EpiPen®?

An EpiPen is a small, hand-held auto-injector for intramuscular-use that administers adrenaline for the emergency treatment of anaphylaxis. Adrenaline (epinephrine) is a fast-acting hormone that is produced naturally by the adrenal glands in the body. Adrenaline works very fast in countering the effects of an anaphylactic response by:

- Widening the air passages in the lungs
 - This helps the casualty breathe
- Increases heart rate and constrict blood vessels
 - This increases blood pressure and cardiac output
- Reverses leakiness of vessels
 - This reduces swelling

Adrenaline is injected through an EpiPen into the fleshy part of the casualty's thigh.

There are a few reasons why it should be injected in this position:

- It is faster working and achieves higher maximum plasma level when administered intra-muscular compared to subcutaneous administration
- The fleshy part of the thigh (lateral thigh) is more vascular than the deltoid region, which means a faster uptake into the circulatory system.

Adrenaline doses range from 0.05ml in infants less than 1 year old, to 0.5ml 13 years and older – that is a ratio of 10x, which is why there are different Epipens ® for adults and children.

Side effects of adrenaline can include:

- Trembling
- Palpitations
- Increased blood pressure
- Nervousness
- Headache
- May be dangerous in high doses to the elderly

Important information about EpiPens®:

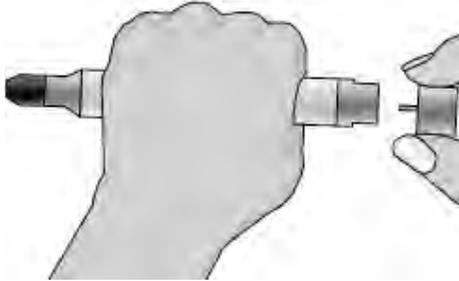
- Storage should be at room temperature
- It should be readily available – NOT locked in a cupboard
- Check expiry date regularly
 - Shelf life is 24 months from manufacture
 - Expired EpiPens® are not as effective
 - Check colour – if it is brown and cloudy, this means it is off and should be replaced immediately. This may occur before expiry date, especially if it has been kept in the heat or in direct sunlight
- Expired EpiPens® can be used if out of date **IN AN EMERGENCY**
- There is limited risk in giving an excessive dose (i.e. Child EpiPen® for children <20kgs) – the risks of not giving it may far outweigh any possible side-effects.

Important information regarding administration of Adrenaline:

- A recent study linked approximately a quarter of deaths outside a hospital as occurring within seconds of moving a casualty to a more upright position.
- Hence ideally the casualty should be supine (laying flat) during the use of the EpiPen® and they should NOT be moved into an upright position – leave the casualty on their back with their legs elevated until the ambulance arrives (minimum 30 minutes)
- It is also important to note that ANY casualty who has required the use of an EpiPen® should ALWAYS be taken to hospital. This means even if their symptoms have improved, an ambulance should still be called if not already for further assessment. Adrenaline lasts for approximately 13-15 minutes, and although a second dose is rarely required, there should be medical attendance and assessment to ensure the casualty recovers satisfactorily.

How to use an EpiPen®

Step 1



- Lay casualty on ground if possible
- Form a fist around the EpiPen®
- Remove Grey cap with other hand
- DO NOT touch black tip

Step 2



- Place the BLACK tip against the fleshy part of the casualty's thigh (the lateral or outer aspect)
- Can be given through a single layer of clothing, but thick or heavy clothing should be moved
- Firmly push into the thigh until you hear the 'click'
- Keep pressing for 10 seconds

After administration, place the pen back into the container and massage the casualty's thigh for around 10 seconds. Always call an ambulance if an EpiPen® has been required. Follow basic first aid techniques, and note the time the EpiPen® was given, and KEEP CASUALTY lying down for at least 30 minutes. For victims with severe anaphylaxis, if symptoms are not relieved by the initial dose after 5 minutes, administer second dose.

Recent statistics found that only 27% of people with an EpiPen® actually used it during an anaphylactic attack. This is due to several reasons:

- Failed to recognise the symptoms of anaphylaxis
- Did not have it with them (!!!)
- Had an expired EpiPen®
- Did not know how to use it

Prevention is always better than cure.

- Ensure early symptoms of anaphylaxis are known and will be recognised
- Casualty should have an action plan in place and if necessary, should have a prescribed EpiPen® with them or near them AT ALL TIMES.
- An alert bracelet or card is a good idea to help others identify what is going on if they are present during an anaphylactic episode
- Maintain communication with family doctor and specialist to review and monitor hypersensitivity.

This page has been intentionally left blank

PROVIDE FIRST AID

ALTERED CONSCIOUS STATES

There are a large number of conditions that can lead to acute disruption of a casualty's cognitive function. These range from a direct blow to the head, to drug or alcohol abuse, to low blood sugar caused by diabetes. Depending on the condition, some states will resolve fairly easily and require minimal intervention. It is however critical to realize that some conditions can deteriorate very quickly and calling 000 / 112 immediately may be the best thing you can do for the casualty.

In the following section, we aim to outline some of the basic principles in recognising an altered conscious state, as well as what indications signify the need for immediate medical assistance.

The Human Brain

The human brain is a uniquely complex and powerful organ. At any one time, the brain is registering sensations such as eyesight, hearing & smell, computing and filtering data and sending appropriate responses. It is controlling our conscious thought, movement & actions as well as our unconscious thought, emotions and memories. It is also controlling the vital aspects of our bodies that keep us alive, such as regulating body temperature, heartbeat & respiration.

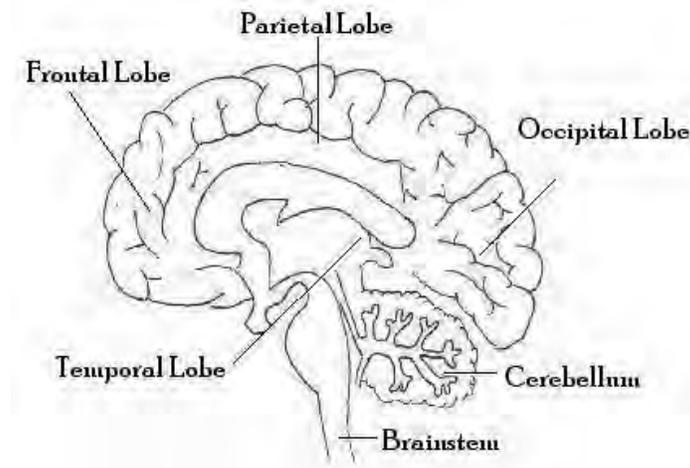
In basic terms, the brain can be divided into 4 main parts:

- Cerebrum
- Diencephalon
- Cerebellum
- Brain Stem

The cerebrum is the largest part of the human brain and is associated with higher function such as conscious thought, intellect and action. It is divided typically into 4 sections called lobes.

- Frontal Lobe: Reasoning, problem solving, emotions and movement
- Parietal Lobe: Movement, recognition,
- Occipital Lobe: Visual Processing
- Temporal Lobes: Auditory, memory and speech

The cerebellum or literally 'little brain', is predominantly responsible for coordination of movement, balance and posture. The Brain Stem is responsible for the vital life functions such as heartbeat, breathing, blood pressure etc.



Cerebrospinal Fluid (CSF)

Cerebrospinal fluid nourishes the brain and spinal cord, as well as protecting it from chemical or mechanical injury. It circulates through the subarachnoid space and through cavities called ventricles. The fluid act as a shock-absorbing agent which prevents the delicate brain tissue from being damaged though contact against the skull. The chemical environment of the CSF is optimal for neural signalling. It regulates this environment as even the smallest change in this consistency can drastically affect brain function. CSF also acts as the medium for exchange of nutrients and waste between the blood and brain tissue.

How to Recognise an Altered Conscious State

There are many simple reactions and responses that we do that we can take for granted, such as our eyes following someone as they walk into the room, or turning our head when we hear someone speak. When a casualty has a condition or injury that affects the brain, these responses can be delayed or non-existent. There are several different methods for quantifying the extent of change to a person's conscious state, such as the **AVPU System** and the **Glasgow Coma Scale** (GCS).

The AVPU System

This is loosely based on the GCS, however it is simplified so a quick, effective and quantifiable assessment of a person's conscious state can be performed and relayed to medical personnel. The AVPU stands for:

- A – ALERT** If you walk into the room and the casualty sees you and follows (tracks) you with their eyes, then they are basically alert.
- V – VERBAL** The casualty does not respond to your presence, but will respond to your verbal commands – i.e. their eyes open when you speak to them
- P – PAIN** The casualty does not respond to your verbal commands, but will respond to pain stimuli, such as a sternal rub or pinching them in the fleshy part of their arm next to the armpit.
- U – UNRESPONSIVE** This means nothing you do gets a response, in other words, they are unconscious.

What to do if they are not alert

In terms of the AVPU scale, a persistent AVPU of anything below A is reason enough to call an ambulance. In situations like this, you should not to leave the casualty for any reason except for a danger to yourself being present. Their conscious state can become worse very quickly. If the casualty becomes unconscious at any stage, then you should follow DRSABCD. If they are breathing, then place them into the recovery position and call an ambulance. If they stop breathing at any stage, then begin CPR.

Levels of Alertness

Another way to assess the extent of injury to the brain is the 1-4 Alert Scale. This is used in many Emergency Services Protocols and refers to how many alert attributes the casualty exhibits. The alert attributes are:

TIME	(Does the casualty know what the time is? What the date is? The year?)
PERSON	(Does the casualty remember their own name?)
PLACE	(Does the casualty know where they are?)
EVENT	(Does the casualty know how they got here? What they are doing here?)

If the casualty is alert and answering all of the above questions successfully, then they are alert and orientated, and it is fairly safe to assume they are not mentally compromised.

CAUSES OF ALTERED CONSCIOUSNESS

There is a popular mnemonic that encompasses the possible reasons for a casualty's altered conscious state, AEIOU-TIPS.

- **A (Alcohol)** - This can certainly affect someone's conscious state – that is what it is designed for! Too much can have detrimental effects.
- **E (Epilepsy)** - Or any seizure disorder. Any casualty that has just had a grand mal seizure will almost definitely have an altered conscious state
- **I (Insulin)** - A diabetic problem if not properly managed can lead to an altered conscious state – generally not enough blood sugar, although too much can also cause problems
- **O (Overdose)** - This can be an OD due to party drugs, or even prescription drugs. When you think overdose, also think under-dose, as forgetting to take meds can also lead to problems
- **U (Uremia)** - Too much urine in the blood. This is caused by a decreased renal function and leads to a build up of toxins in the blood.
- **T (Trauma)** - A direct blow can very quickly alter someone's level of consciousness
- **I (Infection)** - A very high fever, especially if prolonged can cause damage to the brain. Other causes of changes to body temperature such as heat stroke or hypothermia can have similar effects
- **P (Psychiatric)** - Mental illness can manifest as an acute disruption to a casualty's conscious state
- **S (Stroke)** - A bleed in the brain, or an infarct caused by a disruption to the blood supply to an area of the brain can have serious consequences. S can also stand for 'Space Occupying Lesion' which means a tumour or mass in the brain. In other words, there is some pathology in the brain causing the altered state

Important: If a casualty has an unexplained change in conscious state, then an ambulance should be called immediately. If the casualty has had a stroke, then time is critical. Delayed medical assistance can have a large impact on the extent of damage caused by the stroke.

SPECIFIC CAUSES OF ALTERED CONSCIOUSNESS

Now that we have covered how to recognise and assess the extent of an altered mental status, we will cover some of the more common causes for an altered mental status in first aid, and what intervention we can do to improve the outcome for the casualty.

ALCOHOL POISONING AND ILLICIT DRUG USE

This is perhaps the most common cause of altered conscious state that you might encounter. Alcohol impairs judgement, vision, speech, coordination, reflexes, balance and cognitive function. At a blood alcohol level as low as 0.3%, the brain's ability to control respiration, heart rate and blood pressure can be compromised, which can lead to a loss of consciousness, or even death. Although the effects of alcohol can commonly be seen as comical, they can be just as serious as any of the causes of altered conscious state on the AEIOU-TIPS mnemonic. It is important to recognise this and treat an acute, alcohol-related change in conscious state promptly and responsibly.



If you see a decline in a person's AVPU scale, even to V, then you should treat this as seriously as when the cause is not known. The old 'let them sleep it off' way of dealing with alcohol abuse can have serious consequences, as you cannot monitor a person's AVPU scale when they are asleep, and therefore cannot determine if they are in acute alcohol poisoning. If this is the case, and they are asleep, unsupervised, it is possible for them to go into respiratory arrest and then death if not properly managed. If someone 'passes out' or loses consciousness after over-indulging, then this is the equivalent of U on the AVPU scale, and the person's brain has been severely compromised. An ambulance should be called at this stage, and the casualty should not be left unattended.

Management of Acute Alcohol / Drug Poisoning

- If you notice a change in a person's AVPU scale, you should not leave them unattended. If a casualty's conscious level is dropping, it can continue to drop very quickly as more alcohol is absorbed in the brain. A nasogastric tube and stomach pump is needed to remove unabsorbed alcohol / drugs.
- If the casualty is violent, then you can monitor them from a distance.
- Be prepared to call an ambulance if the casualty's condition changes. Remember; do not force yourselves on the casualty as they may become violent. Use assistance of friends if possible.

If the Casualty Becomes Unconscious

- Follow DRSABCD. Position casualty in recovery position to protect airways. Remember vomiting is a very likely outcome, and if unattended, this can compromise their airways by causing aspiration or blockage.
- Call 000 / 112. Emergency medical care is required to prevent further absorption of alcohol and to monitor the casualty until they regain consciousness

UNDER THE INFLUENCE – DRUGS AND ALCOHOL

Alcohol presents a very common cause for altered mental status, and as already discussed, can be very serious and even life-threatening if not properly managed. It not only has direct effects on the body as it travels to the brain and other organs, but impairs judgement which prevents a person from logically assessing a situation and acting in a rational manner.

Alcohol and drugs have been clearly linked in studies to an increase in the likelihood of injury or death from accidents or violent behaviour, and the impact on the road toll is well documented. A person under the influence of drugs or alcohol has problems recognising danger – as like the rest of the brain, the part that is responsible for comprehending and appreciating this is functioning at an impaired level.

Studies have also shown that those under the influence have difficulties reading facial expressions, lose control of their emotions and have cognitive impairment. It should also be noted that using any combination of alcohol or drugs can cause extreme effects and a much higher risk of injury or death. In short, someone under the influence has a decreased ability to:

- Recognise danger and react appropriately
- Control their emotions or violent tendencies and feel physical pain
- Rationally consider a situation and choose a logical course of action
- Evaluate decisions and consequences of the decisions they make

Some common types of drugs:

Marijuana:

This is one of the most frequently used illicit drugs in society, and has similar effects as stimulants, depressants and hallucinogens. Short term effects include:

- Drowsiness
- Reddening of the eyes and dryness of mouth and throat
- Increase in heart rate and body temperature
- Can cause an increased appetite
- Long term use can cause memory and concentration impairments



Cocaine

This is a very strong stimulant to the central nervous system, and is very addictive. It can be taken via injection, smoking or snorting. Short term effects include:

- Anxiety and restlessness
- Tremors, twitches and spasms
- Coordination problems & nausea
- Possible seizures or even respiratory / cardiac arrest
- Long term use can lead to paranoia and anxiety and a decreased ability to feel pleasure

Ecstasy

This is taken as a capsule or tablet. This affects the serotonin system, which plays a large role in regulating mood, sleep, aggression and sensitivity to pain, and as such can affect all of these. Other short term effects include:

- Depression
- Sleep problems
- Severe anxiety
- Long term affects include a decrease in cognitive function and memory



LSD

This is a synthetic hallucinogen that is found in tablet, capsule or liquid form (added to paper, sugar cubes etc). Effects can last for over 12 hours, and include:

- Vivid delusions and hallucinations, and alters the user's sense of time
- Can cause terrifying thoughts or feelings and cause panic

Projectile Objects

There are many types of projectile objects that can cause injury – from glass or shrapnel, to knives if thrown, to bullet wounds. If a projectile object becomes embedded in the skin, you should follow the first aid principles of embedded objects. This involves forming a donut bandage to secure the object (reducing any movement that can potentially cause more injury and damage) and assist in reducing the bleeding by providing indirect pressure to the area. Remember – NEVER attempt to remove an embedded object. If the object is large and deep, the casualty will likely require surgery to remove it. The main thing is to reduce bleeding, keep the object secure and keep the casualty calm until the ambulance arrives.

Bullet wounds provide a potentially more serious and complicated injury, as they are not embedded in the skin and hence they cannot be secured, but rather will likely enter completely into the body. Bullet wounds cause three types of damage:

- Penetration – damaging the skin, muscles and potentially vital organs due to the physical nature of the injury
- Cavitation – the shock wave of the bullet and dissipating heat can cause injury several centimetres from the actual bullet.
- Fragmentation – The bullet itself can fragment and damage / lodge in multiple locations, and if it hits bone, the bone can fragment causing further injury

There are many other complications from bullet wounds, such as the risk of infection or even bullet embolism, where the bullet enters a vein and travels through the cardiovascular system, lodging somewhere and causing a blockage.

Treatment

The first thing to do is call 000. Not only is an ambulance needed, but police intervention is necessary. If there are weapons being fired, you must take care of your own safety – remember, you cannot assist anyone if you get injured.

Follow DRSABCD – if the casualty stops breathing, then immediately start CPR. If the casualty is breathing, concentrate on controlling the bleeding. Depending on the location, you should take further steps:

Chest wound: Seal the wound with an airtight material, such as plastic. This will help prevent air being 'sucked' into the wound and causing a lung to collapse. Seal 3 sides of the covering with tape, but leave the 4th side free so air can escape back out of the wound. If the casualty complains of increased shortness of breath or difficulty breathing, then remove this.

Abdomen: Use direct pressure to control the bleeding, and try to keep the casualty as calm as possible. Damage to internal organs can be very serious, and calling 000 immediately is the best plan to follow. Without proper medical personnel and equipment, there is not much else you can do.

Limbs: Again, use direct pressure on the wound. If possible, raise the part to reduce blood flow to the area. The use of a tourniquet is not recommended first aid treatment, and should only ever be used if all other methods of stopping the bleeding has failed and as a last resort.



Demonstrating appropriate treatment of a casualty

Determining appropriate treatment of a casualty is heavily reliant upon a good assessment of the situation and the casualty themselves. When arriving at a scene where there is one or multiple casualties, a visual survey is the first key in determining what response is necessary, for example:

- Does the casualty appear conscious or unconscious?
- If conscious, does the casualty appear in pain, or are they demonstrating signs of an altered mental status?
- Is there blood present, or any signs of violence?
- Based on the location and circumstances, is there a high risk of alcohol and / or illicit drugs being involved?

Many of these questions can be answered by a short visual assessment of the casualty and their surroundings. Following this, more information is generally needed, which can come from talking to the casualty and asking questions to assess what the problem is, or talking with others to get an idea what has occurred. If the casualty is unconscious, always follow DRABC – this is a highly recommended method of assessing a casualty because it covers all of the most important aspects of assessing a casualty's well-being in a logical and easy to remember order.

If the casualty is conscious, follow a logical progression of questioning and assessment to determine what has occurred. If they appear confused, vague or in any way mentally impaired, then ask them the level of alertness questions:

TIME	(Does the casualty know what the time is? What the date is? The year?)
PERSON	(Does the casualty remember their own name?)
PLACE	(Does the casualty know where they are?)
EVENT	(Does the casualty know how they got here? What they are doing here?)

If they cannot answer any of these, there is a risk that for some reason their brain is not functioning normally and there are many causes for this, from intoxication and overdose, to seizures or head trauma. By piecing the puzzle together from what you have seen and what information you can ascertain from the casualty and any witnesses, you can hopefully narrow down the cause or even determine exactly why they are in the state they are.

If the casualty can answer all of these and is cooperative, then generally they can indicate what has occurred and how they are injured. If the casualty is not cooperative then this can make assessment difficult. If the casualty is being violent, remember the safety of yourself and others is the number one priority.

Generally speaking, by undertaking a good visual assessment and verbal questioning you can almost always form a good idea of what is occurring. From there, it is simply a matter of putting your first aid skills to use to determine the best course of action, for example:

- If they are bleeding, apply direct pressure and elevate the injured part if possible
- If they are suffering from an impaired AVPU, then call an ambulance and monitor them closely until paramedics arrive

Remember, good communication is key. Be calm and collected – take a moment to absorb what is occurring and respond accordingly and not only will this help you act in a more rational manner, but will reassure the casualty and others that you have the situation in control. Further reassuring the casualty that you have the situation in control and they are in good hands will also help keep the situation in control and assist in gaining trust. It is also important to be assertive – demonstrate that you know what you are doing and are confident in your own abilities and people will respond positively. It is a skill that requires practice, but the ability to communicate instructions assertively without being aggressive is the key to getting a positive and helpful response from the casualty any bystanders present.

Chemical exposure (OLEORESIN SPRAY) Capsicum spray

Capsicum spray is used routinely in crowd control, self-defence and in arrests. It has become increasingly popular as a law enforcement weapon of choice as it can diffuse a potentially violent situation and prevent injury to law enforcement officers or the public.

Capsicum spray is an extract of hot peppers consisting of capsaicin and derivatives. It is a lachrymatory agent – meaning that it is designed to irritate the eyes to cause tears and pain. It acts within seconds of being sprayed in a person's face to cause stinging, tearing and blepharospasm (uncontrolled muscle spasm) – causing the eyes to shut.

It also has an effect on the respiratory system – causing bronchoconstriction and coughing as well as mucous secretion, shortness of breath and laryngeal paralysis (causing the inability to speak). The effects can last for up to 30 to 40 minutes.

People with certain conditions may be at an increased risk of developing more severe symptoms, those conditions include:

- Pre-existing allergy to pepper
- Corneal disease
- Hypertension & heart disease
- Respiratory problems, such as asthma or emphysema

More severe respiratory effects may include pulmonary effects or even asphyxia due to bronchospasm.



Treatment

- Encourage blinking – this will help flush out the spray from the eyes. Capsicum is not soluble in water, and even large amounts of water will not wash it off. Blinking will encourage tears to help flush the irritant
- Wear gloves if assisting a casualty – cross contamination of the spray can occur by direct contact then touching your own face
- If the casualty is wearing contact lenses, have them remove them if possible once their hands have been washed.
- If having difficulty breathing, encourage deep breaths and allow space for the casualty to breathe
- Severe effects are rare, but have been documented – if the casualty exhibits any signs of respiratory injury (obvious difficulty breathing, severe coughing and wheezing etc) then pay close attention to them and be prepared to call 000 if they go into respiratory arrest
- If at any stage the casualty becomes unconscious, follow DRSABCD



POSITIONAL ASPHYXIA

This is a condition that occurs when a person's position causes their breathing to be restricted and can be potentially fatal if they are in such a position for any length of time. Positional asphyxia occurs commonly in small infants who find themselves in a position where their airways are restricted and are unable to reposition themselves.

This can occur in adults also either by an accident where they become stuck in a difficult position, or more commonly during restraint by police officers, security guards or even health care staff if not carefully performed.

Restraint

During restraint, pressure should not be applied to the neck. Pressure here, particularly near the carotid sinus can disturb the nervous controls to the heart and can lead to respiratory or cardiac arrest. People who are at higher risk include those with:

- heart problems, such as angina
- high blood pressure or diabetes
- intoxicated or drug affected people
- the elderly

The most common positions where this can occur is with the person forced prone or with their head forced towards the knees.



Warning Signs:

If the person complains of or demonstrates any of the following:

- Difficulty breathing
- Feeling sick / nauseous
- Obvious distension of the veins in their neck
- A change in behaviour – either becomes more or less resistant
- Becomes limp or unresponsive
- Loss of consciousness

If any of these signs occur, the person's restraint should be released if this is an option, or at the very least, immediately modified, allowing them to breathe efficiently.

It should be remembered that an intoxicated or drug affected person is more likely to need restraining, but they are also more likely to suffer from positional asphyxia if an incorrect restraint is applied. Another important note is that a person can be struggling until the moment before they lose consciousness – just because they are shouting or yelling, doesn't mean they are able to breathe effectively.

What to do if they lose consciousness

Follow DRSABCD

- If the person is breathing, lay them in the recovery position and monitor closely
- If the person is not breathing, then you should start CPR immediately and call 000

FAINTING

Fainting is a temporary loss of consciousness, otherwise called syncope. It is generally caused by a temporary reduction in the blood supply to the brain. It can be caused by a variety of factors such as:

- A sudden drop in blood pressure
- A sudden change in position, i.e. from lying to standing
- Dehydration
- Stress or fear
- Poison or Alcohol
- Heat
- Pain

Before fainting, the casualty may feel light-headed, nauseous or dizzy, and may appear pale and clammy.

Management of Fainting

Before Faint

If a casualty is light-headed, and appears near a faint, the best thing to do is to lie them down on their back, and raise their legs, increasing the blood supply to the brain. If the casualty refuses to lie down, offer for them to sit with their head between their legs – although this is not as effective as lying down, it is still better than falling from a standing position. Keep close to the casualty in case they collapse from the sitting position. Remember also to protect your back – if the casualty is falling, do not attempt to keep them upright, but rather guide them gently down onto the ground. Once on the ground they can be placed in the recovery position.

If Unconscious

If they lose consciousness, follow DRSABCD. Fainting usually only lasts from a few seconds to a minute or two, and the casualty may even have a slight seizure. Proper placement into the recovery position will assist recovery. Once conscious, encourage the casualty to lie down until they feel better, then very gradually moving back into an upright position to reduce the risk of fainting again.

Recovery Position – Adults and Children



STROKE

A stroke, or otherwise called a cerebrovascular accident (CVA) is an acute disruption to the blood supply within the brain. A stroke is a medical emergency, and without prompt medical intervention, there can be substantial neurological damage or even death. There are several classifications of strokes, although from a first aid perspective these are purely academic, as all have similar symptoms and all require immediate intervention. The main factor in determining the symptoms is the site of the injury.

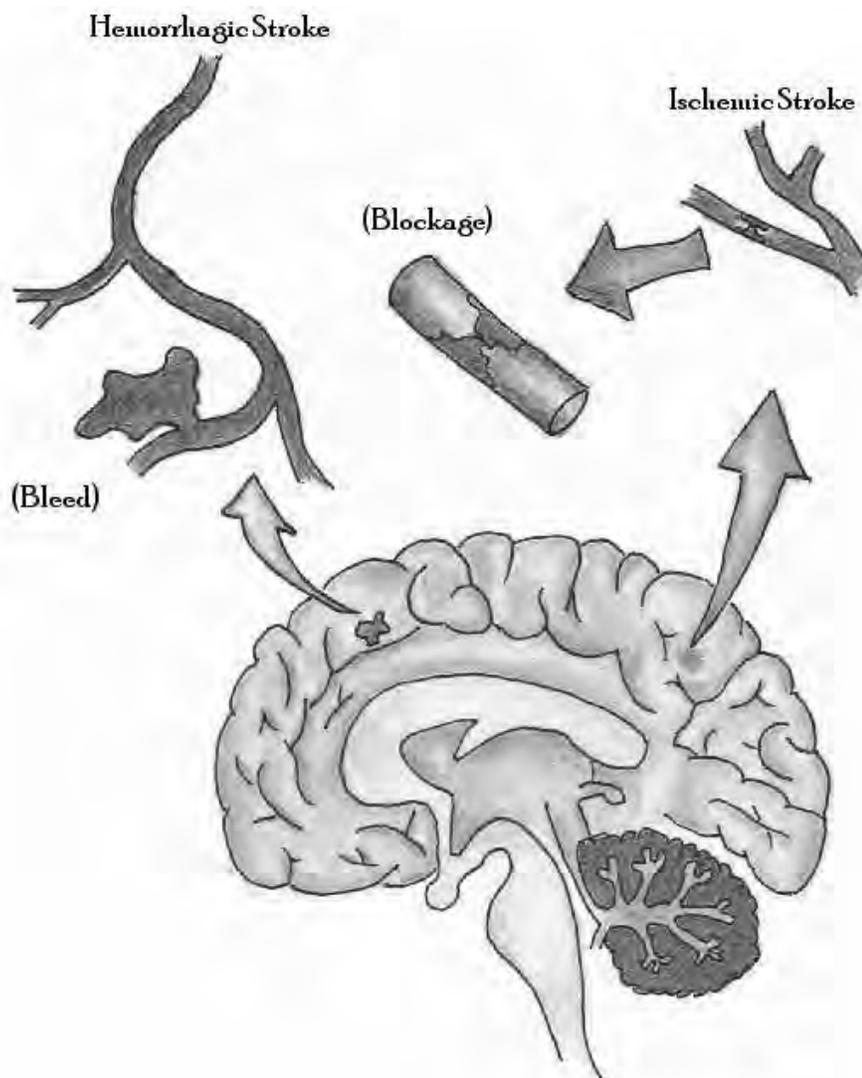
Types of Stroke

Ischemic Stroke

This is by far the most common cause of stroke. In ischemic stroke, a blood vessel becomes either partially or totally blocked by either a blood clot or debris. Depending on the size and location of the vessel, the effected area can be only a small part of the brain, or can extend to a very large area, becoming potentially fatal.

Hemorrhagic Stroke

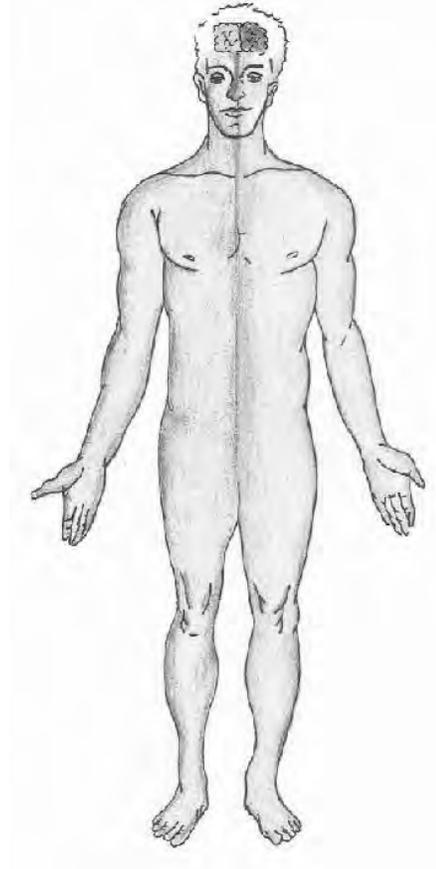
This occurs when a blood vessel ruptures and bleeds into the brain. Not only does this cause blood to be diverted from where it is needed, but the haemorrhaged blood disrupts the delicate chemical balance in the brain causing damage. As bleeding continues, the blood has nowhere to go, and intracranial pressure builds up causing further damage to the brain.



Signs and Symptoms

The most well known symptom of a stroke is **one-sided weakness or numbness**, and is generally on the opposite side of the body as the stroke (depending on which part of the brain is affected). The symptoms of a stroke are dependant on which part of the brain is affected, and include the following:

- Altered taste, smell, vision or hearing
- Drooping of eyelid (ptosis)
- Decreased reflexes
- Balance difficulties
- Altered breathing and heart rate
- Difficulties speaking or understanding (aphasia)
- Memory loss
- Confusion
- Headache
- Vomiting
- Loss of consciousness



How to Pick an Early Stroke

If a person notices any of the above symptoms (Can be different combinations of symptoms depending on the site involved), then there are 3 basic tasks you can get the casualty to perform

- Ask the casualty to smile
- Ask the casualty to raise both their arms, and to keep them raised
- Ask the casualty to repeat a simple sentence after you, (e.g. "The train was late today")

Difficulty performing any of these tasks may indicate an early stroke. If this is the case, prompt transportation to a hospital is necessary by either car or calling 000 / 112. With early diagnosis and intervention, the severity of the stroke can be drastically reduced, and the casualty's outcome can be improved.

Another way to remember strokes is that you should act **FAST**.

F – Facial drooping or weakness, generally 1-sided

A – Arm numbness or weakness, again 1-sided

S – Slurred speech, or difficulty talking or understanding

T – Time to call 000. Time is critical – the faster the casualty is properly diagnosed and treated, the much higher their chance at survival and less risk of permanent brain damage.

Management

The only management that can be achieved is to call 000 / 112 immediately if a stroke is suspected and to keep the casualty comfortable until the ambulance arrives. Do not leave the casualty unattended, as their condition may become worse very quickly. If the casualty becomes unconscious, follow DRSABCD. If the casualty stops breathing, begin CPR.

SEIZURES (EPILEPSY)

A seizure is a sudden interruption to the brain's normal function, when an abnormal level of electrical activity of the neurons takes place. They can manifest as an alteration in mental state, tremors, convulsions or psychiatric symptoms. Epilepsy is the term given to describe a condition where someone is predisposed to recurrent, unprovoked seizures; however anyone can have a seizure given the circumstances, not just people with epilepsy.

Causes of Seizures other than Epilepsy

- Head Injury
- Drug or alcohol intoxication
- Fever (febrile convulsions – see below)
- Tumour
- Certain prescribed drugs, such as some anti-depressants
- Infection
- Photosensitive epilepsy can be triggered by certain TV shows or video games
- Seizures during or shortly after pregnancy can be a symptom of eclampsia

Types of Seizures

Partial (Focal)

In partial seizures, the increased brain activity begins in or involves one part of the brain. The experienced seizure can vary greatly depending on the location within the brain. If simple, the seizure may be as small as a twitching of a limb or part thereof, or if complex may lead to confusion, memory loss and possible unconsciousness.

Generalised

The most recognised type of generalised seizure is the tonic-clonic convulsive seizure (previously referred to as grand mal). The casualty may become rigid and fall, or may cry out or bite their tongue initially. Breathing can become laboured and the casualty may become incontinent. After a generalised seizure, the casualty will most likely feel lethargic and confused, and may have a headache and need to rest.

Management

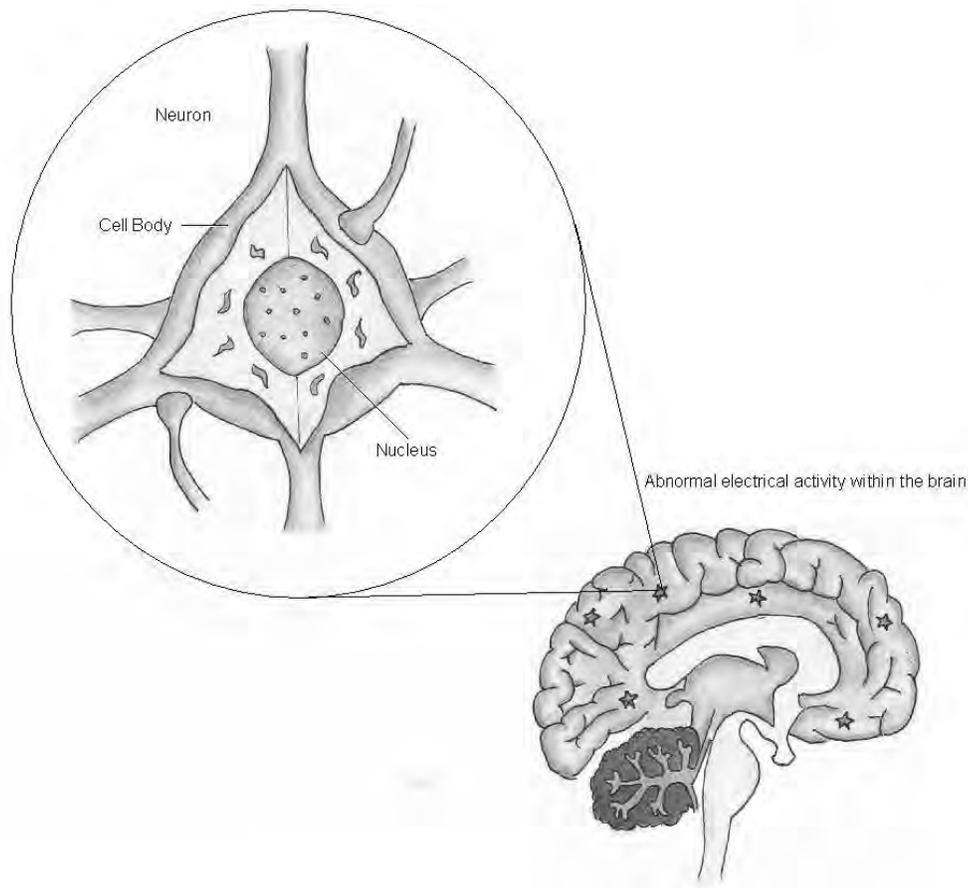
Most Important is to **stay calm**. Look at the time to see how long the seizure lasts for – the length is important as prolonged seizures **longer than 5 minutes** are a medical emergency and you will need to call an ambulance (unless they have a known history of long seizures). Move any bystanders away from the area, and move any objects out of the way which could injure the casualty. **DO NOT ATTEMPT TO RESTRAIN THE CASUALTY, AND DO NOT ATTEMPT TO PUT ANYTHING IN THEIR MOUTH.** If possible you can place something soft underneath their head and loosen any tight clothing. Be prepared to assist the casualty once the seizure stops.

Once the seizure has stopped, follow DRSABCD. If unconscious and breathing, roll the casualty into the recovery position. Wipe away any excess saliva with a tissue and check their airways to make sure there is nothing blocking them such as food or dentures etc. If the casualty has become incontinent, try and be sensitive to their embarrassment, and deal with this discreetly by covering them with a jacket or towel. Do not give them anything to eat or drink until they have fully recovered. They will likely be very tired, so let them rest it off, and stay with them for assurance

A convulsive seizure can be frightening, especially if you have not witnessed one before, and it can be very difficult to keep your wits about you. During the early phase of a seizure, it is not uncommon for the casualty to stop breathing temporarily and turn slightly blue. This looks especially frightening, but will subside once normal breathing continues later on. If the casualty has injured themselves during the seizure, attend their injuries once it has finished.

You need to contact medical assistance if:

- The casualty injures themselves badly in the seizure
- The casualty is having difficulty breathing after the seizure (this should be distinguished from normal laboured breathing because the casualty is puffed out)
- If a second seizure follows the first without any recovery time in-between.
- If the seizure lasts longer than 5 minutes (if the normal time is not known), or if the seizure lasts longer than usual (the casualty may have a bracelet or card in their wallet which outlines the usual time they last for)



Febrile Convulsions

Approximately 1 in every 30 children will experience a febrile convulsion, which is caused by a sudden increase in the child's body temperature, usually due to a fever from a viral or bacterial infection. The most common age group affected is between 6 months and 6 years. Although very frightening for parents, febrile convulsions do not cause brain damage and generally are not harmful to the child. Even very long convulsions lasting up to an hour almost never cause harm. It is important to **stay calm**, follow the above steps and reassure the child.

Management of febrile convulsions is the same as above. If the convulsions stop in less than 5 minutes then you should see your family doctor. If the child was very unwell prior to the convulsion, then you should see your doctor immediately (it is ok to drive the child as long as there is an accompanying adult to care for them during transport).

DO NOT put the child in a bath to cool them down as this can be extremely dangerous

DIABETES

Diabetes Mellitus is a metabolic disorder in which there is a higher than normal amount of sugar found within the blood (hyperglycemia). There are three main types – Type 1, Type 2 and gestational, all of which have similar symptoms but vary in the underlying cause. Type 1 is generally due to destruction of pancreatic beta cells which produce insulin. Type 2 involves resistance to insulin of body tissue. Gestational diabetes is not well understood, but its underlying cause is thought to be due to some abnormal interaction between foetal requirements and maternal metabolic controls.

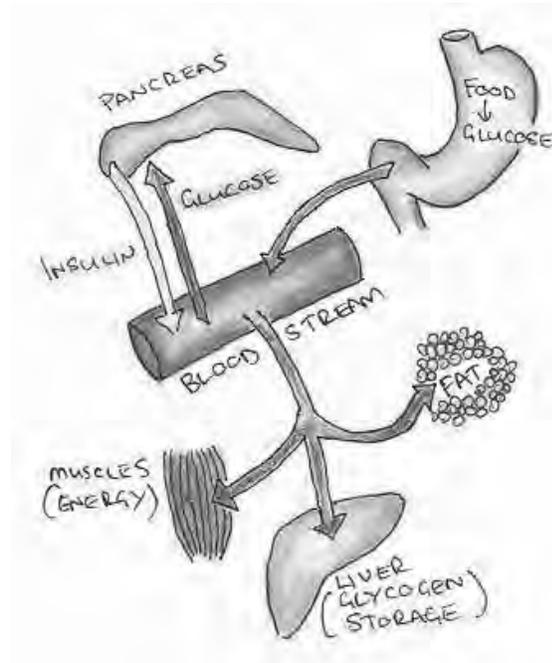
How to Recognise a Hypoglycaemic Attack (Low blood sugar)

There are many symptoms that can be associated with low blood sugar; the following is a shortlist of the more common ones:

- Mental confusion
- Headache
- Sweating
- Pale skin
- Mood swings, such as a temper outburst
- Heart palpitations
- Dizziness
- Trembling
- A craving for sweets
- May progress to unconsciousness

Risk Factors

- Genetic Factors
- Hypertension
- Alcohol
- Smoking
- Poor Diet
- Lack of Exercise



Management

First thing to do if a hypoglycaemic attack is suspected is to **offer the casualty sugar**. This ideally should be something that can be absorbed quickly such as jelly beans, soft drink (not diet) etc. You will be surprised how quickly this sugar will stabilise the casualty's condition. Once the casualty is feeling better, suggest a small meal (e.g. sandwich and milk), as this will help stabilize their blood sugar over a longer period of time. Further medical assistance should be sought in the case of uncontrolled diabetes.

If the casualty becomes unconscious, follow DRSABCD. Seek medical aid urgently. **DO NOT** attempt to feed an unconscious casualty sweet food by mouth, as this will only cause a significant risk to their airways and likely cause them to choke.

Hyperglycaemia (High blood sugar)

High blood sugar occurs generally in people with undiagnosed diabetes. The effect is a build up of toxins in the blood called ketoacidosis. This has a slow onset; however it can lead to unconsciousness if not managed.



Symptoms

The most common symptoms of undiagnosed diabetes are **excessive thirst, excessive urination**, and also an **increased appetite**.

Prolonged high blood glucose also alters the shape of the lens in the eye, and hence **blurred vision** can also be a symptom of undiagnosed diabetes. When ketoacidosis is present, the smell of acetone may be found to be present in the casualty's breath (this is a very sweet smell) as well as rapid, deep breathing, nausea, vomiting, abdominal pain and a state of altered consciousness.

Management

If the casualty presents with symptoms suggesting ketoacidosis, then a medical opinion should be advised immediately. Ketoacidosis is a medical emergency and prompt diagnosis and treatment is the only way to relieve the casualty's symptoms.

If the casualty is unconscious, then follow DRSABCD and call 000 / 112 for an ambulance.

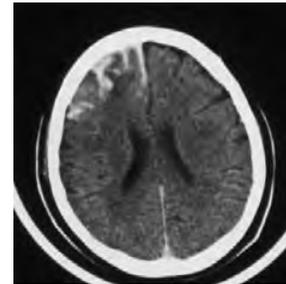
HEAD INJURIES

Head injuries are a common cause of hospitalisation, especially in children. These can occur from motor vehicle accidents, a fall or assault to an occupational accident or sporting injury. Regardless of the cause, head injuries can be serious and need to be properly assessed to ensure there is no underlying injury such as a concussion or haematoma. In the event of a serious head injury, the first aider should assess for signs of concussion such as by following the AVPU scale and asking the casualty relevant questions to ascertain their mental awareness. If the casualty becomes unconscious, DRSABCD should be followed, and bleeding from the skull should be controlled. If bleeding occurs from the ear, then the casualty should be placed in the **recovery position with the effected side down**, to allow blood to drain out of the skull. Any significant head trauma should be referred onto further medical aid to fully assess and monitor the casualty.

What to look out for

If someone sustains a blunt trauma to the head such as in the above circumstances, then they need to be assessed for an underlying injury. If the casualty experiences any of the following, then this can be an indication of a serious injury and an ambulance should be contacted ASAP.

- Any loss of consciousness
- Any change in the AVPU scale – such as becoming groggy or drowsy
- Blurred vision
- Headache
- Dizziness or vertigo
- Confusion or memory loss
- Seizures
- Bleeding from the ears, nose or mouth



If you notice any of the above, an ambulance should be contacted immediately. A serious head injury should not be taken lightly, even if the casualty insists they are fine. Even people without any noticeable signs or symptoms require close observation 12-24 hours after the event to ensure there is no delayed onset of symptoms.

Management

Any bleeding from the head should be controlled, being careful not to place pressure onto the skull if a fracture is suspected. If the skull feels 'spongy', then **DO NOT** place any direct pressure, but rather use pads and indirect pressure to control bleeding. The casualty should be closely monitored, and an ambulance called immediately. If the casualty becomes unconscious, then follow DRSABCD.

If the casualty has a haematoma (brain bruise), concussion or an internal bleed as a result of the trauma, then they can rapidly deteriorate to unconsciousness, and permanent disability or even death can be a possibility if not treated promptly.

SPINAL INJURIES

Spinal injuries should be suspected for all trauma victims. Recent evidence suggests that the risk of causing further injury due to pre-hospital first aid is less than initially thought, however caution is still strongly recommended when moving a victim with a suspected spinal injury.

Spinal injuries can occur in the neck (cervical spine), back of the chest (thoracic spine), lower back (lumbar spine) or a combination of these areas. The higher the injury the higher the danger, additionally cervical injuries are the most common accounting for more than half of all spinal injuries.

What to look out for

The most common causes of spinal injuries are:

- Motor vehicle accidents (car, bike, pedestrian)
- Workplace injuries (industrial accidents)
- Diving into shallow water
- Sporting injuries (e.g. football tackle, falling from horse, etc)
- Falling from a height, such as from a ladder or roof
- Head injuries
- Elderly people are more susceptible to injuries – a fall from standing height can be enough to cause fractures or spinal injuries

Signs and Symptoms

These can be difficult to detect, particularly if the victim is unconscious

- Weakness or inability to move limbs (paralysis)
- Altered or absent skin sensation, tingling, numbness
- Pain in spinal region
- Head / neck in abnormal position
- Loss of bladder control
- Breathing difficulties
- Signs and symptoms associated with head injuries

Management

Conscious casualty

If a spinal injury is suspected, call 000 immediately, reassure the victim and tell them to remain still (do not physically restrain the victim). Keep the victim comfortable until help arrives. If the victim is in danger (e.g. in water or on the road), their immediate safety is first priority and they should be moved carefully if they are at risk of further injury. Care should be taken when moving victims to minimise movement of the spine.

Unconscious Casualty

If the casualty is unconscious, management of airways takes precedence over any potential spinal injury. Follow DRSABCD. If you do need to adjust the victim's airways, use techniques which minimise movement of the cervical spine (neck).

If it is not necessary to move the victim, then they should be managed and stabilised until paramedics arrive. If the victim does need to be moved (i.e. they are in acute danger), care should be taken to ensure the alignment of the spine is maintained.



Methods of spinal immobilisation

In-line stabilisation

One first aider positions themselves above the head of the casualty, looking down towards the casualty's feet. From this position, the first aider can support the victim's head by locking their own elbows for stabilisation and holding onto the sides of the victim's head. Gently raising and placing padding under the head 2cm off the ground (in a supine position) can assist in keeping the neck in a neutral position.



Example of cervical injury management using cervical collar. Note paramedic to the right in the picture performing in-line stabilisation to prevent further injury.

Cervical collars

As can be seen above, these are used by trained personnel to stabilise a victim's neck. These should only be fitted by trained personnel as they need to be correctly sized and fitted.

Children

If a child is involved in a motor vehicle accident whilst in a child seat / capsule, they should ideally not be taken out of this unless they are in danger or unconscious. If it is possible to remove the infant seat / capsule with the child in it this is preferred. Reassure the child and attempt to keep them calm and still until assessed by a paramedic.

Tips when moving an unconscious casualty with a suspected spinal injury

The number 1 tip is to not move the casualty unless necessary (i.e. if they are conscious and the area is safe, instruct them to lie still and call 000). If it is necessary to move the casualty, the following should be followed:

- Obtain assistance if possible and have one person hold the casualty's head in a neutral position during movement.
- Handle the casualty gently and avoid any twisting or movement of the head, neck and torso
- Take particular care to maintain the same spinal alignment at all times during movement
- If the casualty is conscious, try and keep them calm and ask them to stay relaxed and to alert you of any areas of pain during movement. Areas of pain should be immobilised as best as possible when moving the casualty
- Call 000 as soon as possible. Medical assessment should be sought after any incident that may lead to spinal trauma.

CRUSH INJURIES

Crush injuries occur through a crushing force causing injury to a victim such as from vehicle entrapment, industrial incidents or a falling heavy object. Crushing injury to the head, neck, chest or abdomen can quickly lead to death from internal bleeding, respiratory failure or heart failure.



Comminuted fracture of the tibia and fibula following crush injury to lower leg from an industrial injury (trapped by forklift)

Management

- Quickly assess the area for dangers to first aiders or bystanders
- Call 000 immediately
- Crushing forces should be removed from the victim (if physically possible, and only if it is safe to do so).
- Follow DRSABCD
- Treat any bleeding as best as possible and try to keep the victim comfortable and warm
- Do not leave the victim unattended, if they have experienced a significant crushing force they should be closely and carefully monitored until the ambulance arrives
- Even if the victim appears fine and is not complaining of pain, they should be kept still, monitored and reassured until they can be assessed by paramedics. Internal injuries can be difficult to identify and may cause a sudden deterioration in the victim's condition

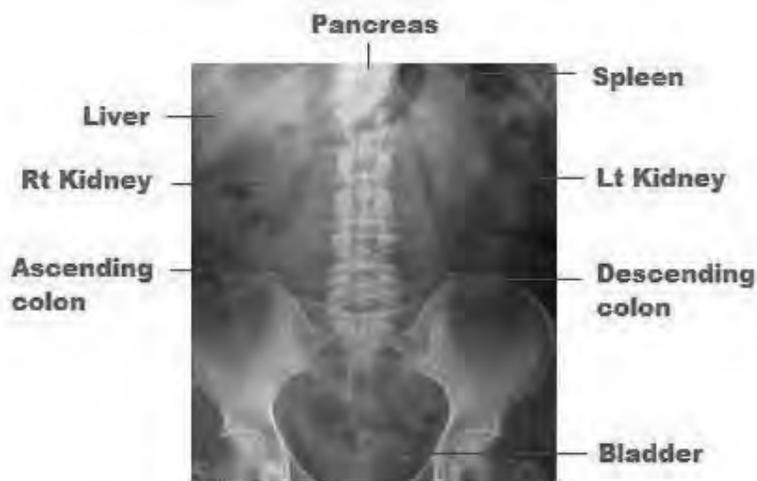
ABDOMINAL INJURIES

There are many types of causes of abdominal injury. Basic first aid principles should be followed depending on the type and cause of the injury, for example:

- For penetrating injury, follow guidelines in bleeding section (embedded object). Use doughnut bandage to avoid movement of the object and to control bleeding
- For trauma, call 000 and follow DRSABCD. Medical assessment should be obtained in any situation where a significant abdominal injury has been sustained
- For crush injury as above – remove any crushing forces and control the bleeding as best as possible
- If the injury is complicated and further symptoms develop, call 000 immediately and keep the casualty calm. Do not leave the casualty unattended.

Basically the best thing a first aider can do is to recognise a serious abdominal trauma and contact 000. The casualty should be monitored and if they become unconscious follow DRSABCD. Control any bleeding using light-moderate pressure (avoid placing firm pressure on the abdomen unless required to stop serious bleeding). Keep the casualty comfortable and warm and await assistance.

Locations of some major abdominal organs:



POISONING

A Poison is any substance that causes injury, illness or death. In terms of risk, it is estimated that up to 80% of all poisonings occur in the home, particularly in the kitchen or bathroom. Hence the old saying of 'precaution is better than cure' is very relevant. Some tips to reduce the risk of this occurring in your household are as follows:



- Properly label all potential poisons, and store them out of reach of children
- Correctly dispose of any unwanted / expired medications. Pharmaceuticals can be returned to a pharmacy for safe disposal
- Use non-poisonous alternatives to cleaning products / insecticides wherever possible
- Do not eat or drink near poisons
- Always follow directions of use, including recommended PPE when painting, cleaning, spraying, etc
- Choose poisonous substances available in child-resistant packaging
- It is also important to remember that child safety caps, although successful at decreasing the number of poisonings are not 100% effective, and still **should not** be left within reach of children.

Poisons can enter the body several ways, the most common being ingested (through the mouth). They can also enter the body by being inhaled, such as car or chlorine fumes. The third way is they can be absorbed through the skin, such as weedkiller or occupational chemicals. Most pharmaceuticals which are relatively safe when taken normally are poisonous in overdose.

Common poisons

- Paracetamol. This is the most common pharmaceutical overdose leading to hospital admission and a common cause of poisoning in children.
- Household products including glues, hair spray, aerosol paints, nail polish, petrol
- Household chemicals including dishwasher detergent
- Some varieties of fungi (such as certain mushrooms and toadstools)
- Cyanide

Signs and Symptoms

These can be very variable, as they depend on the nature of the poison.

- Difficulty breathing, wheezing or shortness of breath
- Burning in the throat and mouth
- Nausea
- Vomiting
- Altered mental state (including hyperactivity, drowsiness, confusion, headache)
- Unconsciousness, or even cardiac arrest

Management

The first step is to identify the suspected poison and ensure that it is not a danger to yourself or others.

- If industrial, farm or laboratory setting then always suspect particularly dangerous agents and take appropriate action to prevent accidental exposure (such as utilising appropriate PPE)
- If there are multiple casualties, then proceed with great caution – there is a high possibility of dangerous environmental contamination (such as fumes)

If safe to do so, attempt to separate the casualty from the substance

- If the poison is swallowed and the casualty is conscious, give them a sip of water to wash out their mouth. **DO NOT** ask them to swallow or attempt to make them vomit
- If inhaled, move the casualty to fresh air (only if safe to do so).
- If the poison enters the eye, flood the eye with running water (or saline if available). Continue for 15 minutes whilst holding the eyelid open
- If poisoned through the skin, remove the contaminated clothing if safe to do so. Take particular care to avoid coming into contact with the poison yourself. Flood the skin with running water and soap / rinse well

Once separated from the poison, contact the **Poisons Information Centre on 131126**. This is a 24 hour national hotline, and operators can instruct you on what to do. They will need to know what **type** of poison is involved, and approximately **how much** has been ingested/inhaled. Some poisons have specific antidotes – if possible, attempt to identify the poison (i.e. check for any nearby containers or bottles) as this will significantly assist diagnosis and treatment.

You will need to:

- Identify the poison
- **DO NOT** give anything by mouth to the casualty unless instructed
- **DO NOT** attempt to make the casualty vomit unless instructed to do so
- Call the Poisons Information Centre and follow their instructions
- While waiting, closely monitor the casualty – do not leave them unattended

Unconscious Casualty

If the casualty is unconscious following poisoning, then you should follow DRSABCD. Particular emphasis should be on the danger risk – ensure that there are no fumes or spilt chemicals that can pose a risk to yourself or others. If necessary, remove the casualty from the source of the exposure if safe to do so.

Before commencing resuscitation, remove any obvious contamination from around the casualty's mouth. If available, a self-inflating bag-valve mask should be used. Mouth-to-mouth should be avoided if inhaled poison is suspected (i.e. cyanide or organophosphate poisoning).

Call 000 / 112 for an ambulance and if there is a large spill involved, you will need to also alert the operator so the fire brigade can decontaminate the area effectively.

BODY TEMPERATURE

Normal body temperature is between 36 - 37.5 degrees Celsius. In normal circumstances, this remains fairly constant regardless of the temperature of our environment through a process called thermoregulation. The body has mechanisms that allow this temperature to be maintained such as:

- Sweat glands causes sweat production which evaporates and cools the skin
- Blood vessels dilate close to the skin surface, allowing heat to radiate out
- Constriction of blood vessels reduces loss of heat in cold temperature
- The body's shivering mechanism causes energy to be converted into heat
- Behavioural responses such as seeking shade or using a warm rug also assist in maintaining body temperature

In extreme heat or cold, the body's mechanisms can be insufficient to combat the difference in temperature, and subsequently the body's core temperature can fall outside of the normal range. When this occurs, conditions such as hypothermia (body temperature falls too low) or hyperthermia (body temperature is too high) can set in. The following is a list of temperature variation effects.

EFFECTS OF BODY TEMPERATURE VARIATION

TOO HOT

- 37° Normal Body temperature
- 38° Sweating, uncomfortable feeling
- 39° Severe sweating, skin becomes flushed and red. Exhaustion and possible convulsions, especially if the casualty is prone to seizures.
- 40° Fainting, weakness, vomiting, headache, dizziness, profuse sweating
- 41° Fainting, vomiting, severe headache, altered mental state, such as hallucinations, delirium and drowsiness. Breathlessness can occur. At this stage, this is a medical emergency
- 42° Casualty may become pale. Severe delirium, vomiting and seizures. Heart rate will become very fast, and casualty may collapse
- 43° Serious brain damage may occur, or even death. Shock and continuous convulsions may also occur. The casualty may go into cardiac arrest
- 44° (and above) Death is almost certain at this point

TOO COLD

- 37° Normal Body Temperature
- 36° Mild to moderate shivering, however this can be within normal limits
- 35° Intense shivering and numbness. Skin will become bluish/grey.
- 34° Severe shivering, loss of movement of fingers. Altered mental status may occur, including confusion
- 33° Shivering will progressively decrease and confusion will get worse. AVPU scale will be altered and casualty may become groggy. Heart rate will become slower and breathing will become shallow
- 32° Severe alteration in mental status will occur, including hallucinations, delirium. Sleepiness will increase, possibly even to unconsciousness. Shivering will stop.
- 31° Most likely unconscious. Heart rate will be very slow, and breathing very shallow
- 28° Casualty may appear dead. Cardiac arrest may take place
- 26° (or below) Generally death due to respiratory arrest will take place

HEAT EXPOSURE

Overexposure in the sun is a very common cause of injury due to excessive heat. When the temperature is too high for the body's cooling mechanisms to sufficiently cope, the body becomes stressed, and injury occurs. Heat cramps, heat exhaustion and heat stroke are three specific stages that the body undergoes during this time. The body's sweating mechanism causes a loss of water from the body, as well as the heat itself causing fluid to evaporate. This leads to dehydration if fluids aren't maintained when in a hot climate.

Heat Cramps

Heat cramps can be extremely painful, and can occur anywhere in the body such as the arms, legs, back and abdomen. Dehydration or excessive exercise can exacerbate the problem. Generally, a casualty will present with signs of heat exhaustion as well as the cramps. Management involves predominantly treating the heat exhaustion, by:

- Moving casualty to a cool, shaded area and recommend they lie down
- Encourage clear fluid intake such as water
- Sports drinks are also useful as they contain electrolytes, which are lost as the body sweats
- Remember, small sips initially are preferable, as if the casualty is very dehydrated or in shock, they may vomit all the fluids up if they drink too fast.
- A cool, wet towel can be placed across the casualty's forehead
- Remove any excessive clothes such as jackets or heavy tops
- Cramps are ideally treated by stretching the area involved – massaging **is not** recommended.
- Cold packs can be used specifically on the affected area for a maximum of 20 minutes at a time
- Call an ambulance if not quickly improving

Heat Exhaustion

Heat exhaustion occurs as the casualty's body temperature increases, and can lead to heat stroke. Heat exhaustion can occur very quickly, especially if the casualty has been over-exerting themselves such as working or exercising in the heat. Signs to look out for include:

- Profuse sweating
- Rapid, weak heartbeat
- Feeling faint
- Nausea
- Heat cramps

Treatment is as above. Again, remember to encourage small sips of water initially – the casualty will be very thirsty and the temptation is to offer fluids as quickly as they can drink them. This can cause more harm than good if vomiting occurs.

Heat Stroke

Heat stroke is a medical emergency, as it occurs generally when the body temperature has reached 40 degrees or above. Symptoms include:

- Headache
- Nausea or vomiting
- Altered mental state – grogginess, confusion, dizziness etc
- As temperature increases, their mental state will be increasingly effected, and unconsciousness can occur

Management is as above, and includes moving the casualty to a cool area, introducing fluids slowly, using water or a damp towel to help cool them. Heat stroke is a medical emergency, and in addition to these steps, the following steps should be taken:

- Call for an ambulance
- Remove further clothing such as shoes and socks, even jeans (it is not necessary to remove underwear)
- If available, apply ice packs or cool packs directly to the casualty's armpits and groin (These areas include the major blood vessels of the upper and lower limbs and hence will increase the rate of cooling)
- Seek medical assistance ASAP. If the casualty is suffering an altered AVPU scale, then call 000 / 112 immediately.
- If the casualty becomes unconscious, follow DRSABCD. **Do not** attempt to administer fluids if the casualty is unconscious

Some Useful differences between Heat Exhaustion and Heat Stroke are as follows:

Heat Exhaustion

Skin moist and clammy
Pupils dilated
Body temperature normal

Heat Stroke

Skin hot and dry
Pupils constricted
Body temperature significantly raised



Remember to keep safe in the sun

- Drink plenty of water
- Wear protective clothing – a hat, T-shirt, sunglasses
- Wear sunscreen, and remember to reapply
- Take breaks – don't go overboard if the temperature is too hot
- Be sensible in the sun

COLD EXPOSURE

It does not have to be freezing for cold exposure to develop. Wind and moisture such as during humid weather or in the rain can also both rapidly decrease the body's temperature. Particularly young or old people can be more susceptible to the cold, as can people in poor physical shape. It is important to be able to recognize the symptoms of hypothermia, particularly the changes that occur as the body's temperature decreases.

Mild Hypothermia

- Uncontrollable shivering
- Numbness of fingers and hands
- Loss of function of extremities
- Skin may become bluish/grey

Management of mild hypothermia includes moving the casualty to a warmer location, giving them a hot drink, removing any wet clothing and encouraging physical activity to increase body temperature. Heat packs or hot water bottles can also be used to assist this process.

Severe Hypothermia

- Decrease and then loss of shivering altogether
- Altered mental status – disorientation, grogginess, confusion etc
- Decreased pulse and respiration rate
- May lead to unconsciousness

Management of severe hypothermia is to attempt to warm the casualty's body temperature as quickly as possible, and contact urgent medical aid. This is a medical emergency, and should be treated as such.

- Contact an ambulance on 000 / 112
- If in a remote location, then do your best to warm the casualty
- Remove all wet clothing
- Place casualty in a dry sleeping bag or blanket
- Use either body heat or another heat source to increase their body temperature
- Hot packs can be applied directly to the casualty's groin and armpits
- In severe hypothermia, **DO NOT** give the casualty hot drinks – this will only serve to draw blood and heat from vital organs to the stomach
- If frostbite has occurred, **DO NOT** attempt to rub warmth into the effected area, as this can cause severe injury to the already damaged tissues
- If unconscious, follow DRSABCD
- Never attempt to place a casualty in a vertical (standing) position if they are experiencing hypothermia, this can cause a rapid change in blood pressure and may lead very promptly to death. Keep them horizontal at all times.

Respiratory Distress

There are many causes of acute ineffective breathing, including:

- Upper airway obstruction
- Problems affecting the lungs
- Drowning or near drowning
- Asthma
- Suffocation
- Damage to breathing control centre of the brain
- Multiple other conditions will result in respiratory distress as symptoms progress

In any situation where a casualty is unconscious and not breathing effectively, follow DRSABCD and perform CPR.

Specific treatments for conditions causing respiratory distress:

There are specific treatments for the following causes of respiratory distress (Please refer to the appropriate sections in this text for first aid directions for these causes of respiratory distress):

- Asthma (will also often be accompanied by wheezing)
- Airway obstruction (casualty may be distressed and clutching at throat)
- Cardiac arrest (accompanied by symptoms such as chest pain)
- Anaphylaxis (after exposure to allergen, may be accompanied by hives and extreme anxiety)

Drowning

Drowning is the process of experiencing respiratory impairment from immersion in liquid. Treatment of a casualty who has been rescued from drowning and is unconscious involves following DRSABCD. The very first step is to place the casualty on their side during the checking / assessment stages of DRSABCD, including checking for breathing (if possible). If the casualty is unconscious and not breathing, then lay the casualty on their back and commence CPR.

Specific problems relating to treatment of drowning casualty

Swimming ability of rescuer

It is critical to ensure that you do not overestimate your own abilities when attempting to save a casualty who is drowning. Unnecessary drownings occur each year due to people attempting rescues beyond their capabilities.

In-water resuscitation

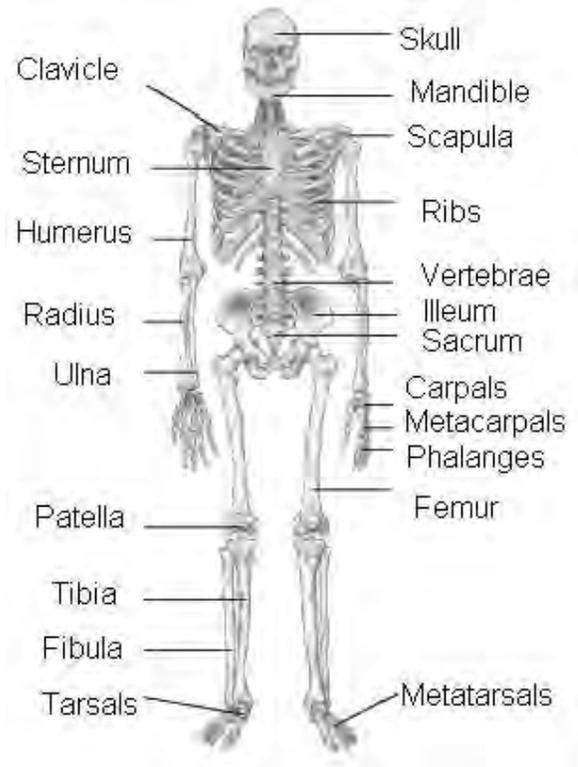
Ideally, the casualty should be removed from the water as soon as possible for treatment. If this is not possible, then expired air resuscitation (EAR) may be attempted by a trained rescuer with appropriate floatation devices

Vomiting / regurgitation

This is a possibility whenever CPR is performed, however due to inhalation of water during drowning; it is much more likely to occur in this situation. Laying the casualty on their side during initial assessment will assist in reducing this risk during CPR. If the casualty does vomit / regurgitate during CPR, immediately roll them onto their side, clear the airways, reassess DRSABCD and continue CPR if necessary.

THE MUSCULOSKELETAL SYSTEM

The musculoskeletal system is a term used to describe the bones, as well as the adjoining ligaments, tendons and muscles. The following introduction section should be read to get an overview of the names and locations of different bones; however you are not expected to demonstrate a complete knowledge of all the bones listed. It is recommended for your own benefit that you become well acquainted with the following section, as it will assist you in understanding medical terminology, and give you a greater knowledge base as a first-aider in which to understand and communicate effectively.



The skeleton can be divided into 2 main parts – the axial and appendicular skeleton. The axial skeleton refers to the spine (vertebrae), skull and ribs. The appendicular skeleton refers to the bones of the upper and lower limbs as well as the pelvic girdle.

Upper Limb Bones

Medically, the term arm refers to the part of your arm that lies between your shoulder and elbow. The bone in the arm is called the **humerus**. The length of your arm below your elbow is actually termed the forearm, which includes the **radius** (the bone on the thumb side of the arm) and **ulna** (the bone on the side of your little finger). The bones in the wrist are called **carpal** bones (there are 8). In the hand, the next group of bones which are between your wrist and fingers are called the **metacarpals**. The fingers (as well as toes) are referred to as **digits**, and the bones in the digits are called **phalanges** (singular = phalanx).

Lower Limb Bones

The part of the leg that lies between your hip and knee is called the **thigh**, and the bone commonly known as the 'thigh-bone' is called the **femur**. It can be confusing to note that whilst the term arm refers to the 'upper' part of your arm, the term leg medically refers to the part of the leg between your knee and ankle. The leg contains the **tibia** (the bone on the inside of your leg) and the **fibula** (the bone on the outside). The correct term for the kneecap is the **patella**. The main bone in the ankle which connects to the leg is called the talus. Your heel bone is called the **calcaneum**. The bones in the part of the foot closest to the ankle are called **tarsals**, the longer bones of the forefoot are called

metatarsals, and the toes are **digits** with the toe bones being called **phalanges** (Note the foot terminology is very similar to the hand).

The bones of the skeleton have 4 main functions:

1. To give shape to the body
2. To produce blood cells
3. Support muscles to allow movement
4. Protect vital organs

The following is a brief list outlining some of the specific medical terms relating to different commonly known names for bones. Again, you do not need to memorize this list, but it is recommended that you read through it so you recognise these terms.

Basic Name	Medical Name
Collar Bone	Clavicle
Shoulder Blade	Scapula
Chest Bone	Sternum
Neck	Cervical Spine (There are 7 cervical vertebrae)
Upper Back	Thoracic Spine (There are 12 Thoracic)
Lower Back	Lumbar Spine (There are 5 Lumbar)
Tail Bone	Coccyx
Chest	Thorax
Tummy	Abdomen
Upper Arm	Humerus
Fingers/Toes	Phalanges
Kneecap	Patella
Heel	Calcaneum
Wrist Bones	Carpal Bones
Thighbone	Femur
Nose Bone	Nasal Septum
Adam's Apple Bone	Hyoid

The levels of the spine are referred to by their area and level, such as C5, or L2. C5 refers to the 5th cervical vertebra. L2 refers to the 2nd lumbar vertebra. The disc spaces are named according to the levels they lie between, for example C7/T1 is the disc between the 7th cervical vertebra and the 1st thoracic vertebra.

FRACTURES

Ever heard this? "Phew, they told me I had a fracture – I was sure I had broken it"

A fracture is the medical term used to describe any break in the cortical surface of a bone. It should be clarified that a break and a fracture are the same thing – a break is not worse than a fracture as is sometimes thought, but rather it is the non-medical equivalent term to fracture. A fracture (or break) can be as small as a tiny chip off a bone, to a complete fracture in which the bone fragments separate and the limb appears deformed. Fractures can occur through a variety of mechanisms, such as a direct blow to a bone (like in a motor vehicle accident or being punched in the face), or indirectly, such as when someone falls forward onto their hand, but in doing so fractures their clavicle due to the force of the fall travelling up the arm to the weakest point. The force does not have to be due to a direct blow - a severe twisting motion or muscular contraction can cause excessive force on a bone or joint and also cause a fracture.

Types of Fractures

The severity of a fracture depends on the force of the trauma and the flexibility and strength of the bone. A simple trip on a crack in the sidewalk concrete can cause an elderly lady with osteoporosis to severely fracture her hip (most commonly the femoral neck). A young, healthy person would most likely get up and walk away uninjured from the same trauma, with only some embarrassment. Obviously as the force of the trauma becomes greater, so does the risk and severity of the fracture.

Another common misconception is that if you can move the injured limb, it can't be broken. This is incorrect, as you can still have almost full use of a limb with a small fracture. Generally there is some degree of loss or difficulty in moving a fractured bone, but the lack of this does not exclude a fracture.

There are numerous different medical classifications of fractures, however in a first-aid sense, there are 3 main types that you should be aware of are:

- Closed fracture
- Open Fracture
- Complicated fracture

A **closed fracture** refers to a break with no penetration through the skin. This is the simplest type of fracture.

If there is penetration of the bone through the skin (e.g. a bone sticking out of a casualty's arm) then this is an **open fracture**. These fractures have a greatly increased chance of infection to both the wound and the bone.

A **complicated fracture** refers to any fracture that has caused additional complications to organs. A fractured rib can be a simple closed fracture, but if it punctures the lung or an abdominal organ such as the spleen, then this becomes complicated as there are secondary injuries which can be extremely severe.

How to pick a fracture

It can be very difficult to distinguish between a bad sprain and a fracture. If there is any doubt, then treat the injury as if it is fractured. Clinical diagnosis can be hindered by excessive swelling, and the use of x-rays or other diagnostic imaging modalities like CT or MRI may be necessary to definitively diagnose a fracture. There are however some signs and symptoms to look out for. Not all of these listed are specific to fractures, but a combination of the following may indicate a fracture

- A loud snap or crack heard by yourself or the casualty.
- An obvious deformity will most likely indicate a fracture.
- A shortening of the injured limb.
- Loss of movement, or extreme pain on movement or when touching the area.
- Unable to put weight on an injured leg.
- The amount of swelling is not always an indication of the severity of the injury, however it should be assumed that when there is significant swelling, there is an underlying injury.



It can be very difficult to judge the extent of an injury based purely on the level of pain indicated by the casualty. In some cases, a person can walk away with a fractured ankle, whereas in other cases a casualty may be hysterical in pain with no significant damage to the part. In any event, if a fracture is suspected, then prompt, correct first aid can prevent further injury and assist healing, as well as help reduce pain by immobilisation.

Fracture treatment.

First aid of a suspected fracture involves 3 basic principles.

- Immobilisation, support and elevation of the injured part
- Assessing and treating the casualty's condition – e.g. for shock, bleeding or other injuries.
- Obtaining a prompt medical opinion for diagnosis and further treatment

Immobilisation is essential when treating a suspected fracture. This can be done using many methods, and depends on the location of the injury, the materials on hand and the casualty themselves. Immobilisation can be achieved by using a splint, such as a length of wood, or a sling, or even by having the casualty hold their own arm or hand. Movement of a fracture can cause significant damage, such as injury to blood vessels, nerves or abdominal organs, which can potentially cause irreversible damage to the limb. Not only this, but movement of a fracture can further displace it, and mean much more difficult treatment – even surgery.

Elevation of the part cannot always be achieved, but when possible is useful in reducing blood flow to the injured area, and hence reducing bleeding and swelling.

Fractures can be extremely painful, and can put a casualty into shock due to the injury itself and the pain. You should **assess the casualty** using a holistic approach, by which refers to the casualty's general condition and their state of mind. You may need to lie the casualty down and call an ambulance if they are in significant pain and going into shock. In this situation, you should do your best to calm the casualty down and ensure that the injured part is well stabilised to reduce further pain.

If a fracture is left untreated for any significant length of time, then there is a risk that it can start to set in an incorrect position and cause possible chronic pain and possible disability of the part. Depending on the severity of the fracture, an orthopaedic opinion may be necessary. **A prompt medical opinion** will ensure that the fracture is properly diagnosed and treated effectively to optimise healing of the bone.

Fracture Healing

There are numerous considerations that affect the length of time a fracture takes to heal. These include the severity and nature of the fracture, the location, general health of the casualty etc. In general terms, it takes approximately 5 weeks or so for the bone to fuse. Even after 5 weeks, the bone is still weakened, and care should be taken not to put too much pressure on the part. It may be another month or two before the bone and the adjoining muscles regains most of their strength. Rehabilitation may be necessary to assist the strengthening of the muscles, which may include specific exercises. Care should be taken not to try and put too much pressure on the bone too early.

Tips for First Aid:

- NEVER attempt to reposition a deformity
- If the limb appears to be numb, or appears pale or blue, then this could signify damage to the blood supply. This is a medical emergency, and you should call 000 / 112 immediately.
- Although an obvious statement, you should handle the injured part carefully. Careless handling of a fractured limb can cause extreme pain and send the casualty into shock.



SPRAINS & STRAINS

A **sprain** is an injury to ligaments, caused by a very sudden overstretching of a joint. There are 4 degrees of a sprain, ranging from a minor tear to a complete rupture. Diagnosis can be achieved through ultrasound or optimally by MRI.

A **strain** refers to an injury to a muscle and/or adjoining tendons. The mechanism of injury and diagnosis tools are similar to that of a sprain. As you can see below, the symptoms are also quite similar.

A sprain or strain usually occurs during sporting activities; however it can occur even while getting out of bed. If a tendon or ligament that is stiff for any reason has a sudden, strong stretching force applied to it, it may overstretch or tear. The most common causes include rolled ankles, whiplash (this is a sprain and strain), falling onto an outstretched hand or a sudden twisting action of the knee.

Signs and Symptoms

Sprain

- Pain
- Swelling
- Bruising
- Instability
- Loss of function of the joint

Strain

- Pain
- Swelling
- Cramping
- Muscle Spasms
- May hear a snapping sound



Treatment

R

Rest. Resting the injured part will encourage healing and prevent further injury. It can be difficult to convince someone to keep off their injured ankle, but it should be stressed that resting the part for a few days can drastically improve healing time in the long term.

I

Ice. Apply for 20 minutes maximum at a time. Never apply ice directly to the skin, but rather wrap it in a towel or t-shirt. The ice will cause blood vessels to constrict and hence help reduce the swelling to the area

C

Compression. A crepe bandage should be applied moderately tight to help reduce the swelling. Be careful not to apply too tight, as this can cut off the blood supply excessively. Assess to ensure there is no numbness or tingling of the limb, and that it is not excessively painful.

E

Elevation. This again helps to reduce swelling by firstly making it more difficult for blood to travel to the part, and secondly helping fluids to drain away from the injured area.

In addition to the RICE routine, there are also factors that can hinder healing or even cause further injury. The following should be avoided, as they can cause HARM:

H

Heat. This has the opposite effect to cold as it causes blood vessels to dilate, which increases swelling. Heat should not be applied for the first 48 hours following an injury

A

Alcohol. This also causes dilation of blood vessels, and hence increases the swelling of the injured area.

R

Running/Exercise. Just like bones, ligaments and tendons need time to heal and recover their strength. Attempting physical activity involving the part too early can not only delay the healing time, but re-injure or further injure the part.

M

Massage. Although this can be beneficial for longstanding ailments, it should not be performed to the injured part in the first 48 hours following the injury. Massage will increase blood flow to the area.

DISLOCATIONS

A dislocation involves the bones of a joint being displaced from their normal position. Generally, this is caused by a sudden trauma directly to a joint such as the shoulder or finger joints. As the bones move out of position, the attached ligaments are also overstretched and hence a strain can also commonly accompany a dislocation. Some people are prone to dislocations, however in most situations; they are caused by a moderate to severe trauma.

A casualty with a dislocation will present with the symptoms of a strain (see previous section), but will also have a **deformity** of a joint, and **loss of movement**.

A first-aider should **NEVER** attempt to re-position the joint – some GP's won't even attempt this. A trained, experienced emergency specialist will utilise x-rays to characterise a dislocation, and then use specific techniques to minimise the dislocation. These steps minimise the chance of causing further injury while reducing the dislocation.



Management

- Sit the casualty down, and make them as comfortable as possible
- Support the injured limb in a comfortable position
- If it is a finger, wrist, ankle etc dislocation, attempt to elevate the entire limb, but only if you can manage this without moving the joint.
- Ice packs can be applied to the area to help reduce swelling. Reducing the swelling will assist reduction
- Get medical assistance ASAP. The longer the joint is out of place, the more likely that significant injury to blood vessels and nerves can take place.

Joint Space



Femoral Head

BITES AND STINGS

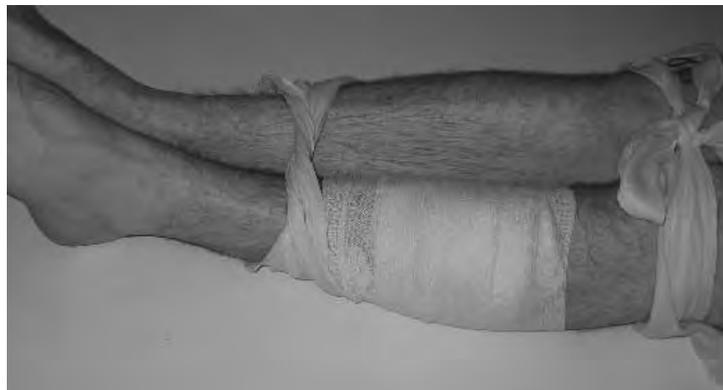
Bites and stings from certain creatures can be potentially dangerous, and Australia has no shortage of such creatures. There are many different varieties of snakes, spiders and jellyfish which carry venom that can cause pain and swelling, and in extreme cases, death (most commonly through neurotoxic muscle paralysis causing breathing failure). Other insect bites can be potentially fatal when a person is allergic to the insect, such as with bee stings.

It can be difficult when faced with a situation to remember how to specifically treat each individual sting or bite. It may be difficult to identify a snake bite as they are not always accompanied by the common 'vampire / fang mark' and may be a single mark or a scratch only. The following basic principles should be studied carefully as they apply to most bites and stings.

Snake Bites – First Aid:

- **Identify** the snake, or at least try and see what it looks like.
Positive identification can assist medical staff in administering the correct anti-venom. Polyvalent venoms can be used when the snake is not known, however snake-specific venoms are still recommended.
- **Pressure** - Apply a pressure bandage to the area
Start by bandaging over the wound (use the same tightness as you would a sprained ankle), then continue bandaging up the limb towards the torso. It is also recommended that a pressure bandage be used when the bite is located on the chest or abdomen.
- **Immobilisation** – Apply a splint or sling
Use any materials on hand to achieve immobilisation. Any movement can cause venom to spread through the body. If possible, do not attempt to move the casualty, but rather seek to bring aid to them. Venom is primarily transported through the body via the lymphatic system which is activated primarily through muscle movement. It is therefore crucial to calm the casualty and prevent movement through the use of the pressure-immobilisation technique.
- **DO NOT** attempt to cut, suck or apply a tourniquet.
These out-dated methods can cause more damage than they prevent.
- **DO NOT** attempt to catch or kill the snake
- **DO NOT** wash the area of the bite
Venom identification kits can be used by emergency staff to identify the snake bite from the area of the wound. Washing the area will only serve to remove this information and will not reduce the venom injected into the casualty.

Statistically, only 1 in 20 snake bites require emergency treatment, however if in doubt, an ambulance should be contacted and a medical opinion should be obtained.



Symptoms that would indicate the need to call an ambulance immediately include:

- Headache is an important symptom to look out for
- Altered mental status – including confusion, irritation, or even unconsciousness
- Abdominal pain
- Hypertension
- Respiratory weakness / difficulty breathing
- Muscle paralysis. This generally takes around 3 hours to develop, and may effect the lungs and send the casualty in respiratory arrest

Occasionally, a casualty may not even know they have been stung. If you are in a high-risk area for snake bites, such as the bush and the casualty complains of any of the above symptoms, a snake bite should be suspected and investigated. Sometimes, it can be only a scratch or laceration over a leg or arm. There will also be probable local swelling and redness. The bite site most of the time will have no pain. You should take care to firstly rest the casualty, and reassure them as best as possible while you investigate for a possible snake bite. If found, follow the pressure-immobilisation approach ASAP and attempt to get emergency medical assistance.

Spider Bites:

Of the numerous species of spiders found in Australia, only two are capable of causing death – the funnel web (including their related atrax species) and the red back spiders. It can be difficult to identify a funnel-web, so any bite from a big, black spider should be considered potentially dangerous. The last confirmed death caused by a spider bite occurred in 1979, hence with current-day anti-venoms, spider bites can be easily treated successfully. Both the funnel web and red-back spiders have specific anti-venoms available, and are administered by emergency staff when there are signs of a life-threatening bite.

First Aid

Funnel Web (or suspected funnel web)

- Treat as a snake bite – use Pressure and Immobilisation
- ONLY IF SAFE TO DO SO, trap the spider so it can be used for identification
- Keep the casualty calm, and ensure that they rest
- Call 000 / 112 immediately for an ambulance

Red Back

- Use the **RICE** method to help reduce swelling and pain
- If it is definitely a red back, you can wash the wound to remove excess venom
- These are generally not fatal, however the casualty should be directed to obtain a medical opinion
- If pain is persistent, or the casualty experiences headache, nausea, vomiting, altered AVPU, then they should be taken to hospital, or call 000 / 112 for an ambulance

STINGS

Single stings from a bee, ant or wasp whilst painful, generally do not cause serious injury unless the victim is allergic to the sting. If symptoms of anaphylaxis occur, then this is a medical emergency and should be treated accordingly (see section on anaphylaxis).

Most stings should be treated as per the RICE method with a cold compress. Bees have a unique sting, as they leave their barb behind. Trying to pull it out will cause more venom to be injected into the casualty, hence you should use a fingernail to scratch out the barb using a sideways motion, then treat using the RICE method. Follow DRSABCD

COMMON CREATURES THAT CAUSE BITES AND STINGS:

It can be difficult when faced with a situation to remember how to specifically treat each individual sting or bite. It may be difficult to identify a snake bite as they are not always accompanied by the common 'vampire / fang mark' and may be a single mark or a scratch only. The following basic principles should be studied carefully as they apply to most bites and stings.

BEE - RED BACK SPIDER - WASP	
	<p>BEE STING - Bee stings (barb) are usually left behind in the skin with the venom sac attached. It should be removed promptly by brushing or scraping sideways.</p> <p>Basic Treatment: Never pull or squeeze the sting out as more venom will be injected. Apply ice to reduce the swelling and to ease the pain (do not apply ice to the eye area). Seek medical attention straight away if an allergic reaction occurs, or if the person has received multiple stings.</p>
	<p>RED BACK SPIDER - The red back spider is found throughout Australia. The female red back spider has a red/ orange stripe on its back while the male is very small, usually with no stripe and is harmless. A red back spider bite may result in pain, redness and sweating at the bite site</p> <p>Basic Treatment: Wash the area and keep it clean. Seek advice from the Poisons Information Centre or your local doctor. If severe pain occurs, the patient needs to be taken to the nearest hospital.</p>
	<p>WASP - The European wasp can sting several times, because unlike the bee, it does not leave its sting behind in the skin. It is attracted to meat that is being cooked, sweet drinks etc</p> <p>Basic Treatment: Clean the affected area with soap and warm water. Use a cold pack to reduce swelling and pain. Use pain-relief medication and creams. Be alert for signs of anaphylaxis (see Severe allergic reactions above). Prolonged swelling at the site of the sting may respond to antihistamines – see your chemist for further advice.</p>

SNAKES - FUNNEL WEB - BLUE RING OCTOPUS BOX JELLYFISH - BLUE BOTTLE JELLYFISH	
	<p>SNAKE BITE - Many snakes are quite harmless to people, those, which are dangerous will usually only bite to protect themselves. Most bites occur on the ankle or lower leg.</p> <p>Basic Treatment: Apply a broad, firm bandage around the limb to cover the bite immediately. If the bite is not on a limb apply firm local pressure. Keep the limb as still as possible. Make a splint made out of any firm object. Keep the person still and do not move them from their position. Try to notice the colour and markings on the snake but do not try to handle it. DO NOT wash the bitten area as the venom on the skin may be used to identify the snake.</p>
	<p>FUNNEL WEB - This spider is large and black. A bite from this spider can be very dangerous. A bite will usually cause severe pain, sweating, nausea and vomiting, difficulty in breathing, muscle twitching and confusion.</p> <p>Basic Treatment: Apply a very firm bandage around the bite and then bandage the whole limb. Use a splint to keep the whole limb still (that is, immobilise the affected limb). Call an ambulance (000) to take the person to the nearest hospital. – DO NOT REMOVE THE BANDAGE</p>

	<p>BLUE RING OCTOPUS - The Blue Ring Octopus is small but very dangerous. At first there is no pain, but within minutes the victim may be unable to breathe, and become paralysed.</p> <p>Basic Treatment: Apply a firm bandage to the bite, and the whole limb. Apply firm pressure if the bite is not on a limb. Take the patient to a hospital as quickly as possible. If the person stops breathing, they will need cardio-pulmonary resuscitation (CPR).</p>
	<p>BOX JELLYFISH - The Box Jellyfish may give a fatal sting through venomous tentacles.</p> <p>Basic Treatment: If stung, flood the affected area with household vinegar and observe DRSABCD.</p>
	<p>BLUE BOTTLE JELLYFISH - Most stings are painful. Allergic reactions are possible. A rash may occur. Blue bottle stings leave a whip-like, red, wavy line on the skin from the tentacle.</p> <p>Basic Treatment: Clear away the tentacles. Immerse in hot water for 20 minutes for pain relief. First check that the water temperature is not too hot. Seek medical advice if pain continues.</p>

Pressure-immobilisation technique summary:

Recommended for the following bites and stings:

- All venomous snakes
- Funnel web spiders
- Blue-ringed octopus and cone shell

Not recommended for:

- Spiders other than funnel web
- Jellyfish or fish stings
- Scorpion, centipede or beetle stings

Basic technique:

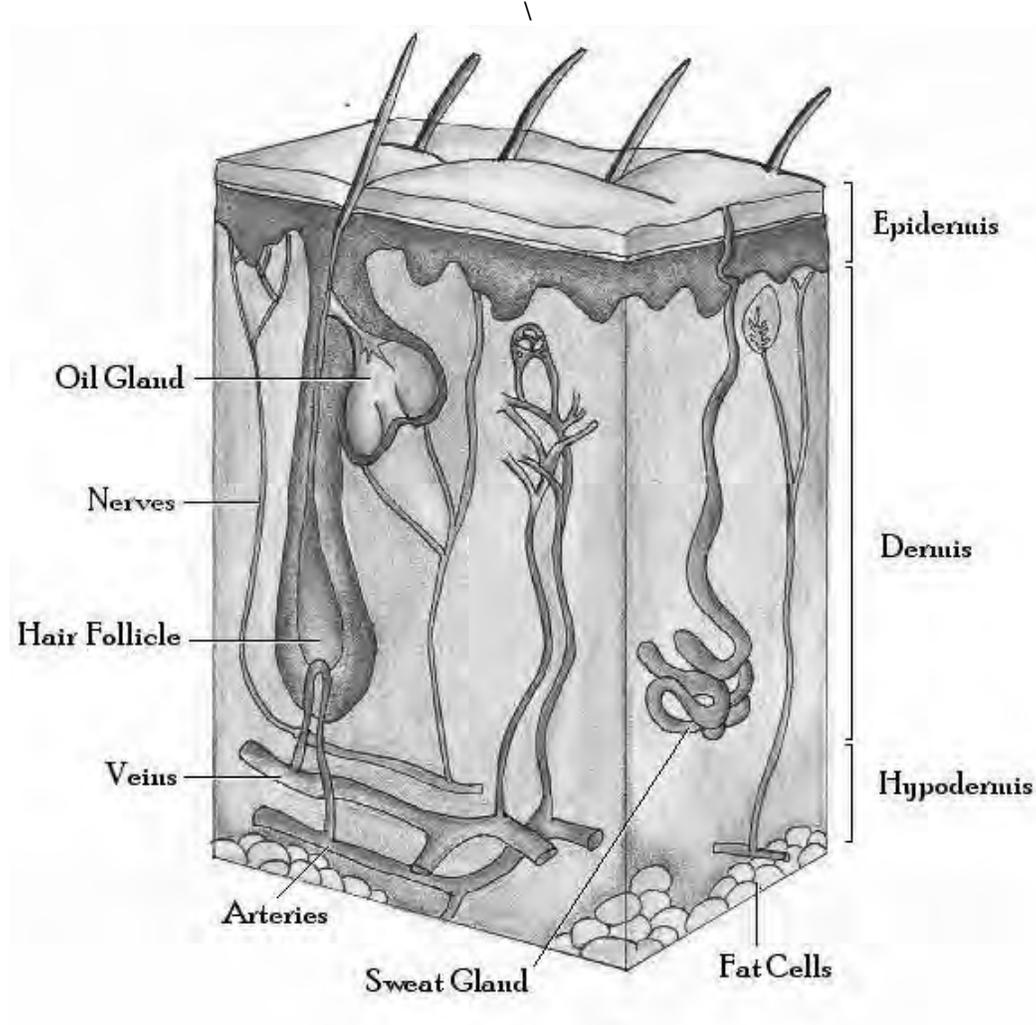
- Ideally use a broad pressure bandage (elasticised bandages are preferred over crepe bandages). If bandages are unavailable, anything can be used however, such as clothing, tea towels etc.
- Start by applying local pressure over the wound
- Bandage should be firm and tight (i.e. tight enough to prevent easily sliding a finger between the bandage and the skin) but not uncomfortable or painful
- Next, bandage the entire limb (using additional bandage or same bandage if long enough).
- Start distally (furthest from body) and work proximally (closer to body) to reduce oedema / swelling
- Once limb is bandaged, use a splint to restrict any movement of the limb (i.e. can be a stick or pole, or if upper limb use a sling)
- Keep the casualty as still as possible and ideally bring assistance to them rather than attempt to move them. Otherwise transport carefully to the nearest hospital

The do not list:

- **Do not** cut, suck or excise bitten area
- **Do not** wash the bitten area
- **Do not** apply an arterial tourniquet
- **Do not** remove the bandage / splint until casualty has been evaluated at a hospital or medical practice
- **Do not** apply firm pressure to the neck or head
- **Do not** use in a manner that restricts breathing or chest movement

THE SKIN

The skin is a waterproof cover designed to protect the body's cells from damage, drying out, infection and from temperature changes. It is liberally supplied with special nerve endings that transmit sensations of touch, temperature and pain. Sweat glands open onto its surface, and sebaceous glands provide a protective oily substance for the skin.



THE EPIDERMIS LAYER

This is outermost layer of the skin and is especially thick on the palms of the hands and the soles of the feet. There are no blood vessels in the epidermis but its deepest layer is supplied with lymph fluid

DERMIS OR CORIUM LAYER

The dermis is a tough, elastic layer containing white fibrous tissue interlaced with yellow elastic fibres.

Many structures are embedded in the dermis including:

- blood vessels;
- lymphatic capillaries and vessels;
- sensory nerve endings;
- sweat glands and their ducts;
- sebaceous glands;
- the arrectores pilorum (or arrector pili), involuntary muscles are sometimes activated in cold weather to give 'goose bumps'; and
- Hair follicles, hair bulbs and hair roots.

HYPODERMIS OR SUBCUTANEOUS SKIN LAYER

This is the deepest skin layer. It connects or binds the dermis above it to the underlying organs. This layer is mainly composed of loose fibrous connective tissue and fat (adipose) cells interlaced with blood vessels. Females have a hypodermis that is generally about 8% thicker than in males. The functions of the hypodermis include storing of lipids, insulation, cushioning of the body and temperature regulation (Van De Graff and Fox, 1986).

SEBACEOUS GLANDS

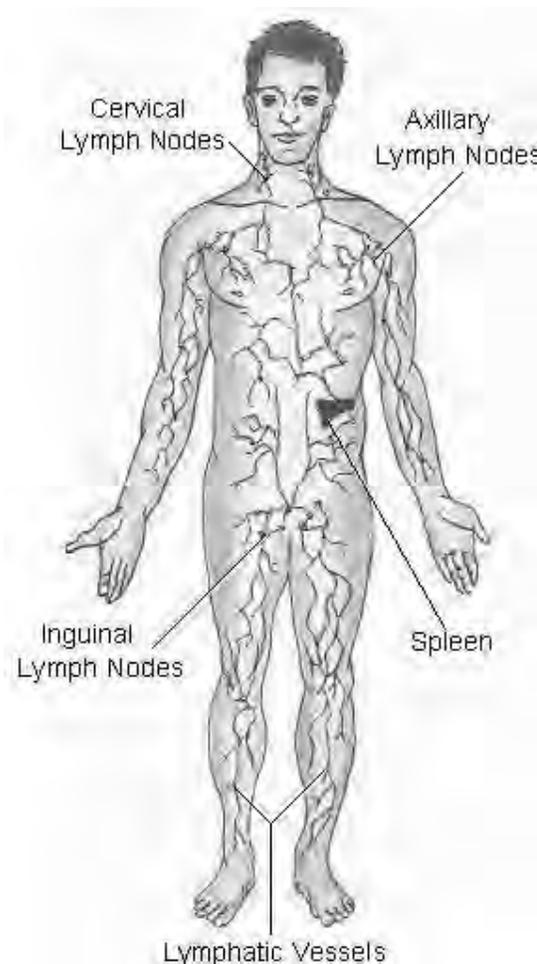
The sebaceous glands are the oil secreting glands that help lubricate the hair shaft and outermost layer of the skin. A certain amount of oil on the skin is necessary to keep it soft and pliable. This natural oil on the skin also helps to give skin its water resistance

THE LYMPHATIC SYSTEM

The lymphatic System is a network of vessels, nodes, ducts and organs that produce and transport lymph fluid. The lymphatic system plays a large part in the following:

- Removing fluids from tissues
- Production of immune cells, such as lymphocytes
- Absorbs fat from the intestines

The lymphatic system does not have a pump like the circulatory system, but rather utilizes muscle movement in order to transport fluids.



The lymphatic system is predominantly responsible also for the transportation of venom from snake bites, which is why it is critical to keep the casualty as still as possible and immobilise the bitten limb. Muscle contractions cause increased lymph movement and hence help spread the venom. An interesting side point is that the lymph nodes become enlarged when the body is fighting an infection. Other causes of lymphadenopathy (increased lymph nodes) include some medications, rheumatoid arthritis, TB, metastatic cancer or even Hep B. Occasionally if your doctor is not sure what is causing enlarged lymph nodes, an ultrasound, or biopsy can assist the diagnosis.

BURNS

To distinguish a minor burn from a serious burn, the first step is to determine the degree and the extent of damage to body tissues. The three classifications of superficial, partial thickness and full thickness burns will help you determine emergency care:

Superficial (First-degree) burn

The least serious burns are those in which only the outer layer of skin (epidermis) is burned. The skin is usually red, with swelling and pain sometimes present. The inner layer of skin hasn't been burned through. Treat a superficial burn as a minor burn unless it involves substantial portions of the hands, feet, face, groin or buttocks, or a major joint.

Partial Thickness (Second-degree) burn

When the first layer of skin has been burned through and the second layer of skin (dermis) also is burned, the injury is termed a partial-thickness burn. Blisters develop and the skin takes on an intensely reddened, splotchy appearance. Partial-thickness burns produce severe pain and swelling.

If the partial-thickness burn is no larger than 2 to 3 inches in diameter, treat it as a minor burn. If the burned area is larger or if the burn is on the hands, feet, face, groin or buttocks, or over a major joint, get medical help immediately.

For minor burns, including partial-thickness burns limited to an area no larger than 2 to 3 inches in diameter, take the following action:

- **Cool the burn.** Hold the burned area under cold running water for at least 5 minutes, or until the pain subsides. If this is impractical, immerse the burn in cold water or cool it with cold compresses. Cooling the burn reduces swelling by conducting heat away from the skin. Don't put ice on the burn.
- **Cover the burn** with a sterile gauze bandage. Don't use fluffy cotton, which may irritate the skin. Wrap the gauze loosely to avoid putting pressure on burned skin. Bandaging keeps air off the burned skin, reduces pain and protects blistered skin.
- **Take an over-the-counter pain reliever.** These include aspirin, ibuprofen (Advil, Motrin, others), naproxen (Aleve) or acetaminophen (Tylenol, others). Never give aspirin to children or teenagers.

Minor burns usually heal without further treatment. They may heal with pigment changes, meaning the healed area may be a different color from the surrounding skin. Watch for signs of infection, such as increased pain, redness, fever, swelling or oozing. If infection develops, seek medical help. Avoid re-injuring or tanning if the burns are less than a year old — doing so may cause more extensive pigmentation changes. Use sunscreen on the area for at least a year.



Caution

Don't use ice. Putting ice directly on a burn can cause frostbite, further damaging your skin. Don't break blisters. Broken blisters are vulnerable to infection.

Full Thickness (Third-degree) burn

The most serious burns are painless and involve all layers of the skin. Fat, muscle and even bone may be affected. Areas may be charred black or appear dry and white. Difficulty inhaling and exhaling, carbon monoxide poisoning or other toxic effects may occur if smoke inhalation accompanies the burn.

For major burns, dial 000 or call for emergency medical assistance. Until an emergency unit arrives, follow these steps:

- **Don't** remove burnt clothing. However, do make sure the victim is no longer in contact with smouldering materials or exposed to smoke or heat.
- **Don't** immerse severe large burns in cold water. Doing so could cause shock.
- **Don't** use ice or iced water to cool burns – these may cause further injury
- **Don't** break blisters or apply ointments, creams or powders other than hydrogel
- **Do** Check for signs of circulation (breathing, coughing or movement). If there is no breathing or other sign of circulation, begin cardiopulmonary resuscitation (CPR).
- **Do** Cover the area of the burn. Use a cool, moist, sterile bandage; clean, moist cloth; or moist towels.

Burns are body tissue injuries caused by contact with dry heat and/or wet heat.

When a burn occurs, the heat destroys the epidermis (top layer of skin). If the burn progresses, the dermis (second layer) is injured or destroyed. Burns break the skin and can cause infection, fluid loss and loss of temperature control. Deep burns can damage muscle, tissue and bone.

Burns are classified by the source, such as heat, cold, chemical, electricity, or radiation. They are also classified by depth.

The more painful a burn, generally the less serious it is

- Beware of symptoms of shock – this can come about very quickly due to sudden fluid losses and the pain involved with the burn
- Due to the increased risk of infection with burns, you should attempt not to touch it with your hand or apply lotions or creams
- Do not try and remove stuck clothing, but rather cut around it
- Generally, any burn larger than a 20 cent piece requires medical attention

Treatment for a Burn:

Always monitor a burn victim for signs and symptoms of shock, notify emergency assistance. Clean and Cool burn area taking appropriate precautions; apply a sterile, non stick dressing.

C

Clean the area. USE WATER ONLY – Do not use lotions, creams or antiseptics on a fresh burn. If there are tiny foreign bodies on the wound site such as gravel, then use water to flush these out.

C

Cool the area. Use cool, running water over the site of the wound for up to 20 minutes.

C

Cover the area with a sterile, non-stick bandage. If this is not available, then use a clean, lint-free material such as a pillow case or sheet

In addition C - Clear Fluids should be drunk slowly to keep fluid levels stable. Remember that serious burns can cause a great loss of body fluids and lead to shock, so it is important to keep the casualty well hydrated.

When to refer for medical aid

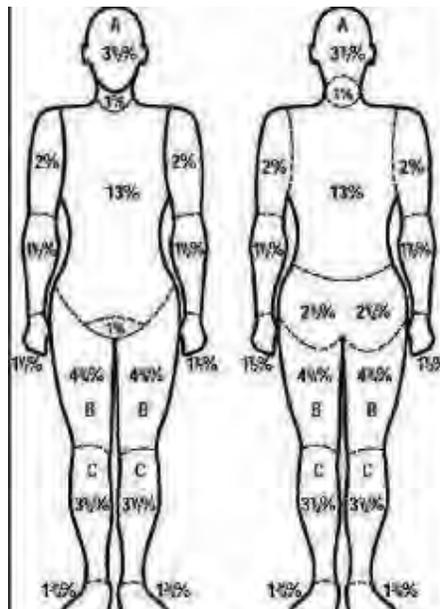
The full extent of a burn can be difficult to tell initially, and hence it can be hard to say whether it is necessary to seek medical aid or just treat using basic first aid. The following require medical aid:

- Superficial burns greater than a 20 cent piece in surface space, or any deep burn
- Any burns involving the face, hands, airways or genitals
- Any burns to children or infants
- Chemical burns and electric burns should be followed up with medical aid
- If you are not sure how serious the burn is, always refer onto medical aid.

REMOVE: - JEWELLERY, BELTS, BUCKLES, CHAINS, ANYTHING THAT HOLDS HEAT (IF SAFE TO DO SO)

RULE OF 9 CHARTS

Medical professionals use charts like these, to assess percentage of body area affected by burns. The chart divides the body surface into areas equating to 9% each. They then use this calculation to determine the total body surface that has been injured. As the proportions of adults and children differ, professionals may use the Lund-Browder chart (below) to more accurately determine the extent of the burn



SPECIFIC TYPES OF BURNS

Electrical burns

Electrical burns are caused by contact with electricity such as electrical devices or lightning strikes. Electrical burns are often associated with other injuries such as cardiac and respiratory system problems. Treatment is to follow DRSABCD – firstly isolate any power supply contacting the casualty without coming into contact with the casualty. If it is unsafe to proceed, then call 000 – do not attempt to move a casualty who is in contact with a live electrical source.

Once the power is isolated, continue DRSABCD. If the casualty is unconscious and not breathing, perform CPR. If the casualty is conscious and stable, then the burn can be treated but the casualty should be referred for medical assessment.

Thermal burns

Thermal burns include flame, scald, inhalation and direct heat contact. Immediately run cool tap water over the burn for at least 20 minutes.

The most potentially dangerous of thermal burns is an inhalation burn. This should be suspected if the casualty has been trapped for a period of time with hot / toxic gas or fumes. The casualty may cough up sputum with black particles, have a hoarse voice and / or breathing difficulties. Symptoms may be delayed, so if an inhalation burn is suspected, call 000 and follow DRSABCD.

Chemical burns

Avoid contact with any chemical burn or contaminated material, such as with proper use of PPE. If the MSDS is available, then refer to this or contact the Poisons Information Centre (131126) for advice.

Immediately run cool tap water over the area for at least 20 minutes and contact 000. For powder chemicals, safely brush the powder from the skin. If the chemical has entered the eye, flush the effected eye thoroughly with water for at least 20 minutes and contact 000.



WOUND MANAGEMENT

There are many different recommendations depending on the type, location and severity of the wound as to what treatment is preferred. In this section, the aim is to provide a general overview into the subject of wound management and to provide basic wound management principles and directions. Any chronic or serious wound should be managed under medical advice.

Basic Tools of Wound Care

A **dressing** refers to the material that is placed directly over the wound. It is preferably sterile to reduce the chance of infection, and a material that will not readily stick to the wound and cause difficulty removing. The main aim is to provide a fairly sterile environment for wound healing to occur, and to assist in reducing the risk of infection.

A **Pad** is an absorbent material placed over the dressing. It assists in controlling bleeding and absorbing any pus or fluids that may seep from the wound.

A **Bandage** is placed over the pad, and can be used for compression to reduce bleeding, and to keep the pad in place.

How to clean a minor wound

- Preparation is important – remove dressing, gauze, tape and bandages from first aid kit & wash your hands thoroughly.
- If there is dirt or other debris in the wound, flush it out using running water, or use saline if available. If there are small foreign bodies such as gravel in the wound, you can also moisten a gauze swab and attempt to wipe them out.
- Wiping a wound should always be done from the centre of the wound towards the outside, and each gauze should be discarded once used. This prevents further dirt or germs from outside being swept into the wound.
- Pat-dry the wound with fresh, dry gauze, and discard the gauze
- Do not put any lotions or creams on the wound, as these can interfere with the body's immune cells and increase the risk of infection.
- Dressing should be applied (sterile, non-stick if available). Padding can also be used if the wound is medium to large. Stick down with tape.
- If the wound is still bleeding, elevate if possible and apply a pressure bandage over the wound and up the limb.
- Remember to dispose of used materials carefully, to avoid the risk of cross-contamination to yourself or others.

Additional Risks

Certain wounds are at a high risk of infection, and require further medical assessment and supervision. These include:

- Animal and human bites
- If the wound was caused by a particularly dirty, or rusty object
- If the casualty has pre-existing conditions that put them in a high risk, such as diabetes or if they are in any way immuno-suppressed (their immune system is compromised), such as with chemotherapy treatment.
- Burn wounds are also at a high risk of infection, especially partial thickness and full thickness burns.

Signs of Infection

If the casualty experiences any of the following signs in their wound, then a medical opinion should be advised as infection is likely

- Redness
- Swelling
- Pus or discharge from the wound
- Pain that is not improving
- Fever, or not feeling well generally



General Self-Care of wounds includes:



- Be careful what drugs you take, for example, anti-inflammatory drugs can hinder the body's immune system.
- Keeping up a proper diet, including vitamin A, C, zinc and copper found in certain fruits and vegetables will assist the body's recovery. Vitamin C is particularly necessary, and supplements may assist if your uptake is unsatisfactory.
- Regular exercise also improves general health and will promote healing.
- Covering the wound generally assists healing. Using a sterile wound covering is one such recommendation.
- Smoking and alcohol can significantly hinder wound healing and should be avoided.
- Diabetes can hinder healing significantly if untreated, and hence should be kept under control as best as possible following medical advice.

References

Asthma Foundation Victoria
Australian Heart Foundation
American Heart Foundation
Australian Resuscitation Council
National Stroke Foundation
American Stroke Foundation
Diabetes Victoria
Australian Medical Association
Worksafe Victoria
Australian Lung Foundation
Diabetes Research Foundation
Brain Injury Association
Epilepsy Society of Australia
Sunsmart Victoria
Burn Foundation of Australia
Anaphylaxis Australia
Royal Children's Hospital Melbourne
ACEQA